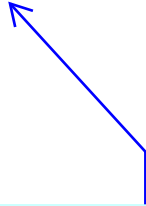




Traffic Impact Study



Please revise to Master
Traffic Impact Study.

Caliber at Constitution

El Paso County, Colorado

Please be sure to update the
Letter of intent with any
changes to this traffic study.

Prepared for:

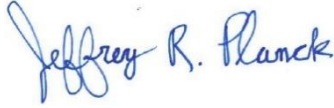
The Garrett Companies, Inc.

Kimley»Horn

T R A F F I C I M P A C T S T U D Y

Traffic Engineer's Statement

The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Jeffrey R. Planck, P.E., PE #53006

October 8, 2021
Date

Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

Mr. Karl Stout
The Garrett Companies, Inc.
1051 Greenwood Springs Boulevard
Suite 101
Greenwood, Indiana 46143

Date

Caliber at Constitution

El Paso County, Colorado

Prepared for
The Garrett Companies, Inc.
1051 Greenwood Springs Boulevard
Suite 101
Greenwood, Indiana 46143

Prepared by
Kimley-Horn and Associates, Inc.
4582 South Ulster Street
Suite 1500
Denver, Colorado 80237
(303) 228-2300

October 2021



This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.

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1.0 EXECUTIVE SUMMARY

This report has been prepared to document the results of the Traffic Study for the Caliber at Constitution development proposed to be located on the southwest corner of Constitution Avenue and Marksheffel Road intersection in El Paso County, Colorado. For the purposes of this analysis, Caliber at Constitution is anticipated to include approximately 226 multifamily housing residences. It is expected that Caliber at Constitution will be completed in the next couple of years; therefore, analysis was conducted for the 2023 and 2045 horizons.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study in accordance with the El Paso County standards and requirements:

Please provide a description of these roadways, identifying the classification of the roadways per ECM Appendix B.8.

- Constitution Avenue and Akers Drive
- Constitution Avenue and Marksheffel Road

In addition, the proposed full movement access along the future extension of Akers Drive and a right-out access along Marksheffel Road were evaluated.


Regional access to the Caliber at Constitution project will be provided by US Highway 24 (US-24), Powers Boulevard (SH-21), and State Highway 94 (SH-94). Primary access will be provided by Constitution Avenue and Marksheffel Road. Direct access will be provided by a full movement access along Akers Drive located approximately 155 feet south of Constitution Avenue (measured edge line to centerline) and a right-out access along Marksheffel Road approximately 400 feet south of Constitution Avenue (measured edge line to center).

Caliber at Constitution is expected to generate approximately 1,230 weekday daily trips, with 76 of these trips occurring during the morning peak hour and 97 of these trips occurring during the afternoon peak hour.

Based on the analysis presented in this report, Kimley-Horn believes Caliber at Constitution will be successfully incorporated into the existing and future roadway network. Analysis of the existing

street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

2023 Recommendations:

- With construction of the Caliber at Constitution development, a south leg is proposed to be constructed at the existing Constitution Avenue and Akers Drive intersection. Based on configuration of the north leg of this intersection providing chevron striping for a future through lane, it is believed that this leg will provide a southbound through lane when the south leg is constructed. Based on El Paso County Engineering Criteria Manual (ECM), a northbound left turn lane will likely be warranted at the Constitution Avenue and Akers Drive intersection; however, a separate northbound right turn lane is not expected to be warranted with buildout future traffic projections. As such, it is recommended that the south leg of the Constitution Avenue and Akers Drive intersection provide a left turn lane and a shared through/right turn lane. It is also recommended that this intersection continue to operate with stop control and a R1-1 “STOP” sign be installed on the northbound approach. To meet El Paso County standards, an eastbound right turn lane should be provided at this intersection. To be consistent with the intersections in the surrounding area, it is recommended that the third eastbound through lane (outside through lane) at this intersection be dropped as a forced right turn lane.  An exclusive right turn lane may be required so as not to impact the through lanes. This will be brought to the attention of the ECM administrator. As this is a rezone, final decisions on these and other proposals will be provided at the subdivision stage.
- With completion of the Caliber at Constitution development, a right-out only access is proposed along the new south leg of Akers Drive approximately 155 feet south of Constitution Avenue (measured edge line to center) and a right-out only access is proposed along Marksheffel Road approximately 400 feet south of Constitution Avenue (measured edge line to center). It is recommended that a R1-1 “STOP” sign be installed on the exiting approach of both accesses. To further identify the proposed access along Marksheffel Road as a right-out only driveway, it is recommended that a R3-2 “NO LEFT TURN” sign be placed underneath the STOP sign. Further, a R6-1(R) “ONE WAY” sign should also be installed within the raised center median of Marksheffel Road. To restrict right turn entrance as well, a R3-1 “NO RIGHT TURN” sign should be installed facing drivers traveling southbound along Marksheffel Road as well as a R5-1 “DO NOT ENTER” sign to be placed behind the STOP sign. The driveway throat at the proposed right-out only access should be oriented to further restrict entering movements.

Deviations Required

Please indicate that these deviations will be provided at the subdivision stage (i.e. preliminary plan/final plat) for the ECM administrators consideration.

FYI: Please be aware that submittal of deviation requests does not imply that they will be approved by the ECM administrator.

- A deviation will be provided to request full movement access from a future south leg of Akers Drive at Constitution Avenue. The future south leg of Akers Drive along Constitution Avenue will be located approximately 1,050 feet west of Marksheffel Road (measured edge line to center), and approximately 825 feet east of Hannah Ridge Drive. According to the El Paso Engineering Criteria Manual (ECM), spacing of roads accessing an urban principal arterial that will result in a full movement intersection shall be planned at one-half mile. However, as stated in the ECM, one parcel access shall be granted to each existing lot, if it does not create safety or operational problems. The intersection of Constitution Avenue and Akers Drive is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that a south leg of Akers Drive at Constitution Avenue should be granted to allow for one full movement access to the existing lot.

Please include the ECM section (ECM 2.2.5.B)
- A deviation will be provided in support of allowing a right-out only access along Marksheffel Road. The proposed right-out access along Marksheffel Road will be located approximately 400 feet south of Constitution Avenue (measured edge line to center). The proposed right-out only access along Marksheffel Road is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that this access should be granted to only allow right-turn exiting movements.

Please include the ECM section (ECM 2.2.5.D)
- The access along the new south leg of Akers Drive will be approximately 155 feet south of Constitution Avenue (measured edge line to center). According to the El Paso County Engineering Criteria Manual, spacing of intersections along urban local roadways from an arterial roadway should be 330 feet from the right-of-way line of the arterial to the centerline of the access roadway. Therefore, the proposed access along the new south leg of Akers Drive does not meet ECM standards. The access along Akers Drive is expected to meet operational, vehicle queue, and sight distance standards. However, the required northbound left turn lane at the Constitution Avenue and Akers Drive intersection will extend beyond the access to the proposed development. A deviation will need to be provided to request for this proposed access to remain at the proposed location.
- A southbound left turn lane is warranted at Akers Drive Access based on projected 2023 total traffic volumes being 59 northbound left turns during the peak hour and the threshold being

FYI: Staff is not inclined to allow removal of a warranted turn lane although this will be reviewed by the ECM administrator at the subdivision stage when the deviation request is submitted.

25 vehicles per hour. However, there are no traffic volumes conflicting with the turning vehicles and there are not any vehicle delays at this access intersection. Therefore, it is recommended that the left turn lane requirement be waived. Of note, according to Colorado Department of Transportation (CDOT) standards, a left turn lane may be dropped if the opposing traffic is predicted to be below 100 directional hourly volumes. There are not expected to be any opposing traffic volumes at buildout and 49 opposing traffic volumes during the peak hour in the long-term future with the potential buildout of the surrounding parcels. A deviation will be requested to allow for this access to operate without a designated southbound left turn lane.

2045 Recommendations:

- A traffic signal is warranted with 2045 traffic volume projections at the intersection of Constitution Avenue and Akers Drive. It is recommended that El Paso County monitor traffic volumes at this intersection in the future to determine if signalization is the appropriate control. It should be noted the north leg of this intersection is the controlling approach that triggers the need for signal control and project traffic is only expected to utilize the south leg of this intersection.

General Recommendations

- Any on-site or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the El Paso County and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of the Traffic Study for the Caliber at Constitution development proposed to be located on the southwest corner of Constitution Avenue and Marksheffel Road intersection in El Paso County, Colorado. A vicinity map illustrating the Caliber at Constitution development is shown in **Figure 1**. For the purposes of this analysis, the project is anticipated to include approximately 226 multifamily housing units. A conceptual land use plan is attached in **Appendix G**. It is expected that Caliber at Constitution will be completed in the next two years; therefore, analysis was conducted for the 2023 and 2045 horizons.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study in accordance with the El Paso County standards and requirements:

- Constitution Avenue and Akers Drive
- Constitution Avenue and Marksheffel Road

In addition, the proposed full movement access along the future extension of Akers Drive and a right-out access along Marksheffel Road were evaluated.

Regional access to the Caliber at Constitution project will be provided by US Highway 24 (US-24), Powers Boulevard (SH-21), and State Highway 94 (SH-94). Primary access will be provided by Constitution Avenue and Marksheffel Road. Direct access will be provided by a full movement access along Akers Drive located approximately 155 feet south of Constitution Avenue (measured edge line to centerline) and a right-out access along Marksheffel Road approximately 400 feet south of Constitution Avenue (measured edge line to center).



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
VICINITY MAP

FIGURE 1

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area

The existing site is comprised of vacant land. Industrial uses and some residential uses are located north and south of the site. A retail center and residential uses are located to the east while residential developments are located to the west of the project. The extended area consists primarily of single-family residences with undeveloped land to the east.

3.2 Existing Roadway Network

Constitution Avenue extends eastbound and westbound with two through lanes in each direction with a posted speed limit of 50 miles per hour. Marksheffel Road extends in the north-south direction with two through lanes in each direction and has a posted speed limit of 50 miles per hour.

The unsignalized T-intersection of Constitution Avenue and Akers Drive (#1) operates with stop control on the southbound approach. The eastbound approach of this intersection consists of a left turn lane and three through lanes while the westbound approach provides a left turn lane, two through lanes, and a right turn lane. The southbound approach includes a left turn lane and a channelized right turn lane operating with free movements. An aerial photo of the existing intersection configuration is below (north is up - typical).



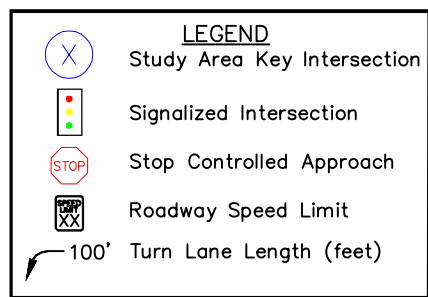
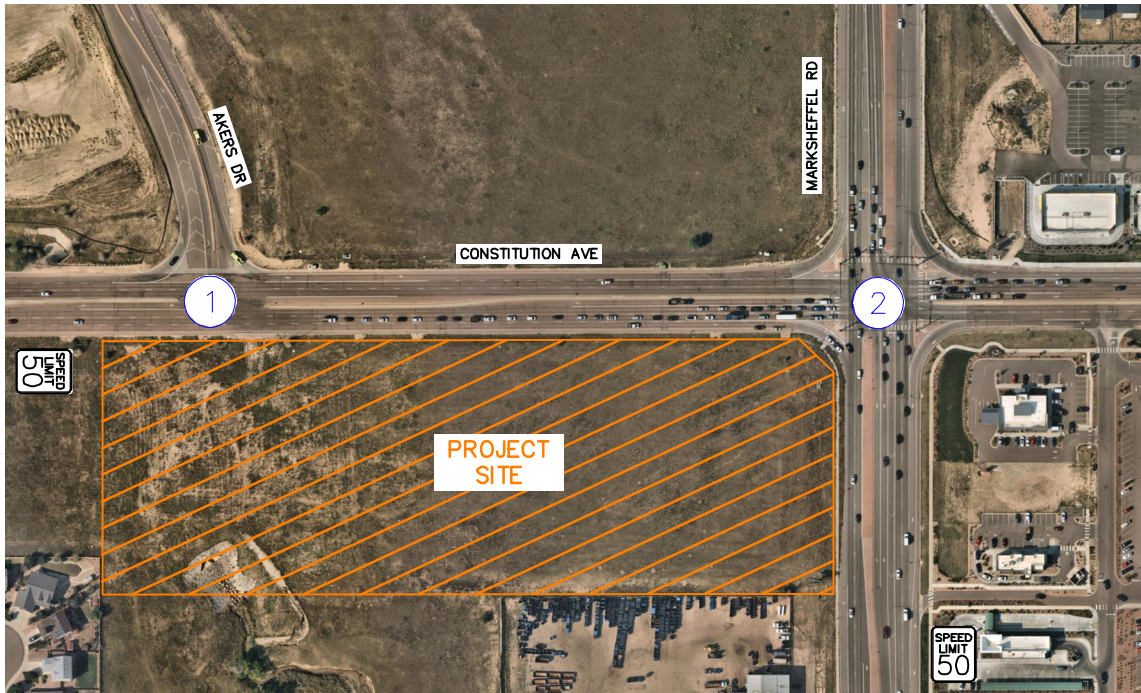
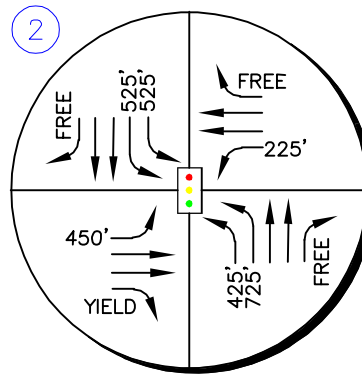
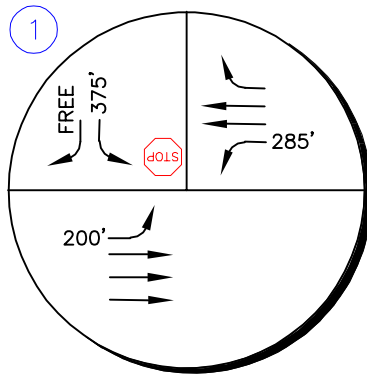
Constitution Avenue and Akers Drive (#1)

The signalized intersection of Constitution Avenue and Marksheffel Road (#2) operates with protected left turn phasing on the northbound and southbound approaches and protective-permissive left turn phasing on the eastbound and westbound approaches. The eastbound and westbound approaches of this intersection consist of a left turn lane, two through lanes, and a right turn lane. The eastbound right turn lane operates with yield control while the westbound right turn lane operates as a free movement. The northbound and southbound approaches consist of dual left turn lanes, two through lanes, and a free right turn lane. An aerial photo of the existing intersection configuration is below.



Constitution Avenue and Marksheffel Road (#2)

The intersection lane configuration and control for the study area intersections are shown in **Figure 2**.



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
EXISTING GEOMETRY AND CONTROL

FIGURE 2

This appears low. Please use the El Paso County MTCP to calculate the growth rate. Per the recently approved Urban collection subdivision traffic study (<https://epcdevplanreview.com/Public/ProjectDetails/166845>) immediately to the west of this site, a 1.3 growth factor was identified from the MTCP and 1.5 growth factor was used to be conservative.

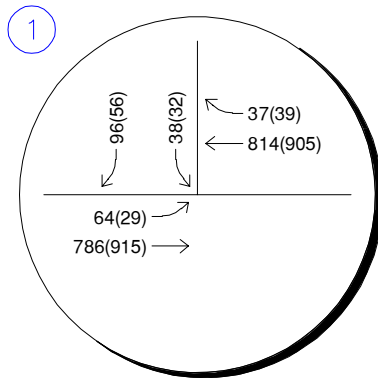
3.3 Existing

Existing turning movement counts were conducted at the study intersections on Tuesday, September 21, 2021 during the morning and afternoon peak hours. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. The existing intersection traffic volumes are shown in **Figure 3** with count sheets provided in **Appendix A**.

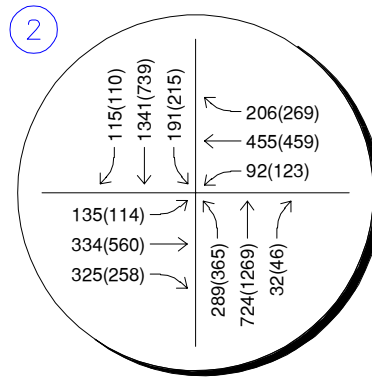
3.4 Unspecified Development Traffic Growth

According to traffic projections from the Pikes Peak Area Council of Governments (PPACOG) traffic model, the area surrounding the site is expected to have an average 25-year growth factor of 1.17. This growth factor equates to an annual growth rate of 0.62 percent. Future traffic volume projections and growth rate calculations are provided in **Appendix B**. Therefore, a 0.62 percent annual growth rate was used to calculate future traffic volumes at the study area key intersections. This annual growth rate was used to estimate short-term 2023 and long-term 2045 traffic volume projections at the key intersections. In addition, traffic volume potential from the undeveloped parcels surrounding the future Akers Drive south of Constitution Avenue was conservatively included as background traffic in 2045. In addition, it is believed that Akers Drive will eventually provide a connection with Talus Ridge Drive in the long-term future; therefore, some traffic was rerouted to the south leg of Akers Drive at Constitution Avenue due to this future connection. The calculated background traffic volumes for 2023 and 2045 are shown in **Figure 4** and **Figure 5**, respectively.

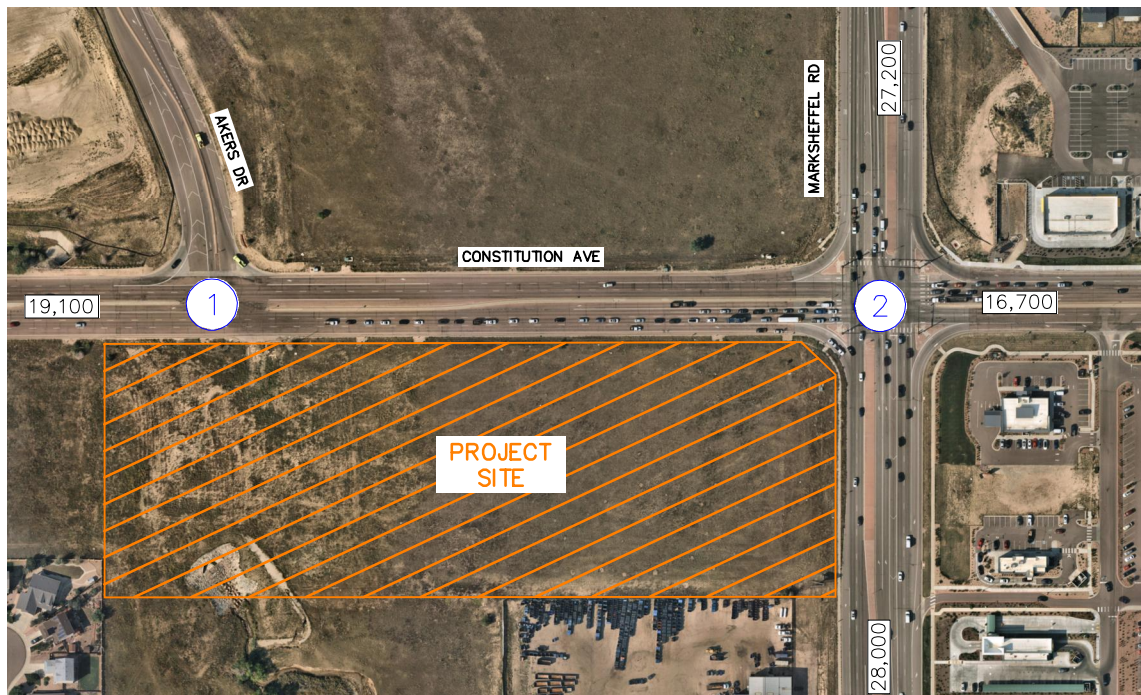
Where/How did these volumes come from? Growth rate table in appendix only shows 2015 & 2040.





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7:15 to 8:15AM (4:15 to 5:15PM)



Tuesday, September 21, 2021
7:00 to 8:00AM (4:30 to 5:30PM)

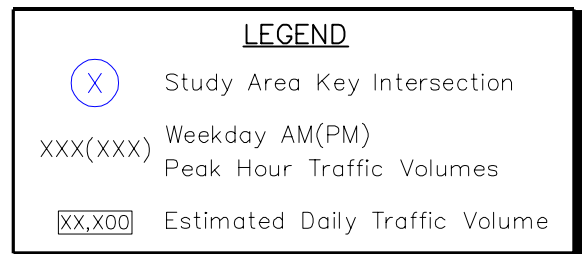
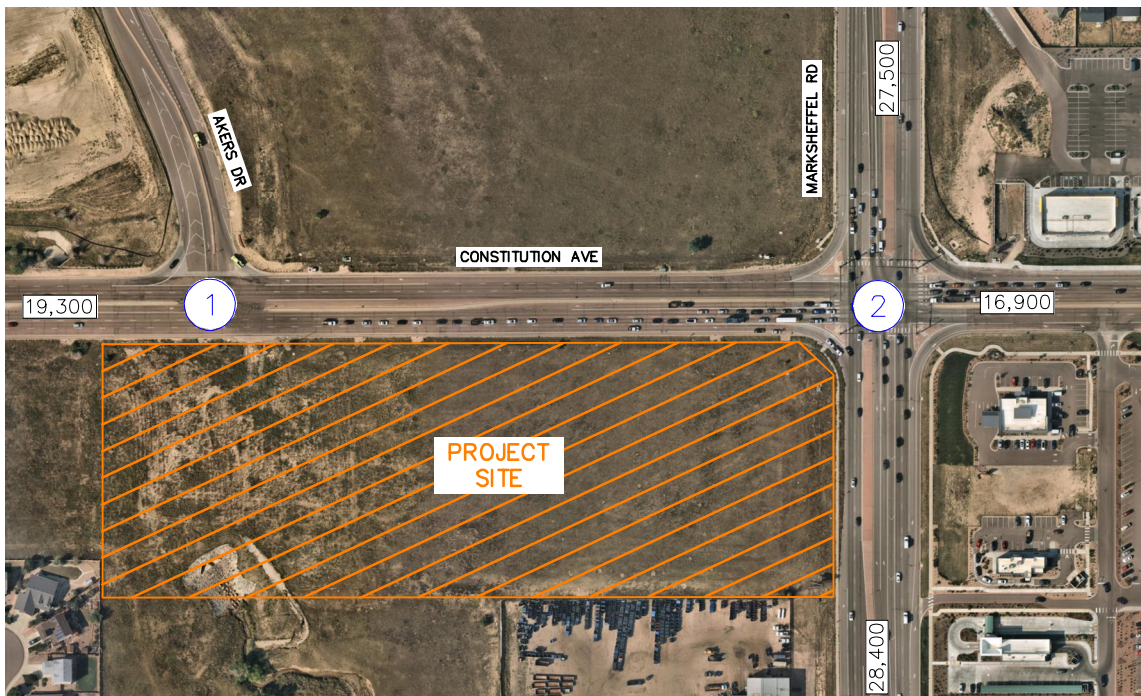
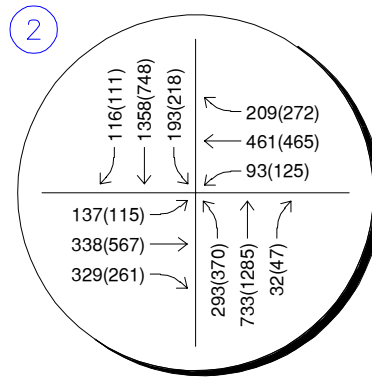
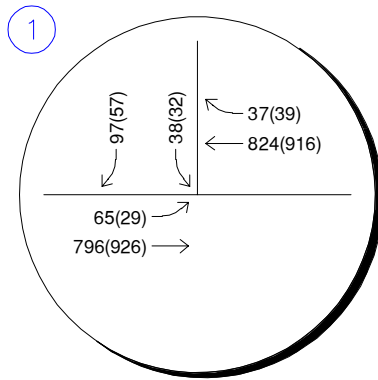


LEGEND

-  Study Area Key Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
-  Estimated Daily Traffic Volume

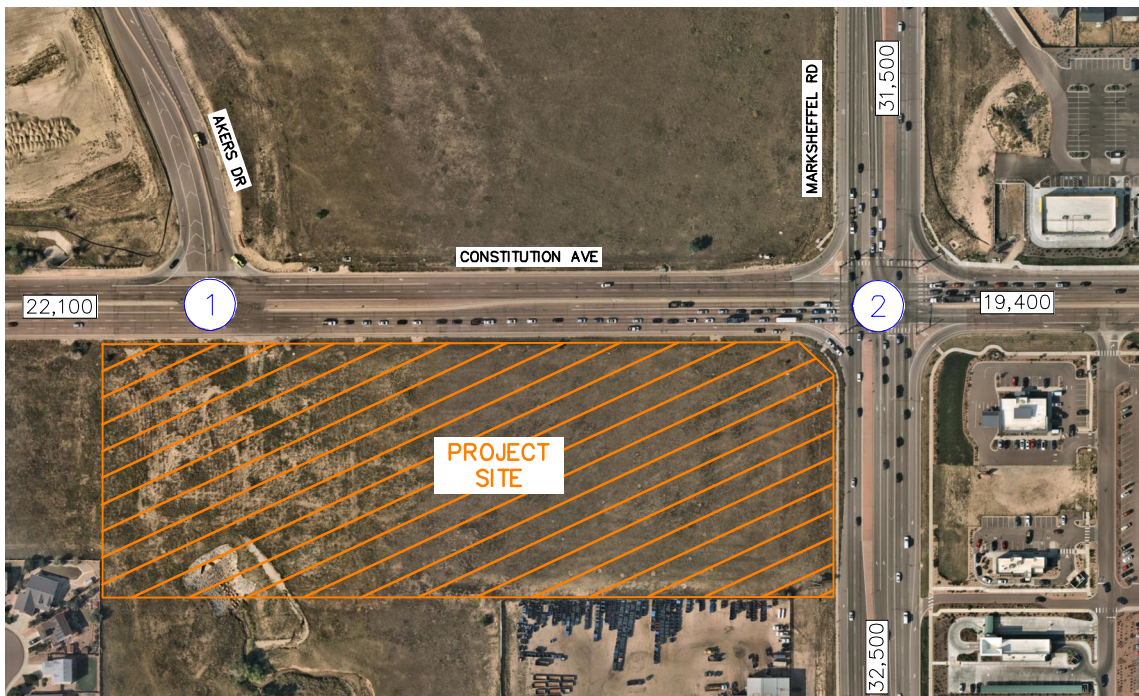
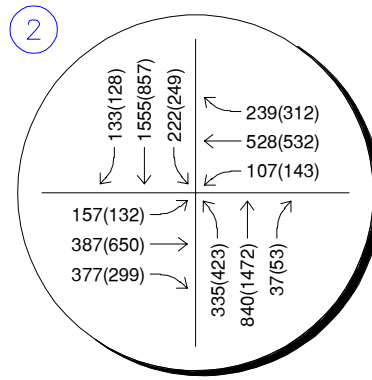
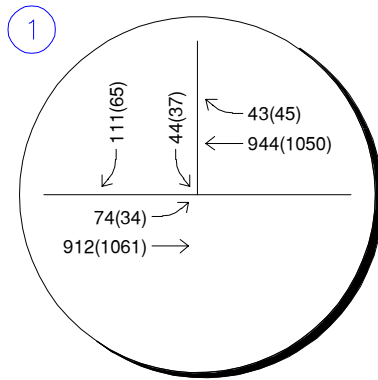
CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2021 EXISTING TRAFFIC VOLUMES

FIGURE 3



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2023 BACKGROUND TRAFFIC VOLUMES

FIGURE 4



LEGEND

ⓧ Study Area Key Intersection

XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes

XX,X00 Estimated Daily Traffic Volume

CALIBER AT CONSTITUTION
 EL PASO COUNTY, COLORADO
 2045 BACKGROUND TRAFFIC VOLUMES

FIGURE 5

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report fitted curve equations that apply to Mid-Rise Multifamily Housing (ITE Land Use Code 221), for traffic associated with the development.

Caliber at Constitution is expected to generate approximately 1,230 weekday daily trips, with 76 of these trips occurring during the morning peak hour and 97 of these trips occurring during the afternoon peak hour. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10th Edition – Volume 1: User's Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the Caliber at Constitution. The trip generation worksheets are included in **Appendix C**.

Table 1 – Caliber at Constitution Traffic Generation

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Mid-Rise Multifamily Housing (ITE 221) – 226 Dwelling Units	1,230	20	56	76	59	38	97

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

Please elaborate on your reasoning for the distributions shown.

4.2 Trip Distribution

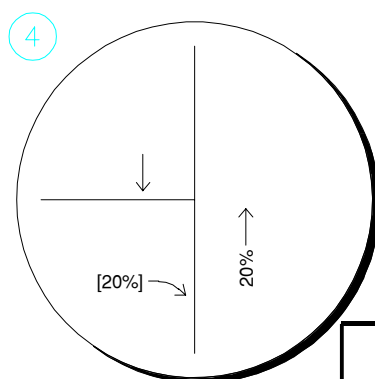
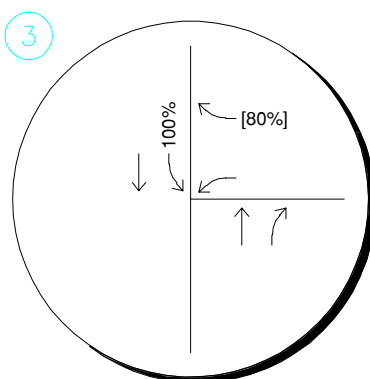
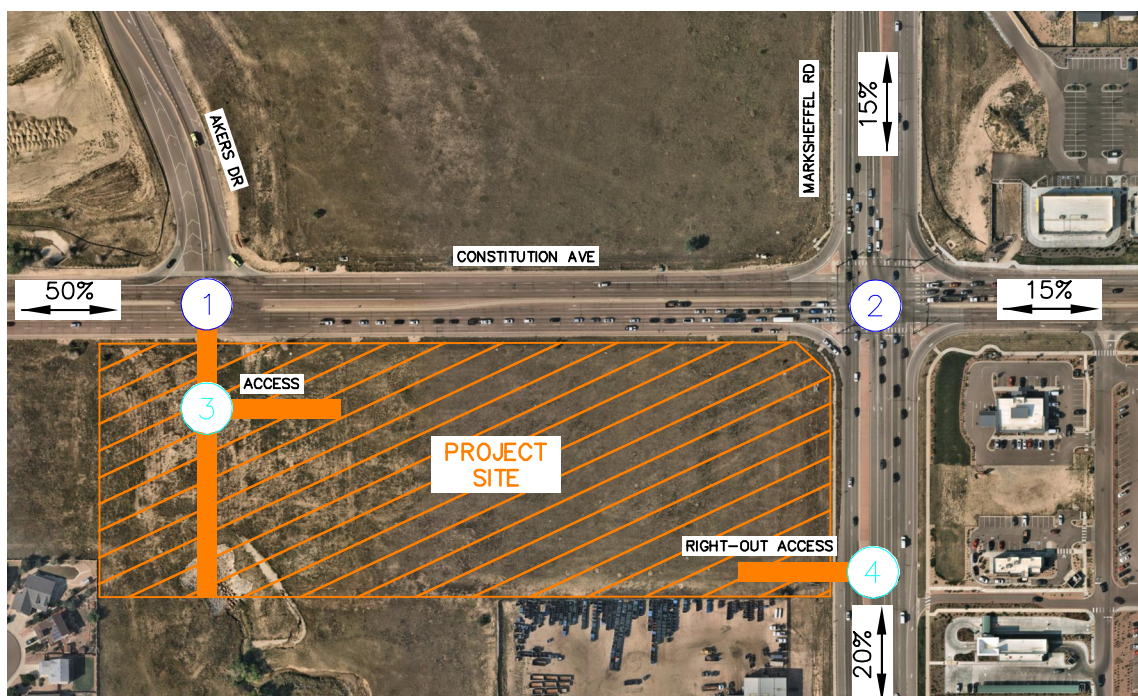
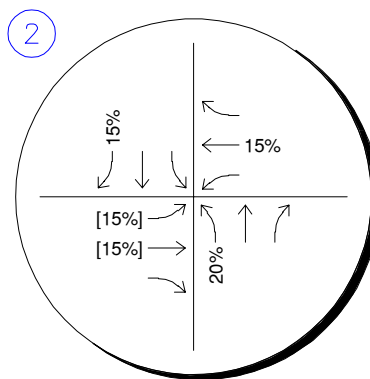
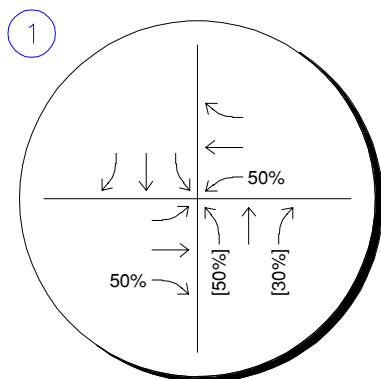
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 6**.

4.3 Traffic Assignment

Caliber at Constitution traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 7**.

4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2023 buildout horizon and long-term 2045 twenty-year planning horizon. These total traffic volumes for the study area are illustrated for the 2023 and 2045 horizon years in **Figures 8 and 9**, respectively.

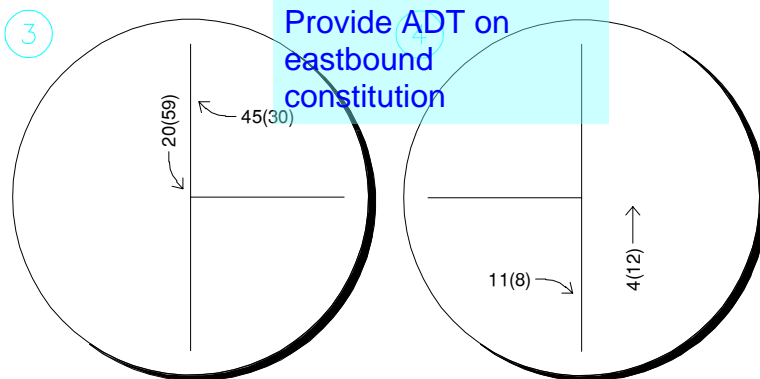
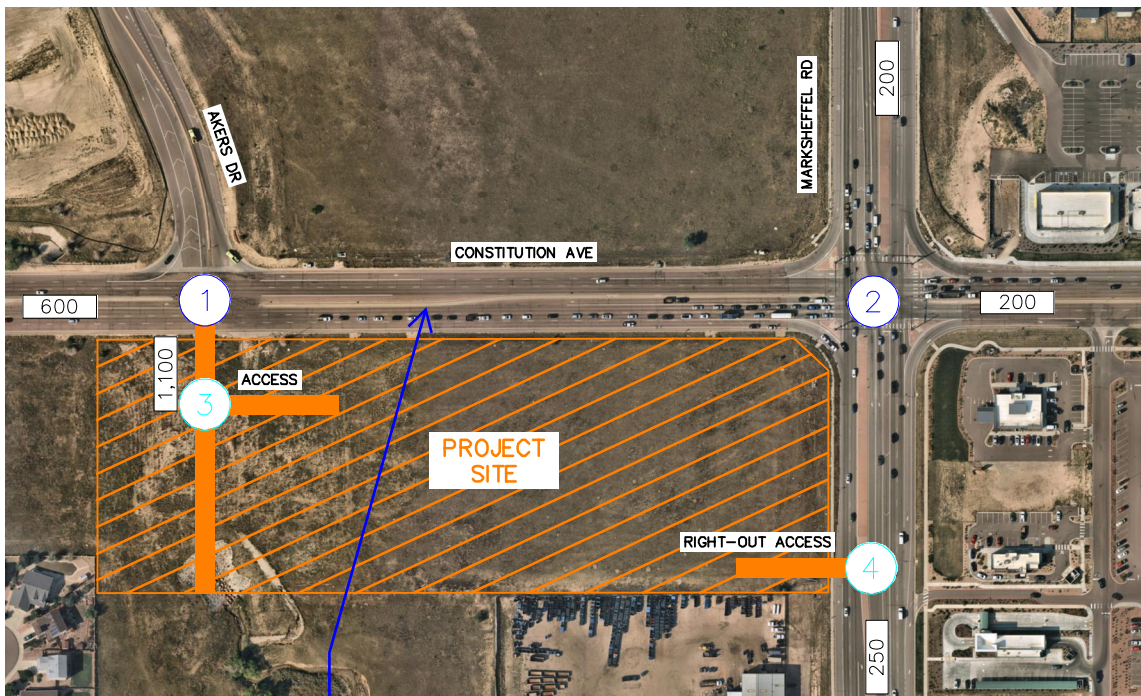
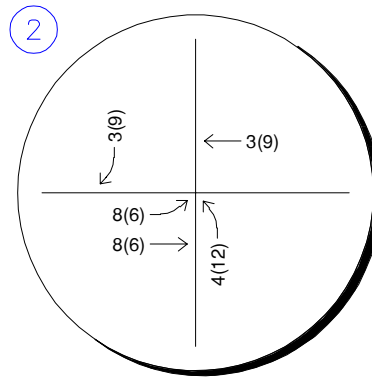
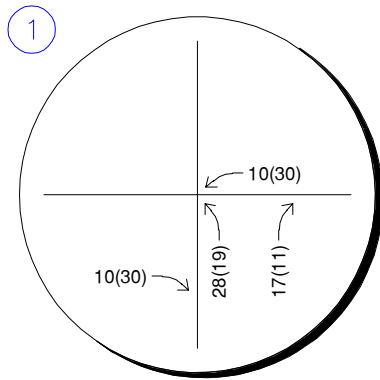


Where did distribution ratios come from?

LEGEND	
①	Study Area Key Intersection
③	Project Access Intersection
XX%	External Trip Distribution Percentage
XX%[XX%]	Entering[Exiting] Trip Distribution Percentage

CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
PROJECT TRIP DISTRIBUTION

FIGURE 6

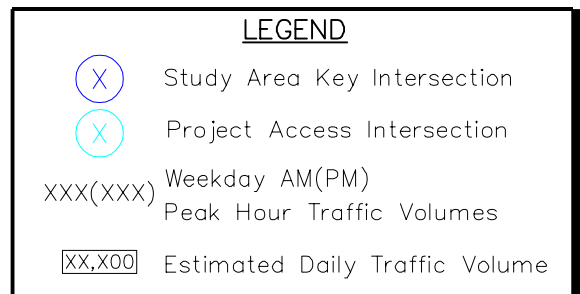
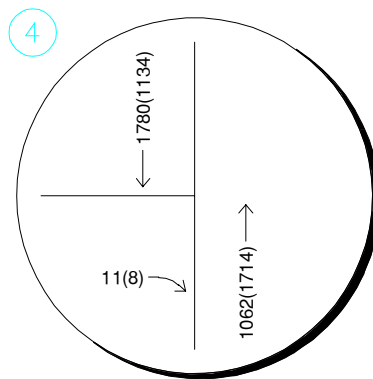
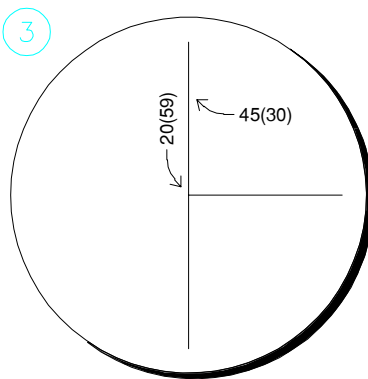
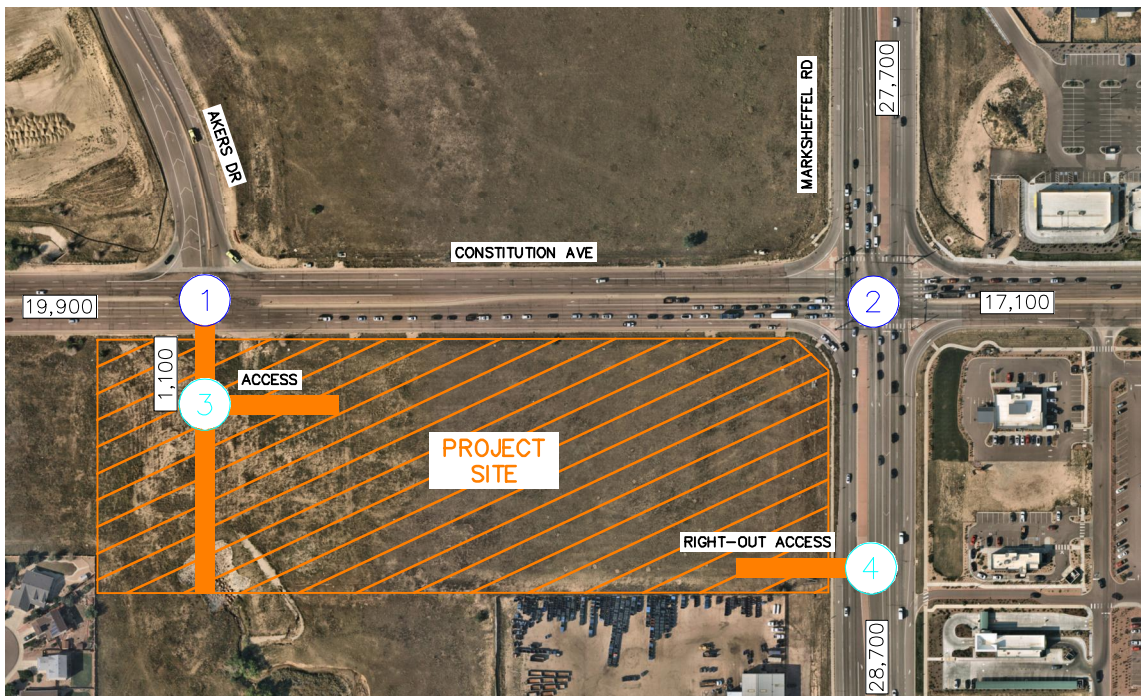
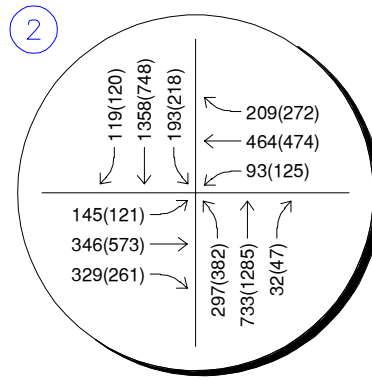
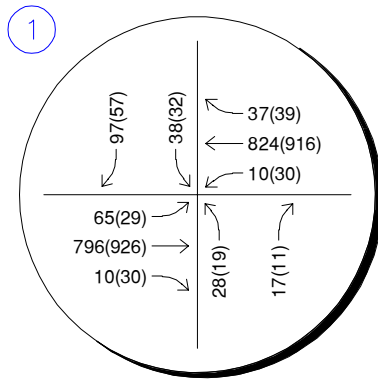


Provide ADT on
 eastbound
 constitution

LEGEND	
ⓧ	Study Area Key Intersection
ⓧ	Project Access Intersection
xxx(xxx)	Weekday AM(PM) Peak Hour Traffic Volumes
xx,x00	Estimated Daily Traffic Volume

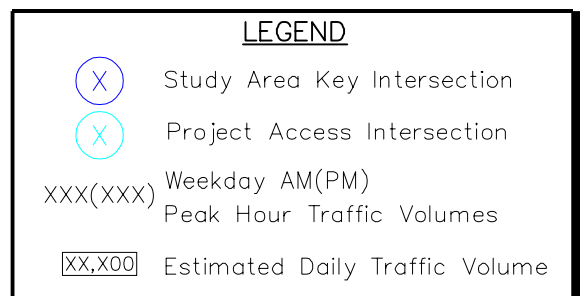
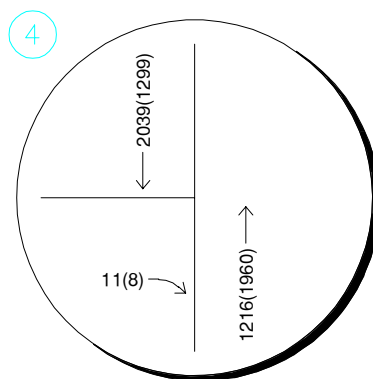
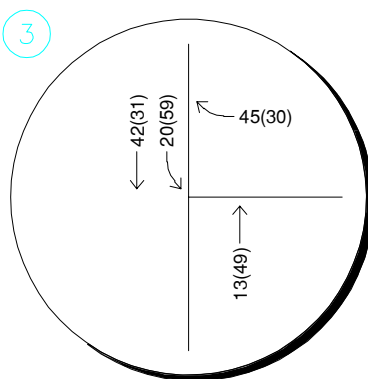
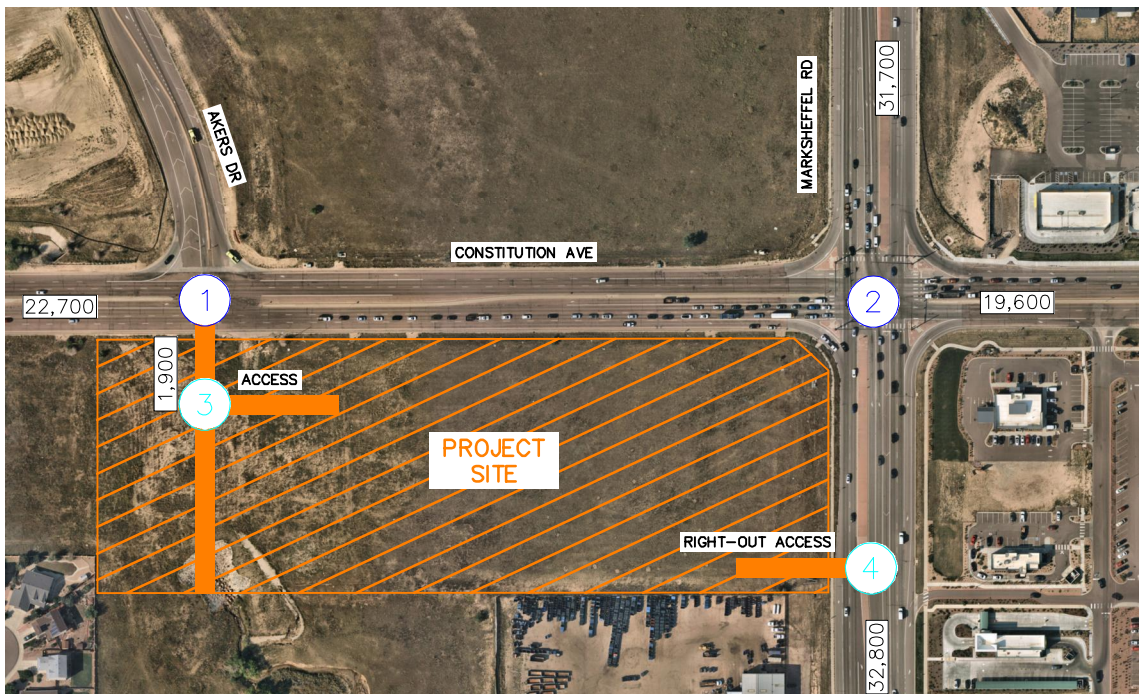
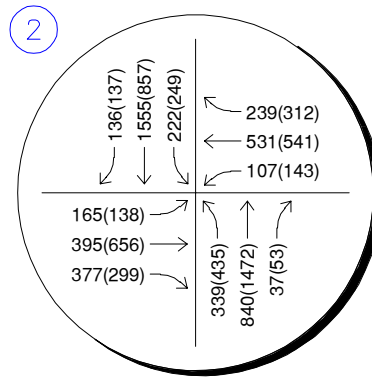
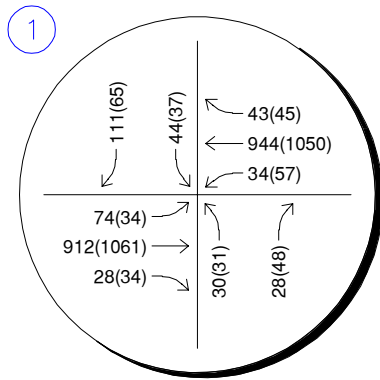
CALIBER AT CONSTITUTION
 EL PASO COUNTY, COLORADO
 PROJECT TRAFFIC ASSIGNMENT

FIGURE 7



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2023 TOTAL TRAFFIC VOLUMES

FIGURE 8



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2045 TOTAL TRAFFIC VOLUMES

FIGURE 9

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2023 and 2045 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual (HCM)*².

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). Based on El Paso County standards, the threshold for acceptable LOS is not less than LOS D during peak hours. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Sixth Edition, Transportation Research Board, 2016.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the intersection as a whole. LOS for signalized, roundabout, and four-way stop controlled intersections are defined for each approach and for the overall intersection.

² Transportation Research Board, *Highway Capacity Manual*, Sixth Edition, Washington DC, 2016.

5.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix D**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 2**. Existing peak hour factors were utilized in the existing and 2023 horizon analysis years while the HCM urban standard of 0.92 was used for the long-term 2045 horizon analysis. The signalized intersection analysis utilizes the observed cycle lengths with optimized phasing and timing. Based on increased national attention given to establishing appropriate yellow and all-red clearance intervals to improve intersection safety, these have been calculated and are applied for approaches at the signalized intersections. The increase in yellow and all red time sacrifices intersection capacity for improved safety. Synchro traffic analysis software was used to analyze the signalized, and unsignalized key intersections for HCM level of service.

Constitution Avenue & Akers Drive (#1)

The unsignalized T-intersection of Constitution Avenue and Akers Drive (#1) operates with stop control on the southbound approach. The intersection movements operate acceptably at LOS C or better during both peak hours under existing conditions. With construction of the Caliber at Constitution development, a south leg is proposed to be constructed at this intersection to align with Akers Drive to the north. Based on configuration of the north leg of this intersection providing chevron striping for a future through lane, it is believed that this leg will provide a southbound through lane when the south leg is constructed. Based on El Paso County Engineering Criteria Manual (ECM), a northbound left turn lane will likely be warranted at this intersection; however, a separate northbound right turn lane is not expected to be warranted with buildout future traffic projections. As such, it is recommended that the south leg of the Constitution Avenue and Akers Drive intersection provide a left turn lane and a shared through/right turn lane. It is also recommended that this intersection continue to operate with stop control and a R1-1 “STOP” sign be installed on the northbound approach. To meet El Paso County standards, an eastbound right turn lane should be provided at this intersection. To be consistent with the intersections in the surrounding area, it is recommended that the third eastbound through lane (outside through lane) at this intersection be dropped as a forced right turn lane. With these improvements and project traffic, all movements at this intersection are anticipated to continue operating at an acceptable LOS D or better during the peak hours in 2023.

What about the other signal warrants? Do those warrants also indicate that a signal is needed? Please address.

Since there are currently not any known plans to develop the surrounding parcels on the south side of Constitution Avenue, evaluation scenarios with and without the trip generation potential of the surrounding parcels was provided in 2045 to better understand the impacts if the surrounding land is developed. With future traffic projections in 2045 without the development of the surrounding parcels south of Constitution Avenue, the northbound and southbound left turn movements at this intersection are expected to operate with LOS E during the peak hours in 2045. With future traffic projections in 2045 including the development of the surrounding parcels south of Constitution Avenue and Akers Drive connecting to Talus Ridge Drive, the southbound left turn movement at this intersection may operate with LOS F during the afternoon peak hour in 2045. To meet El Paso County standards for acceptable intersection operations, a four-hour vehicular volume signal warrant was completed at this intersection and it was found that a signal is warranted in 2045 (warrant Figure attached in **Appendix E**). It should be noted that the signal warrant was met due to traffic on the north leg of the intersection and not project traffic. With signalization, this intersection is anticipated to operate acceptably in 2045 with project traffic. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – Constitution Avenue & Akers Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Existing				
Eastbound Left	10.7	B	10.7	B
Southbound Left	23.9	C	23.3	C
Southbound Right	0.0	A	0.0	A
2023 Background				
Eastbound Left	10.7	B	10.7	B
Southbound Left	24.3	C	23.6	C
Southbound Right	0.0	A	0.0	A
2023 Background Plus Project #				
Northbound Left	32.7	D	31.6	D
Northbound Through/Right	11.7	B	12.2	B
Eastbound Left	10.7	B	10.7	B
Westbound Left	9.9	A	10.8	B
Southbound Left	34.1	D	34.7	D
Southbound Through	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A
2045 Background				
Eastbound Left	11.4	B	11.6	B
Southbound Left	28.4	D	29.0	D
Southbound Right	0.0	A	0.0	A
2045 Background w/ Adjacent Development Parcels #				
Northbound Left	32.5	D	36.8	E
	12.1	B	13.6	B
	11.4	B	11.6	B

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Northbound Through/Right	10.5	B	11.3	B
Eastbound Left	45.2	E	47.4	E
Westbound Left	0.0	A	0.0	A
Southbound Left	0.0	A	0.0	A
Southbound Through				
Southbound Right				
2045 Total Traffic #				
Northbound Left	38.6	E	39.4	E
Northbound Through/Right	12.2	B	13.0	B
Eastbound Left	11.4	B	11.6	B
Westbound Left	10.3	A	11.5	B
Southbound Left	42.7	E	46.4	E
Southbound Through	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A
2045 Total Traffic w/ Adjacent Development Parcels #				
Northbound Left	41.4	E	47.3	E
Northbound Through/Right	12.4	B	13.8	B
Eastbound Left	11.4	B	11.6	B
Westbound Left	10.6	B	11.9	B
Southbound Left	48.5	E	55.5	F
Southbound Through	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A
2045 Total Traffic ##	11.4	B	9.2	A
2045 Total Traffic w/ Adjacent Development Parcels ##	19.7	B	10.0	A

= Stop controlled south leg, southbound through lane, northbound left turn lane, northbound right turn/through lane, two eastbound through lanes, and an eastbound right turn lane

= # + Signalized

Constitution Avenue & Marksheffel Road (#2)

The signalized intersection of Constitution Avenue and Marksheffel Road (#2) operates with protected left turn phasing on the northbound and southbound approaches and protective-permissive left turn phasing on the eastbound and westbound approaches. The intersection operates acceptably at LOS D during both peak hours under existing conditions. With project traffic and the existing lane configurations and control, this intersection is anticipated to continue operating at an acceptable level of service during the peak hours throughout the 2045 horizon. **Table 4** provides the results of the LOS analysis conducted at this intersection.

Table 4 – Constitution Avenue & Marksheffel Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2021 Existing	41.2	D	43.2	D
2023 Background	41.8	D	43.7	D
2023 Background Plus Project	43.4	D	43.8	D
2045 Background	43.6	D	54.6	D
2045 Background Plus Project	43.9	D	55.0	D

Project Accesses

With completion of the Caliber at Constitution project, a full movement access is proposed along the new south leg of Akers Drive approximately 155 feet south of Constitution Avenue (measured edge line to center) and a right-out only access is proposed along Marksheffel Road approximately 400 feet south of Constitution Avenue (measured edge line to center). It is recommended that a R1-1 "STOP" sign be installed on the exiting approach of both accesses. To further identify the proposed access along Marksheffel Road as a right-out only driveway, it is recommended that a R3-2 "NO LEFT TURN" sign be placed underneath the STOP sign. Further, a R6-1(R) "ONE WAY" sign should also be installed within the raised center median of Marksheffel Road. To restrict right turn entrance as well, a R3-1 "NO RIGHT TURN" sign should be installed facing drivers traveling southbound along Marksheffel Road as well as a R5-1 "DO NOT ENTER" sign to be placed behind the STOP sign. The driveway throat at the proposed right-out only access should be oriented to further restrict entering movements. **Table 5** provides the results of the level of service for these project street accesses. As shown in the table, the project access intersections are anticipated to have all movements operating with acceptable LOS C or better during the peak hours in both the buildout year 2023 and the 2045 long term horizons. It should be noted that the access along Akers Drive will not have any conflicting movements in the short-term; therefore, vehicle delays are not reported at this access intersection.

Table 5 – Project Access Level of Service Results

Intersection	2023 Total Traffic				2045 Total Traffic			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Akers Dr Access (#3)								
Westbound Approach	0.0	A	0.0	A	8.5	A	8.7	A
Southbound Left	0.0	A	0.0	A	7.3	A	7.4	A
Marksheffel Rd Access (#4)								
Eastbound Approach	16.7	C	11.0	B	22.6	C	11.9	B

Please be sure to update your analysis per comments provided by staff in the meeting on 12/2/2021 such as (but not limited to) analyzing for a roundabout and moving the proposed access further to the south.

Please account for the development of the parcels to the south in your anticipated classification of this roadway. They are currently zoned industrial which would lead to a large amount of truck traffic on Akers Drive. Additionally these may be rezoned to high dense residential which may add a large amount of trips to Akers.

The El Paso County ECM was used to determine if left and right turn lanes are warranted along Constitution Avenue and Marksheffel Road. El Paso County classifies Constitution Avenue and Marksheffel Road as Principal Arterial roadways. According to El Paso County ECM guidelines for Principal Arterials, a left turn lane is required for any access with a projected peak hour left turning volume of 10 vehicles per hour or greater, a right turn lane is required for any access with a projected peak hour right turning volume of 25 vehicles per hour or greater, and a right turn acceleration lane is required for any access with a projected peak hour right turning volume of 50 vehicles per hour or greater when the posted speed on the roadway is greater than 40 miles per hour.

It is anticipated that the south leg of Akers Drive will be classified as local roadway. According to El Paso County ECM guidelines for Minor Arterials and Lower Classifications, a left turn lane is required for any access with a projected peak hour left turning volume of 25 vehicles per hour or greater, a right turn lane is required for any access with a projected peak hour right turning volume of 50 vehicles per hour or greater, and a right turn acceleration lane is generally not required.

fix typo

Constitution Avenue and Akers Drive:

- A westbound left turn lane exists and is warranted at this intersection based on projected 2023 total traffic volumes being 30 westbound left turns during the peak hour and the threshold being 10 vehicles per hour. The existing westbound left turn lane is 28525 feet with a 200-foot taper. Based on the 50-mile per hour speed limit, the deceleration lane length is 235 feet, plus a 200-foot taper. Additionally, 50 feet of storage is required by El Paso County due to the peak hour volume. Therefore, this left turn lane should provide a length of 285 feet plus a 200-foot taper which is the current length of this turn lane.
- A northbound left turn lane is warranted at this intersection based on projected 2023 total traffic volumes being 28 northbound left turns during the peak hour and the threshold being 25 vehicles per hour. Based on an anticipated 30-mile per hour speed limit, the deceleration lane length is 115 feet, plus a 120-foot taper. Additionally, 50 feet of storage is required by El Paso County due to the peak hour volume. Therefore, this left turn lane is recommended to provide a length of 165 feet plus a 120-foot taper. It should be noted that this turn lane will extend beyond the access to the proposed development.

Please revise per comment above regarding the classification of Akers

- An eastbound right turn lane **is** warranted at this intersection based on projected 2023 total traffic volumes being 30 eastbound right turns during the peak hour and the threshold being 25 vehicles per hour. Based on the 50-mile per hour speed limit, the deceleration lane length is 235 feet, plus a 200-foot taper. Additionally, 50 feet of storage is required by El Paso County due to the peak hour volume. Therefore, this right turn lane should provide a length of 285 feet plus a 200-foot taper. However, to be consistent with the intersections in the surrounding area, it is recommended that the third eastbound through lane (outside through lane) at this intersection be dropped as a forced right turn lane.
- A northbound right turn lane **is not** warranted at this intersection based on projected 2023 total traffic volumes being 17 northbound right turns during the peak hour and the threshold being 25 vehicles per hour.
- A northbound right to eastbound acceleration lane **is not** warranted at this intersection based on projected 2023 total traffic volumes being 17 northbound right turns during the peak hour and the threshold being 50 vehicles per hour.

Akers Drive Access:

- A southbound left turn lane **is** warranted at Akers Drive Access based on projected 2023 total traffic volumes being 59 northbound left turns during the peak hour and the threshold being 25 vehicles per hour. However, there are no traffic volumes conflicting with the turning vehicles and there are not any vehicle delays at this access intersection. Therefore, it is recommended that the left turn lane requirement be waived. Of note, according to Colorado Department of Transportation (CDOT) standards, a left turn lane may be dropped if the opposing traffic is predicted to be below 100 directional hourly volumes. There are not expected to be any opposing traffic volumes at buildout and 49 opposing traffic volumes during the peak hour in the long-term future with the potential buildout of the surrounding parcels. A deviation will be requested to allow for this access to operate without a designated southbound left turn lane.

Marksheffel Road Access:

- An eastbound right to southbound acceleration lane **is not** warranted at this intersection based on projected 2023 total traffic volumes being 11 eastbound right turns during the peak hour and the threshold being 50 vehicles per hour.

5.4 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersections. The queuing analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results are shown in the following **Table 6** with calculations provided within the level of service operational sheets of **Appendix D** for unsignalized intersections and **Appendix F** for signalized intersections.

Table 6 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2023 Calculated Queue (feet)	2023 Recommended Length (feet)	2045 Calculated Queue (feet)	2045 Recommended Length (feet)
Constitution Ave & Akers Dr (#1)					
Eastbound Left	200'	25'	200'	47'	200'
Eastbound Right	DNE	25'	C (EC)	25'	C (EC)
Westbound Left	285'	25'	285'	25'	285'
Southbound Left	375'	25'	375'	63'	375'
Northbound Left	DNE	25'	165'+120'T (EC)	44'	165'+120'T (EC)
Constitution Ave & Marksheffel Rd (#2)					
Eastbound Left	450'	126'	450'	243'	450'
Westbound Left	225'	133'	225'	174'	225'
Northbound Left	425/725'DL	208'	425/725'DL	243'	425/725'DL
Southbound Left	525' DL	157'	525' DL	189'	525' DL

DNE = Does Not Exist; C = Continuous; EC = El Paso County Standards; DL = Dual Left Turn Lanes; **Blue** Text = Recommendation

As shown in the table above, all vehicle queues are expected to be managed in the available turn lane lengths throughout 2045.

see previous
comments above and
adjust accordingly.

5.5 Access Spacing Requirements and Internal Roadway Classifications

According to El Paso County 2016 Major Transportation Corridors Plan Update, Constitution Avenue and Marksheffel Road are classified as Principal Arterials while the south leg of Akers Drive will have the character of a local roadway. The following identifies the intersection spacing requirements for the access intersections associated with the project:

Constitution Avenue and Akers Drive

The future south leg of Akers Drive along Constitution Avenue will be located approximately 1,050 feet west of Marksheffel Road (measured edge line to center), and approximately 825 feet east of Hannah Ridge Drive. According to the El Paso Engineering Criteria Manual (ECM), spacing of roads accessing an urban principal arterial that will result in a full movement intersection shall be planned at one-half mile and should the one-half mile spacing not be “viable of practical” for providing access to adjacent lane, a deviation may be considered by the ECM administrator. However, as stated in the ECM, one parcel access shall be granted to each existing lot, if it does not create safety or operational problems. The intersection of Constitution Avenue and Akers Drive is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that a south leg of Akers Drive at Constitution Avenue should be granted to allow for one full movement access to the existing lot. A deviation will be provided to request full movement access from a future south leg of Akers Drive at Constitution Avenue.

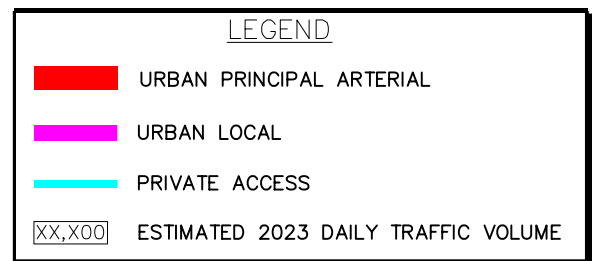
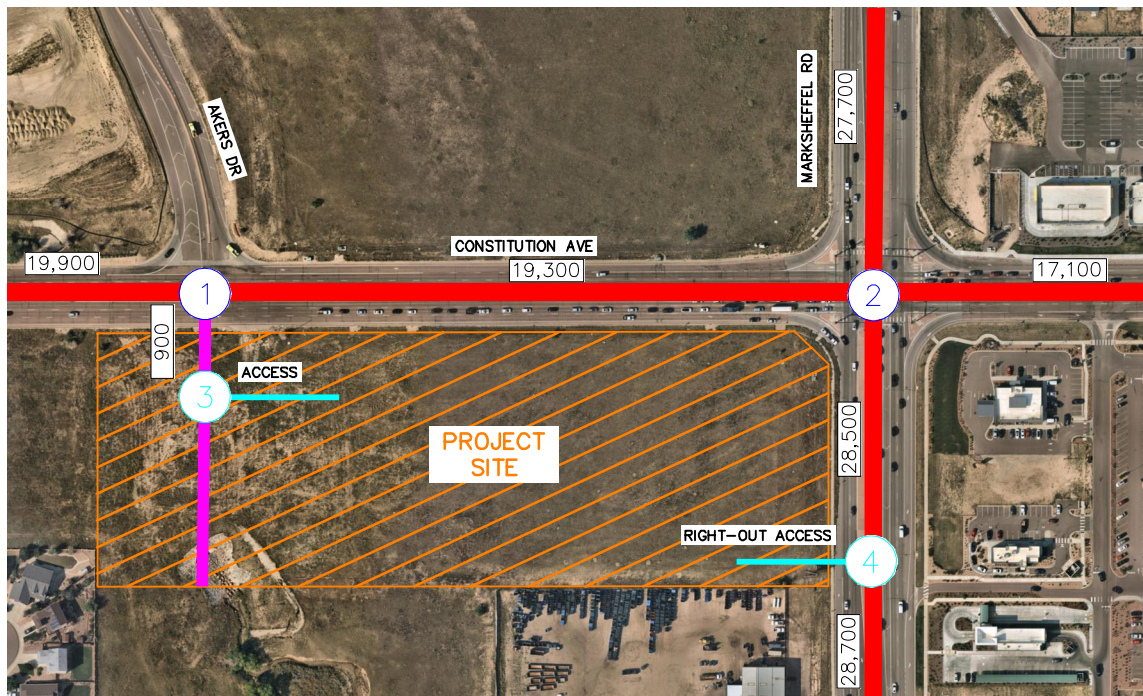
Akers Drive Access

The access along the new south leg of Akers Drive will be approximately 155 feet south of Constitution Avenue (measured edge line to center). According to the El Paso County Engineering Criteria Manual, spacing of intersections along urban local roadways from an arterial roadway should be 330 feet from the right-of-way line of the arterial to the centerline of the access roadway. Therefore, the proposed access along the new south leg of Akers Drive does not meet ECM standards. The access along Akers Drive is expected to meet operational, vehicle queue, and sight distance standards. However, and as stated previously, the required northbound left turn lane at the Constitution Avenue and Akers Drive intersection will extend beyond the access to the proposed development. A deviation will need to be provided to request for this proposed access to remain at the proposed location.

Marksheffel Road Right-Out Only Access

The proposed right-out access along Marksheffel Road will be located approximately 400 feet south of Constitution Avenue (measured edge line to center). The proposed right-out only access along Marksheffel Road is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that this access should be granted to only allow right-turn exiting movements. A deviation will be provided in support of allowing a right-out only access along Marksheffel Road.

The future segment of Akers Drive south of Constitution Avenue and the Project Access meets El Paso County average daily traffic threshold standard of 3,000 vehicles per day for an Urban Local street. Specifically, Akers Drive south of Constitution Avenue is expected to have approximately 1,100 vehicles per day. Constitution Avenue and Marksheffel Road meet the El Paso County average daily threshold standard of 40,000 vehicles per day for an Urban Arterial 4-lane roadway. Attached **Figure 10** illustrates the circulation plan and street classification map for roadways internal and external to the Caliber at Constitution project.



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
CIRCULATION PLAN

FIGURE 10

5.6 Sight Distance Evaluation

It is recommended that sight triangles be provided at all site access points to give drivers exiting the site a clear view of oncoming traffic. Landscaping and objects within sight triangles must not obstruct drivers' views of the adjacent travel lanes. ECM design intersection sight distances for left turn from stop were evaluated at the accesses along Constitution Avenue, Akers Drive, and Marksheffel Road. ECM does not provide sight distances for right-turning vehicles from stop; therefore, AASHTO standards were used for right-turn from stop distances at the project accesses. The following identifies sight distance requirements for the access intersections associated with

Please refer to ECM table 2-35 for entering sight distance values and revise accordingly. Please be aware that the sight distance in the table is based on posted speed.

Marksheffel Road

With AASHTO standards, the intersection sight distance for a vehicle turning right from stop is 480 feet. Therefore, all obstructions for right turning vehicles from stop should be clear to the left within the triangle created with a vertex point located 13 feet from the edge of the major road traveled way and a line-of-sight distance of 480 feet located in the middle of the nearest southbound through lane along Marksheffel Road for the right-out access. It is believed that the proposed right-out only access along Marksheffel Road is appropriately located to provide the necessary sight distance needed for through volumes along Marksheffel Road. As this access is located approximately 400 feet from Constitution Avenue, sight distances of 480 feet will not be provided for vehicles turning from Constitution Avenue to southbound Marksheffel Road; however, these vehicles will be traveling at speeds much slower than 50 miles per hour. Therefore, it is believed that the proposed access along Marksheffel Road is appropriately located to provide necessary sight distances.

table 2-21

Constitution Avenue and Akers Drive

According to Table 2-22 from ECM and a roadway design speed of 50 miles per hour along Constitution Avenue, the intersection sight distance for a vehicle turning left from stop is 555 feet. With AASHTO standards, the sight distance for a vehicle turning right from stop is 480 feet. Therefore, all obstructions for left turning vehicles from stop should be clear to the right within the triangle created with a vertex point located 13 feet from the edge of the major road traveled way (typical position of the minor road driver's eye when stopped) and a line-of-sight distance of 555 feet located in the middle of the nearest westbound through lane along Constitution Avenue for the Constitution Avenue and Akers Drive intersection. Likewise, all obstructions for right turning

Please update accordingly the location of the access per comments provided in the meeting with staff. Please be aware that ECM table 2-21 is **roadway** intersection sight distance and table 2-35 is sight distance for driveways (access design).

should be 555 ft.
revise accordingly.

vehicles from stop should be clear to the left within the triangle created with a vertex point located 13 feet from the edge of the major road traveled way and a line-of-sight distance of 480 feet located in the middle of the nearest eastbound through lane along Constitution Avenue. Therefore, it is believed that the intersection of Constitution Avenue and Akers Drive is appropriately located to provide necessary sight distances.

and Akers Drive is
update as necessary
per previous comments
regarding the
classification of akers

Akers Drive Access

With El Paso County standards and a roadway design speed of 25 miles per hour along Akers Drive, the intersection sight distance for a vehicle turning left from stop is 280 feet, while with AASHTO standards, the sight distance for a vehicle turning right from stop is 240 feet. Therefore, all obstructions for left turning vehicles from stop should be clear to the right within the triangle created with a vertex point located 13 feet from the edge of the major road traveled way and a line-of-sight distance of 280 feet located in the middle of the southbound through lane along Akers Drive. Likewise, all obstructions for right turning vehicles from stop should be clear to the left within the triangle created with a vertex point located 13 feet from the edge of the major road traveled way and a line-of-sight distance of 240 feet located in the middle of the northbound through lane along Akers Drive. This access is located approximately 155 feet from Constitution Avenue; therefore, sight distances of 280 feet will not be provided for vehicles turning from Constitution Avenue to southbound Akers Drive. However, vehicles turning from Constitution Avenue will be traveling at speeds much slower than 25 miles per hour. Further, there is not any project traffic expected to perform westbound to southbound left turn movements from the access along Akers Drive. Therefore, it is believed that the proposed access along Akers Drive is appropriately located to provide necessary sight distances.

5.7 Bicycle and Pedestrian Access

Sidewalks are provided along both sides of the Marksheffel Road. A sidewalk is provided on the south side of Constitution Avenue east of Marksheffel Road. Adjacent to the site, there are no bicycle lanes along Marksheffel Road or Constitution Avenue. Sidewalks are proposed with the project adjacent to the property frontages along Constitution Avenue and Akers Drive.

5.8 Road Impact Fees

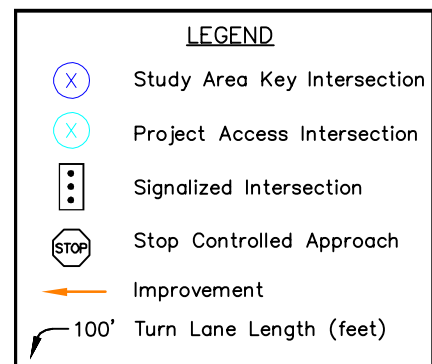
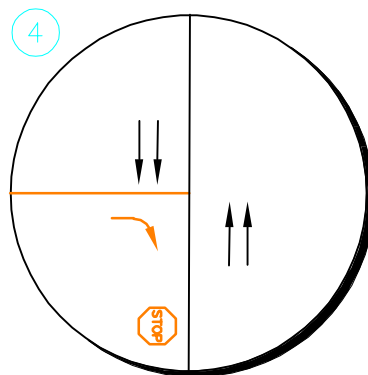
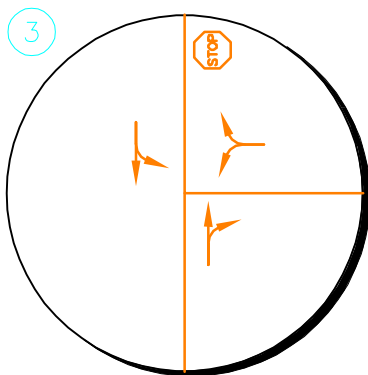
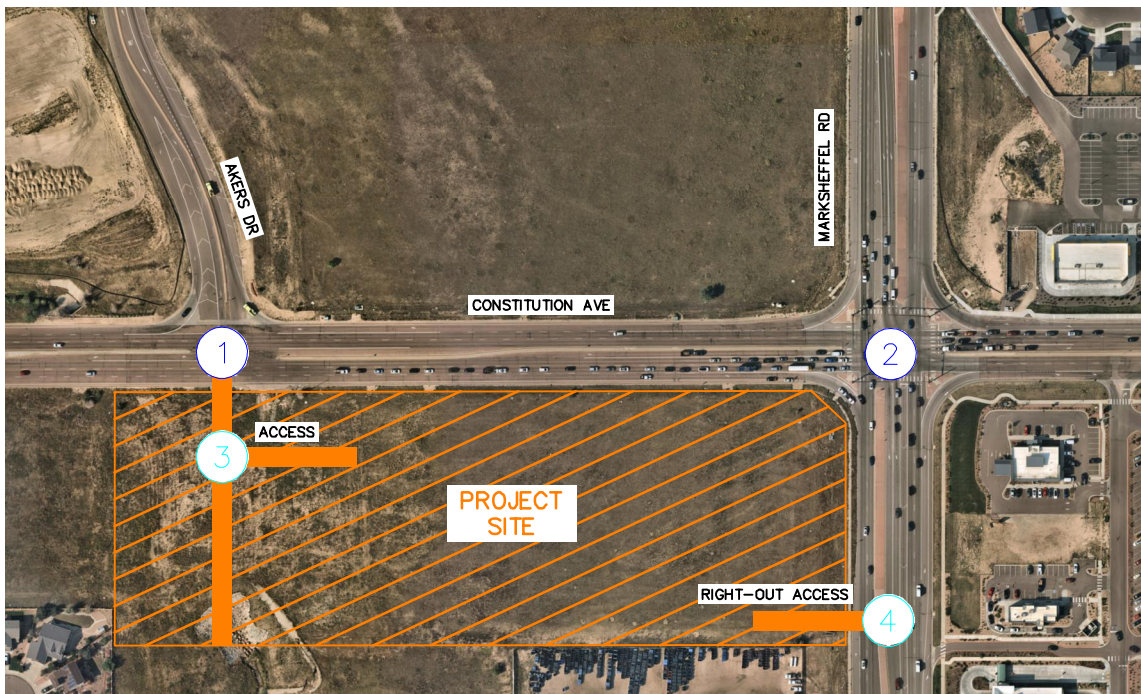
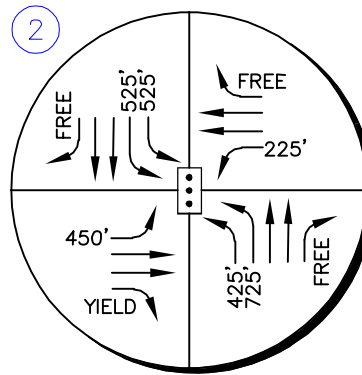
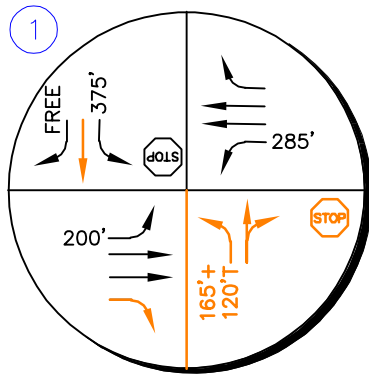
Road impact fees were evaluated based on the El Paso County Road Impact Fee Schedule. Based on these fee schedule guidelines, the fee per multi-family dwelling unit is \$2,407. Therefore, the road impact fee for the proposed 226 multi-family residences is expected to be \$543,982. Road impact fee calculations are shown in **Table 7**. During the final plat process, the project team will determine if the impact fees are paid up front or if the property will be included in one of the available public improvement districts with reduced upfront costs. The project team will determine payment methods with the final plat.

Table 7 – Road Impact Fees

Use	Units	Fee / Unit	Total Fee
Multi-Family Housing	226	\$2,407	\$543,982

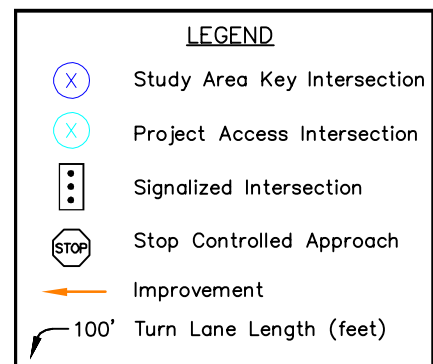
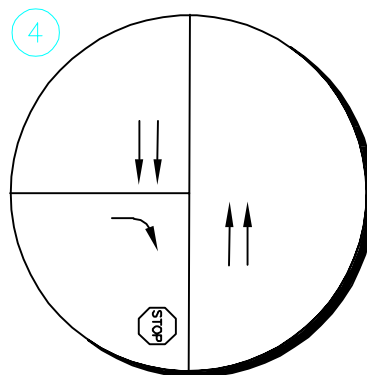
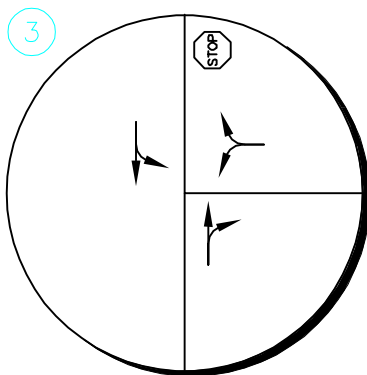
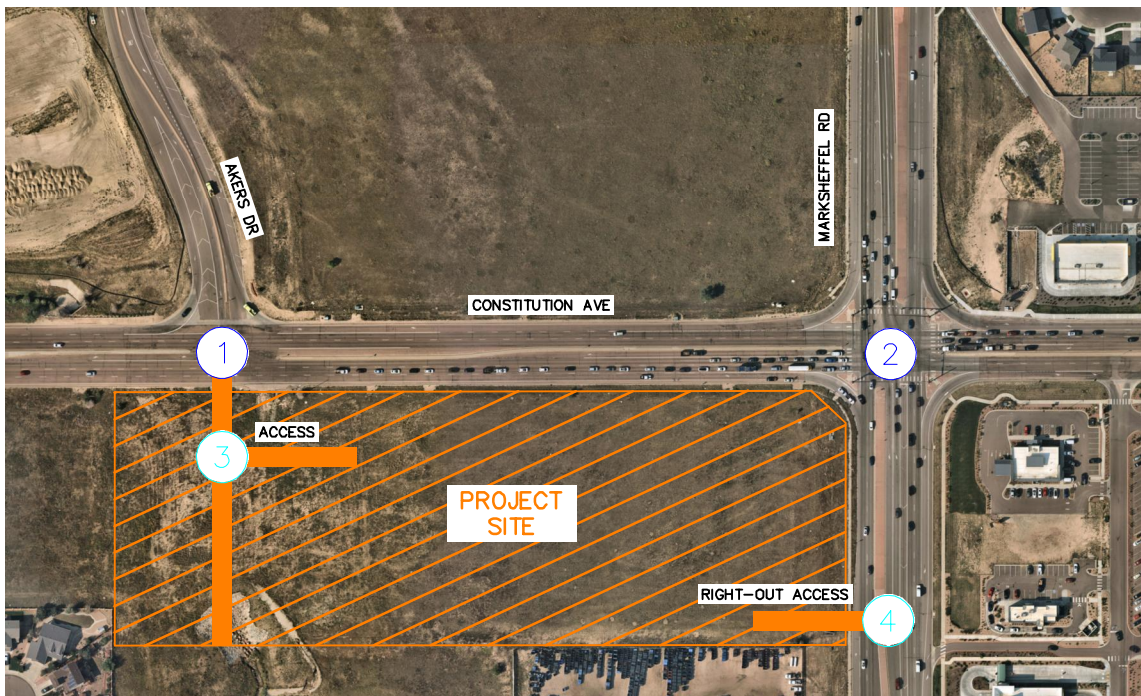
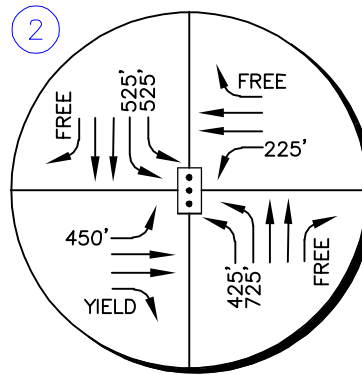
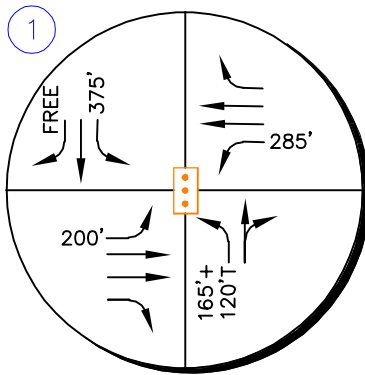
5.9 Improvement Summary

Based on the results of the intersection operational, turn lane evaluations, and vehicle queuing analysis, the key intersection recommended improvements and control are shown in **Figure 11** for 2023 and **Figure 12** for 2045.



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2023 RECOMMENDATIONS

FIGURE 11



CALIBER AT CONSTITUTION
EL PASO COUNTY, COLORADO
2045 RECOMMENDATIONS

FIGURE 12

Please also discuss the ROW that will be provided/required along Constitution. It should match what was done on the site to the west (Urban Collection PCD File No. SF2028).

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Caliber at Constitution will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

2023 Recommendations:

- With construction of the Caliber at Constitution development, a south leg is proposed to be constructed at the existing Constitution Avenue and Akers Drive intersection. Based on configuration of the north leg of this intersection providing chevron striping for a future through lane, it is believed that this leg will provide a southbound through lane when the south leg is constructed. Based on El Paso County Engineering Criteria Manual (ECM), a northbound left turn lane will likely be warranted at the Constitution Avenue and Akers Drive intersection; however, a separate northbound right turn lane is not expected to be warranted with buildout future traffic projections. As such, it is recommended that the south leg of the Constitution Avenue and Akers Drive intersection provide a left turn lane and a shared through/right turn lane. It is also recommended that this intersection continue to operate with stop control and a R1-1 “STOP” sign be installed on the northbound approach. To meet El Paso County standards, an eastbound right turn lane should be provided at this intersection. To be consistent with the intersections in the surrounding area, it is recommended that the third eastbound through lane (outside through lane) at this intersection be dropped as a forced right turn lane.
- With completion of the Caliber at Constitution project, a full movement access is proposed along the new south leg of Akers Drive approximately 155 feet south of Constitution Avenue (measured edge line to center) and a right-out only access is proposed along Marksheffel Road approximately 400 feet south of Constitution Avenue (measured edge line to center). It is recommended that a R1-1 “STOP” sign be installed on the exiting approach of both accesses. To further identify the proposed access along Marksheffel Road as a right-out only driveway, it is recommended that a R3-2 “NO LEFT TURN” sign be placed underneath the STOP sign. Further, a R6-1(R) “ONE WAY” sign should also be installed within the raised center median of Marksheffel Road. To restrict right turn entrance as well, a R3-1 “NO RIGHT

TURN” sign should be installed facing drivers traveling southbound along Marksheffel Road as well as a R5-1 “DO NOT ENTER” sign to be placed behind the STOP sign. The driveway throat at the proposed right-out only access should be oriented to further restrict entering movements.

Deviations Required

- A deviation will be provided to request full movement access from a future south leg of Akers Drive at Constitution Avenue. The future south leg of Akers Drive along Constitution Avenue will be located approximately 1,050 feet west of Marksheffel Road (measured edge line to center), and approximately 825 feet east of Hannah Ridge Drive. According to the El Paso Engineering Criteria Manual (ECM), spacing of roads accessing an urban principal arterial that will result in a full movement intersection shall be planned at one-half mile. However, as stated in the ECM, one parcel access shall be granted to each existing lot, if it does not create safety or operational problems. The intersection of Constitution Avenue and Akers Drive is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that a south leg of Akers Drive at Constitution Avenue should be granted to allow for one full movement access to the existing lot.
- A deviation will be provided in support of allowing a right-out only access along Marksheffel Road. The proposed right-out access along Marksheffel Road will be located approximately 400 feet south of Constitution Avenue (measured edge line to center). The proposed right-out only access along Marksheffel Road is expected to meet operational, vehicle queue, and sight distance standards; therefore, it is believed that this access should be granted to only allow right-turn exiting movements.
- The access along the new south leg of Akers Drive will be approximately 155 feet south of Constitution Avenue (measured edge line to center). According to the El Paso County Engineering Criteria Manual, spacing of intersections along urban local roadways from an arterial roadway should be 330 feet from the right-of-way line of the arterial to the centerline of the access roadway. Therefore, the proposed access along the new south leg of Akers Drive does not meet ECM standards. The access along Akers Drive is expected to meet operational, vehicle queue, and sight distance standards. However, the required northbound left turn lane at the Constitution Avenue and Akers Drive intersection will extend beyond the

access to the proposed development. A deviation will need to be provided to request for this proposed access to remain at the proposed location.

- A southbound left turn lane is warranted at Akers Drive Access based on projected 2023 total traffic volumes being 59 northbound left turns during the peak hour and the threshold being 25 vehicles per hour. However, there are no traffic volumes conflicting with the turning vehicles and there are not any vehicle delays at this access intersection. Therefore, it is recommended that the left turn lane requirement be waived. Of note, according to Colorado Department of Transportation (CDOT) standards, a left turn lane may be dropped if the opposing traffic is predicted to be below 100 directional hourly volumes. There are not expected to be any opposing traffic volumes at buildout and 49 opposing traffic volumes during the peak hour in the long-term future with the potential buildout of the surrounding parcels. A deviation will be requested to allow for this access to operate without a designated southbound left turn lane.

2045 Recommendations:

- A traffic signal is warranted with 2045 traffic volume projections at the intersection of Constitution Avenue and Akers Drive. It is recommended that El Paso County monitor traffic volumes at this intersection in the future to determine if signalization is the appropriate control. It should be noted the north leg of this intersection is the controlling approach that triggers the need for signal control and project traffic is only expected to utilize the south leg of this intersection.

General Recommendations

- Any on-site or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the El Paso County and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

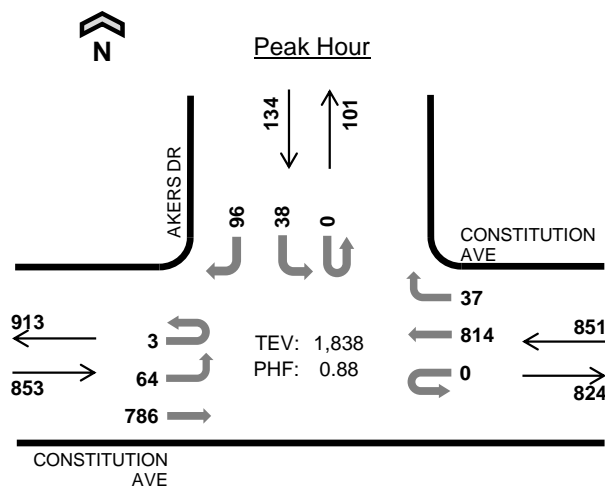
Please state whether the MTCP or other corridor study calls for the construction of improvements in the immediate area (ECM B.8).

APPENDICES

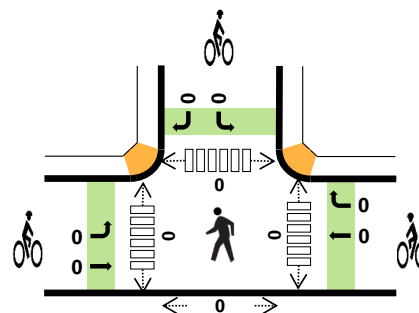
APPENDIX A

Intersection Count Sheets

AKERS DR CONSTITUTION AVE



Date: Tue, Sep 21, 2021
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM



	HV %:	PHF
EB	4.0%	0.89
WB	3.3%	0.83
NB	-	-
SB	3.7%	0.74
TOTAL	3.6%	0.88

Two-Hour Count Summaries

Interval Start	CONSTITUTION AVE Eastbound				CONSTITUTION AVE Westbound				0 Northbound				AKERS DR 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	2	7	150	0	0	0	169	11	0	0	0	0	0	5	0	12	356	0
7:15 AM	2	13	168	0	0	0	191	6	0	0	0	0	0	5	0	24	409	0
7:30 AM	0	19	221	0	0	0	213	9	0	0	0	0	0	16	0	29	507	0
7:45 AM	1	24	213	0	0	0	238	18	0	0	0	0	0	6	0	24	524	1,796
8:00 AM	0	8	184	0	0	0	172	4	0	0	0	0	0	11	0	19	398	1,838
8:15 AM	0	9	180	0	0	0	148	9	0	0	0	0	0	8	0	11	365	1,794
8:30 AM	0	5	146	0	0	0	133	5	0	0	0	0	0	8	0	6	303	1,590
8:45 AM	1	7	116	0	0	0	148	6	0	0	0	0	0	5	0	8	291	1,357
Count Total	6	92	1,378	0	0	0	1,412	68	0	0	0	0	0	64	0	133	3,153	0
Peak Hour	All	3	64	786	0	0	0	814	37	0	0	0	0	38	0	96	1,838	0
	HV	0	3	31	0	0	0	27	1	0	0	0	0	3	0	2	67	0
	HV%	0%	5%	4%	-	-	-	3%	3%	-	-	-	-	8%	-	2%	4%	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	8	6	0	4	18	0	0	0	0	0	0	0	0	0	0
7:15 AM	3	6	0	1	10	0	0	0	0	0	0	0	0	0	0
7:30 AM	12	4	0	1	17	0	0	0	0	0	0	0	0	0	0
7:45 AM	12	7	0	1	20	0	0	0	0	0	0	0	0	0	0
8:00 AM	7	11	0	2	20	0	0	0	0	0	0	0	0	0	0
8:15 AM	15	8	0	4	27	0	0	0	0	0	0	0	0	0	0
8:30 AM	11	4	0	1	16	0	0	0	0	0	0	0	0	0	0
8:45 AM	6	12	0	5	23	0	0	0	0	0	0	0	0	0	0
Count Total	74	58	0	19	151	0	0	0	0	0	0	0	0	0	0
Peak Hr	34	28	0	5	67	0	0	0	0	0	0	0	0	0	0

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	CONSTITUTION AVE				CONSTITUTION AVE				0				AKERS DR				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	2	6	0	0	0	6	0	0	0	0	0	0	1	0	3	18	0
7:15 AM	0	0	3	0	0	0	6	0	0	0	0	0	0	1	0	0	10	0
7:30 AM	0	3	9	0	0	0	4	0	0	0	0	0	0	0	0	1	17	0
7:45 AM	0	0	12	0	0	0	6	1	0	0	0	0	0	1	0	0	20	65
8:00 AM	0	0	7	0	0	0	11	0	0	0	0	0	0	1	0	1	20	67
8:15 AM	0	0	15	0	0	0	4	4	0	0	0	0	0	1	0	3	27	84
8:30 AM	0	1	10	0	0	0	4	0	0	0	0	0	0	0	0	1	16	83
8:45 AM	0	1	5	0	0	0	11	1	0	0	0	0	0	2	0	3	23	86
Count Total	0	7	67	0	0	0	52	6	0	0	0	0	0	7	0	12	151	0
Peak Hour	0	3	31	0	0	0	27	1	0	0	0	0	0	3	0	2	67	0

Two-Hour Count Summaries - Bikes																		
Interval Start	CONSTITUTION AVE				CONSTITUTION AVE				0				AKERS DR				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	LT	TH	RT		LT	TH	RT		LT	TH	RT		LT	TH	RT			
7:00 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
7:15 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
7:30 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
7:45 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:00 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:15 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:30 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
8:45 AM	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Count Total	0	0	0		0	0	0		0	0	0		0	0	0		0	0
Peak Hour	0	0	0		0	0	0		0	0	0		0	0	0		0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	CONSTITUTION AVE				CONSTITUTION AVE				0				AKERS DR				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	6	0	0	0	4	6	0	0	0	0	0	1	0	1	18	0
4:15 PM	0	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	9	0
4:30 PM	0	0	7	0	0	0	5	0	0	0	0	0	0	1	0	0	13	0
4:45 PM	0	0	6	0	0	0	1	1	0	0	0	0	0	0	0	0	8	48
5:00 PM	0	0	2	0	0	0	2	1	0	0	0	0	0	1	0	0	6	36
5:15 PM	0	2	2	0	0	0	3	0	0	0	0	0	0	0	0	0	7	34
5:30 PM	0	0	2	0	0	0	3	0	0	0	0	0	0	2	0	0	7	28
5:45 PM	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	4	24
Count Total	0	2	30	0	0	0	26	8	0	0	0	0	0	5	0	1	72	0
Peak Hour	0	0	19	0	0	0	13	2	0	0	0	0	0	2	0	0	36	0

Two-Hour Count Summaries - Bikes																	
Interval Start	CONSTITUTION AVE			CONSTITUTION AVE			0			AKERS DR			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	1	0			
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	0			
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	3			
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2			
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2			
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Count Total	0	1	0	0	1	0	0	0	0	1	0	0	3	0			
Peak Hour	0	1	0	0	1	0	0	0	0	0	0	0	2	0			

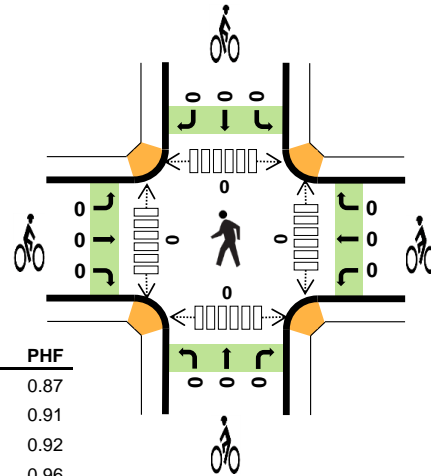
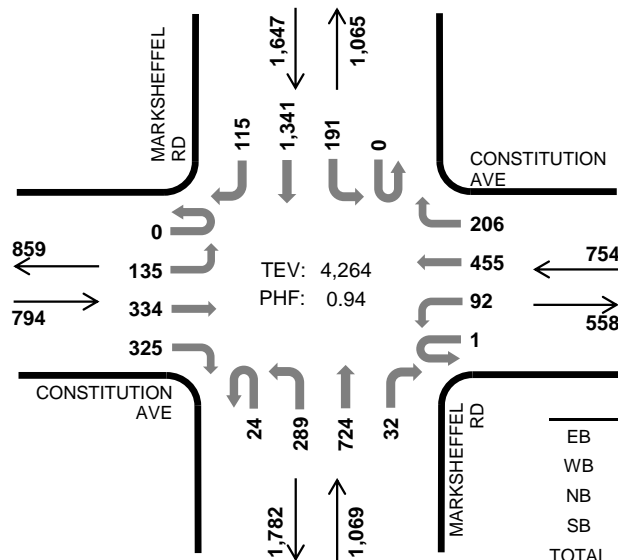
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

MARKSHEFFEL RD CONSTITUTION AVE



Peak Hour

Date: Tue, Sep 21, 2021
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:00 AM to 8:00 AM



	HV %:	PHF
EB	4.2%	0.87
WB	3.6%	0.91
NB	5.5%	0.92
SB	2.4%	0.96
TOTAL	3.7%	0.94

Two-Hour Count Summaries

Interval Start		CONSTITUTION AVE				CONSTITUTION AVE				MARKSHEFFEL RD				MARKSHEFFEL RD				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	29	58	71	1	23	90	47	8	71	174	6	0	34	370	24	1,006	0
	7:15 AM	0	32	67	83	0	27	108	59	0	67	166	9	0	43	330	24	1,015	0
	7:30 AM	0	35	103	89	0	18	125	49	11	69	202	10	0	55	341	23	1,130	0
	7:45 AM	0	39	106	82	0	24	132	51	5	82	182	7	0	59	300	44	1,113	4,264
	8:00 AM	0	24	81	85	0	25	89	40	5	67	160	10	0	47	282	25	940	4,198
	8:15 AM	0	33	94	62	0	26	85	33	3	40	129	8	0	41	208	23	785	3,968
	8:30 AM	0	25	67	55	0	23	65	29	7	55	133	9	0	43	206	20	737	3,575
	8:45 AM	0	20	60	48	0	25	79	28	5	55	116	8	0	21	160	25	650	3,112
Count Total		0	237	636	575	1	191	773	336	44	506	1,262	67	0	343	2,197	208	7,376	0
Peak Hour	All	0	135	334	325	1	92	455	206	24	289	724	32	0	191	1,341	115	4,264	0
	HV	0	15	11	7	0	5	11	11	0	9	42	8	0	3	34	3	159	0
	HV%	-	11%	3%	2%	0%	5%	2%	5%	0%	3%	6%	25%	-	2%	3%	3%	4%	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	7	6	17	11	41	0	0	0	0	0	0	0	0	0	0
7:15 AM	4	6	15	9	34	0	0	0	0	0	0	0	0	0	0
7:30 AM	7	4	11	10	32	0	0	0	0	0	0	0	0	0	0
7:45 AM	15	11	16	10	52	0	0	0	0	0	0	0	0	0	0
8:00 AM	8	10	20	15	53	0	0	0	0	0	0	0	0	0	0
8:15 AM	17	8	14	9	48	0	0	0	0	0	0	0	0	0	0
8:30 AM	9	8	20	11	48	0	0	0	0	0	0	0	0	0	0
8:45 AM	7	11	14	12	44	0	0	0	0	0	0	0	0	0	0
Count Total	74	64	127	87	352	0	0	0	0	0	0	0	0	0	0
Peak Hour	33	27	59	40	159	0	0	0	0	0	0	0	0	0	0

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	CONSTITUTION AVE				CONSTITUTION AVE				MARKSHEFFEL RD				MARKSHEFFEL RD				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	2	1	4	0	0	3	3	0	2	14	1	0	1	8	2	41	0
7:15 AM	0	3	0	1	0	3	1	2	0	2	11	2	0	2	7	0	34	0
7:30 AM	0	4	2	1	0	1	2	1	0	4	6	1	0	0	10	0	32	0
7:45 AM	0	6	8	1	0	1	5	5	0	1	11	4	0	0	9	1	52	159
8:00 AM	0	1	5	2	0	3	5	2	0	7	11	2	0	1	13	1	53	171
8:15 AM	0	7	7	3	0	4	4	0	0	2	12	0	0	3	5	1	48	185
8:30 AM	0	5	3	1	0	4	3	1	0	1	15	4	0	3	8	0	48	201
8:45 AM	0	1	4	2	0	4	4	3	0	4	8	2	0	0	9	3	44	193
Count Total	0	29	30	15	0	20	27	17	0	23	88	16	0	10	69	8	352	0
Peak Hour	0	15	11	7	0	5	11	11	0	9	42	8	0	3	34	3	159	0

Two-Hour Count Summaries - Bikes																	
Interval Start	CONSTITUTION AVE			CONSTITUTION AVE			MARKSHEFFEL RD			MARKSHEFFEL RD			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

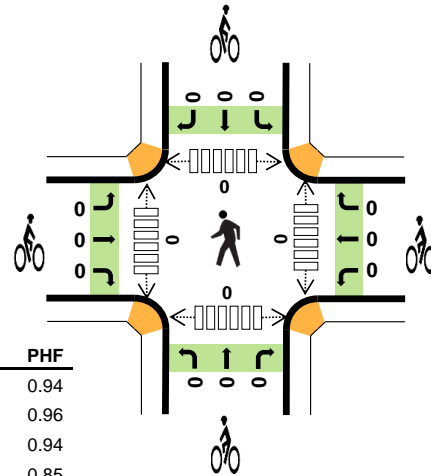
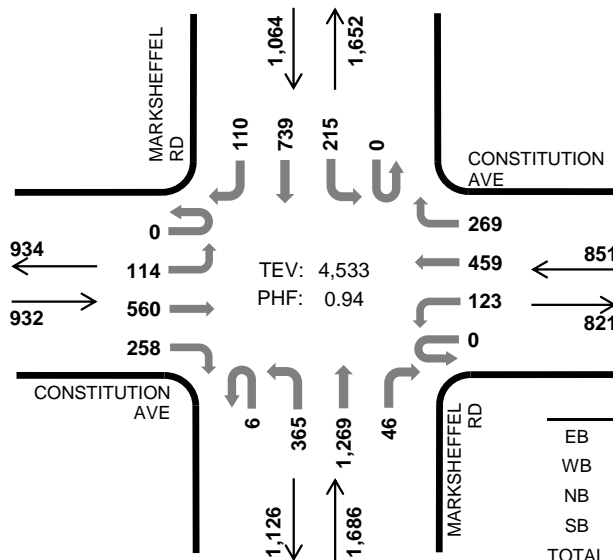
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

MARKSHEFFEL RD CONSTITUTION AVE



Peak Hour

Date: Tue, Sep 21, 2021
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	2.0%	0.94
WB	1.9%	0.96
NB	1.8%	0.94
SB	4.7%	0.85
TOTAL	2.5%	0.94

Two-Hour Count Summaries

Interval Start		CONSTITUTION AVE				CONSTITUTION AVE				MARKSHEFFEL RD				MARKSHEFFEL RD				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	37	151	63	0	34	92	57	4	94	259	10	0	46	156	32	1,035	0
4:15 PM		0	27	149	62	0	23	85	49	1	101	297	12	0	53	166	29	1,054	0
4:30 PM		0	25	127	70	0	39	118	65	0	90	332	13	0	48	151	29	1,107	0
4:45 PM		0	22	146	62	0	33	118	69	1	106	301	13	0	58	184	30	1,143	4,339
5:00 PM		0	35	140	72	0	22	102	76	3	96	338	10	0	49	233	30	1,206	4,510
5:15 PM		0	32	147	54	0	29	121	59	2	73	298	10	0	60	171	21	1,077	4,533
5:30 PM		0	21	150	70	0	22	90	62	2	98	293	8	0	67	164	34	1,081	4,507
5:45 PM		0	30	120	58	0	27	97	60	4	61	251	21	0	57	131	32	949	4,313
Count Total		0	229	1,130	511	0	229	823	497	17	719	2,369	97	0	438	1,356	237	8,652	0
Peak Hour	All	0	114	560	258	0	123	459	269	6	365	1,269	46	0	215	739	110	4,533	0
	HV	0	3	5	11	0	4	6	6	0	5	24	1	0	7	43	0	115	0
	HV%	-	3%	1%	4%	-	3%	1%	2%	0%	1%	2%	2%	-	3%	6%	0%	3%	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	7	15	15	16	53	0	0	0	0	0	0	0	0	0	0
4:15 PM	4	4	11	14	33	0	0	0	0	0	0	0	0	0	0
4:30 PM	7	4	12	13	36	0	0	0	0	0	0	0	0	0	0
4:45 PM	7	4	7	9	27	0	0	0	0	0	0	0	0	0	0
5:00 PM	2	1	7	13	23	0	0	0	0	0	0	0	0	0	0
5:15 PM	3	7	4	15	29	0	0	0	0	0	0	0	0	0	0
5:30 PM	4	0	4	11	19	0	0	0	0	0	0	0	0	0	0
5:45 PM	1	3	4	3	11	0	0	0	0	0	0	0	0	0	0
Count Total	35	38	64	94	231	0	0	0	0	0	0	0	0	0	0
Peak Hour	19	16	30	50	115	0	0	0	0	0	0	0	0	0	0

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	CONSTITUTION AVE				CONSTITUTION AVE				MARKSHEFFEL RD				MARKSHEFFEL RD				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	3	1	3	0	6	7	2	0	5	9	1	0	3	11	2	53	0
4:15 PM	0	1	0	3	0	2	2	0	0	2	6	3	0	2	12	0	33	0
4:30 PM	0	1	3	3	0	2	2	0	0	2	10	0	0	2	11	0	36	0
4:45 PM	0	1	1	5	0	1	0	3	0	0	6	1	0	1	8	0	27	149
5:00 PM	0	0	1	1	0	0	1	0	0	3	4	0	0	1	12	0	23	119
5:15 PM	0	1	0	2	0	1	3	3	0	0	4	0	0	3	12	0	29	115
5:30 PM	0	0	2	2	0	0	0	0	0	0	3	1	0	1	9	1	19	98
5:45 PM	0	1	0	0	0	0	3	0	0	0	2	2	0	2	1	0	11	82
Count Total	0	8	8	19	0	12	18	8	0	12	44	8	0	15	76	3	231	0
Peak Hour	0	3	5	11	0	4	6	6	0	5	24	1	0	7	43	0	115	0

Two-Hour Count Summaries - Bikes																	
Interval Start	CONSTITUTION AVE			CONSTITUTION AVE			MARKSHEFFEL RD			MARKSHEFFEL RD			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

APPENDIX B

Future Traffic Projections

PPACOG Growth Rate: El Paso Constitution

Location	2015 AADT	2040 AADT	Growth Factor	Growth Rate
Constitution Ave E/O Marksheffel Rd	6910	7451	1.08	0.30%
Marksheffel Rd N/O Constitution Ave	10100	10381	1.03	0.11%
Marksheffel Rd S/O Constitution Ave	8840	12336	1.40	1.34%
Total	25850	30168	1.17	0.62%

APPENDIX C

Trip Generation Worksheets

Project	Caliber at Constitution		
Subject	Trip Generation for Multifamily Housing (Mid-Rise)		
Designed by	TES	Date	September 21, 2021
Job No.	96481004		
Checked by		Date	
Sheet No.	1	of	1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Fitted Curve Equations

Land Use Code - Multifamily Housing (Mid-Rise) (221)

Independent Variable - Dwelling Units (X)

$$X = 226$$

T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Series 200 Page 74)

$$\ln(T) = 0.98 \ln(X) - 0.98$$

$$\ln(T) = 0.98 * \ln(226.0) - 0.98$$

Directional Distribution: 26% ent. 74% exit.

T = 76 Average Vehicle Trip Ends

20 entering 56 exiting

$$20 + 56 = 76$$

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Series 200 Page 75)

$$\ln(T) = 0.96 \ln(X) - 0.63$$

$$\ln(T) = 0.96 * \ln(226.0) - 0.63$$

Directional Distribution: 61% ent. 39% exit.

T = 97 Average Vehicle Trip Ends

59 entering 38 exiting

$$59 + 38 = 97$$

Weekday (Series 200 Page 73)

$$(T) = 5.45(X) - 1.75$$

$$(T) = 5.45 * 226 - 1.75$$

Directional Distribution: 50% ent. 50% exit.

T = 1230 Average Vehicle Trip Ends

615 entering 615 exiting

$$615 + 615 = 1230$$

Peak Hour of Generator, Saturday (Series 200 Page 79)

$$(T) = 0.42(X) + 6.73$$

$$(T) = 0.42 * 226 + 6.73$$

Directional Distribution: 49% ent. 51% exit.

T = 102 Average Vehicle Trip Ends

50 entering 52 exiting

$$50 + 52 = 102$$

APPENDIX D

Intersection Analysis Worksheets







Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↱	↱↱↱	↱↱	↱	↱	↱
Traffic Vol, veh/h	64	786	814	37	38	96
Future Vol, veh/h	64	786	814	37	38	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	893	925	42	43	109
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	967	0	-	0	1428	-
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	503	-
Critical Hdwy	4.14	-	-	-	6.29	-
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	2.22	-	-	-	3.67	-
Pot Cap-1 Maneuver	708	-	-	-	154	0
Stage 1	-	-	-	-	338	0
Stage 2	-	-	-	-	539	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	708	-	-	-	138	-
Mov Cap-2 Maneuver	-	-	-	-	233	-
Stage 1	-	-	-	-	303	-
Stage 2	-	-	-	-	539	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.8	0		23.9		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	708	-	-	-	233	-
HCM Lane V/C Ratio	0.103	-	-	-	0.185	-
HCM Control Delay (s)	10.7	-	-	-	23.9	0
HCM Lane LOS	B	-	-	-	C	A
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7	-

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↱	↱↱↱	↱↱	↱	↱	↱
Traffic Vol, veh/h	29	915	905	39	32	56
Future Vol, veh/h	29	915	905	39	32	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	1005	995	43	35	62

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1038	0	0 1461
Stage 1	-	-	- 995
Stage 2	-	-	- 466
Critical Hdwy	4.14	-	- 6.29
Critical Hdwy Stg 1	-	-	- 5.84
Critical Hdwy Stg 2	-	-	- 6.04
Follow-up Hdwy	2.22	-	- 3.67
Pot Cap-1 Maneuver	665	-	- 147 0
Stage 1	-	-	- 311 0
Stage 2	-	-	- 564 0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	665	-	- 140
Mov Cap-2 Maneuver	-	-	- 232
Stage 1	-	-	- 296
Stage 2	-	-	- 564







Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	23.3
HCM LOS	C		

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	665	-	-	-	232	-
HCM Lane V/C Ratio	0.048	-	-	-	0.152	-
HCM Control Delay (s)	10.7	-	-	-	23.3	0
HCM Lane LOS	B	-	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5	-

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	65	796	824	37	38	97
Future Vol, veh/h	65	796	824	37	38	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	905	936	42	43	110
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	978	0	-	0	1446	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	510	-
Critical Hdwy	4.14	-	-	-	6.29	-
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	2.22	-	-	-	3.67	-
Pot Cap-1 Maneuver	701	-	-	-	150	0
Stage 1	-	-	-	-	333	0
Stage 2	-	-	-	-	535	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	701	-	-	-	134	-
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	535	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.8	0		24.3		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	701	-	-	-	229	-
HCM Lane V/C Ratio	0.105	-	-	-	0.189	-
HCM Control Delay (s)	10.7	-	-	-	24.3	0
HCM Lane LOS	B	-	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	-	0.7	-

Intersection












Int Delay, s/veh 0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	926	916	39	32	57
Future Vol, veh/h	29	926	916	39	32	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	1018	1007	43	35	63

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1050	0	0 1478
Stage 1	-	-	- 1007
Stage 2	-	-	- 471
Critical Hdwy	4.14	-	- 6.29
Critical Hdwy Stg 1	-	-	- 5.84
Critical Hdwy Stg 2	-	-	- 6.04
Follow-up Hdwy	2.22	-	- 3.67
Pot Cap-1 Maneuver	659	-	- 144 0
Stage 1	-	-	- 306 0
Stage 2	-	-	- 560 0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	659	-	- 137
Mov Cap-2 Maneuver	-	-	- 228
Stage 1	-	-	- 291
Stage 2	-	-	- 560

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	23.6
HCM LOS			C












Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	659	-	-	-	228	-
HCM Lane V/C Ratio	0.048	-	-	-	0.154	-
HCM Control Delay (s)	10.7	-	-	-	23.6	0
HCM Lane LOS	B	-	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5	-

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	796	10	10	824	37	28	0	17	38	0	97
Future Vol, veh/h	65	796	10	10	824	37	28	0	17	38	0	97
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	92	92	88	88	92	92	92	88	92	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	74	905	11	11	936	42	30	0	18	43	0	110

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	978	0	0	916	0	0	1543	2053	453	1559	2022	-
Stage 1	-	-	-	-	-	-	1053	1053	-	958	958	-
Stage 2	-	-	-	-	-	-	490	1000	-	601	1064	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	701	-	-	740	-	-	78	55	554	76	57	0
Stage 1	-	-	-	-	-	-	242	301	-	276	334	0
Stage 2	-	-	-	-	-	-	529	319	-	454	298	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	701	-	-	740	-	-	71	48	554	67	50	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	160	138	-	166	154	-
Stage 1	-	-	-	-	-	-	216	269	-	247	329	-
Stage 2	-	-	-	-	-	-	521	314	-	393	266	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.1			24.8			34.1		
HCM LOS							C			D		







Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	160	554	701	-	-	740	-	-	166	-	-
HCM Lane V/C Ratio	0.19	0.033	0.105	-	-	0.015	-	-	0.26	-	-
HCM Control Delay (s)	32.7	11.7	10.7	-	-	9.9	-	-	34.1	0	0
HCM Lane LOS	D	B	B	-	-	A	-	-	D	A	A
HCM 95th %tile Q(veh)	0.7	0.1	0.4	-	-	0	-	-	1	-	-

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	926	30	30	916	39	19	0	11	32	0	57
Future Vol, veh/h	29	926	30	30	916	39	19	0	11	32	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	92	92	91	91	92	92	92	91	92	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	1018	33	33	1007	43	21	0	12	35	0	63












Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1050	0	0	1051	0	0	1652	2198	509	1646	2188	-
Stage 1	-	-	-	-	-	-	1082	1082	-	1073	1073	-
Stage 2	-	-	-	-	-	-	570	1116	-	573	1115	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	659	-	-	658	-	-	65	44	509	65	45	0
Stage 1	-	-	-	-	-	-	232	292	-	235	295	0
Stage 2	-	-	-	-	-	-	474	281	-	472	282	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	659	-	-	658	-	-	60	40	509	59	41	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	156	134	-	156	135	-
Stage 1	-	-	-	-	-	-	221	278	-	223	280	-
Stage 2	-	-	-	-	-	-	450	267	-	439	268	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.3			24.5			34.7		
HCM LOS							C			D		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	156	509	659	-	-	658	-	-	156	-	-
HCM Lane V/C Ratio	0.132	0.023	0.048	-	-	0.05	-	-	0.225	-	-
HCM Control Delay (s)	31.6	12.2	10.7	-	-	10.8	-	-	34.7	0	0
HCM Lane LOS	D	B	B	-	-	B	-	-	D	A	A
HCM 95th %tile Q(veh)	0.4	0.1	0.2	-	-	0.2	-	-	0.8	-	-

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	912	944	43	44	111
Future Vol, veh/h	74	912	944	43	44	111
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	991	1026	47	48	121
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	1073	0	-	0	1582	-
Stage 1	-	-	-	-	1026	-
Stage 2	-	-	-	-	556	-
Critical Hdwy	4.14	-	-	-	6.29	-
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	2.22	-	-	-	3.67	-
Pot Cap-1 Maneuver	645	-	-	-	125	0
Stage 1	-	-	-	-	299	0
Stage 2	-	-	-	-	506	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	110	-
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	506	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.9	0		28.4		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	645	-	-	-	201	-
HCM Lane V/C Ratio	0.125	-	-	-	0.238	-
HCM Control Delay (s)	11.4	-	-	-	28.4	0
HCM Lane LOS	B	-	-	-	D	A
HCM 95th %tile Q(veh)	0.4	-	-	-	0.9	-













Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑	↱	↰	↱
Traffic Vol, veh/h	34	1061	1050	45	37	65
Future Vol, veh/h	34	1061	1050	45	37	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	200	-	-	0	375	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	1153	1141	49	40	71
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	1190	0	-	0	1676	-
Stage 1	-	-	-	-	1141	-
Stage 2	-	-	-	-	535	-
Critical Hdwy	4.14	-	-	-	6.29	-
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	2.22	-	-	-	3.67	-
Pot Cap-1 Maneuver	582	-	-	-	109	0
Stage 1	-	-	-	-	261	0
Stage 2	-	-	-	-	519	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	582	-	-	-	102	-
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	244	-
Stage 2	-	-	-	-	519	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.4	0		29		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	582	-	-	-	190	-
HCM Lane V/C Ratio	0.063	-	-	-	0.212	-
HCM Control Delay (s)	11.6	-	-	-	29	0
HCM Lane LOS	B	-	-	-	D	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8	-













Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	912	18	24	944	43	2	0	11	44	0	111
Future Vol, veh/h	74	912	18	24	944	43	2	0	11	44	0	111
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	80	991	20	26	1026	47	2	0	12	48	0	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1073	0	0	1011	0	0	1716	2276	496	1734	2249	-
Stage 1	-	-	-	-	-	-	1151	1151	-	1078	1078	-
Stage 2	-	-	-	-	-	-	565	1125	-	656	1171	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	645	-	-	681	-	-	58	40	519	56	41	0
Stage 1	-	-	-	-	-	-	211	271	-	233	293	0
Stage 2	-	-	-	-	-	-	477	278	-	421	265	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	645	-	-	681	-	-	51	34	519	48	35	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	133	111	-	136	124	-
Stage 1	-	-	-	-	-	-	185	237	-	204	282	-
Stage 2	-	-	-	-	-	-	459	267	-	360	232	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.2	15.2	45.2
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	133	519	645	-	-	681	-	-	136	-	-
HCM Lane V/C Ratio	0.016	0.023	0.125	-	-	0.038	-	-	0.352	-	-
HCM Control Delay (s)	32.5	12.1	11.4	-	-	10.5	-	-	45.2	0	0
HCM Lane LOS	D	B	B	-	-	B	-	-	E	A	A
HCM 95th %tile Q(veh)	0.1	0.1	0.4	-	-	0.1	-	-	1.4	-	-

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	1061	4	27	1050	45	12	0	37	37	0	65
Future Vol, veh/h	34	1061	4	27	1050	45	12	0	37	37	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	1153	4	29	1141	49	13	0	40	40	0	71
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1190	0	0	1157	0	0	1856	2475	577	1850	2430	-
Stage 1	-	-	-	-	-	-	1227	1227	-	1199	1199	-
Stage 2	-	-	-	-	-	-	629	1248	-	651	1231	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	582	-	-	600	-	-	45	29	460	46	31	0
Stage 1	-	-	-	-	-	-	189	249	-	197	257	0
Stage 2	-	-	-	-	-	-	437	243	-	424	248	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	582	-	-	600	-	-	41	26	460	~ 39	28	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	126	108	-	124	114	-
Stage 1	-	-	-	-	-	-	177	233	-	184	245	-
Stage 2	-	-	-	-	-	-	416	231	-	362	232	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			0.3			19.3			47.4		
HCM LOS							C			E		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3	
Capacity (veh/h)	126	460	582	-	-	600	-	-	124	-	-	
HCM Lane V/C Ratio	0.104	0.087	0.063	-	-	0.049	-	-	0.324	-	-	
HCM Control Delay (s)	36.8	13.6	11.6	-	-	11.3	-	-	47.4	0	0	
HCM Lane LOS	E	B	B	-	-	B	-	-	E	A	A	
HCM 95th %tile Q(veh)	0.3	0.3	0.2	-	-	0.2	-	-	1.3	-	-	
Notes												
-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	912	10	10	944	43	28	0	17	44	0	111
Future Vol, veh/h	74	912	10	10	944	43	28	0	17	44	0	111
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	80	991	11	11	1026	47	30	0	18	48	0	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1073	0	0	1002	0	0	1686	2246	496	1704	2210	-
Stage 1	-	-	-	-	-	-	1151	1151	-	1048	1048	-
Stage 2	-	-	-	-	-	-	535	1095	-	656	1162	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	645	-	-	687	-	-	61	41	519	59	44	0
Stage 1	-	-	-	-	-	-	211	271	-	244	303	0
Stage 2	-	-	-	-	-	-	497	288	-	421	267	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	645	-	-	687	-	-	55	35	519	51	38	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	137	116	-	142	133	-
Stage 1	-	-	-	-	-	-	185	237	-	214	298	-
Stage 2	-	-	-	-	-	-	489	283	-	356	234	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	28.6	42.7
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	137	519	645	-	-	687	-	-	142	-	-
HCM Lane V/C Ratio	0.222	0.036	0.125	-	-	0.016	-	-	0.337	-	-
HCM Control Delay (s)	38.6	12.2	11.4	-	-	10.3	-	-	42.7	0	0
HCM Lane LOS	E	B	B	-	-	B	-	-	E	A	A
HCM 95th %tile Q(veh)	0.8	0.1	0.4	-	-	0	-	-	1.4	-	-













Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↗↗	↰	↰	↗↗	↰	↰	↗		↰	↗	↰
Traffic Vol, veh/h	34	1061	30	30	1050	45	19	0	11	37	0	65
Future Vol, veh/h	34	1061	30	30	1050	45	19	0	11	37	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	1153	33	33	1141	49	21	0	12	40	0	71

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1190	0	0	1186	0	0	1864	2483	577	1858	2467	-
Stage 1	-	-	-	-	-	-	1227	1227	-	1207	1207	-
Stage 2	-	-	-	-	-	-	637	1256	-	651	1260	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	582	-	-	585	-	-	45	29	460	45	30	0
Stage 1	-	-	-	-	-	-	189	249	-	194	254	0
Stage 2	-	-	-	-	-	-	432	241	-	424	240	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	582	-	-	585	-	-	41	26	460	~ 40	27	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	125	108	-	126	110	-
Stage 1	-	-	-	-	-	-	177	233	-	182	240	-
Stage 2	-	-	-	-	-	-	408	228	-	387	225	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	29.7	46.4
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	125	460	582	-	-	585	-	-	126	-	-
HCM Lane V/C Ratio	0.165	0.026	0.063	-	-	0.056	-	-	0.319	-	-
HCM Control Delay (s)	39.4	13	11.6	-	-	11.5	-	-	46.4	0	0
HCM Lane LOS	E	B	B	-	-	B	-	-	E	A	A
HCM 95th %tile Q(veh)	0.6	0.1	0.2	-	-	0.2	-	-	1.3	-	-

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













Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	912	28	34	944	43	30	0	28	44	0	111
Future Vol, veh/h	74	912	28	34	944	43	30	0	28	44	0	111
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	80	991	30	37	1026	47	33	0	30	48	0	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1073	0	0	1021	0	0	1738	2298	496	1756	2281	-
Stage 1	-	-	-	-	-	-	1151	1151	-	1100	1100	-
Stage 2	-	-	-	-	-	-	587	1147	-	656	1181	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	645	-	-	675	-	-	56	38	519	54	39	0
Stage 1	-	-	-	-	-	-	211	271	-	226	286	0
Stage 2	-	-	-	-	-	-	463	272	-	421	262	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	645	-	-	675	-	-	49	31	519	~ 44	32	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	106	-	129	117	-
Stage 1	-	-	-	-	-	-	185	237	-	198	270	-
Stage 2	-	-	-	-	-	-	438	257	-	347	230	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.4	27.4	48.5
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	131	519	645	-	-	675	-	-	129	-	-
HCM Lane V/C Ratio	0.249	0.059	0.125	-	-	0.055	-	-	0.371	-	-
HCM Control Delay (s)	41.4	12.4	11.4	-	-	10.6	-	-	48.5	0	0
HCM Lane LOS	E	B	B	-	-	B	-	-	E	A	A
HCM 95th %tile Q(veh)	0.9	0.2	0.4	-	-	0.2	-	-	1.5	-	-

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

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	1061	34	57	1050	45	31	0	48	37	0	65
Future Vol, veh/h	34	1061	34	57	1050	45	31	0	48	37	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Free
Storage Length	200	-	0	225	-	0	150	-	-	375	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	1153	37	62	1141	49	34	0	52	40	0	71

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1190	0	0	1190	0	0	1922	2541	577	1916	2529	-
Stage 1	-	-	-	-	-	-	1227	1227	-	1265	1265	-
Stage 2	-	-	-	-	-	-	695	1314	-	651	1264	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	582	-	-	582	-	-	40	27	460	41	27	0
Stage 1	-	-	-	-	-	-	189	249	-	179	239	0
Stage 2	-	-	-	-	-	-	399	226	-	424	239	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	582	-	-	582	-	-	35	23	460	~ 32	23	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	118	98	-	110	94	-
Stage 1	-	-	-	-	-	-	177	233	-	168	213	-
Stage 2	-	-	-	-	-	-	356	202	-	352	224	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.6	26.9	55.5
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	118	460	582	-	-	582	-	-	110	-	-
HCM Lane V/C Ratio	0.286	0.113	0.063	-	-	0.106	-	-	0.366	-	-
HCM Control Delay (s)	47.3	13.8	11.6	-	-	11.9	-	-	55.5	0	0
HCM Lane LOS	E	B	B	-	-	B	-	-	F	A	A
HCM 95th %tile Q(veh)	1.1	0.4	0.2	-	-	0.4	-	-	1.5	-	-





















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

Timings

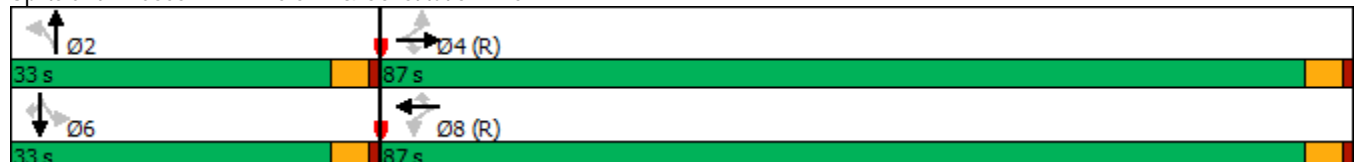
2045 Total AM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021

										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Configurations										
Traffic Volume (vph)	74	912	10	10	944	43	28	0	44	111
Future Volume (vph)	74	912	10	10	944	43	28	0	44	111
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases		4			8			2		
Permitted Phases	4		4	8		8	2		6	6
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	87.0	87.0	87.0	87.0	87.0	87.0	33.0	33.0	33.0	33.0
Total Split (%)	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	27.5%	27.5%	27.5%	27.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max
Act Effect Green (s)	82.5	82.5	82.5	82.5	82.5	82.5	28.5	28.5	28.5	28.5
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.24	0.24	0.24	0.24
v/c Ratio	0.26	0.41	0.01	0.03	0.42	0.04	0.09	0.04	0.15	0.25
Control Delay	9.7	8.7	2.4	6.3	16.3	3.9	36.7	0.1	37.7	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.7	2.4	6.3	16.3	3.9	36.7	0.1	37.7	3.9
LOS	A	A	A	A	B	A	D	A	D	A
Approach Delay		8.8			15.7			23.0		
Approach LOS		A			B			C		
Intersection Summary										
Cycle Length: 120										
Actuated Cycle Length: 120										
Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green										
Natural Cycle: 50										
Control Type: Actuated-Coordinated										
Maximum v/c Ratio: 0.42										
Intersection Signal Delay: 12.5										
Intersection LOS: B										
Intersection Capacity Utilization 50.6%										
ICU Level of Service A										
Analysis Period (min) 15										

Splits and Phases: 1: Akers Dr & Constitution Ave



HCM 6th Signalized Intersection Summary

2045 Total AM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021



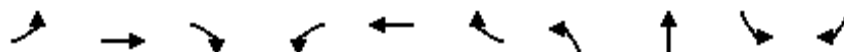
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	912	10	10	944	43	28	0	17	44	0	111
Future Volume (veh/h)	74	912	10	10	944	43	28	0	17	44	0	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	991	11	11	1026	47	30	0	18	48	0	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	355	2443	1090	379	2443	1090	362	0	376	379	444	376
Arrive On Green	0.69	0.69	0.69	0.69	0.69	0.69	0.24	0.00	0.24	0.24	0.00	0.24
Sat Flow, veh/h	526	3554	1585	562	3554	1585	1270	0	1585	1395	1870	1585
Grp Volume(v), veh/h	80	991	11	11	1026	47	30	0	18	48	0	121
Grp Sat Flow(s),veh/h/ln	526	1777	1585	562	1777	1585	1270	0	1585	1395	1870	1585
Q Serve(g_s), s	9.5	14.5	0.3	1.0	15.2	1.1	2.2	0.0	1.1	3.3	0.0	7.6
Cycle Q Clear(g_c), s	24.7	14.5	0.3	15.5	15.2	1.1	2.2	0.0	1.1	4.3	0.0	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	355	2443	1090	379	2443	1090	362	0	376	379	444	376
V/C Ratio(X)	0.23	0.41	0.01	0.03	0.42	0.04	0.08	0.00	0.05	0.13	0.00	0.32
Avail Cap(c_a), veh/h	355	2443	1090	379	2443	1090	362	0	376	379	444	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.34	0.34	0.34	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.7	8.1	5.9	11.5	8.2	6.0	35.7	0.0	35.3	37.0	0.0	37.8
Incr Delay (d2), s/veh	1.5	0.5	0.0	0.0	0.2	0.0	0.4	0.0	0.2	0.7	0.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	5.3	0.1	0.1	5.5	0.4	0.7	0.0	0.4	1.2	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.1	8.6	5.9	11.5	8.4	6.1	36.2	0.0	35.5	37.6	0.0	40.0
LnGrp LOS	B	A	A	B	A	A	D	A	D	D	A	D
Approach Vol, veh/h		1082			1084			48			169	
Approach Delay, s/veh		9.1			8.3			35.9			39.3	
Approach LOS		A			A			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.0		87.0		33.0		87.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		28.5		82.5		28.5		82.5				
Max Q Clear Time (g_c+I1), s		4.2		26.7		9.6		17.5				
Green Ext Time (p_c), s		0.1		11.1		0.5		10.4				
Intersection Summary												
HCM 6th Ctrl Delay				11.4								
HCM 6th LOS				B								

Timings

2045 Total PM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Configurations										
Traffic Volume (vph)	34	1061	30	30	1050	45	19	0	37	65
Future Volume (vph)	34	1061	30	30	1050	45	19	0	37	65
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases		4			8			2		
Permitted Phases	4		4	8		8	2		6	6
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	91.0	91.0	91.0	91.0	91.0	91.0	29.0	29.0	29.0	29.0
Total Split (%)	75.8%	75.8%	75.8%	75.8%	75.8%	75.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max
Act Effect Green (s)	86.5	86.5	86.5	86.5	86.5	86.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72	0.72	0.20	0.20	0.20	0.20
v/c Ratio	0.13	0.45	0.03	0.12	0.45	0.04	0.07	0.03	0.14	0.17
Control Delay	6.4	7.6	1.6	15.3	25.4	7.7	39.6	0.1	40.8	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	7.6	1.6	15.3	25.4	7.7	39.6	0.1	40.8	0.8
LOS	A	A	A	B	C	A	D	A	D	A
Approach Delay		7.4			24.4			25.2		
Approach LOS		A			C			C		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 16.0

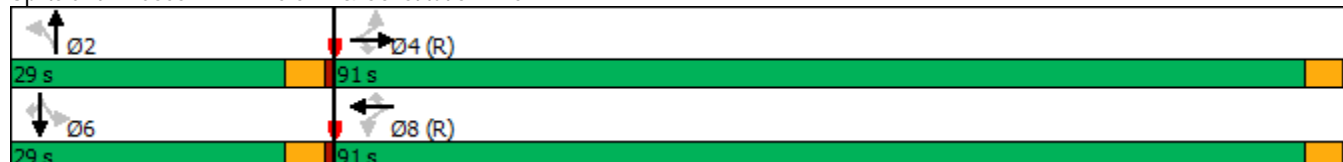
Intersection LOS: B

Intersection Capacity Utilization 48.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Akers Dr & Constitution Ave


























HCM 6th Signalized Intersection Summary

2045 Total PM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	1061	30	30	1050	45	19	0	11	37	0	65
Future Volume (veh/h)	34	1061	30	30	1050	45	19	0	11	37	0	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	37	1153	33	33	1141	49	21	0	12	40	0	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	337	2562	1143	337	2562	1143	331	0	324	338	382	324
Arrive On Green	0.72	0.72	0.72	0.72	0.72	0.72	0.20	0.00	0.20	0.20	0.00	0.20
Sat Flow, veh/h	471	3554	1585	472	3554	1585	1329	0	1585	1402	1870	1585
Grp Volume(v), veh/h	37	1153	33	33	1141	49	21	0	12	40	0	71
Grp Sat Flow(s),veh/h/ln	471	1777	1585	472	1777	1585	1329	0	1585	1402	1870	1585
Q Serve(g_s), s	4.2	16.1	0.7	3.7	15.8	1.1	1.5	0.0	0.7	2.8	0.0	4.5
Cycle Q Clear(g_c), s	20.1	16.1	0.7	19.8	15.8	1.1	1.5	0.0	0.7	3.6	0.0	4.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	337	2562	1143	337	2562	1143	331	0	324	338	382	324
V/C Ratio(X)	0.11	0.45	0.03	0.10	0.45	0.04	0.06	0.00	0.04	0.12	0.00	0.22
Avail Cap(c_a), veh/h	337	2562	1143	337	2562	1143	331	0	324	338	382	324
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.65	0.65	0.65	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	6.9	4.8	11.0	6.9	4.8	38.6	0.0	38.3	39.7	0.0	39.8
Incr Delay (d2), s/veh	0.7	0.6	0.0	0.4	0.4	0.0	0.4	0.0	0.2	0.7	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	5.7	0.2	0.4	5.5	0.3	0.5	0.0	0.3	1.0	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	7.5	4.8	11.4	7.3	4.9	39.0	0.0	38.5	40.4	0.0	41.3
LnGrp LOS	B	A	A	B	A	A	D	A	D	D	A	D
Approach Vol, veh/h	1223		1223				33		111			
Approach Delay, s/veh	7.5		7.3				38.8		41.0			
Approach LOS	A		A				D		D			
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	29.0		91.0		29.0		91.0					
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5					
Max Green Setting (Gmax), s	24.5		86.5		24.5		86.5					
Max Q Clear Time (g_c+I1), s	3.5		22.1		6.5		21.8					
Green Ext Time (p_c), s	0.1		13.2		0.3		13.0					
Intersection Summary												
HCM 6th Ctrl Delay	9.2											
HCM 6th LOS	A											

Timings

2045 Total AM w Adj. Development - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021
























										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Configurations										
Traffic Volume (vph)	74	912	28	34	944	43	30	0	44	111
Future Volume (vph)	74	912	28	34	944	43	30	0	44	111
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases		4			8			2		
Permitted Phases	4		4	8		8	2		6	6
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	65.0	65.0	65.0	65.0	65.0	65.0	32.4	32.4	32.4	32.4
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	Max	Max
Act Effect Green (s)	41.0	41.0	41.0	41.0	41.0	41.0	47.4	47.4	47.4	47.4
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42	0.49	0.49	0.49	0.49
v/c Ratio	0.71	0.67	0.04	0.30	0.69	0.07	0.05	0.04	0.07	0.15
Control Delay	55.3	24.5	4.6	23.1	25.0	4.0	16.6	0.1	16.8	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	24.5	4.6	23.1	25.0	4.0	16.6	0.1	16.8	3.9
LOS	E	C	A	C	C	A	B	A	B	A
Approach Delay		26.2			24.1			8.7		
Approach LOS		C			C			A		
Intersection Summary										
Cycle Length: 97.4										
Actuated Cycle Length: 97.4										
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green										
Natural Cycle: 50										
Control Type: Actuated-Coordinated										
Maximum v/c Ratio: 0.71										
Intersection Signal Delay: 23.5										
Intersection LOS: C										
Intersection Capacity Utilization 50.6%										
ICU Level of Service A										
Analysis Period (min) 15										

Splits and Phases: 1: Akers Dr & Constitution Ave



HCM 6th Signalized Intersection Summary 2045 Total AM w Adj. Development - Signalized.syn
1: Akers Dr & Constitution Ave

10/05/2021

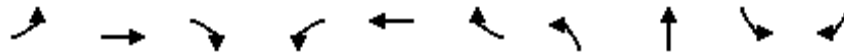
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	912	28	34	944	43	30	0	28	44	0	111
Future Volume (veh/h)	74	912	28	34	944	43	30	0	28	44	0	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	991	30	37	1026	47	33	0	30	48	0	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	1656	739	218	1656	739	635	0	699	668	825	699
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.44	0.00	0.44	0.44	0.00	0.44
Sat Flow, veh/h	526	3554	1585	552	3554	1585	1270	0	1585	1380	1870	1585
Grp Volume(v), veh/h	80	991	30	37	1026	47	33	0	30	48	0	121
Grp Sat Flow(s),veh/h/ln	526	1777	1585	552	1777	1585	1270	0	1585	1380	1870	1585
Q Serve(g_s), s	13.1	20.0	1.0	5.2	21.0	1.6	1.4	0.0	1.0	2.0	0.0	4.5
Cycle Q Clear(g_c), s	34.1	20.0	1.0	25.2	21.0	1.6	1.4	0.0	1.0	3.0	0.0	4.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	205	1656	739	218	1656	739	635	0	699	668	825	699
V/C Ratio(X)	0.39	0.60	0.04	0.17	0.62	0.06	0.05	0.00	0.04	0.07	0.00	0.17
Avail Cap(c_a), veh/h	288	2216	989	305	2216	989	635	0	699	668	825	699
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.34	0.34	0.34	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.2	19.2	14.1	28.5	19.4	14.3	15.5	0.0	15.4	16.3	0.0	16.4
Incr Delay (d2), s/veh	1.2	0.3	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	8.0	0.4	0.7	8.3	0.6	0.4	0.0	0.4	0.7	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.4	19.5	14.1	28.6	19.6	14.3	15.7	0.0	15.6	16.5	0.0	16.9
LnGrp LOS	C	B	B	C	B	B	B	A	B	B	A	B
Approach Vol, veh/h		1101			1110			63			169	
Approach Delay, s/veh		20.4			19.7			15.6			16.8	
Approach LOS		C			B			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.3		49.7		47.3		49.7				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		27.9		60.5		27.9		60.5				
Max Q Clear Time (g_c+I1), s		3.4		36.1		6.5		27.2				
Green Ext Time (p_c), s		0.2		9.1		0.5		9.9				
Intersection Summary												
HCM 6th Ctrl Delay				19.7								
HCM 6th LOS				B								

Timings

2045 Total PM w Adj. Development - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Configurations										
Traffic Volume (vph)	34	1061	34	57	1050	45	31	0	37	65
Future Volume (vph)	34	1061	34	57	1050	45	31	0	37	65
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases		4			8			2		
Permitted Phases	4		4	8		8	2		6	6
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	91.0	91.0	91.0	91.0	91.0	91.0	29.0	29.0	29.0	29.0
Total Split (%)	75.8%	75.8%	75.8%	75.8%	75.8%	75.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max
Act Effect Green (s)	86.5	86.5	86.5	86.5	86.5	86.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.72	0.72	0.72	0.72	0.72	0.72	0.20	0.20	0.20	0.20
v/c Ratio	0.13	0.45	0.03	0.22	0.45	0.04	0.12	0.12	0.15	0.17
Control Delay	6.4	7.6	1.6	13.1	13.7	6.0	40.4	0.6	40.9	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	7.6	1.6	13.1	13.7	6.0	40.4	0.6	40.9	0.8
LOS	A	A	A	B	B	A	D	A	D	A
Approach Delay		7.4			13.4			16.3		
Approach LOS		A			B			B		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 31 (26%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 10.8

Intersection LOS: B

Intersection Capacity Utilization 53.5%

ICU Level of Service A
























Analysis Period (min) 15

Splits and Phases: 1: Akers Dr & Constitution Ave



HCM 6th Signalized Intersection Summary 2045 Total PM w Adj. Development - Signalized.syn
1: Akers Dr & Constitution Ave

10/05/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	1061	34	57	1050	45	31	0	48	37	0	65
Future Volume (veh/h)	34	1061	34	57	1050	45	31	0	48	37	0	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	37	1153	37	62	1141	49	34	0	52	40	0	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	337	2562	1143	336	2562	1143	331	0	324	300	382	324
Arrive On Green	0.72	0.72	0.72	0.72	0.72	0.72	0.20	0.00	0.20	0.20	0.00	0.20
Sat Flow, veh/h	471	3554	1585	471	3554	1585	1329	0	1585	1352	1870	1585
Grp Volume(v), veh/h	37	1153	37	62	1141	49	34	0	52	40	0	71
Grp Sat Flow(s),veh/h/ln	471	1777	1585	471	1777	1585	1329	0	1585	1352	1870	1585
Q Serve(g_s), s	4.2	16.1	0.8	7.5	15.8	1.1	2.5	0.0	3.2	3.0	0.0	4.5
Cycle Q Clear(g_c), s	20.1	16.1	0.8	23.6	15.8	1.1	2.5	0.0	3.2	6.2	0.0	4.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	337	2562	1143	336	2562	1143	331	0	324	300	382	324
V/C Ratio(X)	0.11	0.45	0.03	0.18	0.45	0.04	0.10	0.00	0.16	0.13	0.00	0.22
Avail Cap(c_a), veh/h	337	2562	1143	336	2562	1143	331	0	324	300	382	324
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.65	0.65	0.65	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	6.9	4.8	11.8	6.9	4.8	39.0	0.0	39.3	41.9	0.0	39.8
Incr Delay (d2), s/veh	0.7	0.6	0.1	0.8	0.4	0.0	0.6	0.0	1.1	0.9	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	5.7	0.3	0.9	5.5	0.3	0.9	0.0	1.4	1.1	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	7.5	4.8	12.6	7.3	4.9	39.6	0.0	40.4	42.8	0.0	41.3
LnGrp LOS	B	A	A	B	A	A	D	A	D	D	A	D
Approach Vol, veh/h	1227			1252			86			111		
Approach Delay, s/veh	7.5			7.4			40.1			41.9		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	29.0			91.0			29.0			91.0		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	24.5			86.5			24.5			86.5		
Max Q Clear Time (g_c+I1), s	5.2			22.1			8.2			25.6		
Green Ext Time (p_c), s	0.3			13.3			0.2			13.8		
Intersection Summary												
HCM 6th Ctrl Delay	10.0											
HCM 6th LOS	A											

Timings

2: Marksheffel Rd & Constitution Ave

2021 Existing AM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	334	325	92	455	206	289	724	32	191	1341	115
Future Volume (vph)	135	334	325	92	455	206	289	724	32	191	1341	115
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	14.0	24.8		14.6	25.4		19.0	62.6		18.0	61.6	
Total Split (%)	11.7%	20.7%		12.2%	21.2%		15.8%	52.2%		15.0%	51.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	26.6	18.6	120.0	27.9	19.3	120.0	12.9	58.0	120.0	11.2	56.4	120.0
Actuated g/C Ratio	0.22	0.16	1.00	0.23	0.16	1.00	0.11	0.48	1.00	0.09	0.47	1.00
v/c Ratio	0.80	0.65	0.22	0.41	0.85	0.14	0.83	0.45	0.02	0.63	0.86	0.08
Control Delay	67.9	53.7	0.3	38.5	64.2	0.2	72.4	21.8	0.0	61.7	35.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	53.7	0.3	38.5	64.2	0.2	72.4	21.8	0.0	61.7	35.0	0.1
LOS	E	D	A	D	E	A	E	C	A	E	D	A
Approach Delay		34.3			43.6			35.1			35.7	
Approach LOS		C			D			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 36.7







Intersection LOS: D

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave

























				
Ø1	Ø2 (R)	Ø3	Ø4	
18 s	62.6 s	14.6 s	24.8 s	
				
Ø5	Ø6 (R)	Ø7	Ø8	
19 s	61.6 s	14 s	25.4 s	

HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2021 Existing AM.syn

09/28/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	334	325	92	455	206	289	724	32	191	1341	115
Future Volume (veh/h)	135	334	325	92	455	206	289	724	32	191	1341	115
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	144	355	0	98	484	0	307	770	0	203	1427	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	588		242	551		361	1786		262	1684	
Arrive On Green	0.07	0.17	0.00	0.06	0.15	0.00	0.10	0.50	0.00	0.08	0.47	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	144	355	0	98	484	0	307	770	0	203	1427	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.0	11.1	0.0	5.5	16.0	0.0	10.5	16.5	0.0	6.9	42.4	0.0
Cycle Q Clear(g_c), s	8.0	11.1	0.0	5.5	16.0	0.0	10.5	16.5	0.0	6.9	42.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	588		242	551		361	1786		262	1684	
V/C Ratio(X)	0.73	0.60		0.40	0.88		0.85	0.43		0.77	0.85	
Avail Cap(c_a), veh/h	199	588		270	589		374	1786		346	1684	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.2	46.4	0.0	39.6	49.6	0.0	52.8	19.0	0.0	54.4	27.8	0.0
Incr Delay (d2), s/veh	12.4	1.7	0.0	1.1	13.7	0.0	16.3	0.8	0.0	7.8	5.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	5.1	0.0	2.5	8.1	0.0	5.4	6.9	0.0	3.3	18.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	48.2	0.0	40.6	63.2	0.0	69.1	19.7	0.0	62.2	33.3	0.0
LnGrp LOS	D	D		D	E		E	B		E	C	
Approach Vol, veh/h		499	A		582	A		1077	A		1630	A
Approach Delay, s/veh		49.7			59.4			33.8			36.9	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.1	66.3	12.7	25.9	18.5	62.9	14.0	24.6				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	12.0	56.6	9.1	18.8	13.0	55.6	8.0	* 20				
Max Q Clear Time (g_c+I1), s	8.9	18.5	7.5	13.1	12.5	44.4	10.0	18.0				
Green Ext Time (p_c), s	0.2	6.4	0.0	1.1	0.1	7.4	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay	41.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

























Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Marksheffel Rd & Constitution Ave

2021 Existing PM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	560	258	123	459	269	365	1269	46	215	739	110
Future Volume (vph)	114	560	258	123	459	269	365	1269	46	215	739	110
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	14.0	30.0		14.4	30.4		26.0	59.6		16.0	49.6	
Total Split (%)	11.7%	25.0%		12.0%	25.3%		21.7%	49.7%		13.3%	41.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	31.1	23.2	120.0	32.8	24.1	120.0	17.9	54.5	120.0	10.0	46.6	120.0
Actuated g/C Ratio	0.26	0.19	1.00	0.27	0.20	1.00	0.15	0.45	1.00	0.08	0.39	1.00
v/c Ratio	0.57	0.87	0.17	0.69	0.69	0.18	0.76	0.84	0.03	0.80	0.57	0.07
Control Delay	41.9	61.4	0.2	49.9	50.0	0.2	58.9	35.1	0.0	74.8	31.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	61.4	0.2	49.9	50.0	0.2	58.9	35.1	0.0	74.8	31.5	0.1
LOS	D	E	A	D	D	A	E	D	A	E	C	A
Approach Delay		42.1			34.3			39.3			37.0	
Approach LOS		D			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 38.4






Intersection LOS: D

Intersection Capacity Utilization 83.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave

























			
Ø1	Ø2 (R)	Ø3	Ø4
16 s	59.6 s	14.4 s	30 s
			
Ø5	Ø6 (R)	Ø7	Ø8
26 s	49.6 s	14 s	30.4 s

HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2021 Existing PM.syn

09/28/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	560	258	123	459	269	365	1269	46	215	739	110
Future Volume (veh/h)	114	560	258	123	459	269	365	1269	46	215	739	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	121	596	0	131	488	0	388	1350	0	229	786	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	236	668		212	680		456	1635		283	1458	
Arrive On Green	0.07	0.19	0.00	0.07	0.19	0.00	0.13	0.46	0.00	0.08	0.41	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	121	596	0	131	488	0	388	1350	0	229	786	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	6.5	19.6	0.0	7.0	15.4	0.0	13.2	39.7	0.0	7.8	20.1	0.0
Cycle Q Clear(g_c), s	6.5	19.6	0.0	7.0	15.4	0.0	13.2	39.7	0.0	7.8	20.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	236	668		212	680		456	1635		283	1458	
V/C Ratio(X)	0.51	0.89		0.62	0.72		0.85	0.83		0.81	0.54	
Avail Cap(c_a), veh/h	236	711		212	737		576	1635		288	1458	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.9	47.5	0.0	37.2	45.5	0.0	50.9	28.2	0.0	54.2	26.8	0.0
Incr Delay (d2), s/veh	1.9	13.1	0.0	5.3	3.1	0.0	9.7	4.9	0.0	15.5	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	9.9	0.0	3.4	7.1	0.0	6.3	17.6	0.0	4.0	8.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	60.6	0.0	42.5	48.6	0.0	60.6	33.1	0.0	69.7	28.2	0.0
LnGrp LOS	D	E		D	D		E	C		E	C	
Approach Vol, veh/h		717	A		619	A		1738	A		1015	A
Approach Delay, s/veh		56.9			47.3			39.3			37.6	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.8	61.2	14.4	28.6	21.8	55.2	14.0	29.0				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	10.0	53.6	8.9	24.0	20.0	43.6	8.0	* 25				
Max Q Clear Time (g_c+I1), s	9.8	41.7	9.0	21.6	15.2	22.1	8.5	17.4				
Green Ext Time (p_c), s	0.0	7.4	0.0	0.9	0.6	5.7	0.0	1.9				
Intersection Summary												
HCM 6th Ctrl Delay			43.2									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2023 Background AM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	338	329	93	461	209	293	733	32	193	1358	116
Future Volume (vph)	137	338	329	93	461	209	293	733	32	193	1358	116
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	14.0	24.8		14.6	25.4		19.0	62.6		18.0	61.6	
Total Split (%)	11.7%	20.7%		12.2%	21.2%		15.8%	52.2%		15.0%	51.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	26.7	18.7	120.0	28.0	19.3	120.0	12.9	58.0	120.0	11.2	56.3	120.0
Actuated g/C Ratio	0.22	0.16	1.00	0.23	0.16	1.00	0.11	0.48	1.00	0.09	0.47	1.00
v/c Ratio	0.81	0.65	0.22	0.42	0.86	0.14	0.85	0.46	0.02	0.64	0.87	0.08
Control Delay	69.2	53.8	0.3	38.7	64.8	0.2	73.7	21.9	0.0	62.0	35.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.2	53.8	0.3	38.7	64.8	0.2	73.7	21.9	0.0	62.0	35.9	0.1
LOS	E	D	A	D	E	A	E	C	A	E	D	A
Approach Delay		34.6			43.9			35.6			36.4	
Approach LOS		C			D			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 37.2




Intersection LOS: D

Intersection Capacity Utilization 85.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave

























				
Ø1	Ø2 (R)	Ø3	Ø4	
18 s	62.6 s	14.6 s	24.8 s	
				
Ø5	Ø6 (R)	Ø7	Ø8	
19 s	61.6 s	14 s	25.4 s	

HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2023 Background AM.syn

09/28/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	338	329	93	461	209	293	733	32	193	1358	116
Future Volume (veh/h)	137	338	329	93	461	209	293	733	32	193	1358	116
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	360	0	99	490	0	312	780	0	205	1445	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	591		242	555		366	1779		264	1675	
Arrive On Green	0.07	0.17	0.00	0.06	0.16	0.00	0.11	0.50	0.00	0.08	0.47	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	146	360	0	99	490	0	312	780	0	205	1445	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.0	11.3	0.0	5.5	16.2	0.0	10.6	16.8	0.0	7.0	43.5	0.0
Cycle Q Clear(g_c), s	8.0	11.3	0.0	5.5	16.2	0.0	10.6	16.8	0.0	7.0	43.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	198	591		242	555		366	1779		264	1675	
V/C Ratio(X)	0.74	0.61		0.41	0.88		0.85	0.44		0.78	0.86	
Avail Cap(c_a), veh/h	198	591		269	589		374	1779		346	1675	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.3	46.4	0.0	39.4	49.5	0.0	52.7	19.2	0.0	54.4	28.3	0.0
Incr Delay (d2), s/veh	13.5	1.8	0.0	1.1	14.1	0.0	16.9	0.8	0.0	8.0	6.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	5.1	0.0	2.5	8.3	0.0	5.5	7.1	0.0	3.3	19.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.8	48.2	0.0	40.5	63.7	0.0	69.6	20.0	0.0	62.4	34.4	0.0
LnGrp LOS	D	D		D	E		E	B		E	C	
Approach Vol, veh/h		506	A		589	A		1092	A		1650	A
Approach Delay, s/veh		50.1			59.8			34.1			37.9	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.2	66.1	12.8	26.0	18.7	62.6	14.0	24.7				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	12.0	56.6	9.1	18.8	13.0	55.6	8.0	* 20				
Max Q Clear Time (g_c+l1), s	9.0	18.8	7.5	13.3	12.6	45.5	10.0	18.2				
Green Ext Time (p_c), s	0.2	6.5	0.0	1.1	0.0	6.9	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay	41.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

























Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2023 Background PM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	567	261	125	465	272	370	1285	47	218	748	111
Future Volume (vph)	115	567	261	125	465	272	370	1285	47	218	748	111
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	14.0	30.0		14.4	30.4		26.0	59.6		16.0	49.6	
Total Split (%)	11.7%	25.0%		12.0%	25.3%		21.7%	49.7%		13.3%	41.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	31.2	23.3	120.0	32.9	24.1	120.0	18.0	54.4	120.0	10.0	46.4	120.0
Actuated g/C Ratio	0.26	0.19	1.00	0.27	0.20	1.00	0.15	0.45	1.00	0.08	0.39	1.00
v/c Ratio	0.58	0.88	0.18	0.70	0.70	0.18	0.77	0.85	0.03	0.81	0.58	0.07
Control Delay	42.6	62.2	0.2	50.8	50.2	0.3	59.2	35.9	0.0	75.6	31.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.6	62.2	0.2	50.8	50.2	0.3	59.2	35.9	0.0	75.6	31.8	0.1
LOS	D	E	A	D	D	A	E	D	A	E	C	A
Approach Delay		42.7			34.5			40.0			37.4	
Approach LOS		D			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 38.9


Intersection LOS: D

Intersection Capacity Utilization 83.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave

























			
Ø1	Ø2 (R)	Ø3	Ø4
16 s	59.6 s	14.4 s	30 s
			
Ø5	Ø6 (R)	Ø7	Ø8
26 s	49.6 s	14 s	30.4 s

HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2023 Background PM.syn

09/28/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	567	261	125	465	272	370	1285	47	218	748	111
Future Volume (veh/h)	115	567	261	125	465	272	370	1285	47	218	748	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	122	603	0	133	495	0	394	1367	0	232	796	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	673		211	685		461	1627		286	1447	
Arrive On Green	0.07	0.19	0.00	0.07	0.19	0.00	0.13	0.46	0.00	0.08	0.41	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	122	603	0	133	495	0	394	1367	0	232	796	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	6.6	19.9	0.0	7.1	15.7	0.0	13.4	40.7	0.0	7.9	20.5	0.0
Cycle Q Clear(g_c), s	6.6	19.9	0.0	7.1	15.7	0.0	13.4	40.7	0.0	7.9	20.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	235	673		211	685		461	1627		286	1447	
V/C Ratio(X)	0.52	0.90		0.63	0.72		0.85	0.84		0.81	0.55	
Avail Cap(c_a), veh/h	235	711		211	737		576	1627		288	1447	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.8	47.5	0.0	37.1	45.4	0.0	50.8	28.7	0.0	54.1	27.2	0.0
Incr Delay (d2), s/veh	2.0	13.6	0.0	5.8	3.2	0.0	10.0	5.4	0.0	15.9	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	10.0	0.0	3.4	7.2	0.0	6.4	18.1	0.0	4.1	9.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.8	61.1	0.0	42.9	48.7	0.0	60.9	34.1	0.0	70.0	28.7	0.0
LnGrp LOS	D	E		D	D		E	C		E	C	
Approach Vol, veh/h		725	A		628	A		1761	A		1028	A
Approach Delay, s/veh		57.3			47.5			40.1			38.0	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.9	60.9	14.4	28.7	22.0	54.9	14.0	29.1				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	10.0	53.6	8.9	24.0	20.0	43.6	8.0	* 25				
Max Q Clear Time (g_c+I1), s	9.9	42.7	9.1	21.9	15.4	22.5	8.6	17.7				
Green Ext Time (p_c), s	0.0	7.0	0.0	0.8	0.6	5.7	0.0	1.9				
Intersection Summary												
HCM 6th Ctrl Delay			43.7									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2: Marksheffel Rd & Constitution Ave

2023 Total AM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	346	329	93	464	209	297	733	32	193	1358	119
Future Volume (vph)	145	346	329	93	464	209	297	733	32	193	1358	119
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	23.5	36.5		23.5	36.5		23.5	36.5		23.5	36.5	
Total Split (%)	19.6%	30.4%		19.6%	30.4%		19.6%	30.4%		19.6%	30.4%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	39.8	26.2	120.0	32.8	22.7	120.0	16.1	47.8	120.0	12.5	44.1	120.0
Actuated g/C Ratio	0.33	0.22	1.00	0.27	0.19	1.00	0.13	0.40	1.00	0.10	0.37	1.00
v/c Ratio	0.54	0.48	0.22	0.30	0.74	0.14	0.69	0.55	0.02	0.58	1.11	0.08
Control Delay	33.9	42.3	0.3	27.7	52.6	0.2	57.3	31.8	0.0	57.4	97.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	42.3	0.3	27.7	52.6	0.2	57.3	31.8	0.0	57.4	97.3	0.1
LOS	C	D	A	C	D	A	E	C	A	E	F	A
Approach Delay		24.0			35.3			38.0			85.8	
Approach LOS		C			D			D			F	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 53.3

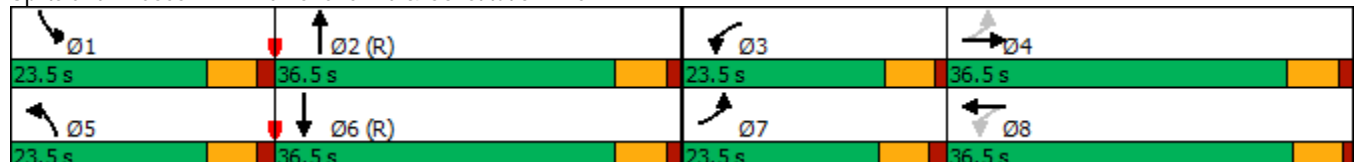
Intersection LOS: D

Intersection Capacity Utilization 86.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave



























HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2023 Total AM.syn

09/28/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	346	329	93	464	209	297	733	32	193	1358	119
Future Volume (veh/h)	145	346	329	93	464	209	297	733	32	193	1358	119
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	154	368	0	99	494	0	316	780	0	205	1445	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	252	725		282	613		381	1640		270	1525	
Arrive On Green	0.09	0.20	0.00	0.06	0.17	0.00	0.11	0.46	0.00	0.08	0.43	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	154	368	0	99	494	0	316	780	0	205	1445	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.4	11.0	0.0	5.4	16.0	0.0	10.7	18.2	0.0	7.0	46.9	0.0
Cycle Q Clear(g_c), s	8.4	11.0	0.0	5.4	16.0	0.0	10.7	18.2	0.0	7.0	46.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	252	725		282	613		381	1640		270	1525	
V/C Ratio(X)	0.61	0.51		0.35	0.81		0.83	0.48		0.76	0.95	
Avail Cap(c_a), veh/h	355	903		441	918		504	1640		504	1525	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.2	42.4	0.0	37.6	47.7	0.0	52.3	22.3	0.0	54.2	32.9	0.0
Incr Delay (d2), s/veh	2.4	0.6	0.0	0.7	3.2	0.0	8.6	1.0	0.0	4.4	13.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	4.9	0.0	2.4	7.4	0.0	5.1	7.8	0.0	3.2	22.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.6	43.0	0.0	38.3	50.9	0.0	60.8	23.3	0.0	58.6	46.4	0.0
LnGrp LOS	D	D		D	D		E	C		E	D	
Approach Vol, veh/h		522	A		593	A		1096	A		1650	A
Approach Delay, s/veh		42.0			48.8			34.1			48.0	
Approach LOS		D			D			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.4	61.4	12.8	30.5	19.2	57.5	16.5	26.7				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	17.5	30.5	18.0	30.5	17.5	30.5	17.5	* 31				
Max Q Clear Time (g_c+I1), s	9.0	20.2	7.4	13.0	12.7	48.9	10.4	18.0				
Green Ext Time (p_c), s	0.4	3.9	0.1	2.2	0.5	0.0	0.2	2.7				
Intersection Summary												
HCM 6th Ctrl Delay			43.4									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2: Marksheffel Rd & Constitution Ave

2023 Total PM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	573	261	125	474	272	382	1285	47	218	748	120
Future Volume (vph)	121	573	261	125	474	272	382	1285	47	218	748	120
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	13.0	30.0		14.4	31.4		27.0	59.6		16.0	48.6	
Total Split (%)	10.8%	25.0%		12.0%	26.2%		22.5%	49.7%		13.3%	40.5%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	30.3	23.3	120.0	33.9	25.1	120.0	18.6	54.3	120.0	10.0	45.7	120.0
Actuated g/C Ratio	0.25	0.19	1.00	0.28	0.21	1.00	0.16	0.45	1.00	0.08	0.38	1.00
v/c Ratio	0.64	0.89	0.18	0.69	0.68	0.18	0.76	0.85	0.03	0.81	0.59	0.08
Control Delay	47.3	63.0	0.2	50.4	48.9	0.3	58.3	36.0	0.0	75.6	32.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.3	63.0	0.2	50.4	48.9	0.3	58.3	36.0	0.0	75.6	32.5	0.1
LOS	D	E	A	D	D	A	E	D	A	E	C	A
Approach Delay		43.9			33.9			39.9			37.6	
Approach LOS		D			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 84.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave



























HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

2023 Total PM.syn

09/28/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	573	261	125	474	272	382	1285	47	218	748	120
Future Volume (veh/h)	121	573	261	125	474	272	382	1285	47	218	748	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	129	610	0	133	504	0	406	1367	0	232	796	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	678		211	719		475	1622		286	1428	
Arrive On Green	0.06	0.19	0.00	0.07	0.20	0.00	0.14	0.46	0.00	0.08	0.40	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	129	610	0	133	504	0	406	1367	0	232	796	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	7.0	20.1	0.0	7.1	15.8	0.0	13.8	40.8	0.0	7.9	20.7	0.0
Cycle Q Clear(g_c), s	7.0	20.1	0.0	7.1	15.8	0.0	13.8	40.8	0.0	7.9	20.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	227	678		211	719		475	1622		286	1428	
V/C Ratio(X)	0.57	0.90		0.63	0.70		0.85	0.84		0.81	0.56	
Avail Cap(c_a), veh/h	227	711		211	767		605	1622		288	1428	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.5	47.4	0.0	37.0	44.5	0.0	50.6	28.8	0.0	54.1	27.7	0.0
Incr Delay (d2), s/veh	3.3	14.1	0.0	5.9	2.7	0.0	9.4	5.5	0.0	15.9	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	10.2	0.0	3.4	7.2	0.0	6.6	18.2	0.0	4.1	9.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.9	61.6	0.0	43.0	47.1	0.0	60.0	34.3	0.0	70.0	29.2	0.0
LnGrp LOS	D	E		D	D		E	C		E	C	
Approach Vol, veh/h		739	A		637	A		1773	A		1028	A
Approach Delay, s/veh		58.0			46.3			40.2			38.5	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.9	60.8	14.4	28.9	22.5	54.2	13.0	30.3				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	10.0	53.6	8.9	24.0	21.0	42.6	7.0	* 26				
Max Q Clear Time (g_c+I1), s	9.9	42.8	9.1	22.1	15.8	22.7	9.0	17.8				
Green Ext Time (p_c), s	0.0	6.9	0.0	0.8	0.7	5.6	0.0	2.1				
Intersection Summary												
HCM 6th Ctrl Delay			43.8									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2045 Background AM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	157	387	377	107	528	239	335	840	37	222	1555	133
Future Volume (vph)	157	387	377	107	528	239	335	840	37	222	1555	133
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	12.0	24.8		11.2	24.0		19.0	66.0		18.0	65.0	
Total Split (%)	10.0%	20.7%		9.3%	20.0%		15.8%	55.0%		15.0%	54.2%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	24.8	18.8	120.0	24.2	18.5	120.0	13.0	60.4	120.0	11.6	59.0	120.0
Actuated g/C Ratio	0.21	0.16	1.00	0.20	0.15	1.00	0.11	0.50	1.00	0.10	0.49	1.00
v/c Ratio	1.11	0.74	0.25	0.66	1.03	0.16	0.96	0.50	0.02	0.72	0.95	0.09
Control Delay	146.3	57.4	0.4	56.7	96.4	0.2	91.0	21.1	0.0	65.2	42.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	146.3	57.4	0.4	56.7	96.4	0.2	91.0	21.1	0.0	65.2	42.3	0.1
LOS	F	E	A	E	F	A	F	C	A	E	D	A
Approach Delay		49.2			65.3			39.8			42.0	
Approach LOS		D			E			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 46.9

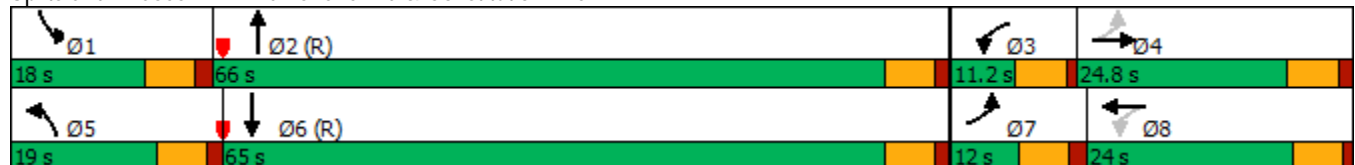
Intersection LOS: D

Intersection Capacity Utilization 95.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave



























HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

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






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	157	387	377	107	528	239	335	840	37	222	1555	133
Future Volume (veh/h)	157	387	377	107	528	239	335	840	37	222	1555	133
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	412	0	114	562	0	356	894	0	236	1654	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	149	572		194	548		374	2319		294	2236	
Arrive On Green	0.05	0.16	0.00	0.05	0.15	0.00	0.11	0.65	0.00	0.08	0.63	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	167	412	0	114	562	0	356	894	0	236	1654	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	6.0	13.2	0.0	5.7	18.5	0.0	12.3	14.0	0.0	8.0	38.7	0.0
Cycle Q Clear(g_c), s	6.0	13.2	0.0	5.7	18.5	0.0	12.3	14.0	0.0	8.0	38.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	149	572		194	548		374	2319		294	2236	
V/C Ratio(X)	1.12	0.72		0.59	1.03		0.95	0.39		0.80	0.74	
Avail Cap(c_a), veh/h	149	572		194	548		374	2319		346	2236	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.2	47.8	0.0	43.1	50.7	0.0	53.2	9.7	0.0	53.9	15.4	0.0
Incr Delay (d2), s/veh	109.7	4.4	0.0	4.6	45.2	0.0	33.9	0.5	0.0	11.2	2.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	6.2	0.0	0.8	11.6	0.0	7.1	5.3	0.0	4.0	15.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	156.8	52.2	0.0	47.6	95.9	0.0	87.1	10.2	0.0	65.1	17.7	0.0
LnGrp LOS	F	D		D	F		F	B		E	B	
Approach Vol, veh/h		579	A		676	A		1250	A		1890	A
Approach Delay, s/veh		82.4			87.8			32.1			23.6	
Approach LOS		F			F			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.2	84.8	11.2	25.3	19.0	82.0	12.0	24.5				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	12.0	60.0	5.7	18.8	13.0	59.0	6.0	* 19				
Max Q Clear Time (g_c+l1), s	10.0	16.0	7.7	15.2	14.3	40.7	8.0	20.5				
Green Ext Time (p_c), s	0.2	7.9	0.0	0.9	0.0	12.1	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			43.6									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2: Marksheffel Rd & Constitution Ave

2045 Background PM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	650	299	143	532	312	423	1472	53	249	857	128
Future Volume (vph)	132	650	299	143	532	312	423	1472	53	249	857	128
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	14.0	30.0		14.4	30.4		26.0	59.6		16.0	49.6	
Total Split (%)	11.7%	25.0%		12.0%	25.3%		21.7%	49.7%		13.3%	41.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	32.0	24.0	120.0	33.8	24.9	120.0	19.0	53.6	120.0	10.0	44.6	120.0
Actuated g/C Ratio	0.27	0.20	1.00	0.28	0.21	1.00	0.16	0.45	1.00	0.08	0.37	1.00
v/c Ratio	0.73	0.98	0.20	0.79	0.77	0.21	0.83	0.99	0.04	0.93	0.69	0.09
Control Delay	54.0	76.7	0.3	59.7	52.9	0.3	62.6	53.9	0.0	92.2	35.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.0	76.7	0.3	59.7	52.9	0.3	62.6	53.9	0.0	92.2	35.6	0.1
LOS	D	E	A	E	D	A	E	D	A	F	D	A
Approach Delay		52.8			37.3			54.4			43.3	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 48.2

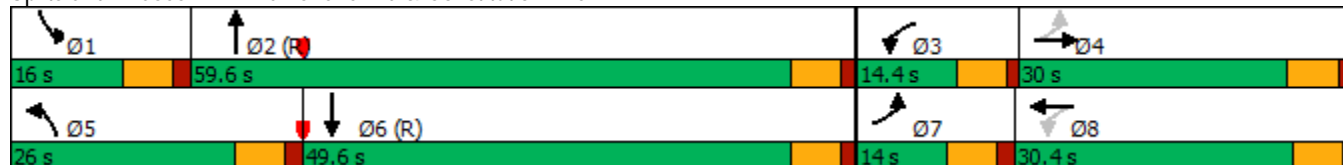
Intersection LOS: D

Intersection Capacity Utilization 93.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave



























HCM 6th Signalized Intersection Summary

2: Marksheffel Rd & Constitution Ave

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






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	650	299	143	532	312	423	1472	53	249	857	128
Future Volume (veh/h)	132	650	299	143	532	312	423	1472	53	249	857	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	140	691	0	152	566	0	450	1566	0	265	912	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	711		197	723		512	1587		288	1357	
Arrive On Green	0.07	0.20	0.00	0.07	0.20	0.00	0.15	0.45	0.00	0.08	0.38	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	140	691	0	152	566	0	450	1566	0	265	912	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	7.5	23.2	0.0	8.1	18.1	0.0	15.3	52.3	0.0	9.1	25.6	0.0
Cycle Q Clear(g_c), s	7.5	23.2	0.0	8.1	18.1	0.0	15.3	52.3	0.0	9.1	25.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	223	711		197	723		512	1587		288	1357	
V/C Ratio(X)	0.63	0.97		0.77	0.78		0.88	0.99		0.92	0.67	
Avail Cap(c_a), veh/h	223	711		197	737		576	1587		288	1357	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.6	47.7	0.0	36.9	45.3	0.0	50.0	32.8	0.0	54.6	30.9	0.0
Incr Delay (d2), s/veh	5.5	26.9	0.0	16.8	5.4	0.0	13.4	19.6	0.0	32.9	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	12.8	0.0	4.5	8.5	0.0	7.6	26.1	0.0	5.3	11.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.1	74.6	0.0	53.8	50.7	0.0	63.4	52.5	0.0	87.5	33.5	0.0
LnGrp LOS	D	E		D	D		E	D		F	C	
Approach Vol, veh/h		831	A		718	A		2016	A		1177	A
Approach Delay, s/veh		69.1			51.4			54.9			45.7	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	59.6	14.4	30.0	23.8	51.8	14.0	30.4				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	10.0	53.6	8.9	24.0	20.0	43.6	8.0	* 25				
Max Q Clear Time (g_c+l1), s	11.1	54.3	10.1	25.2	17.3	27.6	9.5	20.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.5	5.9	0.0	1.6				
Intersection Summary												
HCM 6th Ctrl Delay			54.6									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings

2: Marksheffel Rd & Constitution Ave

2045 Total AM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	395	377	107	531	239	339	840	37	222	1555	136
Future Volume (vph)	165	395	377	107	531	239	339	840	37	222	1555	136
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	13.0	24.8		12.2	24.0		19.0	64.0		19.0	64.0	
Total Split (%)	10.8%	20.7%		10.2%	20.0%		15.8%	53.3%		15.8%	53.3%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	25.8	18.8	120.0	25.2	18.5	120.0	13.0	58.8	120.0	12.2	58.0	120.0
Actuated g/C Ratio	0.22	0.16	1.00	0.21	0.15	1.00	0.11	0.49	1.00	0.10	0.48	1.00
v/c Ratio	1.07	0.76	0.25	0.61	1.04	0.16	0.97	0.52	0.02	0.68	0.97	0.09
Control Delay	128.5	58.2	0.4	51.5	97.8	0.2	94.0	22.3	0.0	62.4	45.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	128.5	58.2	0.4	51.5	97.8	0.2	94.0	22.3	0.0	62.4	45.8	0.1
LOS	F	E	A	D	F	A	F	C	A	E	D	A
Approach Delay		47.3			65.5			41.7			44.4	
Approach LOS		D			E			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 48.1

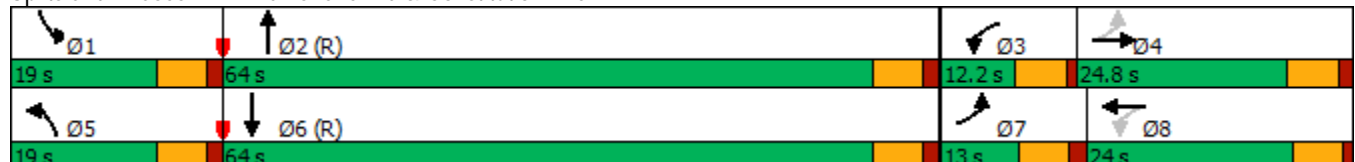
Intersection LOS: D

Intersection Capacity Utilization 96.1%

ICU Level of Service F
























Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave



HCM 6th Signalized Intersection Summary 2: Marksheffel Rd & Constitution Ave

2045 Total AM.syn
09/28/2021

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	395	377	107	531	239	339	840	37	222	1555	136
Future Volume (veh/h)	165	395	377	107	531	239	339	840	37	222	1555	136
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	176	420	0	114	565	0	361	894	0	236	1654	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	164	572		206	548		374	2287		296	2206	
Arrive On Green	0.06	0.16	0.00	0.06	0.15	0.00	0.11	0.64	0.00	0.09	0.62	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	176	420	0	114	565	0	361	894	0	236	1654	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	7.0	13.5	0.0	6.5	18.5	0.0	12.5	14.4	0.0	8.0	39.6	0.0
Cycle Q Clear(g_c), s	7.0	13.5	0.0	6.5	18.5	0.0	12.5	14.4	0.0	8.0	39.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	164	572		206	548		374	2287		296	2206	
V/C Ratio(X)	1.07	0.73		0.55	1.03		0.96	0.39		0.80	0.75	
Avail Cap(c_a), veh/h	164	572		206	548		374	2287		374	2206	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.1	47.9	0.0	40.8	50.7	0.0	53.3	10.2	0.0	53.9	16.1	0.0
Incr Delay (d2), s/veh	91.3	4.9	0.0	3.2	46.7	0.0	37.1	0.5	0.0	9.2	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	6.4	0.0	3.0	11.7	0.0	7.3	5.5	0.0	3.9	15.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	137.4	52.8	0.0	43.9	97.5	0.0	90.3	10.7	0.0	63.1	18.5	0.0
LnGrp LOS	F	D		D	F		F	B		E	B	
Approach Vol, veh/h	596		A	679		A	1255		A	1890		A
Approach Delay, s/veh	77.8			88.5			33.6			24.1		
Approach LOS	E			F			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.3	83.7	12.2	25.3	19.0	81.0	13.0	24.5				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	13.0	58.0	6.7	18.8	13.0	58.0	7.0	* 19				
Max Q Clear Time (g_c+l1), s	10.0	16.4	8.5	15.5	14.5	41.6	9.0	20.5				
Green Ext Time (p_c), s	0.2	7.8	0.0	0.8	0.0	11.2	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			43.9									
HCM 6th LOS			D									
Notes												

Timings

2: Marksheffel Rd & Constitution Ave

2045 Total PM.syn

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	656	299	143	541	312	435	1472	53	249	857	137
Future Volume (vph)	138	656	299	143	541	312	435	1472	53	249	857	137
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	24.0		10.5	23.5		11.0	24.0		11.0	24.0	
Total Split (s)	13.0	30.0		14.4	31.4		27.0	59.6		16.0	48.6	
Total Split (%)	10.8%	25.0%		12.0%	26.2%		22.5%	49.7%		13.3%	40.5%	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5		1.0	1.0		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		5.5	5.5		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effect Green (s)	31.0	24.0	120.0	34.8	25.9	120.0	19.7	53.6	120.0	10.0	43.9	120.0
Actuated g/C Ratio	0.26	0.20	1.00	0.29	0.22	1.00	0.16	0.45	1.00	0.08	0.37	1.00
v/c Ratio	0.80	0.99	0.20	0.79	0.75	0.21	0.82	0.99	0.04	0.93	0.70	0.09
Control Delay	64.6	79.0	0.3	59.6	51.3	0.3	61.2	53.9	0.0	92.2	36.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.6	79.0	0.3	59.6	51.3	0.3	61.2	53.9	0.0	92.2	36.4	0.1
LOS	E	E	A	E	D	A	E	D	A	F	D	A
Approach Delay		55.6			36.5			54.1			43.6	
Approach LOS		E			D			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 48.6







Intersection LOS: D

Intersection Capacity Utilization 93.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Marksheffel Rd & Constitution Ave

























				
Ø1	Ø2 (R)	Ø3	Ø4	
16 s	59.6 s	14.4 s	30 s	
				
Ø5	Ø6 (R)	Ø7	Ø8	
27 s	48.6 s	13 s	31.4 s	




HCM 6th Signalized Intersection Summary




2: Marksheffel Rd & Constitution Ave

2045 Total PM.syn

09/28/2021




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	656	299	143	541	312	435	1472	53	249	857	137
Future Volume (veh/h)	138	656	299	143	541	312	435	1472	53	249	857	137
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	147	698	0	152	576	0	463	1566	0	265	912	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	213	711		195	752		528	1587		288	1341	
Arrive On Green	0.06	0.20	0.00	0.07	0.21	0.00	0.15	0.45	0.00	0.08	0.38	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	147	698	0	152	576	0	463	1566	0	265	912	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	7.0	23.5	0.0	8.1	18.3	0.0	15.7	52.3	0.0	9.1	25.8	0.0
Cycle Q Clear(g_c), s	7.0	23.5	0.0	8.1	18.3	0.0	15.7	52.3	0.0	9.1	25.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	213	711		195	752		528	1587		288	1341	
V/C Ratio(X)	0.69	0.98		0.78	0.77		0.88	0.99		0.92	0.68	
Avail Cap(c_a), veh/h	213	711		195	767		605	1587		288	1341	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.4	47.8	0.0	37.0	44.5	0.0	49.7	32.8	0.0	54.6	31.3	0.0
Incr Delay (d2), s/veh	9.0	29.2	0.0	17.8	4.6	0.0	12.6	19.6	0.0	32.9	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	13.2	0.0	4.5	8.5	0.0	7.7	26.1	0.0	5.3	11.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.4	77.0	0.0	54.8	49.1	0.0	62.3	52.5	0.0	87.5	34.1	0.0
LnGrp LOS	D	E		D	D		E	D		F	C	
Approach Vol, veh/h		845	A		728	A		2029	A		1177	A
Approach Delay, s/veh		72.0			50.3			54.7			46.1	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	59.6	14.4	30.0	24.3	51.3	13.0	31.4				
Change Period (Y+Rc), s	6.0	6.0	5.5	6.0	6.0	6.0	6.0	* 6				
Max Green Setting (Gmax), s	10.0	53.6	8.9	24.0	21.0	42.6	7.0	* 26				
Max Q Clear Time (g_c+l1), s	11.1	54.3	10.1	25.5	17.7	27.8	9.0	20.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.6	5.7	0.0	1.8				
Intersection Summary												
HCM 6th Ctrl Delay			55.0									
HCM 6th LOS			D									
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	0	0	20	0
Future Vol, veh/h	0	45	0	0	20	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	49	0	0	22	0
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	44	0	0	0	0	0
Stage 1	0	-	-	-	-	-
Stage 2	44	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	967	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	978	-	-	-	-	-
Platoon blocked, %		-	-	-	-	-
Mov Cap-1 Maneuver	967	-	-	-	-	-
Mov Cap-2 Maneuver	928	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	978	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s		0				
HCM LOS	-					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	30	0	0	59	0
Future Vol, veh/h	0	30	0	0	59	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	0	0	64	0
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	128	0	0	0	0	0
Stage 1	0	-	-	-	-	-
Stage 2	128	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	866	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Platoon blocked, %		-	-	-	-	-
Mov Cap-1 Maneuver	866	-	-	-	-	-
Mov Cap-2 Maneuver	852	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s		0				
HCM LOS	-					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

Intersection

Int Delay, s/veh 4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	13	0	20	42
Future Vol, veh/h	0	45	13	0	20	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	49	14	0	22	46




Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	104	14	0
Stage 1	14	-	-
Stage 2	90	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	894	1066	-
Stage 1	1009	-	-
Stage 2	934	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	881	1066	-
Mov Cap-2 Maneuver	871	-	-
Stage 1	1009	-	-
Stage 2	921	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	1066	1604
HCM Lane V/C Ratio	-	-	0.046	0.014
HCM Control Delay (s)	-	-	8.5	7.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection

Int Delay, s/veh 4.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	30	49	0	59	31
Future Vol, veh/h	0	30	49	0	59	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	2	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	53	0	64	34

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	215	53	0
Stage 1	53	-	-
Stage 2	162	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	773	1014	-
Stage 1	970	-	-
Stage 2	867	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	741	1014	-
Mov Cap-2 Maneuver	780	-	-
Stage 1	970	-	-
Stage 2	831	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	4.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	1014	1553
HCM Lane V/C Ratio	-	-	0.032	0.041
HCM Control Delay (s)	-	-	8.7	7.4
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1

HCM 6th TWSC
4: Marksheffel Rd & Right-Out Access

2023 Total AM.syn
09/28/2021

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↗	↗	
Traffic Vol, veh/h	0	11	0	1062	1780	0
Future Vol, veh/h	0	11	0	1062	1780	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	12	0	1154	1935	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	968	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	*320	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %		1		-	-	
Mov Cap-1 Maneuver	-	*320	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16.7	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT EBLn1		SBT			
Capacity (veh/h)	- 320		-			
HCM Lane V/C Ratio	- 0.037		-			
HCM Control Delay (s)	- 16.7		-			
HCM Lane LOS	- C		-			
HCM 95th %tile Q(veh)	- 0.1		-			
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 6th TWSC
4: Marksheffel Rd & Right-Out Access

2023 Total PM.syn
09/28/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	8	0	1714	1134	0
Future Vol, veh/h	0	8	0	1714	1134	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	0	1863	1233	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	617	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	*607	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %		1		-	-	
Mov Cap-1 Maneuver	-	*607	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT			
Capacity (veh/h)	- 607		-			
HCM Lane V/C Ratio	- 0.014		-			
HCM Control Delay (s)	- 11		-			
HCM Lane LOS	- B		-			
HCM 95th %tile Q(veh)	- 0		-			
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 6th TWSC
4: Marksheffel Rd & Right-Out Access

2045 Total AM.syn
09/28/2021

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↗	↗	
Traffic Vol, veh/h	0	11	0	1216	2039	0
Future Vol, veh/h	0	11	0	1216	2039	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	12	0	1322	2216	0
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1108	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	*216	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %		1		-	-	
Mov Cap-1 Maneuver	-	*216	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	22.6		0		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT EBLn1		SBT			
Capacity (veh/h)	-		216			
HCM Lane V/C Ratio	-		0.055			
HCM Control Delay (s)	-		22.6			
HCM Lane LOS	-		C			
HCM 95th %tile Q(veh)	-		0.2			
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 6th TWSC
4: Marksheffel Rd & Right-Out Access

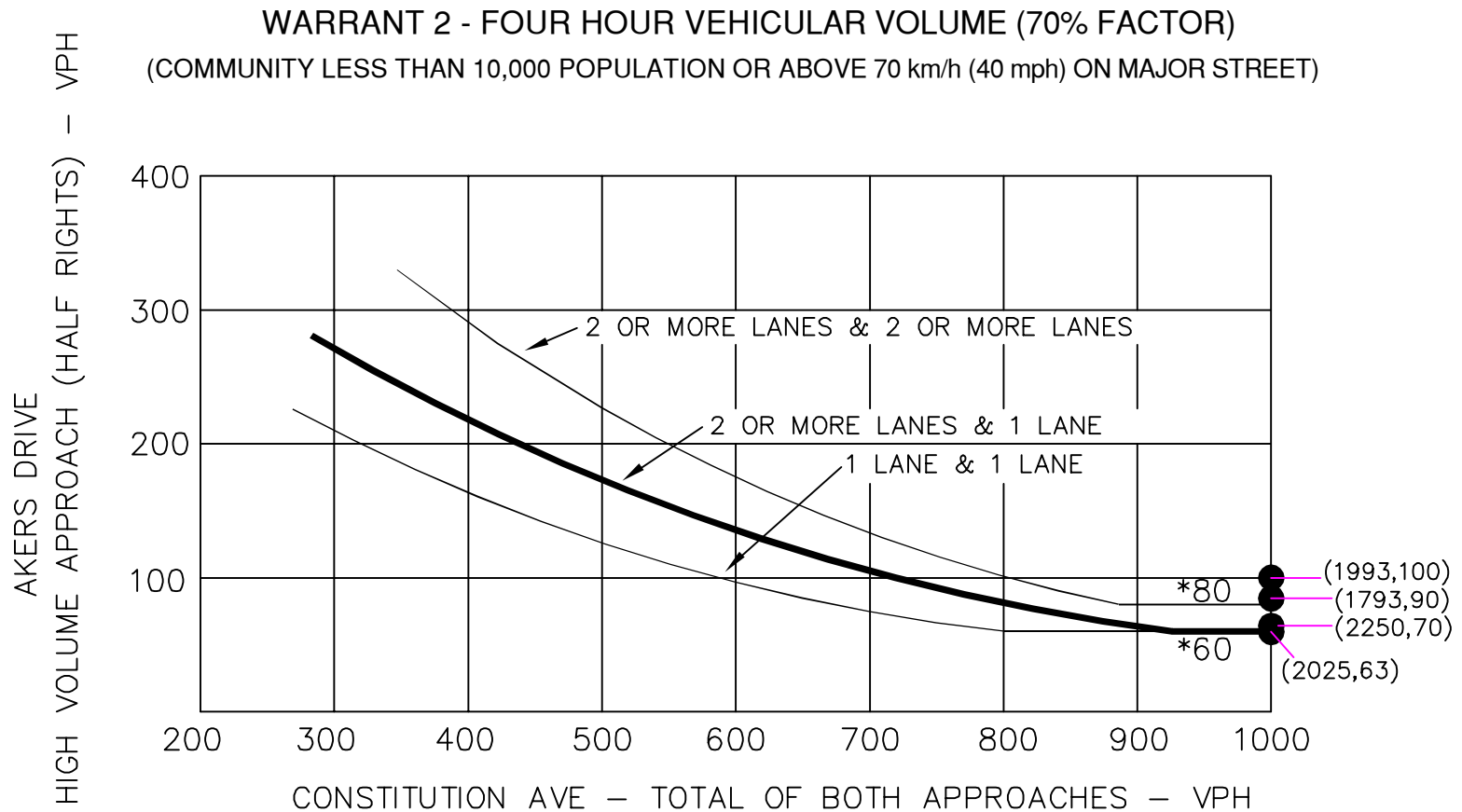
2045 Total PM.syn
09/28/2021

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Traffic Vol, veh/h	0	8	0	1960	1299	0
Future Vol, veh/h	0	8	0	1960	1299	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	0	2130	1412	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	706	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	*528	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %		1		-	-	
Mov Cap-1 Maneuver	-	*528	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	11.9	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT			
Capacity (veh/h)	- 528		-			
HCM Lane V/C Ratio	- 0.016		-			
HCM Control Delay (s)	- 11.9		-			
HCM Lane LOS	- B		-			
HCM 95th %tile Q(veh)	- 0.1		-			
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

APPENDIX E

Signal Warrant Figure

Scale: 1=100



* NOTE: 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

CONSTITUTION AVE & AKERS DR
SIGNAL WARRANT ANALYSIS
FOUR HOUR VOLUME WARRANT

● 2045 TOTAL TRAFFIC DATA POINT

Source: Manual of Uniform Traffic Control Devices 2009

Kimley»Horn

APPENDIX F

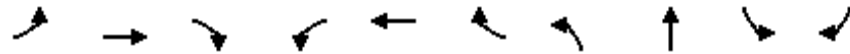
Queue Analysis Worksheets

Queues

2045 Total AM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	80	991	11	11	1026	47	30	18	48	121
v/c Ratio	0.26	0.41	0.01	0.03	0.42	0.04	0.09	0.04	0.15	0.25
Control Delay	9.7	8.7	2.4	6.3	16.3	3.9	36.7	0.1	37.7	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.7	2.4	6.3	16.3	3.9	36.7	0.1	37.7	3.9
Queue Length 50th (ft)	21	158	0	3	419	10	18	0	30	0
Queue Length 95th (ft)	47	196	5	m5	m426	m12	44	0	63	28
Internal Link Dist (ft)		512			1058			252		
Turn Bay Length (ft)	200			225			150		375	
Base Capacity (vph)	307	2433	1092	321	2433	1103	334	501	330	492
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.41	0.01	0.03	0.42	0.04	0.09	0.04	0.15	0.25

Intersection Summary

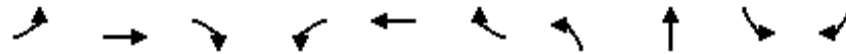
m Volume for 95th percentile queue is metered by upstream signal.

Queues

2045 Total PM - Signalized.syn

1: Akers Dr & Constitution Ave

10/05/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	37	1153	33	33	1141	49	21	12	40	71
v/c Ratio	0.13	0.45	0.03	0.12	0.45	0.04	0.07	0.03	0.14	0.17
Control Delay	6.4	7.6	1.6	15.3	25.4	7.7	39.6	0.1	40.8	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	7.6	1.6	15.3	25.4	7.7	39.6	0.1	40.8	0.8
Queue Length 50th (ft)	8	171	0	14	465	9	13	0	26	0
Queue Length 95th (ft)	20	210	9	m23	534	m17	36	0	58	0
Internal Link Dist (ft)		512			1058			252		
Turn Bay Length (ft)	200			225			150		375	
Base Capacity (vph)	287	2551	1150	281	2551	1154	287	428	285	430
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.45	0.03	0.12	0.45	0.04	0.07	0.03	0.14	0.17

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	154	368	350	99	494	222	316	780	34	205	1445	127
v/c Ratio	0.54	0.48	0.22	0.30	0.74	0.14	0.69	0.55	0.02	0.58	1.11	0.08
Control Delay	33.9	42.3	0.3	27.7	52.6	0.2	57.3	31.8	0.0	57.4	97.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	42.3	0.3	27.7	52.6	0.2	57.3	31.8	0.0	57.4	97.3	0.1
Queue Length 50th (ft)	84	131	0	52	191	0	122	243	0	79	~680	0
Queue Length 95th (ft)	120	166	0	81	236	0	164	366	0	115	#982	0
Internal Link Dist (ft)		1058			960			381			511	
Turn Bay Length (ft)	450			225			575			525		
Base Capacity (vph)	334	916	1583	437	914	1583	516	1408	1583	500	1301	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.40	0.22	0.23	0.54	0.14	0.61	0.55	0.02	0.41	1.11	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

Queues

2023 Total PM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	129	610	278	133	504	289	406	1367	50	232	796	128
v/c Ratio	0.64	0.89	0.18	0.69	0.68	0.18	0.76	0.85	0.03	0.81	0.59	0.08
Control Delay	47.3	63.0	0.2	50.4	48.9	0.3	58.3	36.0	0.0	75.6	32.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.3	63.0	0.2	50.4	48.9	0.3	58.3	36.0	0.0	75.6	32.5	0.1
Queue Length 50th (ft)	73	242	0	75	189	0	156	492	0	92	261	0
Queue Length 95th (ft)	#126	#335	0	#133	248	0	208	595	0	#157	336	0
Internal Link Dist (ft)	1058				960				381		511	
Turn Bay Length (ft)	450				225				575		525	
Base Capacity (vph)	202	707	1583	193	763	1583	600	1602	1583	287	1349	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.86	0.18	0.69	0.66	0.18	0.68	0.85	0.03	0.81	0.59	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Queues

2045 Total AM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	176	420	401	114	565	254	361	894	39	236	1654	145
v/c Ratio	1.07	0.76	0.25	0.61	1.04	0.16	0.97	0.52	0.02	0.68	0.97	0.09
Control Delay	128.5	58.2	0.4	51.5	97.8	0.2	94.0	22.3	0.0	62.4	45.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	128.5	58.2	0.4	51.5	97.8	0.2	94.0	22.3	0.0	62.4	45.8	0.1
Queue Length 50th (ft)	~122	165	0	70	~247	0	145	244	0	91	635	0
Queue Length 95th (ft)	#243	224	0	#124	#363	0	#243	304	0	135	#816	0
Internal Link Dist (ft)	1058				960				381			
Turn Bay Length (ft)	450			225			575			525		
Base Capacity (vph)	165	554	1583	186	545	1583	371	1735	1583	371	1710	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.76	0.25	0.61	1.04	0.16	0.97	0.52	0.02	0.64	0.97	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.













Queue shown is maximum after two cycles.

Queues

2045 Total PM.syn

2: Marksheffel Rd & Constitution Ave

09/28/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	147	698	318	152	576	332	463	1566	56	265	912	146
v/c Ratio	0.80	0.99	0.20	0.79	0.75	0.21	0.82	0.99	0.04	0.93	0.70	0.09
Control Delay	64.6	79.0	0.3	59.6	51.3	0.3	61.2	53.9	0.0	92.2	36.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.6	79.0	0.3	59.6	51.3	0.3	61.2	53.9	0.0	92.2	36.4	0.1
Queue Length 50th (ft)	84	285	0	87	221	0	178	620	0	107	320	0
Queue Length 95th (ft)	#157	#414	0	#174	287	0	237	#797	0	#189	397	0
Internal Link Dist (ft)	1058			960			381			511		
Turn Bay Length (ft)	450			225			575			525		
Base Capacity (vph)	183	707	1583	193	763	1583	600	1580	1583	286	1294	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.99	0.20	0.79	0.75	0.21	0.77	0.99	0.04	0.93	0.70	0.09

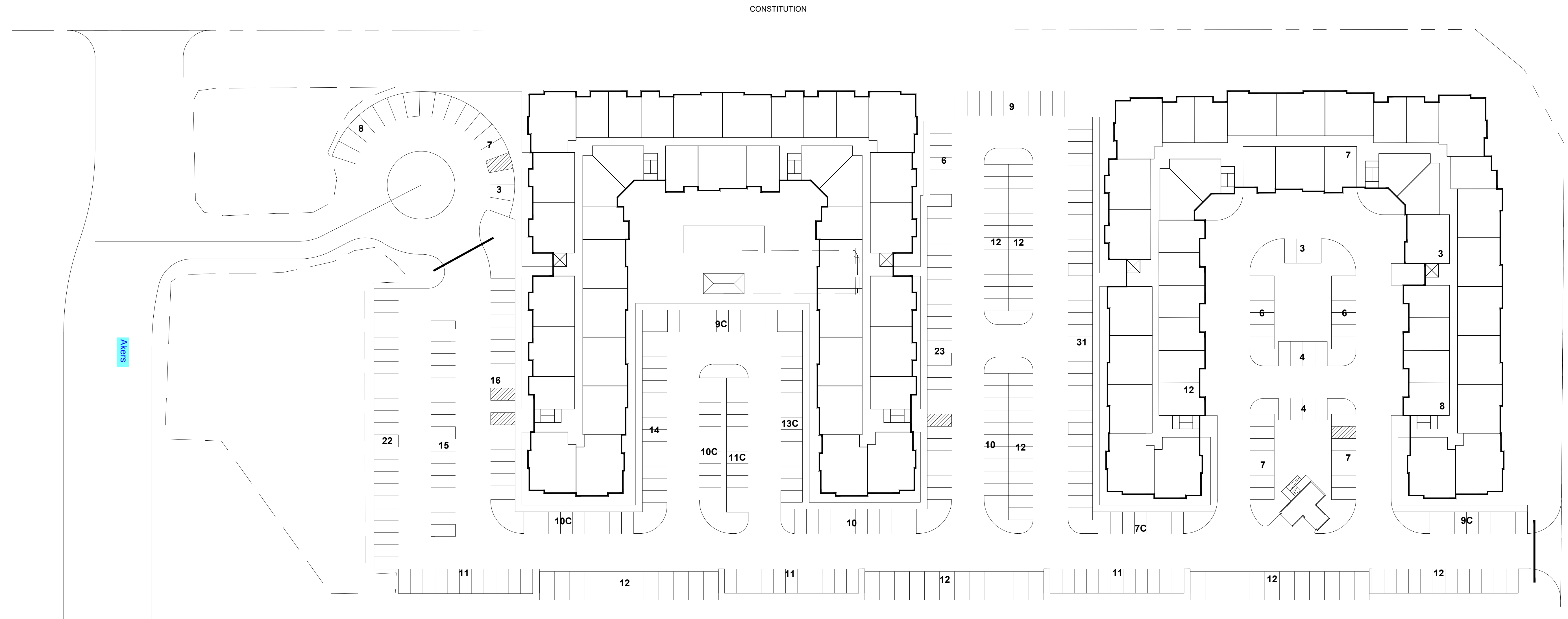
Intersection Summary

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

APPENDIX G

Conceptual Site Plan

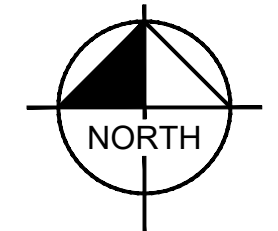
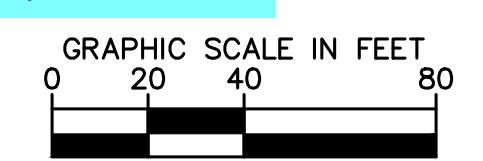
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PARKING TABLE	
ATTACHED GARAGES	30
DETACHED GARAGES	36
REGULAR SURFACE SPACES	269
COMPACT SURFACE SPACES	77
ADA SURFACE STALLS	9
TOTAL	421

FULL STALL = 9'x18"
COMPACT STALLS = 9'x16'
REQUIRED = 458
NEEDED REDUCTION = 37 STALLS (9%)

Note: 2 of the ADA stalls will need to be van accessible per LDC Chapter 6.2.5.d.2.c



Per table 6-5 in LDC compact space dimensions need only be 8' x 15'

EL PASO CONSTITUTION
PARKING EXHIBIT
09/17/2021

Kimley»Horn

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