Exhibit 9

TRAFFIC IMPACT STUDY

FOR

HIGH SCHOOL AT WILDCREEK

January 31, 2019

PREPARED FOR:

Washoe County School District

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EXECUTIVE SUMMARY

The proposed High School at Wildcreek site is located north of North McCarran Boulevard and east of Sullivan Lane at the existing Wildcreek Golf Course property. The proposed high school would serve 2,125 students and 150 employees/staff. The anticipated future zoning boundary would generally include the current Hug High School zoning district and all of Sun Valley.

The proposed project would generate approximately 4,314 Daily, 1,105 AM peak hour, 701 Afternoon peak hour, and 298 PM peak hour trips. The High School at Wildcreek is anticipated to be a closed campus with students staying on-site during their breaks. Access to the project site would be provided via two new roundabout intersections on Sullivan Lane. **Exhibit 1** on page 12 shows the proposed roundabout lane configurations.

Under Existing Plus Project conditions and 2040 Plus Project conditions, the El Rancho Drive/Sullivan Lane and McCarran Boulevard/Sullivan Lane intersections would operate at LOS F. Additionally, the El Rancho Drive/Sun Valley Boulevard intersection is expected to have a volume-to-capacity ratio greater than 1.0 indicating a need for capacity improvements.

The following intersection improvements would mitigate and improve operations to acceptable levels:

- El Rancho Drive/Sun Valley Boulevard –
    - Convert the existing westbound to northbound right-turn lane to a free right-turn lane with acceleration lane and merge taper
    - Optimize signal timing

    Based on NDOT's *Access Management System and Standards, 2017 Edition*, an acceleration lane with 280 feet of acceleration length followed by at least 144 feet of taper length should be constructed. Consideration should be given during final design to adjusting these lengths to either intentionally include or exclude the northerly apartment complex driveway within the acceleration lane.

- El Rancho Drive/Sullivan Lane –
    - Construct a roundabout at the intersection with a shared through/right-turn lane on the northbound approach, a left-turn lane and a right-turn pocket on the westbound approach, and a left-turn lane and shared through/left-turn lane on the southbound approach (see **Exhibit 2** on page 16)

- McCarran Boulevard/Sullivan Lane (see **Figure 12**) –
    - Modify northbound lane configurations to include one left-turn lane and a shared through/right-turn lane
    - Modify southbound lane configurations to include two left-turn lanes, one through lane, and one right-turn lane
    - Change northbound and southbound signal phasing to protected left-turns

  - Extend the eastbound left-turn pocket to include 600 feet of striped pocket plus 170 feet of deceleration length plus 180 feet of taper, to provide a conservative length for peak queue storage
  - Optimize signal timing

- McCarran Boulevard/El Rancho Drive
  - Optimize signal timing in coordination with the McCarran Boulevard/Sullivan Lane intersection

Additionally, the following multimodal improvements are recommended (see **Figure 5**):

- Sullivan Lane: Construct sidewalks and bicycle lanes along the project frontage
- East side of Sullivan Lane between Wedekind Road and El Rancho Drive, east side of El Rancho Drive north of Sullivan Lane, and on the north side of McCarran Boulevard west of Sullivan Lane: Construct sidewalk at select locations to fill in gaps in the existing walking infrastructure
- Public Transit: Based on RTC direction, potentially construct an RTC RIDE transit stop on Sullivan Lane near the campus entrance. The RTC may wish to consider changes to Route 15 to better serve high school students and staff
- Implement a 15 mph "school zone" on Sullivan Lane during the morning arrival and afternoon dismissal peak travel periods (specific times to be based on the actual school hours schedule)

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INTRODUCTION

This Traffic Impact Study evaluates the potential traffic impacts associated with the proposed High School at Wildcreek in Sparks, Nevada. This study of potential transportation impacts was undertaken for planning purposes and to determine what traffic controls or other mitigations are needed to manage the project traffic.

Project Description

The proposed high school site is located north of North McCarran Boulevard and east of Sullivan Lane at the existing Wildcreek Golf Course property as shown on **Figure 1**. The proposed high school would serve 2,125 students who generally reside in the current Hug High School zoning district and throughout all of Sun Valley. The area of traffic contribution is shown on **Figure 2**. The high school would have approximately 150 employees/staff. The proposed project would include all typical features of a high school including a stadium, athletic facilities, and large parking areas. The project site plan is shown on **Figure 3**.

Study Area and Evaluated Scenarios

The following intersections and roadway segments (shown on **Figure 1**) are included in the analysis based on scoping discussions with the City of Sparks and the anticipated future school zoning boundaries:

Intersections

- El Rancho Drive / Sun Valley Boulevard
- El Rancho Drive / Sullivan Lane
- Sullivan Lane / North Project Access – plus project conditions
- Sullivan Lane / Niblick Drive
- Sullivan Lane / South Project Access – plus project conditions
- Sullivan Lane / Green Vista Drive
- McCarran Boulevard / El Rancho Drive
- McCarran Boulevard / Sullivan Lane

Roadway Segments

- North McCarran Boulevard – between El Rancho Drive and Sullivan Lane
- El Rancho Drive – between Sun Valley Boulevard and Sullivan Lane
- Sullivan Lane – between El Rancho Drive and McCarran Boulevard

This study includes analysis of the weekday AM, Afternoon (when school is dismissed), and PM peak hours as these are the periods of time in which peak traffic is anticipated to occur. The evaluated development scenarios are:

- Existing Conditions (no project)
- Existing Plus Project Conditions
- 2040 Background Conditions (no project)
- 2040 Plus Project Conditions

The 2040 Background conditions scenario reflects the 2040 horizon year which is consistent with the latest version of the Regional Transportation Commission's (RTC) *2040 Regional Transportation Plan (2040 RTP)*.

ANALYSIS METHODOLOGY

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows.

Intersections

The complete methodology for intersection level of service analysis is established in the *Highway Capacity Manual (HCM) 2010*, published by the Transportation Research Board (TRB). Due to some operational limitations in the *HCM 2010*, the methodology established in the *Highway Capacity Manual 2000* was also used. **Table 1** presents the delay thresholds for each level of service grade at signalized and unsignalized intersections.

Table 1: Level of Service Definition for Intersections

Level of Service	Brief Description	Average Delay (seconds per vehicle)	
		Signalized Intersections	Unsignalized Intersections
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 20	10 to 15
C	Stable conditions with significant affect from other vehicles.	20 to 35	15 to 25
D	High density traffic conditions still with stable flow.	35 to 55	25 to 35
E	At or near capacity flows.	55 to 80	35 to 50
F	Over capacity conditions.	> 80	> 50

Source: Highway Capacity Manual (2010), Chapters 18 through 21

Level of service calculations were performed for the signalized, side street stop, and all way stop controlled study intersections using the Synchro 9 software package with analysis and results reported in accordance with *HCM 2000* and *HCM 2010* methodology. Roundabout intersections were analyzed using SIDRA software with results also reported in accordance with the current *HCM 2010* methodology.

Roadway Segments

Table 2 shows daily roadway segment level of service thresholds based on roadway facility type and number of lanes. Daily roadway segment level of service is determined by comparing daily traffic volumes to thresholds presented in the table.

Table 2: Average Daily Traffic LOS Thresholds by Facility Type

Facility Type	Maximum Service Flow Rate (Daily for Given Service Level)				
# of Lanes	LOS A	LOS B	LOS C	LOS D	LOS E
Arterial – High Access Control					
2	n/a	9,400	17,300	19,200	20,300
4	n/a	20,400	36,100	38,400	40,600
6	n/a	31,600	54,700	57,600	60,900
8	n/a	42,500	73,200	76,800	81,300
Arterial – Moderate Access Control					
2	n/a	5,500	14,800	17,500	18,600
4	n/a	12,000	32,200	35,200	36,900
6	n/a	18,800	49,600	52,900	55,400
8	n/a	25,600	66,800	70,600	73,900
Arterial – Low Access Control					
2	n/a	n/a	6,900	13,400	15,100
4	n/a	n/a	15,700	28,400	30,200
6	n/a	n/a	24,800	43,100	45,400
8	n/a	n/a	34,000	57,600	60,600

Source: Washoe County 2035 RTP, Table 3-4

Level of Service Policy

The *2040 Regional Transportation Plan* establishes level of service criteria for regional roadway facilities in the City of Reno, City of Sparks, and Washoe County. The current Level of Service policy is:

"All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better."

"All regional roadway facilities projected to carry 27,000 or more ADT at the latest RTP horizon – LOS E or better."

"All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting corridors".

Where intersections are already experiencing level of service beyond the thresholds, conditions should not be exacerbated. In practice, this is commonly interpreted as not increasing average delay per vehicle by more than 5 seconds, or the volume-to-capacity ratio by more than 0.05 for roundabout intersections.

The following LOS thresholds were used for this study based on the above regional policies:

- El Rancho Drive / Sun Valley Boulevard – LOS E
- El Rancho Drive / Sullivan Lane – LOS D
- Sullivan Lane / North Project Access – LOS D
- Sullivan Lane / Niblick Drive – LOS D
- Sullivan Lane / South Project Access – LOS D
- Sullivan Lane / Green Vista Drive – LOS D
- McCarran Boulevard / El Rancho Drive – LOS E
- McCarran Boulevard / Sullivan Lane – LOS E

NDOT has agreed to defer to the LOS policy established by the *2040 RTP* for the subject roadways and intersections within NDOT jurisdiction.

EXISTING CONDITIONS

Roadway Facilities

A brief description of the key roadways in the study area is provided below.

North McCarran Boulevard is a four-lane, High Access Control (HAC) Arterial roadway. McCarran Boulevard is a loop road that surrounds the Reno and Sparks metropolitan area. The posted speed limit on McCarran Boulevard near the project area is 45 mph. The segment of McCarran Blvd between El Rancho Drive and Rock Boulevard is programmed to be widened to six (6) lanes (three through lanes in each direction) in the 2027-2040 timeframe per the *2040 RTP*.

Sullivan Lane is generally a north-south roadway that extends from El Rancho Drive in the north to Prater Way in the south. Near the project site, Sullivan Lane is a two-lane roadway with a posted speed limit of 35 mph north of McCarran Boulevard and 25 mph south of McCarran Boulevard. The *2040 RTP* classifies Sullivan Lane as a Low Access Control (LAC) Arterial.

El Rancho Drive is generally a north-south roadway that extends from Sun Valley Boulevard in the north to Victorian Avenue in the south. El Rancho Drive is a four-lane roadway (two lanes in each direction) south of McCarran Boulevard, and a three-lane roadway (one lane in each direction with a two-way left-turn lane) north of McCarran Boulevard. Approximately 770 feet south/east of Sun Valley Boulevard, El Rancho Drive transitions back to a four-lane roadway as it approaches Sun Valley Boulevard. West of Sun Valley Boulevard, the roadway changes names to Dandini Boulevard and has one lane in each direction. The *2040 RTP* classifies El Rancho Drive as a Moderate Access Control (MAC) Arterial. The posted speed limit near the project site is 35 mph.

Sun Valley Boulevard / Clear Acre Lane is generally a north-south five-lane roadway (two lanes in each direction with a two-way left-turn lane). North of El Rancho Drive the roadway is named Sun Valley Boulevard and south of El Rancho Drive it is named Clear Acre Lane. Sun Valley Boulevard and Clear Acre

Lane are both classified as MAC Arterials in the *2040 RTP*. The posted speed limit on Sun Valley Boulevard north of El Rancho Drive is 35 mph. South of El Rancho Drive, the speed limit on Clear Acre Lane is 45 mph.

School Bus Service and Public Transit Facilities

The current Washoe County School District policy is to provide bus service for high school students outside a three (3) mile radius of the school. **Figure 4** shows a three-mile radius in relation to the proposed High School at Wildcreek site. A portion of the zoning district in the northern part of Sun Valley would be eligible for bus service.

Figure 4 also shows the RTC RIDE fixed transit routes within the vicinity of the proposed school site.

Route 5 provides service from 4th Street Station to Sun Valley and travels along Sutro Street, Clear Acre Lane, and Sun Valley Boulevard. Route 5 includes two Snow Route detours moving service from Selmi Drive and Clear Acre Lane to McCarran Boulevard and El Rancho Drive during inclement weather. The second Snow Route detour moves service from 8th Avenue to 7th Avenue in Sun Valley. Service is provided Monday through Friday on 30 minute to one hour headways from 5:00 AM to approximately 1:00 AM. Weekend and holiday service is provided from 5:15 AM to approximately 1:00 AM on one hour headways.

Route 15 is closest to the Wildcreek site as it traverses through the El Rancho Drive/Sullivan Lane intersection just north of the site. It provides service between 4th Street Station and Truckee Meadows Community College (TMCC) and travels along Sutro Street, Wedekind Road, El Rancho Drive, and Dandini Boulevard. Service is provided on 30 minute to one hour headways from 5:45 AM to approximately 11:30 PM Monday through Friday. Weekend and holiday service is provided on one hour headways, with Saturday service from 5:45 AM to approximately 11:30 PM, and Sunday and holiday service from approximately 5:45 AM to approximately 10:30 PM.

The Wildcreek site is generally served by public transit (Routes 5 and 15). Transit service for the high school could be significantly improved by moving Route 15 to Sullivan Lane instead of El Rancho Drive. Such a decision would have to be made by the Regional Transportation Commission based on overall ridership demand and other factors.

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities including bicycle lanes and sidewalks partially exist within the project vicinity. **Figure 5** shows the existing bicycle and pedestrian facilities network near the project site.

Bicycle lanes exist on McCarran Boulevard, El Rancho Drive, and Clear Acre Lane, and on Sun Valley Boulevard between 2nd Avenue and 7th Avenue. There are currently no bicycle lanes on Sullivan Lane or on Sun Valley Boulevard between El Rancho Drive and 2nd Avenue.

Sidewalk facilities in the project area also have gaps. There are no sidewalks along the north side of McCarran Boulevard west of Sullivan Lane to Rock Boulevard. The south side of McCarran Boulevard has an asphalt walking path from Sullivan Lane to Wedekind Road. Sullivan Lane has sidewalk along its west

side from McCarran Boulevard to El Rancho Drive. Sidewalks exist on both sides of El Rancho Drive from McCarran Boulevard to Wildcreek Drive, and along the west side from Wildcreek Drive to Sullivan Lane and from Maynard Way to Sun Valley Boulevard. Clear Acre Lane and Sun Valley Boulevard have short sections of noncontiguous sidewalk throughout most of their lengths.

Existing Intersection Level of Service

Existing conditions intersection level of service analysis was performed using Synchro 9 analysis software, with reporting for unsignalized intersections based on *HCM 2010* methodology and reporting for signalized intersections based on *HCM 2000* methodology. *HCM 2010* does not enable analysis of signalized intersections with shared through/turn lanes and exclusive turn lanes on the same approach (as currently seen at the McCarran Boulevard/Sullivan Lane intersection). For consistency between analysis scenarios, *HCM 2000* reporting was used for all signalized intersections throughout this report.

The existing peak hour factors from the traffic counts were used in the analysis. A default heavy vehicle percentage of two percent was also used. The existing intersection lane configurations and traffic controls are shown on **Figure 6** and the existing traffic volumes are shown on **Figure 7**. **Table 3** shows the existing conditions intersection level of service results. The technical calculations are provided in **Appendix A**.

Table 3: Existing Conditions Intersection Level of Service Results

Intersection	Control	AM		Afternoon[1]		PM	
		LOS	Delay[2] (sec)	LOS	Delay[2] (sec)	LOS	Delay[2] (sec)
El Rancho Dr / Sun Valley Blvd	Signal	C	26.0	C	24.4	C	32.2
El Rancho Dr / Sullivan Ln	Side-Street Stop						
Westbound Approach		B	11.4	C	15.7	D	27.3
Southbound Left		A	8.6	A	8.9	A	9.8
Sullivan Ln / Niblick Dr	Side-Street Stop						
Eastbound Approach		B	13.2	B	10.3	B	12.3
Northbound Left		A	8.4	A	8.0	A	8.3
Sullivan Ln / Green Vista Dr	Side-Street Stop						
Eastbound Approach		C	15.1	B	12.1	C	15.3
Westbound Approach		C	22.3	C	18.7	D	32.8
Northbound Left		A	8.7	A	8.1	A	8.3
Southbound Left		A	8.0	A	7.9	A	8.3
McCarran Blvd / El Rancho Dr	Signal	D	48.4	C	28.2	D	45.7
McCarran Blvd / Sullivan Ln	Signal	D	39.4	D	36.7	E	57.4

Notes:
1. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM.
2. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) intersections.
3. The LOS and delay results for the signalized intersections are based on HCM 2000 reporting because HCM 2010 does not support turning movement analysis with shared and exclusive lanes.
Source: Traffic Works, 2019

As shown in **Table 3**, the study intersections currently operate at acceptable levels of service. It should be noted that the McCarran Boulevard/Sullivan Lane intersection currently functions at LOS E during the PM peak hour.

Existing Roadway Segment Level of Service

Three roadway segments were analyzed near the project site based on Annual Average Daily Traffic (AADT) volumes obtained from the Nevada Department of Transportation's (NDOT) Traffic Records Information Access (TRINA) online application. Level of service was determined by comparing the daily traffic volumes (shown on **Figure 7**) to the capacity thresholds provided in **Table 2**. **Table 4** shows the daily roadway segment volumes and corresponding levels of service for the study roadway segments.

Table 4: Existing Conditions Roadway Segment Level of Service Results

Roadway	Location	Classification[1]	# of Lanes	Volume[2]	LOS	v/c Ratio
McCarran Blvd	El Rancho Dr to Sullivan Ln	HAC Arterial	4	29,000	C	0.71
El Rancho Dr	Sun Valley Blvd to Sullivan Ln	MAC Arterial	4[3]	10,000	B	0.27
Sullivan Ln	El Rancho Dr to McCarran Blvd	LAC Arterial	2	5,600	C	0.37

Notes:
1. HAC = High Access Control; MAC = Moderate Access Control; LAC = Low Access Control
2. Based on 2017 AADT volumes from NDOT's Traffic Records Information Access (TRINA).
3. El Rancho Drive has four lanes near Sun Valley Blvd where traffic volume data was collected. East/south of Sun Valley Blvd, El Rancho Drive has two lanes.
Source: Traffic Works, 2019

As shown in the table, the study roadway segments currently operate at acceptable levels of service.

PROJECT CONDITIONS

Trip Generation

Trip generation rates from *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE) were used to develop trip generation estimates for the proposed high school based on 2,125 students and associated staff. **Table 5** shows the trip generation estimates for the AM, Afternoon (when school is dismissed), and PM peak hours.

Table 5: Trip Generation Estimates

Land Use (ITE Code)	Size	Trips[1]						
		Daily	AM	AM In/Out	Afternoon[2]	Afternoon In/Out	PM	PM In/Out
High School (350)	2,125 students	4,314	1,105	740 / 365	701	224 / 477	298	143 / 155

Notes: 1. Trips were calculated based on the following rates per student: Daily – 2.03; AM – 0.52 (67% in / 33% out); Afternoon – 0.33 (32% in / 68% out); PM – 0.14 (48% in / 52% out)
2. The afternoon peak hour is between 2:00 PM and 4:00 PM.
Source: Traffic Works, 2019

As shown in the table, the proposed high school is expected to generate approximately 4,314 Daily, 1,105 AM peak hour, 701 Afternoon peak hour, and 298 PM peak hour trips. The High School at Wildcreek is anticipated to be a closed campus, meaning students are not permitted to leave or enter the campus during the middle of the day without permission (i.e. students may not leave campus for lunch, etc.).

The trip generation rates inherently consider the various travel modes to and from a high school including walking, bicycling, and bus ridership. Therefore, no trip rate reductions were applied for the use of alternate travel modes.

With this volume of traffic generated, the project would not be considered "regionally significant" based on traffic volumes.

Trip Distribution

The distribution of trips to the adjacent roadway network was determined based on the anticipated future school zoning (encompassing all of Sun Valley and the current Hug High School zone, as generally shown on **Figure 2**). Project trips are anticipated to be distributed as follows and shown on **Figure 8**:

- 45% to/from the north via Sun Valley Boulevard
- 5% to/from the northwest via Dandini Boulevard and Clear Acre Lane
- 30% to/from the west and south via El Rancho Drive and Sullivan Lane
- 15% to/from the west via N. McCarran Boulevard
- 5% to/from the east via N. McCarran Boulevard

The peak hour project trips at the study intersections are shown on **Figure 9**.

Peak Hour Factor

The peak hour factor (PHF) of an intersection is determined based on the following equation:

PHF = Total Peak Hour Volume / (Volume During the Peak 15 Minutes x 4)

In other words, the peak hour factor describes how traffic is dispersed throughout a peak hour. If traffic is dispersed evenly over the entire hour, the peak hour factor is higher (for example, if each 15 minute period of the peak hour has the same amount of traffic, the peak hour factor would be 1.0). Areas with higher fluctuations in traffic, for example near schools or businesses with a lot of employees that work the same shift times, may have lower peak hour factors because a large number of vehicles are arriving or leaving at the same time within a more condensed period of time. Traffic generated by a school is likely to lower the peak hour factor of nearby intersections which can negatively affect operations during the peak periods of activity. This analysis considers the worst 15 minutes.

The peak hour factors for each movement at the study intersections were calculated based on the existing peak hour factors of the existing traffic and assuming approximately 1/3 of students arrive during the 15 minutes before school starts and depart during the 15 minutes after school is dismissed with the other

2/3 also arriving within the peak hour. During the PM peak hour when project traffic primarily consists of faculty and students attending extra-curricular activities, the peak hour factors of the existing traffic were used at the study intersections.

Project Access

The project would include two access points on Sullivan Lane – one approximately 280 feet north of Niblick Drive (intersection #3 on **Figure 1**) and one approximately 760 feet north of Green Vista Drive (intersection #5 on **Figure 1**). Both access roads would connect to Sullivan Lane using roundabout intersections. An internal roadway network would provide access to the parking areas on the site, as shown on **Figure 3**.

The roundabout intersections at the project access locations should be configured as shown in **Exhibit 1** below to function properly with the proposed peak demands. As shown in the exhibit, the North Project Access roundabout would need two southbound lanes with one shared through/left-turn lane and one left-turn lane. The northbound and westbound legs would function as single lane approaches. The South Project Access roundabout would function adequately with a single lane on all approaches.

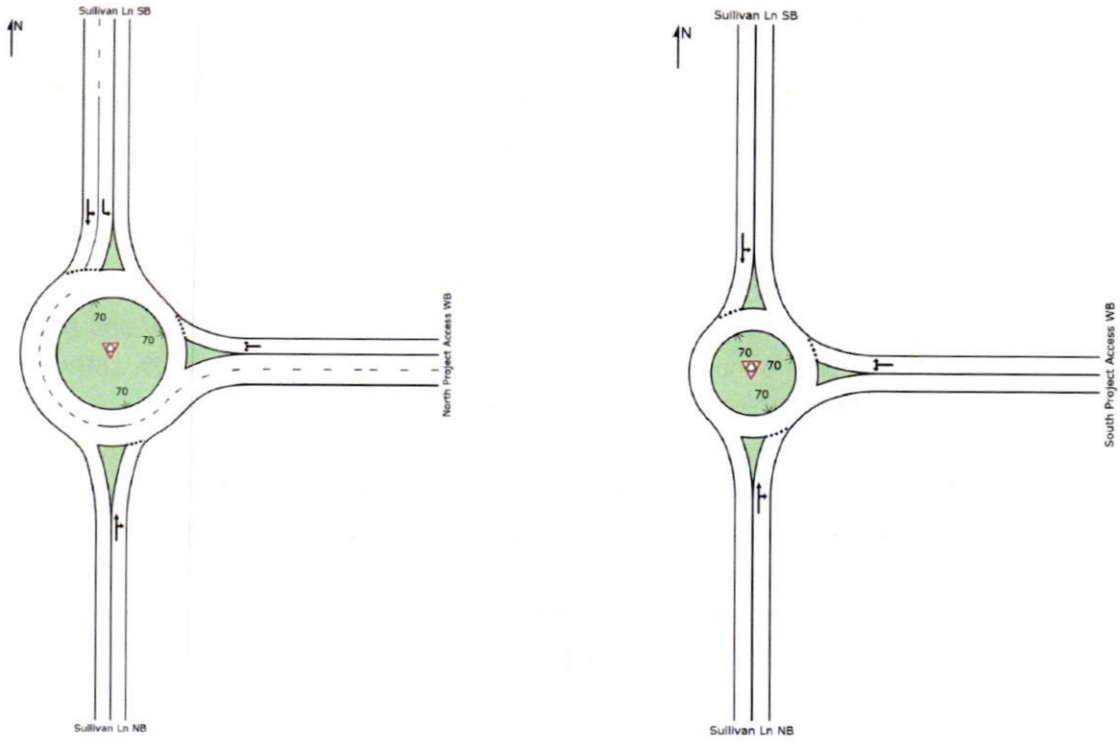


Exhibit 1: Proposed Roundabout Configurations – Project Access Locations

Multimodal Improvements

The Washoe County School District would construct the following multimodal improvements (shown on **Figure 5**) with the proposed project to serve students using alternative modes of travel:

- Sullivan Lane: Construct sidewalks and bicycle lanes along the project frontage
- East side of Sullivan Lane between Wedekind Road and El Rancho Drive, east side of El Rancho Drive north of Sullivan Lane, and on the north side of McCarran Boulevard west of Sullivan Lane: Construct sidewalk at select locations to fill in gaps in the existing walking infrastructure
- Public Transit: Based on RTC direction, potentially construct an RTC RIDE transit stop on Sullivan Lane near the campus entrance. The RTC may wish to consider changes to Route 15 to better serve high school students and staff
- Implement a 15 mph "school zone" on Sullivan Lane during the morning arrival and afternoon dismissal peak travel periods (specific times to be based on the actual school hours schedule)

EXISTING PLUS PROJECT CONDITIONS

Existing Plus Project Traffic Volumes

Project generated trips (**Figure 9**) were added to existing traffic volumes at the study intersections (**Figure 7**) to develop Existing Plus Project peak hour traffic volumes (shown on **Figure 10**).

Existing Plus Project Intersection Level of Service

Existing Plus Project intersection level of service analysis was performed using Synchro 9 software for the signalized and stop controlled intersections, with results reported based on *HCM 2000* and *HCM 2010* methodologies, respectively. The roundabout intersections were analyzed using SIDRA software with results reported based on *HCM 2010* methods. Peak hour factors for the AM and Afternoon peak hours (when students generate the majority of the project trips) were calculated assuming approximately 1/3 of students arrive during the 15 minutes before school starts and depart during the 15 minutes after school is dismissed. The existing intersection peak hour factors were used for the PM peak hour analysis. Existing Plus Project intersection lane configurations and controls are shown on **Figure 11. Table 6** shows the Existing Plus Project intersection level of service results for the AM, Afternoon, and PM peak hours. The technical calculations are provided in **Appendix B**.

Table 6: Existing Plus Project Intersection Level of Service Results

Intersection	Control[1]	AM			Afternoon[2]			PM		
		LOS	Delay[3]	V/C	LOS	Delay[3]	V/C	LOS	Delay[3]	V/C
El Rancho Dr/Sun Valley Blvd	Signal	C	28.4	NA	D	49.7	NA	D	47.8	NA
El Rancho Dr/Sullivan Ln	Side-Street Stop									
Westbound Approach		**F**	**>1,000**	**NA**	**F**	**705.0**	**NA**	**F**	**256.9**	**NA**
Southbound Left		C	17.6	NA	B	10.0	NA	B	10.7	NA
Sullivan Ln/North Project Access	RAB									
Northbound Approach		C	16.4	0.67	A	9.8	0.51	A	9.0	0.48
Southbound Approach		B	11.5	0.68	A	6.7	0.38	A	7.3	0.42
Westbound Approach		B	10.0	0.38	B	13.6	0.52	A	6.9	0.14
Sullivan Ln/Niblick Dr	Side-Street Stop									
Eastbound Approach		C	19.8	NA	B	11.4	NA	B	13.2	NA
Northbound Left		A	9.3	NA	A	8.4	NA	A	8.4	NA
Sullivan Ln/South Project Access	RAB									
Northbound Approach		C	17.1	0.71	A	8.1	0.42	A	8.9	0.48
Southbound Approach		C	17.8	0.76	A	9.5	0.48	A	8.3	0.45
Westbound Approach		A	8.5	0.30	A	9.5	0.38	A	6.5	0.11
Sullivan Ln/Green Vista Dr	Side-Street Stop									
Eastbound Approach		C	22.9	NA	C	15.5	NA	C	16.8	NA
Westbound Approach		**E**	**42.0**	**NA**	D	29.1	NA	**E**	**39.7**	**NA**
Northbound Left		A	9.2	NA	A	8.7	NA	A	8.4	NA
Southbound Left		A	8.9	NA	A	8.2	NA	A	8.4	NA
McCarran Blvd/El Rancho Dr	Signal	E	55.7	NA	D	35.2	NA	D	45.6	NA
McCarran Blvd/Sullivan Ln[4]	Signal	**F**	**93.1**	**NA**	D	46.9	NA	E	60.8	NA

Notes: 1. RAB = roundabout
2. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM, when school gets out.
3. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) and roundabout intersections.
4. The LOS and delay results for the McCarran Blvd/Sullivan Ln intersection are based on HCM 2000 reports because HCM 2010 does not support turning movement analysis with shared and exclusive lanes.
Bold indicates unacceptable operations.
Source: Traffic Works, 2019

As shown in the table, the El Rancho Drive/Sullivan Lane and McCarran Boulevard/Sullivan Lane intersections are expected to operate at LOS F during at least one of the study peak hours. Additionally, the El Rancho Drive/Sun Valley Boulevard intersection is expected to operate at LOS D, but with a volume-to-capacity ratio of 0.99 indicating a need for capacity improvement.

The westbound approach of the Sullivan Lane/Green Vista Drive intersection is expected to operate at LOS E with up to 42.0 seconds of delay (only 7 seconds more than the LOS E threshold). It should be noted that the proposed project would not add any traffic to the westbound approach of this intersection, only to the northbound and southbound approaches which are expected to operate at LOS A during all three peak hours. This condition (LOS E/F for a minor side street movement, with less than 60 seconds average delay in this case) commonly exists throughout urban and suburban areas and is a manageable situation

that does not justify a traffic signal, roundabout, or other major improvement that would disrupt traffic flow on Sullivan Lane (the major street). Additionally, the low side-street volumes (5 westbound vehicles during the AM peak hour and 35 vehicles during the PM peak hour, when LOS E conditions are expected to occur) do not warrant a traffic signal at this intersection. Therefore, no mitigations are recommended at the Sullivan Lane/Green Vista Drive intersection. If drivers do not want to wait for a gap to make a left-turn from the westbound approach, they have the option of making a right-turn and then a U-turn at the South Project Access roundabout intersection.

Recommended Improvements

As shown in **Table 6**, the El Rancho Drive/Sullivan Lane and McCarran Boulevard/Sullivan Lane intersections are expected to operate at LOS F under Existing Plus Project conditions. Additionally, the El Rancho Drive/Sun Valley Boulevard intersection is expected to have a volume-to-capacity ratio of 0.99 and needs improvement. The following intersection improvements would mitigate the project's impacts and provide acceptable levels of service:

- El Rancho Drive/Sun Valley Boulevard –
    - Convert the existing westbound to northbound right-turn lane to a free right-turn lane with acceleration lane and merge taper
    - Optimize signal timing

    Based on NDOT's *Access Management System and Standards, 2017 Edition*, an acceleration lane on a facility with a posted speed limit of 35 mph should include 280 feet of acceleration length followed by at least 144 feet of taper length (12:1 taper ratio, 12 feet of assumed lane width). The segment of Sun Valley Boulevard north of El Rancho Drive has a 35 mph speed limit. The acceleration lane lengths required above would fit within the existing widened roadway section which extends approximately 550 feet north from El Rancho Drive. Consideration should be given during final design to adjusting these lengths to either intentionally include or exclude the northerly apartment complex driveway within the acceleration lane.

- El Rancho Drive/Sullivan Lane –
    - Construct a roundabout at the intersection with a shared through/right-turn lane on the northbound approach, a left-turn lane and a right-turn pocket on the westbound approach, and a left-turn lane and shared through/left-turn lane on the southbound approach (as shown in **Exhibit 2** below)

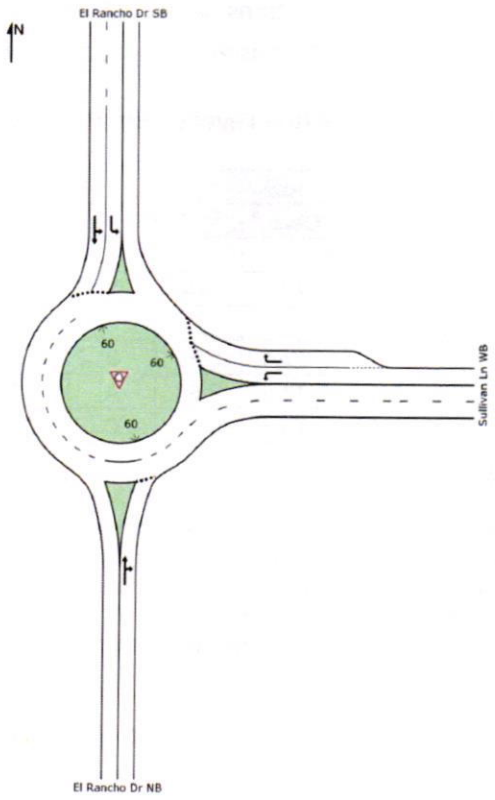


Exhibit 2: Proposed Roundabout Configuration – El Rancho Drive/Sullivan Lane

- McCarran Boulevard/Sullivan Lane –
  - Modify northbound lane configurations to include one left-turn lane and a shared through/right-turn lane
  - Modify southbound lane configurations to include two left-turn lanes, one through lane, and one right-turn lane
  - Change northbound and southbound signal phasing to protected left-turns
  - Extend the eastbound left-turn pocket to include 600 feet of striped pocket plus 170 feet of deceleration length plus 180 feet of taper, to provide a conservative length for peak queue storage
  - Optimize signal timing

- McCarran Boulevard/El Rancho Drive
  - Optimize signal timing in coordination with the McCarran Boulevard/Sullivan Lane intersection

All existing bicycle lanes and sidewalks will be perpetuated with the recommended improvements.

Figure 12 shows the recommended intersection improvements for the McCarran Boulevard/Sullivan Lane intersection.

Table 7 shows the Existing Plus Project conditions level of service results with the intersection improvements listed above. The technical calculations are provided in **Appendix B**.

Table 7: Existing Plus Project Intersection Level of Service Results – with Mitigation

Intersection	Control	AM			Afternoon[1]			PM		
		LOS	Delay[2]	V/C	LOS	Delay[2]	V/C	LOS	Delay[2]	V/C
El Rancho Dr/Sun Valley Blvd	Signal	C	25.5	NA	C	23.1	NA	C	26.9	NA
El Rancho Dr/Sullivan Ln	RAB									
Northbound Approach		C	17.4	0.56	B	10.8	0.47	B	12.9	0.55
Southbound Approach		B	13.5	0.66	A	7.2	0.33	A	6.7	0.33
Westbound Approach		B	10.5	0.59	C	22.2	0.83	C	19.0	0.73
McCarran Blvd/Sullivan Ln	Signal	E	64.2	NA	C	28.6	NA	34.2	C	NA

Notes: 1. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM, when school gets out.
2. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) and roundabout intersections.
3. For consistency, the LOS and delay results for the signalized intersections are based on HCM 2000 reports because HCM 2010 does not support turning movement analysis with shared and exclusive lanes.
Source: Traffic Works, 2019

As shown in the table, the study intersections would operate at acceptable levels of service with the recommended improvements. It should be noted that operations at the McCarran Boulevard/El Rancho Drive intersection are also expected to improve with mitigations at the McCarran Boulevard/Sullivan Lane intersection due to better signal coordination opportunities between the two traffic signals.

Roadway Segment Level of Service

Daily project trips were added to the existing daily roadway segment volumes at the study locations. Existing Plus Project conditions roadway segment level of service was determined by comparing the daily roadway segment volumes (shown on **Figure 10)** to the thresholds in **Table 2**. The daily roadway segment level of service results are shown in **Table 8**.

Table 8: Existing Plus Project Conditions Roadway Segment Level of Service Results

Roadway	Location	Classification[1]	# of Lanes	Volume[2]	LOS	v/c Ratio
McCarran Blvd	El Rancho Dr to Sullivan Ln	HAC Arterial	4	29,650	C	0.73
El Rancho Dr	Sun Valley Blvd to Sullivan Ln	MAC Arterial	4[3]	12,160	C	0.33
Sullivan Ln	El Rancho Dr to McCarran Blvd	LAC Arterial	2	8,620	D	0.57

Notes:
1. HAC = High Access Control; MAC = Moderate Access Control; LAC = Low Access Control
2. Based on 2017 AADT volumes from NDOT's Traffic Records Information Access (TRINA).
3. El Rancho Drive has four lanes near Sun Valley Blvd where traffic volume data was collected. South of Sun Valley Blvd, El Rancho Drive has two lanes. The Existing Plus Project traffic volume would operate at LOS C with two lanes as well.
Source: Traffic Works, 2019

As shown in the table, the study roadway segments are expected to operate at acceptable levels of service on a daily basis under Existing Plus Project conditions.

FUTURE YEAR (2040) CONDITIONS

Planned Regional Roadway Improvements

The *2040 RTP* outlines programmed roadway projects of regional significance. The project list is split into three time periods: 2017 – 2021 (first five years of the plan), 2022 – 2026 (second five years of the plan), and 2027 – 2040 (remaining years of the plan). The key programmed improvement is the widening of McCarran Boulevard from 4 to 6 lanes between El Rancho Drive and Rock Boulevard in the 2027 – 2040 timeframe. The following roadway projects are programmed within the project vicinity.

Note that the Pyramid Highway/Sun Valley/US 395 Connector *(listed in italics below)* is not included in this traffic analysis to ensure a conservative analysis. Construction of that new roadway would reduce traffic volumes on McCarran Boulevard adjacent to the project site. Therefore, the project mitigations/improvements needed could be less than described in this report. This 2040 Background Conditions analysis presents a worst case scenario, assuming higher background traffic volumes near the proposed high school.

RTP Regional Road Improvements (2017-2021)

- Sun Valley Boulevard – 7th Avenue to Pyramid Highway/US 395 Connector: Multimodal improvements (Preliminary Engineering & NEPA Phase)
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 1 – Queen Way to Golden View: Widen Pyramid Highway to 6 lanes from Queen Way to Golden View (Preliminary Engineering & NEPA Phase)*

RTP Regional Road Improvements (2022-2026)

- Sun Valley Boulevard – 7th Avenue to Pyramid Highway/US 395 Connector: Multimodal improvements
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 1 – Queen Way to Golden View: Widen Pyramid Highway to 6 lanes from Queen Way to Golden View*

RTP Regional Road Improvements (2027-2040)

- El Rancho Drive/Dandini Boulevard – Raggio Parkway to Sullivan Lane: Multimodal improvements, including enhanced sidewalks and bike lanes
- McCarran Boulevard – El Rancho Drive to Rock Boulevard: Widen 4 to 6 lanes
- Sun Valley Boulevard – 7th Avenue to Highland Ranch Parkway: Multimodal improvements

- *Pyramid Highway/Sun Valley/US 395 Connector Phase 2 – US 395 to Pyramid Way/Sparks Boulevard: New 6 lane arterial from US 395 to West Sun Valley; New 4 lane arterial from West Sun Valley to Pyramid Way*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 3 – Widen Disc Drive from Pyramid Highway to Vista Boulevard from 4 to 6 lanes*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 4 – Interchange improvements at the Connector/Dandini Boulevard interchange*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 5 – US 395 system ramp improvements*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 6 – Widen Pyramid Highway from Lazy Five Parkway to La Posada Drive from 4 to 6 lanes*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 7 – Extend Disc Drive from Connector to Pyramid Way: New 4 lane arterial*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 8 – Construct new interchange at Sparks Boulevard*
- *Pyramid Highway/Sun Valley/US 395 Connector Phase 9 – Operational improvements from La Posada Drive to Calle de la Plata; widen Pyramid Way from Sunset Springs Lane to Calle de la Plata from 2 to 4 lanes*

2040 Traffic Volumes

2040 roadway segment and intersection volumes were developed using outputs from the RTC's regional travel demand model. Base year and future year model volumes were used to develop growth rates for the study area roadways and intersections. The model volumes were adjusted upward assuming the worst case scenario that the Pyramid Highway/395 Connector might not be in place by 2040. 2040 Background conditions daily roadway segment and peak hour intersection volumes are shown on **Figure 13**.

2040 No Project Intersection Level of Service Analysis

2040 Background conditions intersection level of service analysis was performed for the study intersections using Synchro 9 analysis software, with reporting for unsignalized intersections based on *HCM 2010* methodology and reporting for signalized intersections based on *HCM 2000* methodology. *HCM 2010* does not enable analysis of signalized intersections with shared through/turn lanes and exclusive turn lanes on the same approach (as currently seen at the McCarran Boulevard/Sullivan Lane intersection). For consistency between analysis scenarios, *HCM 2000* reporting was used for all signalized intersections throughout this report. The level of service analysis assumes six (6) lanes on McCarran Boulevard from El Rancho Drive to Rock Boulevard (per the *2040 RTP*) and the existing lane configurations at all other intersections. The 2040 intersection lane configurations and traffic controls are shown on **Figure 14**. **Table 9** shows the level of service and delay at the study intersections for this study scenario. The technical calculations are provided in **Appendix C**.

Table 9: 2040 Background Intersection Level of Service Results

Intersection	Control	AM		Afternoon[1]		PM	
		LOS	Delay[2]	LOS	Delay[2]	LOS	Delay[2]
El Rancho Dr / Sun Valley Blvd	Signal	C	27.5	C	24.9	E	57.4
El Rancho Dr / Sullivan Ln	Side-Street Stop						
Westbound Approach		B	14.1	C	17.3	**F**	**51.9**
Southbound Left		A	8.6	A	9.0	B	10.4
Sullivan Ln / Niblick Dr	Side-Street Stop						
Eastbound Approach		B	13.5	B	10.7	B	13.9
Northbound Left		A	8.4	A	8.0	A	8.3
Sullivan Ln / Green Vista Dr	Side-Street Stop						
Eastbound Approach		C	15.5	B	12.4	C	16.2
Westbound Approach		C	23.6	C	20.3	**E**	**39.0**
Northbound Left		A	8.7	A	8.2	A	8.3
Southbound Left		A	8.1	A	8.0	A	8.4
McCarran Blvd / El Rancho Dr	Signal	D	42.4	C	30.1	D	50.1
McCarran Blvd / Sullivan Ln	Signal	D	36.0	D	38.3	E	68.3

Notes: 1. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM, when school gets out.
2. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) intersections.
3. The LOS and delay results for signalized intersections are based on *HCM 2000* reports because *HCM 2010* does not support turning movement analysis with shared and exclusive lanes.
Source: Traffic Works, 2019

As shown in **Table 9**, the westbound approaches of the El Rancho Drive/Sullivan Lane and Sullivan Lane/Green Vista Drive intersections are expected to operate at LOS F and LOS E during the PM peak hour, respectively. The remaining study intersections are expected to operate acceptably under 2040 Background conditions. However, the El Rancho Drive/Sun Valley Boulevard and McCarran Boulevard/Sullivan Lane intersections would function at LOS E during the PM peak hour.

2040 Background Roadway Segment Level of Service

The study roadway segments were analyzed based on the 2040 Background conditions traffic volumes shown on **Figure 13**. Level of service was determined by comparing the daily traffic volumes to the capacity thresholds provided in **Table 2**. **Table 10** shows the daily roadway segment level of service results for the study roadway segments.

Table 10: 2040 Background Conditions Roadway Segment Level of Service Results

Roadway	Location	Classification[1]	# of Lanes	Volume	LOS	v/c Ratio
McCarran Blvd	El Rancho Dr to Sullivan Ln	HAC Arterial	6	35,000	C	0.57
El Rancho Dr	Sun Valley Blvd to Sullivan Ln	MAC Arterial	4[2]	10,230	B	0.28
Sullivan Ln	El Rancho Dr to McCarran Blvd	LAC Arterial	2	5,600	C	0.37

Notes:
1. HAC = High Access Control; MAC = Moderate Access Control; LAC = Low Access Control
2. El Rancho Drive has four lanes near Sun Valley Blvd where traffic volume data was collected. East/south of Sun Valley Blvd, El Rancho Drive has two lanes. The 2040 Background traffic volume would operate at LOS C with two lanes as well.
Source: Traffic Works, 2019

As shown in the table, the study roadway segments are expected to operate at acceptable levels of service on a daily basis under 2040 Background conditions.

2040 Plus Project Traffic Volumes

Project generated trips (**Figure 9**) were added to the 2040 Background traffic volumes at the study intersections (**Figure 13**) to develop 2040 Plus Project daily roadway segment and peak hour intersection traffic volumes (shown on **Figure 15**).

2040 Plus Project Intersection Level of Service

2040 Plus Project intersection level of service analysis was performed using Synchro 9 software for the signalized and stop controlled intersections, with results reported based on *HCM 2000* and *HCM 2010* methodologies, respectively. The roundabout intersections were analyzed using SIDRA software with results reported based on *HCM 2010* methods. Peak hour factors for the AM and Afternoon peak hours (when students generate the majority of the project trips) were calculated assuming approximately 1/3 of students arrive during the 15 minutes before school starts and depart during the 15 minutes after school is dismissed. The 2040 Background conditions intersection peak hour factors were used for the PM peak hour. **Table 11** shows the 2040 Plus Project intersection level of service results for the AM, Afternoon, and PM peak hours. The technical calculations are provided in **Appendix D**.

Table 11: 2040 Plus Project Intersection Level of Service Results

Intersection	Control[1]	AM			Afternoon[2]			PM		
		LOS	Delay[3]	V/C	LOS	Delay[3]	V/C	LOS	Delay[3]	V/C
El Rancho Dr/Sun Valley Blvd	Signal	C	29.5	NA	C	31.5	NA	E	70.7	NA
El Rancho Dr/Sullivan Ln	Side-Street Stop									
Westbound Approach		**F**	**>1,000**	**NA**	**F**	**755.0**	**NA**	**F**	**394.0**	**NA**
Southbound Left		C	17.3	NA	B	10.2	NA	B	11.4	NA
Sullivan Ln/North Project Access	RAB									
Northbound Approach		C	17.8	0.70	B	10.1	0.53	A	9.5	0.52
Southbound Approach		B	11.7	0.69	A	6.8	0.39	A	7.6	0.44
Westbound Approach		B	10.4	0.39	B	13.9	0.53	A	7.2	0.14
Sullivan Ln/Niblick Dr	Side-Street Stop									
Eastbound Approach		C	20.6	NA	B	12.1	NA	C	15.1	NA
Northbound Left		A	9.4	NA	A	8.4	NA	A	8.5	NA
Sullivan Ln/South Project Access	RAB									
Northbound Approach		C	19.1	0.75	A	8.3	0.43	A	9.4	0.51
Southbound Approach		C	18.2	0.77	A	9.8	0.50	A	8.7	0.47
Westbound Approach		A	8.9	0.31	A	9.7	0.39	A	6.8	0.12
Sullivan Ln/Green Vista Dr	Side-Street Stop									
Eastbound Approach		C	24.2	NA	C	16.0	NA	C	17.9	NA
Westbound Approach		**E**	**44.9**	**NA**	D	32.0	NA	**E**	**48.3**	**NA**
Northbound Left		A	9.3	NA	A	8.8	NA	A	8.5	NA
Southbound Left		A	9.0	NA	A	8.2	NA	A	8.5	NA
McCarran Blvd/El Rancho Dr	Signal	D	49.3	NA	D	41.2	NA	E	56.4	NA
McCarran Blvd/Sullivan Ln	Signal	**F**	**138.3**	**NA**	D	40.3	NA	**F**	**82.9**	**NA**

Notes: 1. RAB = roundabout
2. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM, when school gets out.
3. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) and roundabout intersections.
4. The LOS and delay results for the signalized intersections are based on *HCM 2000* reports because *HCM 2010* does not support turning movement analysis with shared and exclusive lanes.
Source: Traffic Works, 2019

As shown in the table, the El Rancho Drive/Sullivan Lane and McCarran Boulevard/Sullivan Lane intersections are expected to operate at LOS F during at least one peak hour under 2040 Plus Project conditions. Additionally, the El Rancho Drive/Sun Valley Boulevard intersection is expected to operate at LOS E with a volume-to-capacity ratio greater than 1.0 indicating capacity improvement needs.

The westbound approach of the Sullivan Lane/Green Vista Drive intersection is expected to operate at LOS E with up to 48.3 seconds of delay. It should be noted that the proposed project would not add any traffic to the westbound approach of this intersection, only the northbound and southbound approaches which are expected to operate at LOS A during all three peak hours. This condition (LOS E/F for a minor side street movement, with less than 60 seconds average delay in this case) commonly exists throughout urban and suburban areas and is a manageable situation that does not justify a traffic signal, roundabout,

or other major improvement that would disrupt traffic flow on Sullivan Lane (the major street). Additionally, the low side-street volumes (5 westbound vehicles during the AM peak hour and 40 vehicles during the PM peak hour, when LOS E conditions are expected to occur) do not warrant a traffic signal at this intersection. Therefore, no mitigations are recommended at the Sullivan Lane/Green Vista Drive intersection. If drivers do not want to wait for a gap to make a left-turn from the westbound approach, they have the option of making a right-turn and then a U-turn at the South Project Access roundabout.

Recommended Improvements

The El Rancho Drive/Sun Valley Boulevard, El Rancho Drive/Sullivan Lane, and McCarran Boulevard/Sullivan Lane intersections would need mitigations under the 2040 Plus Project conditions. The following intersection improvements would mitigate the project's impacts and provide acceptable levels of service:

- El Rancho Drive/Sun Valley Boulevard –
    - Convert the existing westbound to northbound right-turn lane to a free right-turn lane with acceleration lane and merge taper
    - Optimize signal timing

    Based on NDOT's *Access Management System and Standards, 2017 Edition*, an acceleration lane with 280 feet of acceleration length followed by at least 144 feet of taper length should be constructed. Consideration should be given during final design to adjusting these lengths to either intentionally include or exclude the northerly apartment complex driveway within the acceleration lane.

- El Rancho Drive/Sullivan Lane –
    - Construct a roundabout at the intersection with a shared through/right-turn lane on the northbound approach, a left-turn lane and right-turn lane on the westbound approach, and a left-turn lane and shared through/left-turn lane on the southbound approach (see **Exhibit 2** on page 16)

- McCarran Boulevard/Sullivan Lane (see **Figure 12**) –
    - Modify the northbound lane configurations to include one left-turn lane and a shared through/right-turn lane
    - Modify the southbound lane configurations to include two left-turn lanes, one through lane, and one right-turn lane
    - Change the northbound and southbound signal phasing to protected left-turns
    - Extend the eastbound left-turn pocket to include 600 feet of striped pocket plus 170 feet of deceleration length plus 180 of taper, to provide a conservative length for peak queue storage
    - Optimize signal timing

- McCarran Boulevard/El Rancho Drive
    - Optimize signal timing in coordination with the McCarran Boulevard/Sullivan Lane intersection

All existing bicycle lanes and sidewalks would be perpetuated with the recommended improvements.

Table 12 shows the 2040 Plus Project conditions level of service results with the intersection improvements listed above.

Table 12: 2040 Plus Project Intersection Level of Service Results – with Mitigation

Intersection	Control	AM			Afternoon[1]			PM		
		LOS	Delay[2]	V/C	LOS	Delay[2]	V/C	LOS	Delay[2]	V/C
El Rancho Dr/Sun Valley Blvd	Signal									
		C	26.5	NA	C	23.8	NA	D	35.2	NA
El Rancho Dr/Sullivan Ln	RAB									
Northbound Approach		C	17.9	0.58	B	11.8	0.52	C	16.1	0.65
Southbound Approach		B	13.9	0.67	A	7.3	0.33	A	6.9	0.34
Westbound Approach		B	10.7	0.59	C	22.6	0.82	C	24.7	0.80
McCarran Blvd/Sullivan Ln	Signal									
		D	50.5	NA	C	26.7	NA	D	36.0	NA

Notes: 1. The afternoon peak hour is the highest hour between 2:00 PM and 4:00 PM, when school gets out.
2. Delay is reported in seconds per vehicle for the overall intersection for signalized intersections, and the worst approach/movement for unsignalized (side-street stop controlled) and roundabout intersections.
3. For consistency, the LOS and delay results for the signalized intersections are based on *HCM 2000* reports because *HCM 2010* does not support turning movement analysis with shared and exclusive lanes.
Source: Traffic Works, 2019

As shown in the table, the study intersections would operate at acceptable levels of service with the recommended improvements.

Roadway Segment Level of Service

Daily project trips were added to the 2040 daily roadway segment volumes at the study locations. 2040 Plus Project conditions roadway segment level of service was determined by comparing the daily roadway segment volumes (shown on **Figure 15**) to the thresholds in **Table 2**. The daily roadway segment level of service results are shown in **Table 13**.

Table 13: 2040 Plus Project Conditions Roadway Segment Level of Service Results

Roadway	Location	Classification[1]	# of Lanes	Volume[2]	LOS	v/c Ratio
McCarran Blvd	El Rancho Dr to Sullivan Ln	HAC Arterial	6	35,650	C	0.59
El Rancho Dr	Sun Valley Blvd to Sullivan Ln	MAC Arterial	4[3]	12,290	C	0.33
Sullivan Ln	El Rancho Dr to McCarran Blvd	LAC Arterial	2	8,620	D	0.57

Notes:
1. HAC = High Access Control; MAC = Moderate Access Control; LAC = Low Access Control
2. Based on 2017 AADT volumes from NDOT's Traffic Records Information Access (TRINA).
3. El Rancho Drive has four lanes near Sun Valley Blvd where traffic volume data was collected. South of Sun Valley Blvd, El Rancho Drive has two lanes. The 2040 Plus Project traffic volume would operate at LOS C with two lanes as well.
Source: Traffic Works, 2019

As shown in the table, the study roadway segments are expected to operate at acceptable levels of service on a daily basis under 2040 Plus Project conditions.

CONCLUSIONS & RECOMMENDATIONS

The following is a list of our key findings and recommendations:

- The proposed High School at Wildcreek would have 2,125 students and 150 employees/staff.
- The future school zoning boundary is generally anticipated to include the current Hug High School zoning district and all of Sun Valley.
- The proposed project would generate approximately 4,314 Daily, 1,105 AM peak hour, 701 Afternoon peak hour, and 298 PM peak hour trips. It is anticipated that the proposed high school would be a closed campus, meaning students are not permitted to leave or enter the campus during the middle of the day without permission (i.e. students may not leave campus for lunch, etc.).
- Access to the project site would be provided via two new roundabout intersections on Sullivan Lane. **Exhibit 1** on page 12 shows the proposed roundabout lane configurations.
- Under Existing Plus Project conditions and 2040 Plus Project conditions, the El Rancho Drive/Sullivan Lane and McCarran Boulevard/Sullivan Lane intersections would operate at LOS F unless improved. Additionally, the El Rancho Drive/Sun Valley Boulevard intersection is expected to have a volume-to-capacity ratio greater than 1.0 and would also require capacity improvements.
- The following intersection improvements would mitigate the project's impacts and improve operations to acceptable levels:

    - El Rancho Drive/Sun Valley Boulevard –
        - Convert the existing westbound to northbound right-turn lane to a free right-turn lane with acceleration lane and merge taper
        - Optimize signal timing

Based on NDOT's *Access Management System and Standards, 2017 Edition*, an acceleration lane with 280 feet of acceleration length followed by at least 144 feet of taper length should be constructed. Consideration should be given during final design to adjusting these lengths to either intentionally include or exclude the northerly apartment complex driveway within the acceleration lane.

- El Rancho Drive/Sullivan Lane –
  - Construct a roundabout at the intersection with a shared through/right-turn lane on the northbound approach, a left-turn lane and a right-turn pocket on the westbound approach, and a left-turn lane and shared through/left-turn lane on the southbound approach (see **Exhibit 2** on page 16)

- McCarran Boulevard/Sullivan Lane (see **Figure 12**) –
  - Modify northbound lane configurations to include one left-turn lane and a shared through/right-turn lane
  - Modify southbound lane configurations to include two left-turn lanes, one through lane, and one right-turn lane
  - Change northbound and southbound signal phasing to protected left-turns
  - Extend the eastbound left-turn pocket to include 600 feet of striped pocket plus 170 feet of deceleration length plus 180 feet of taper, to provide a conservative length for peak queue storage
  - Optimize signal timing

- McCarran Boulevard/El Rancho Drive
  - Optimize signal timing in coordination with the McCarran Boulevard/Sullivan Lane intersection

- The following multimodal improvements are also recommended as shown in **Figure 5**:
  - Sullivan Lane: Construct sidewalks and bicycle lanes along the project frontage
  - East side of Sullivan Lane between Wedekind Road and El Rancho Drive, east side of El Rancho Drive north of Sullivan Lane, and on the north side of McCarran Boulevard west of Sullivan Lane: Construct sidewalk at select locations to fill in gaps in the existing walking infrastructure
  - Public Transit: Based on RTC direction, potentially construct an RTC RIDE transit stop on Sullivan Lane near the campus entrance. The RTC may wish to consider changes to Route 15 to better serve high school students and staff
  - Implement a 15 mph "school zone" on Sullivan Lane during the morning arrival and afternoon dismissal peak travel periods (specific times to be based on the actual school hours schedule)

TRAFFIC WORKS

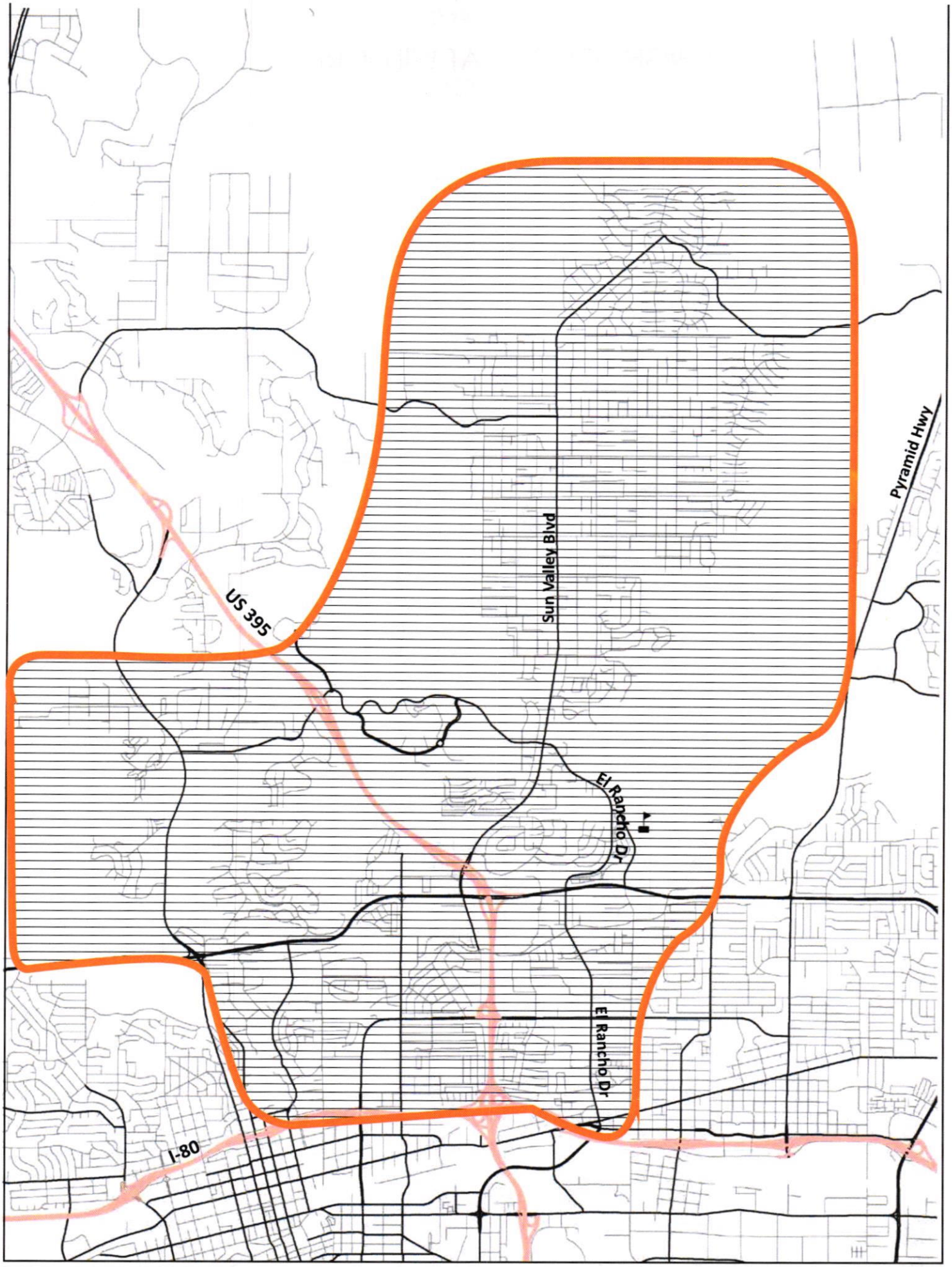
Legend

(X) - New Project Intersection

(Y) - Existing Intersection

Figure 1

High School at Wildcreek
Traffic Impact Study



TRAFFIC WORKS

- Traffic Contribution Area
- Project Site

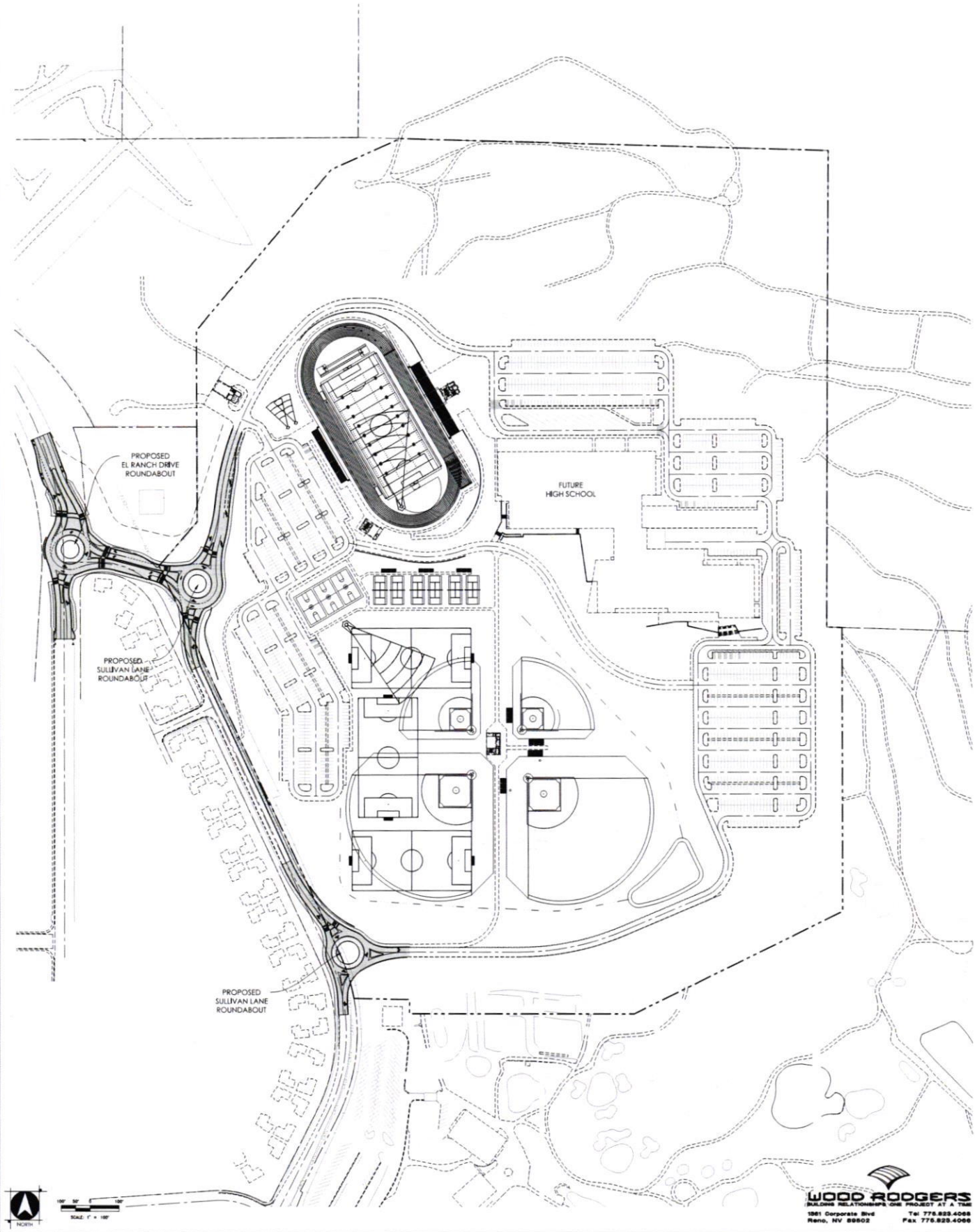
Figure 2
High School at Wildcreek
Traffic Impact Study

PRELIMINARY SITE

HIGH SCHOOL AT WILDCREEK

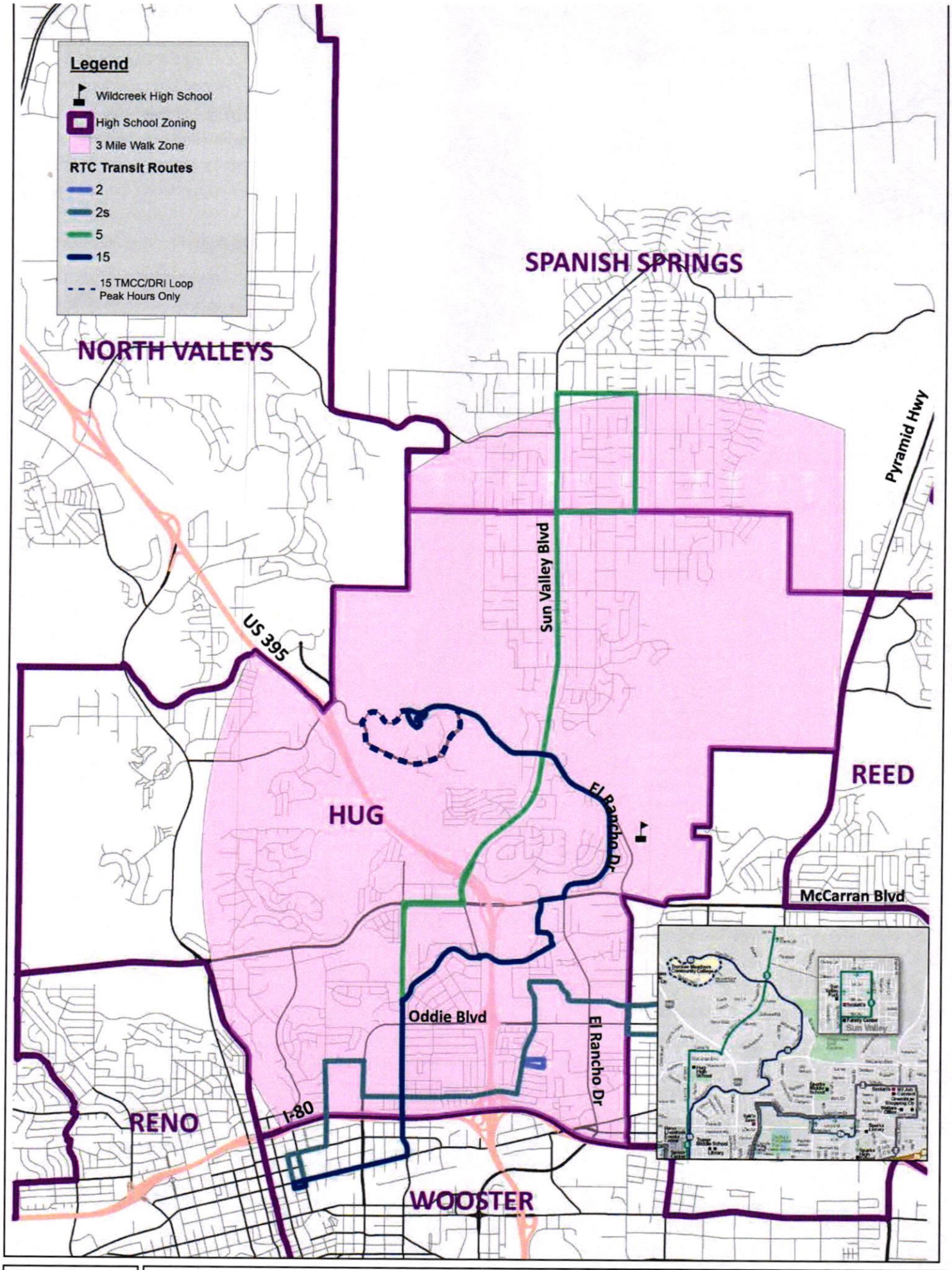
WASHOE COUNTY SCHOOL DISTICT

NOVEMBER, 2018



TRAFFIC WORKS

Figure 3
High School at Wildcreek
Traffic Impact Study

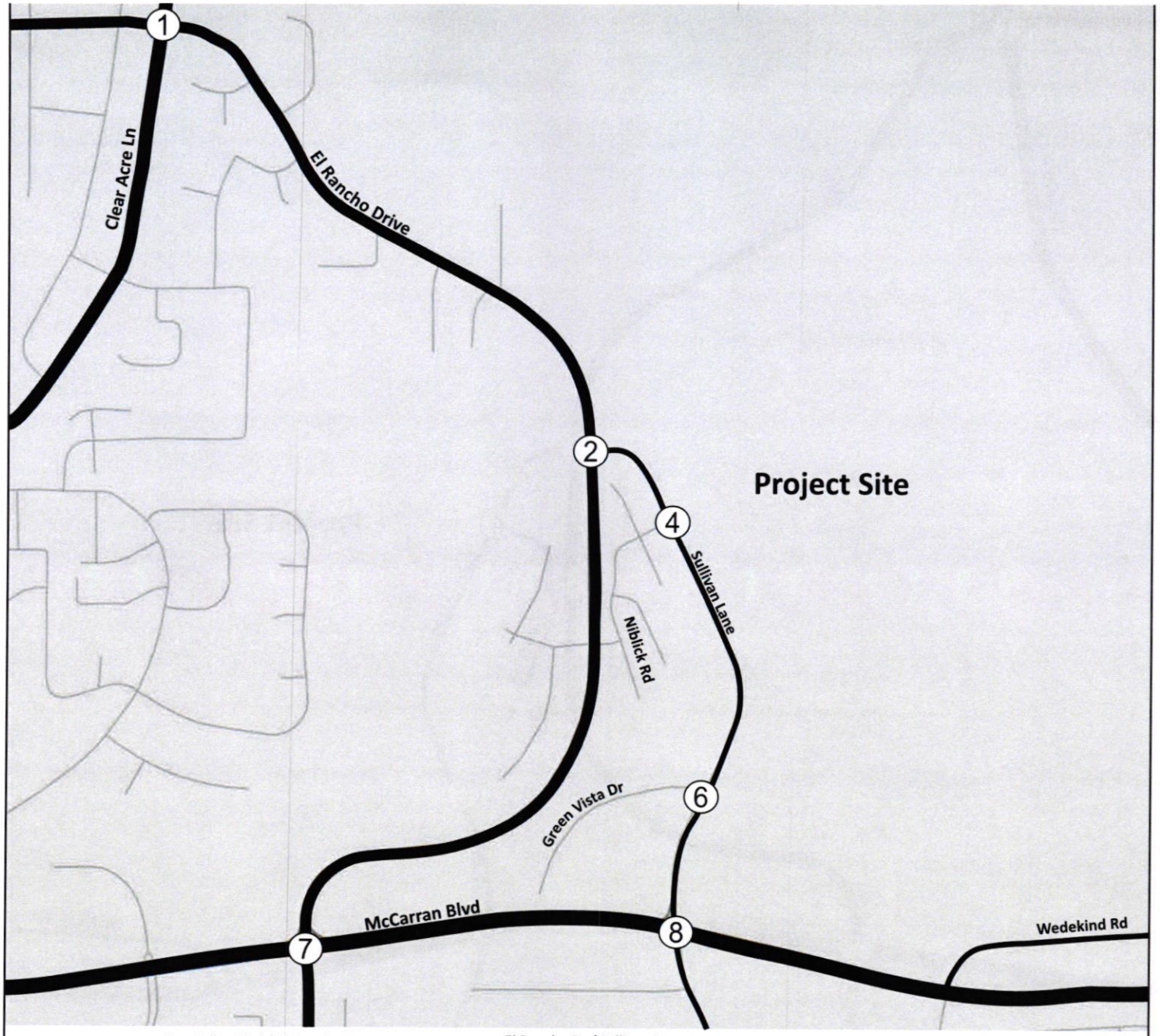


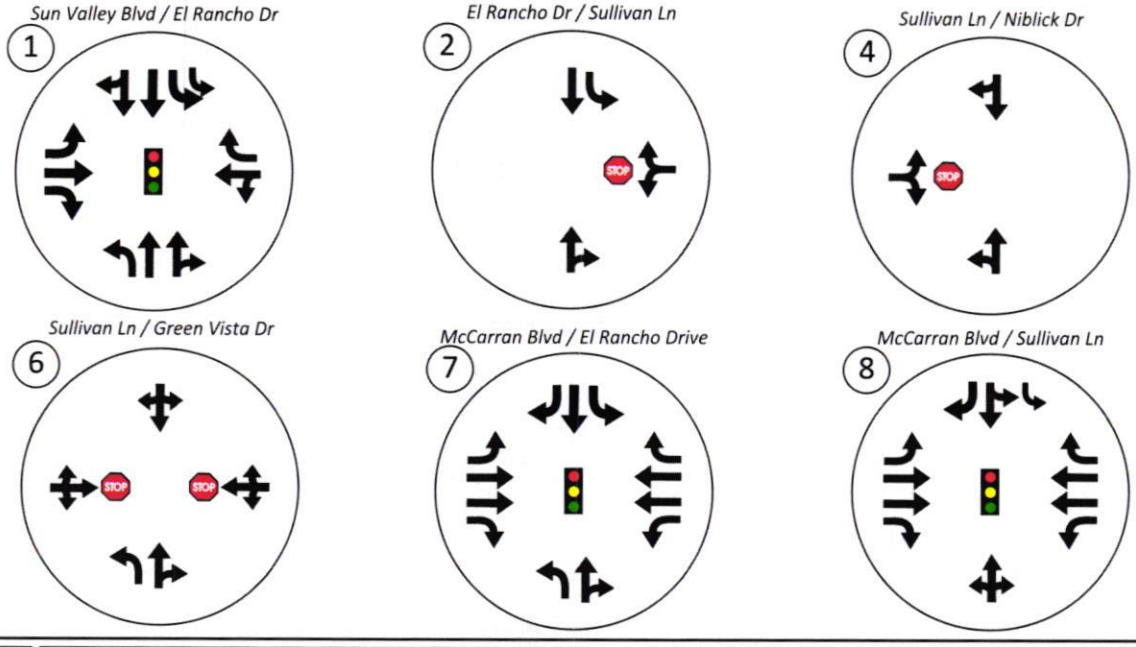
TRAFFIC WORKS

Figure 4
High School at Wildcreek
Traffic Impact Study
School Bus Service and Public Transit Facilities

TRAFFIC WORKS

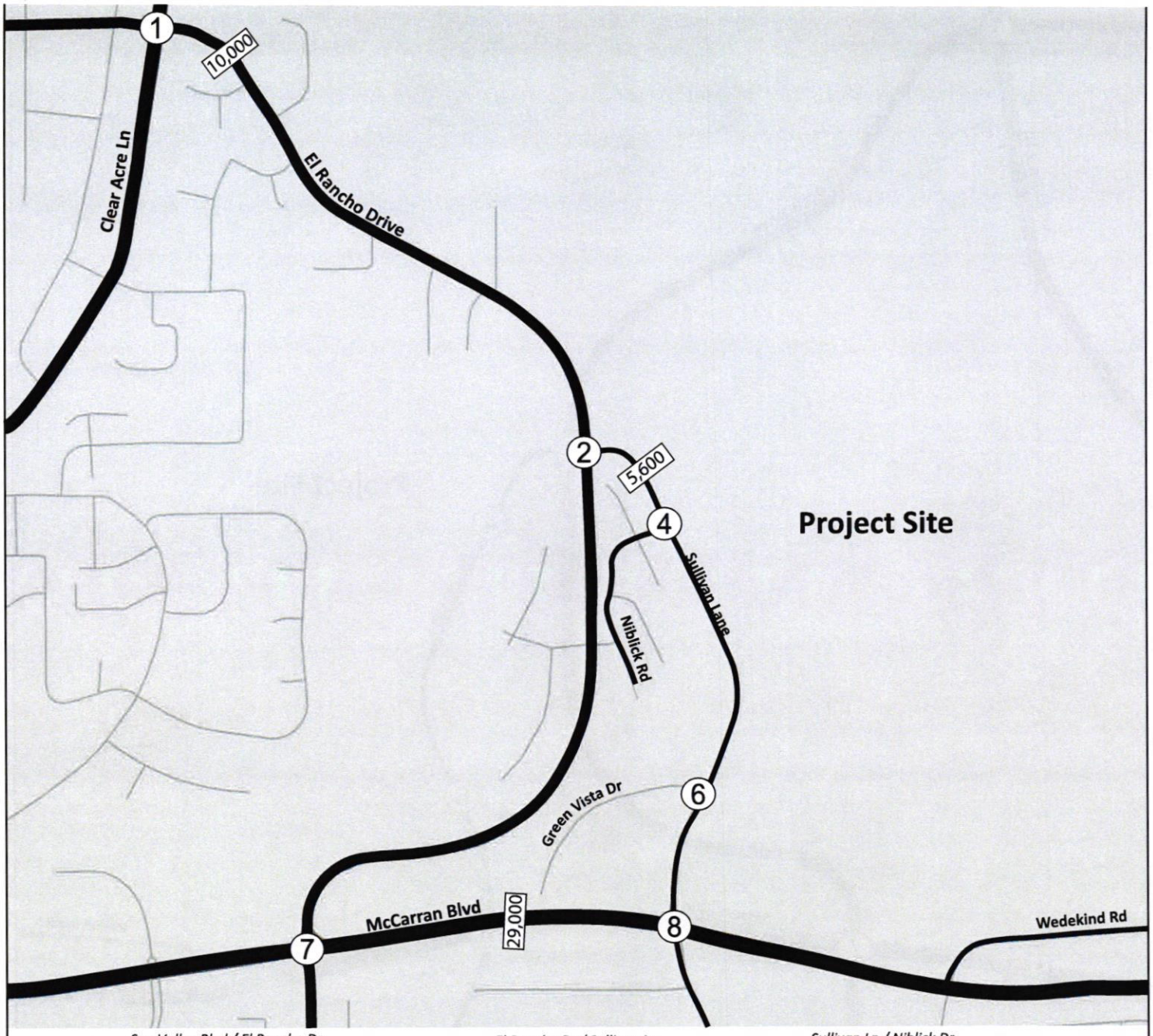
Figure 5
High School at Wildcreek
Traffic Impact Study

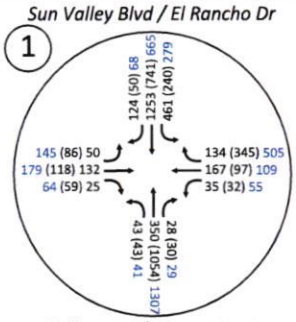


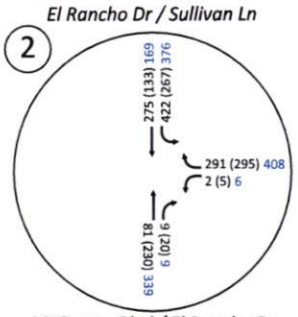


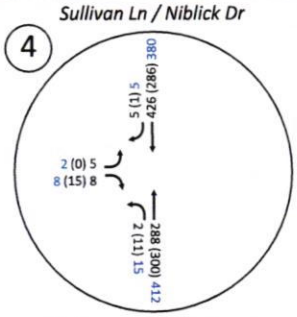
TRAFFIC WORKS

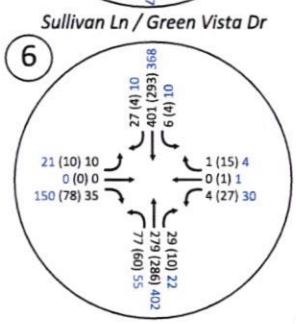
Figure 6
High School at Wildcreek
Traffic Impact Study

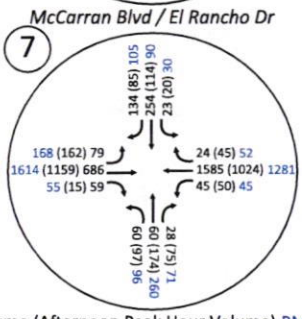


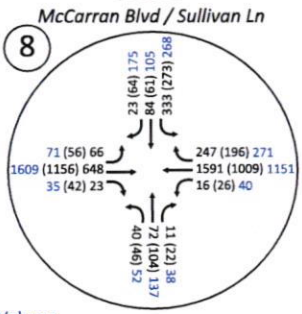










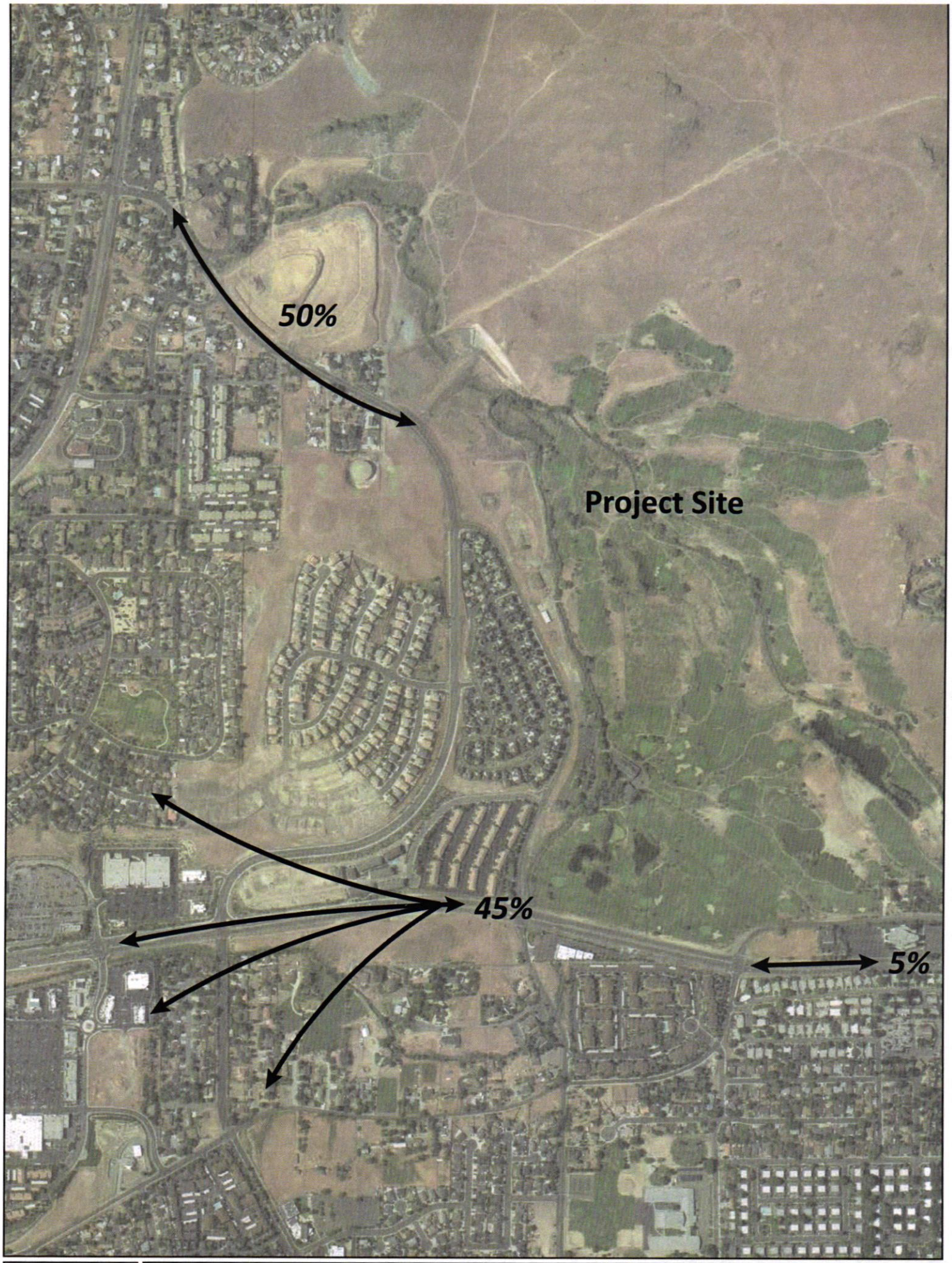


AM Peak Hour Volume (Afternoon Peak Hour Volume) PM Peak Hour Volume

TRAFFIC WORKS

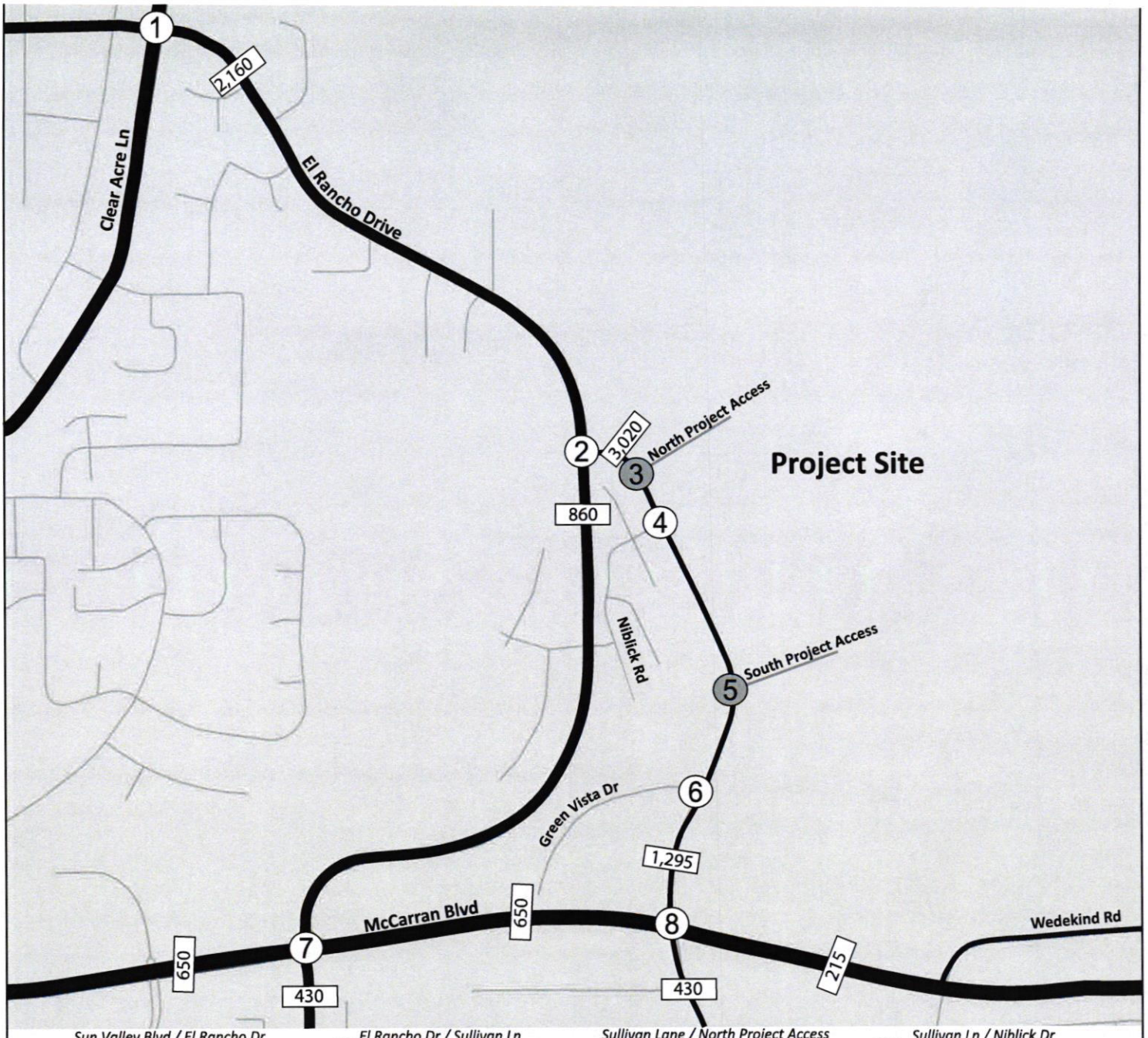
xx,xxx - Daily Volumes

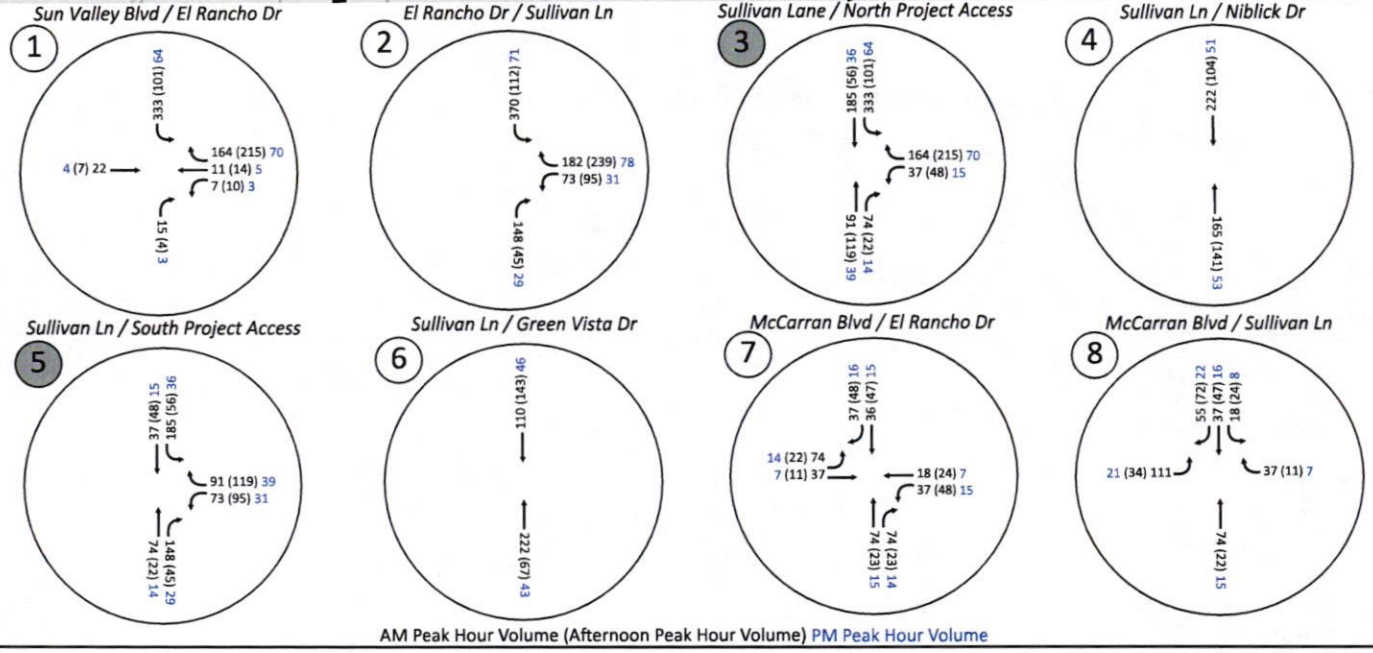
Figure 7
High School at Wildcreek
Traffic Impact Study



TRAFFIC WORKS

Figure 8
High School at Wildcreek
Traffic Impact Study



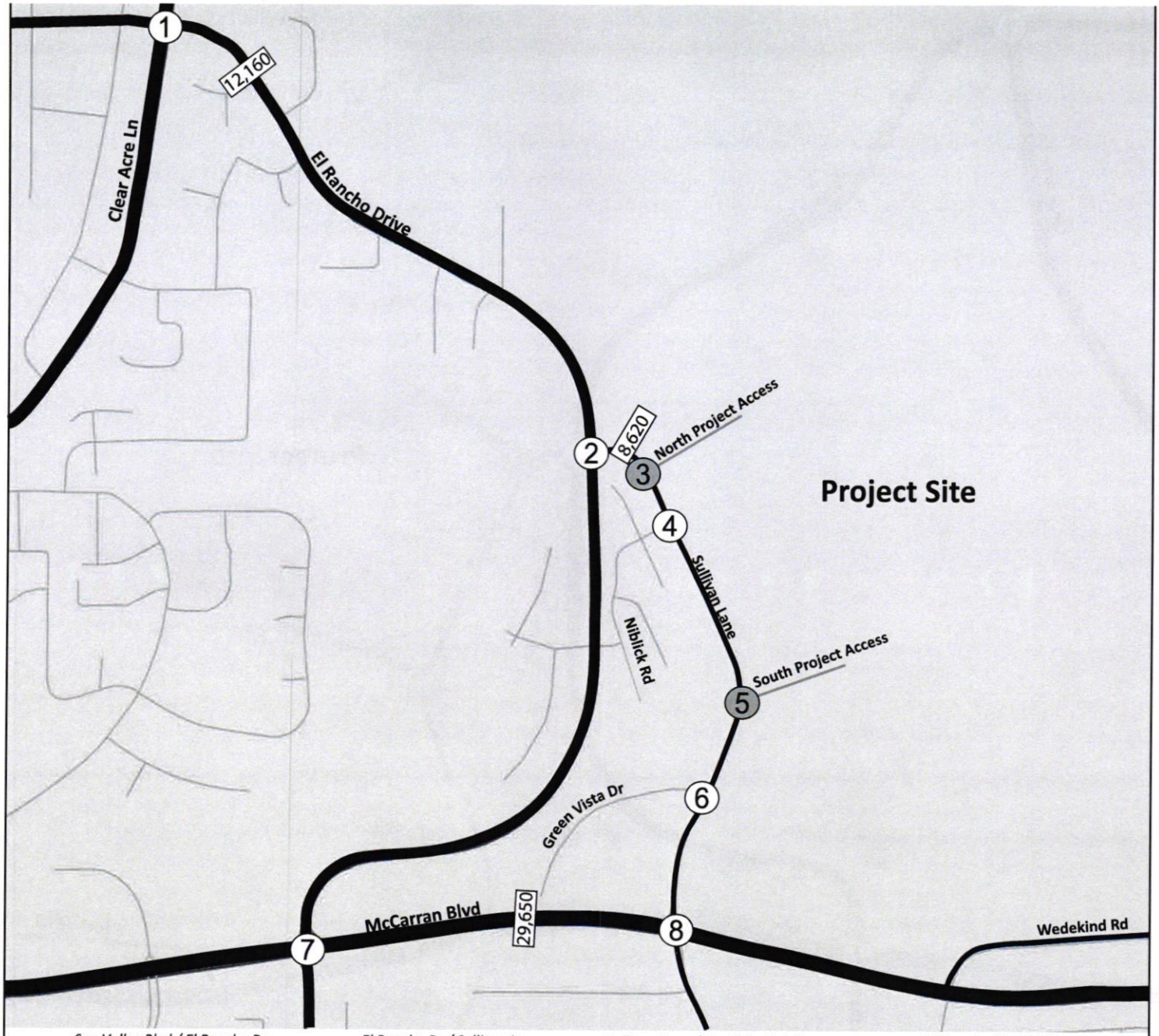


AM Peak Hour Volume (Afternoon Peak Hour Volume) PM Peak Hour Volume

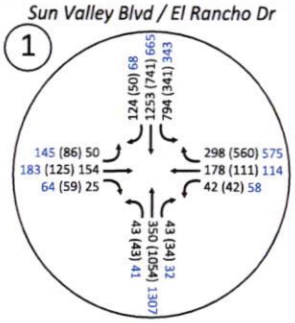
TRAFFIC WORKS

XX,XXX - Daily Volumes

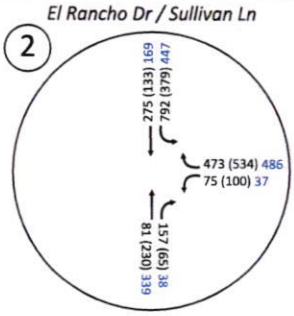
Figure 9
High School at Wildcreek
Traffic Impact Study



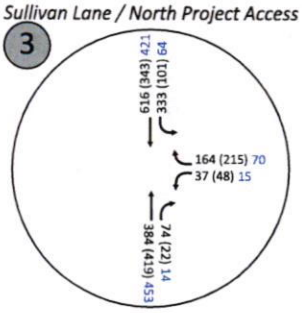
Sun Valley Blvd / El Rancho Dr



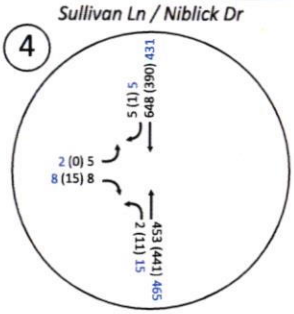
El Rancho Dr / Sullivan Ln



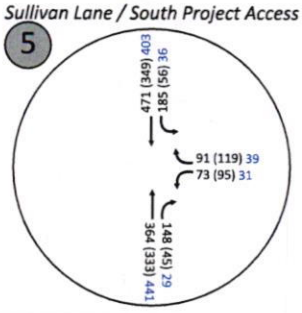
Sullivan Lane / North Project Access



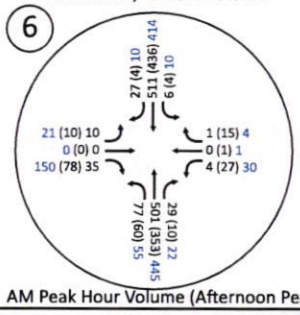
Sullivan Ln / Niblick Dr



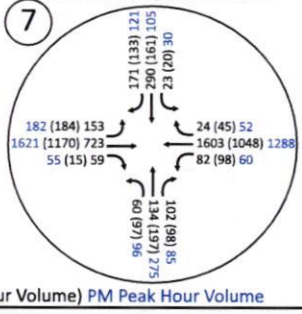
Sullivan Lane / South Project Access



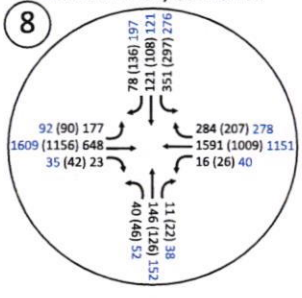
Sullivan Ln / Green Vista Dr



McCarran Blvd / El Rancho Dr



McCarran Blvd / Sullivan Ln

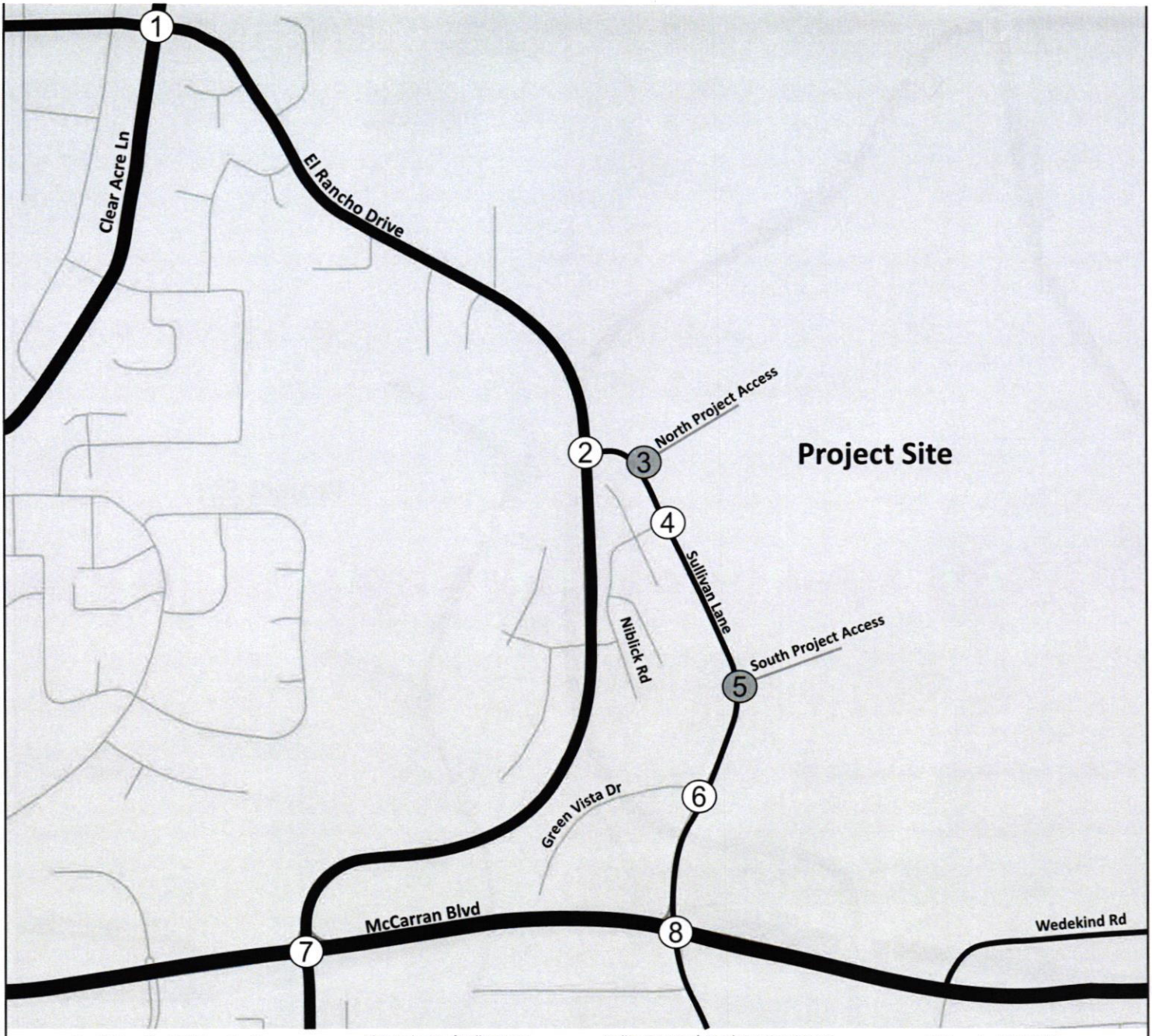


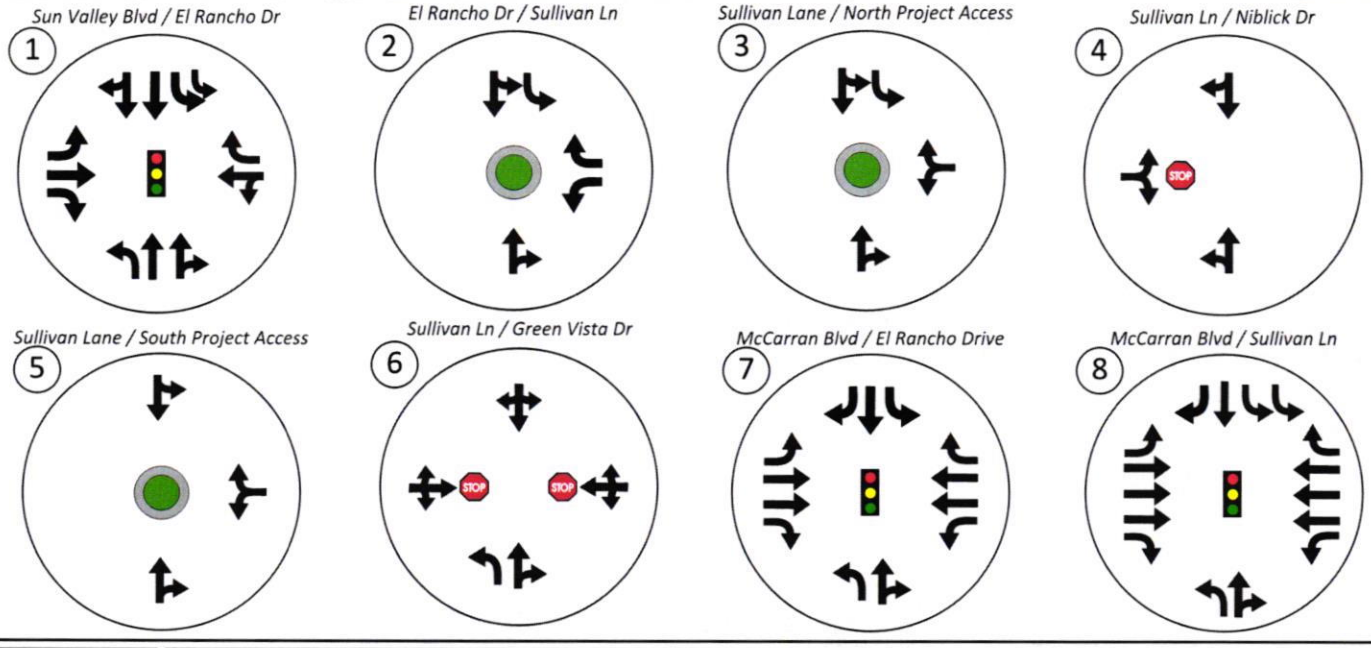
AM Peak Hour Volume (Afternoon Peak Hour Volume) PM Peak Hour Volume

TRAFFIC WORKS

xx,xxx - Daily Volumes

Figure 10
High School at Wildcreek
Traffic Impact Study

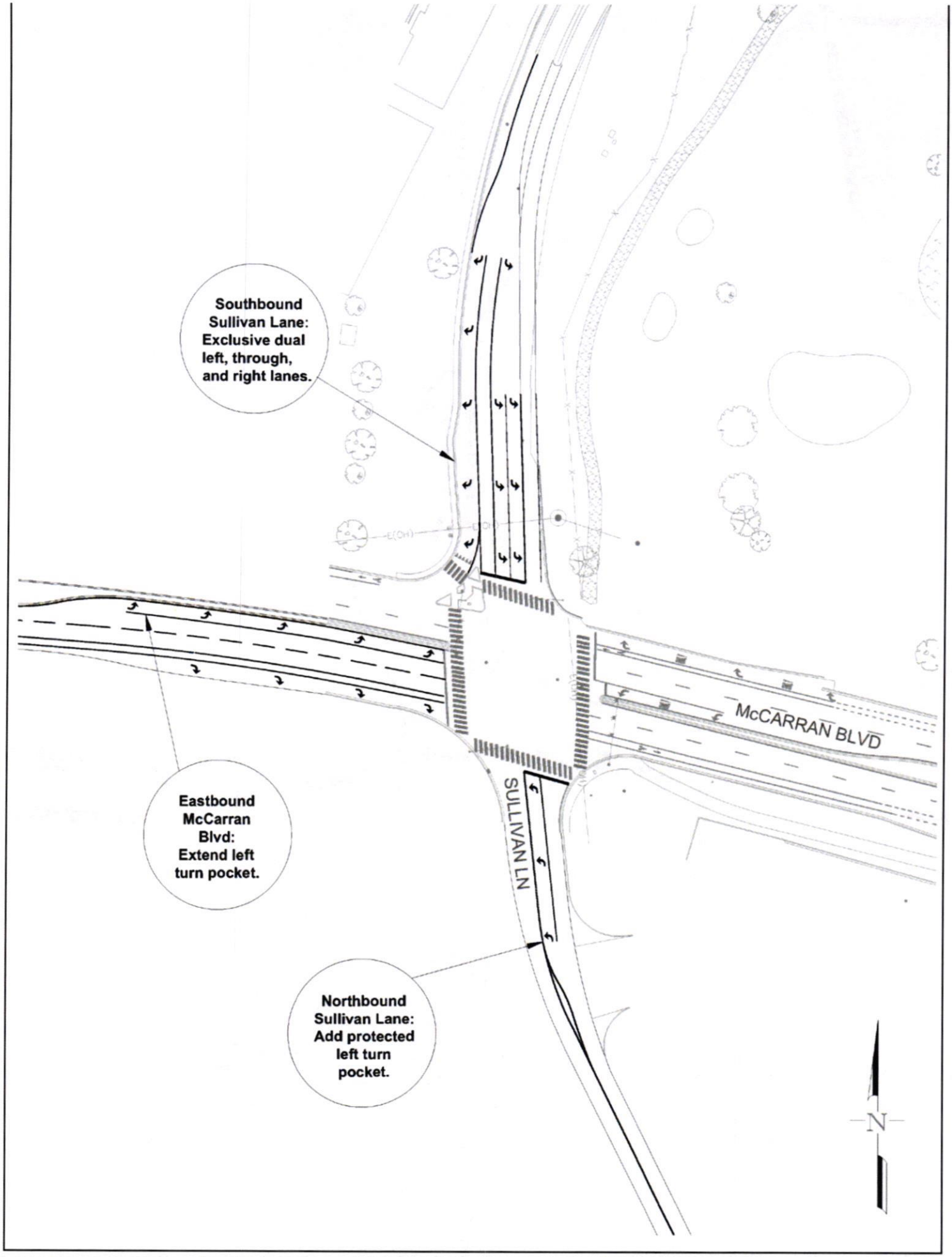




TRAFFIC WORKS

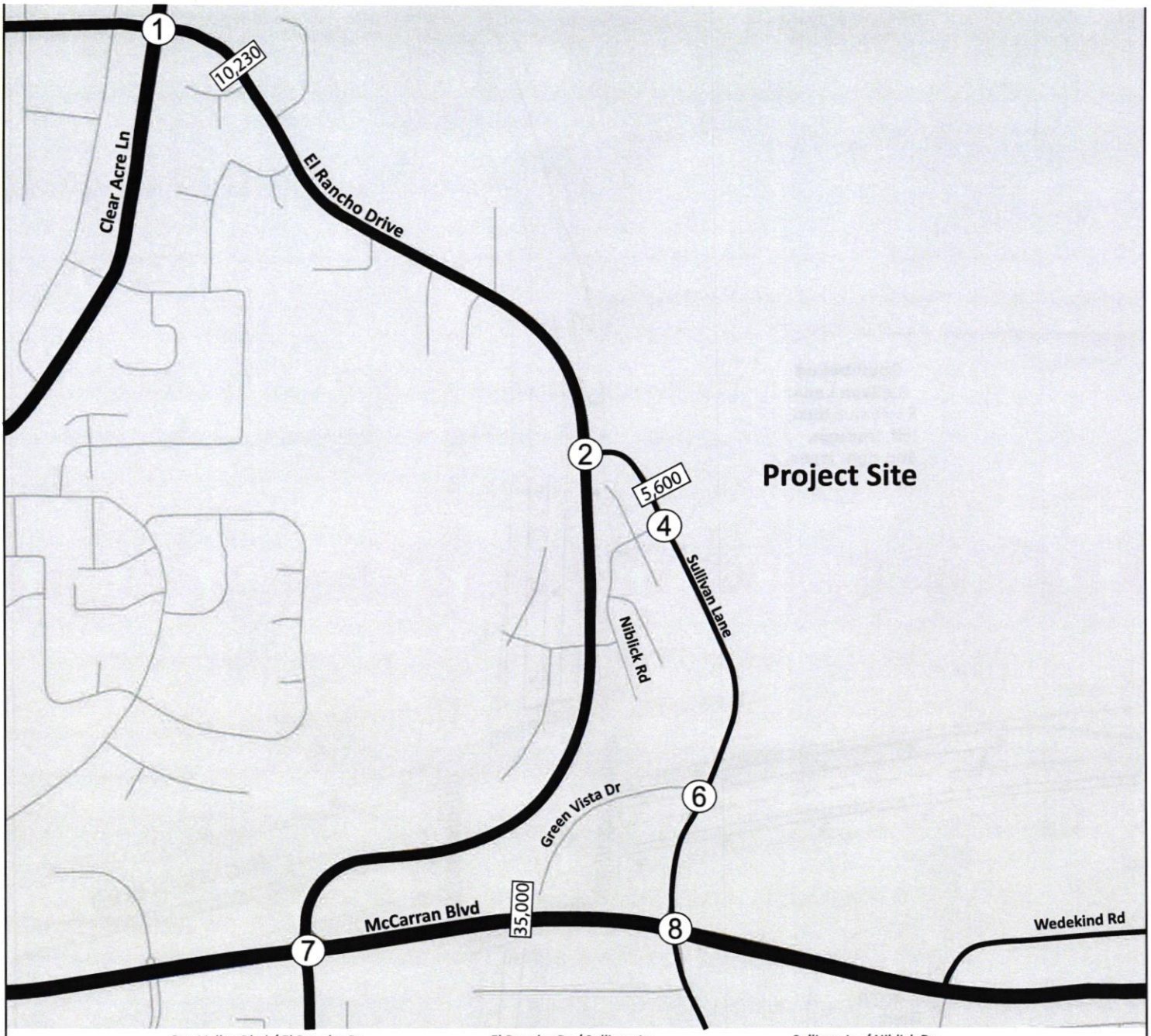
- Roundabout
- Traffic Signal
- Stop Control
- Lane Configuration

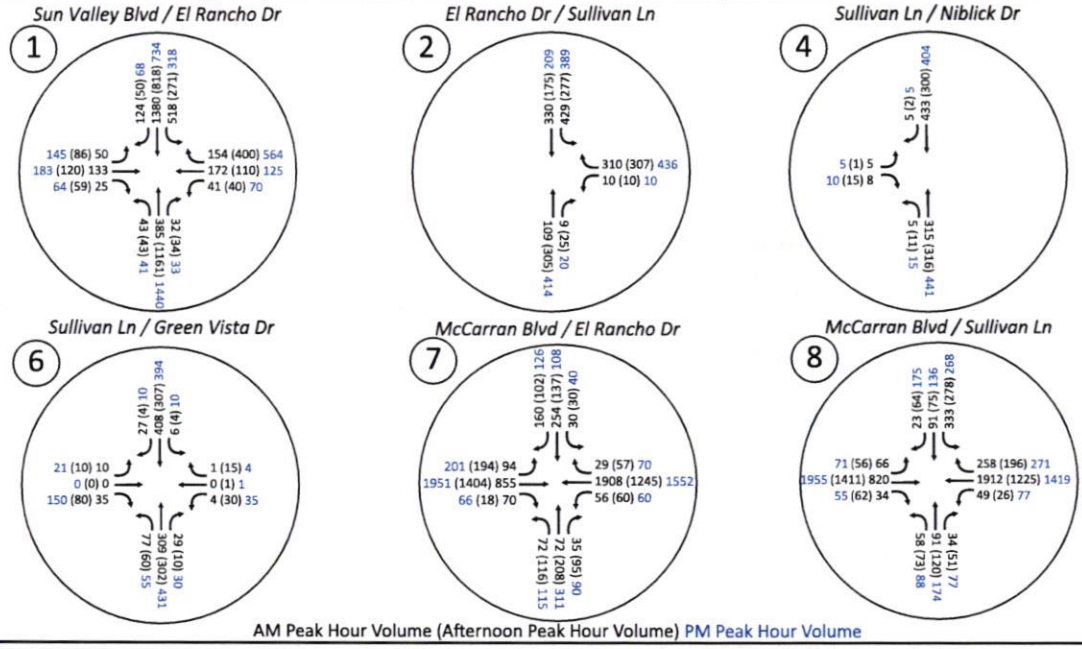
Figure 11
High School at Wildcreek
Traffic Impact Study



TRAFFIC WORKS

Figure 12
High School at Wildcreek
Traffic Impact Study



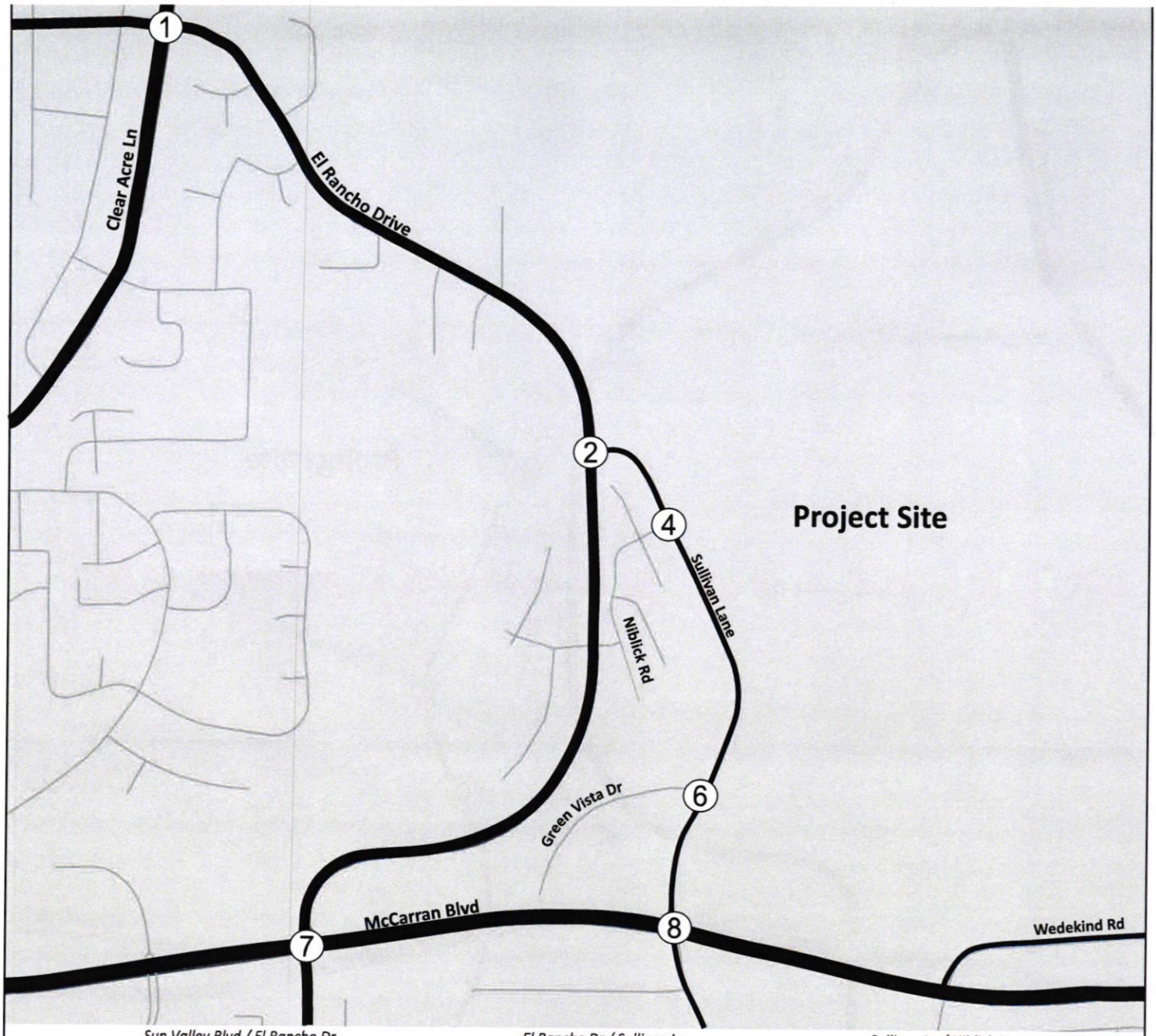


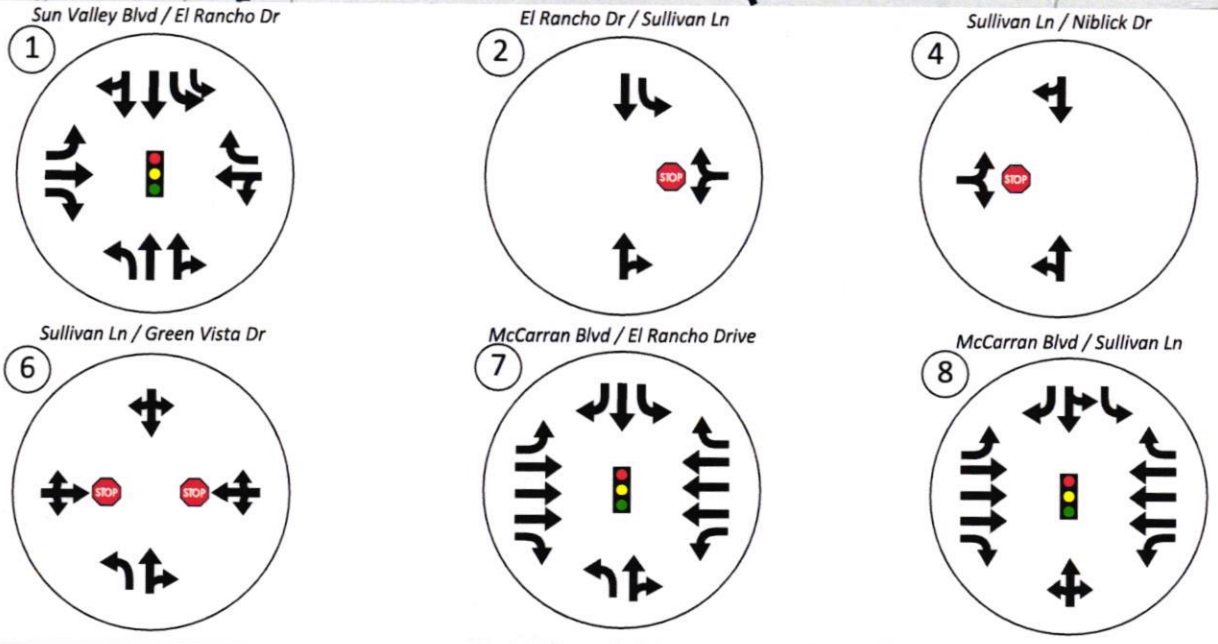
AM Peak Hour Volume (Afternoon Peak Hour Volume) PM Peak Hour Volume

TRAFFIC WORKS

xx,xxx - Daily Volumes

Figure 13
High School at Wildcreek
Traffic Impact Study

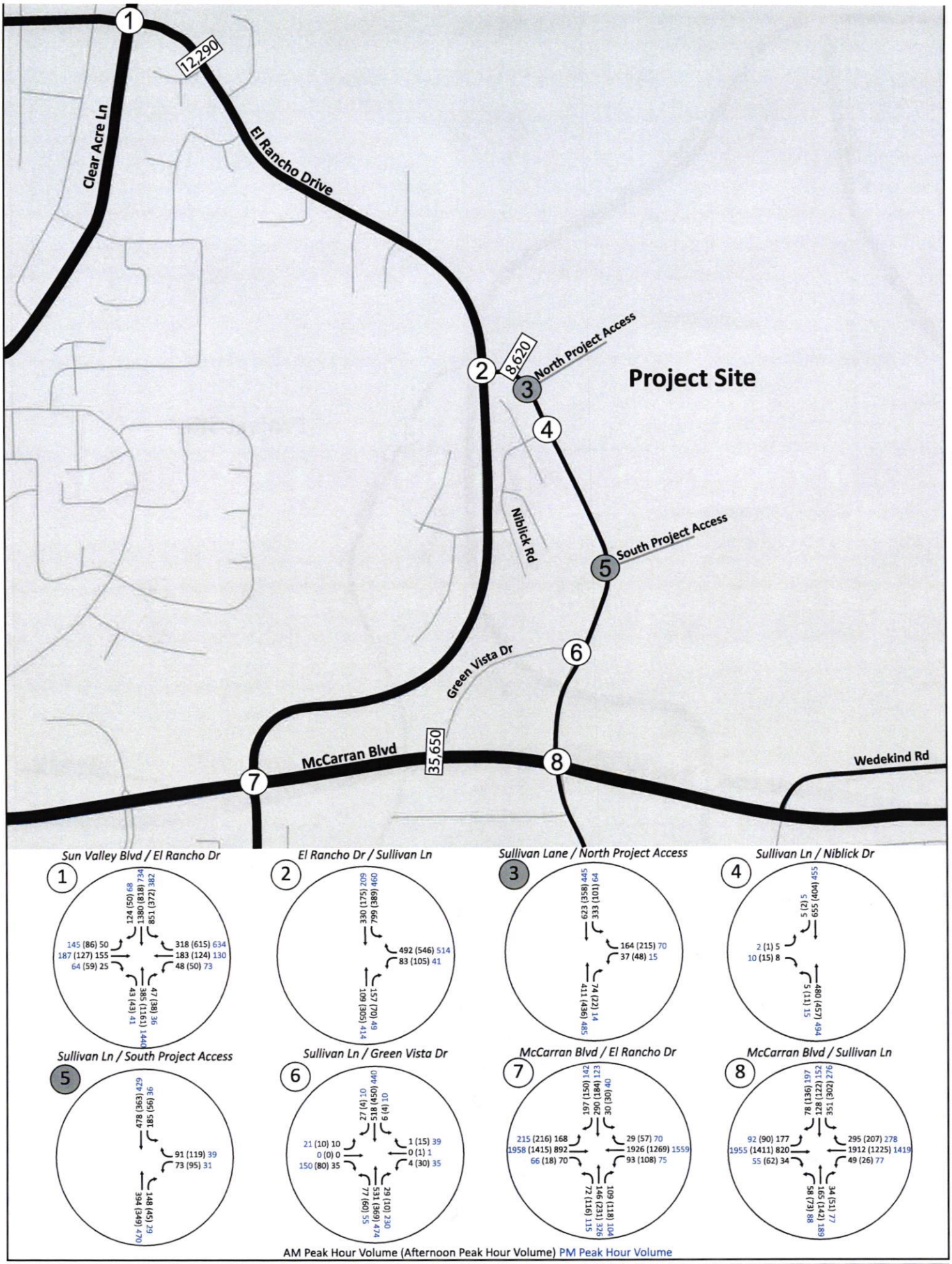




TRAFFIC WORKS

- Roundabout
- Traffic Signal
- Stop Control
- Lane Configuration

Figure 14
High School at Wildcreek
Traffic Impact Study

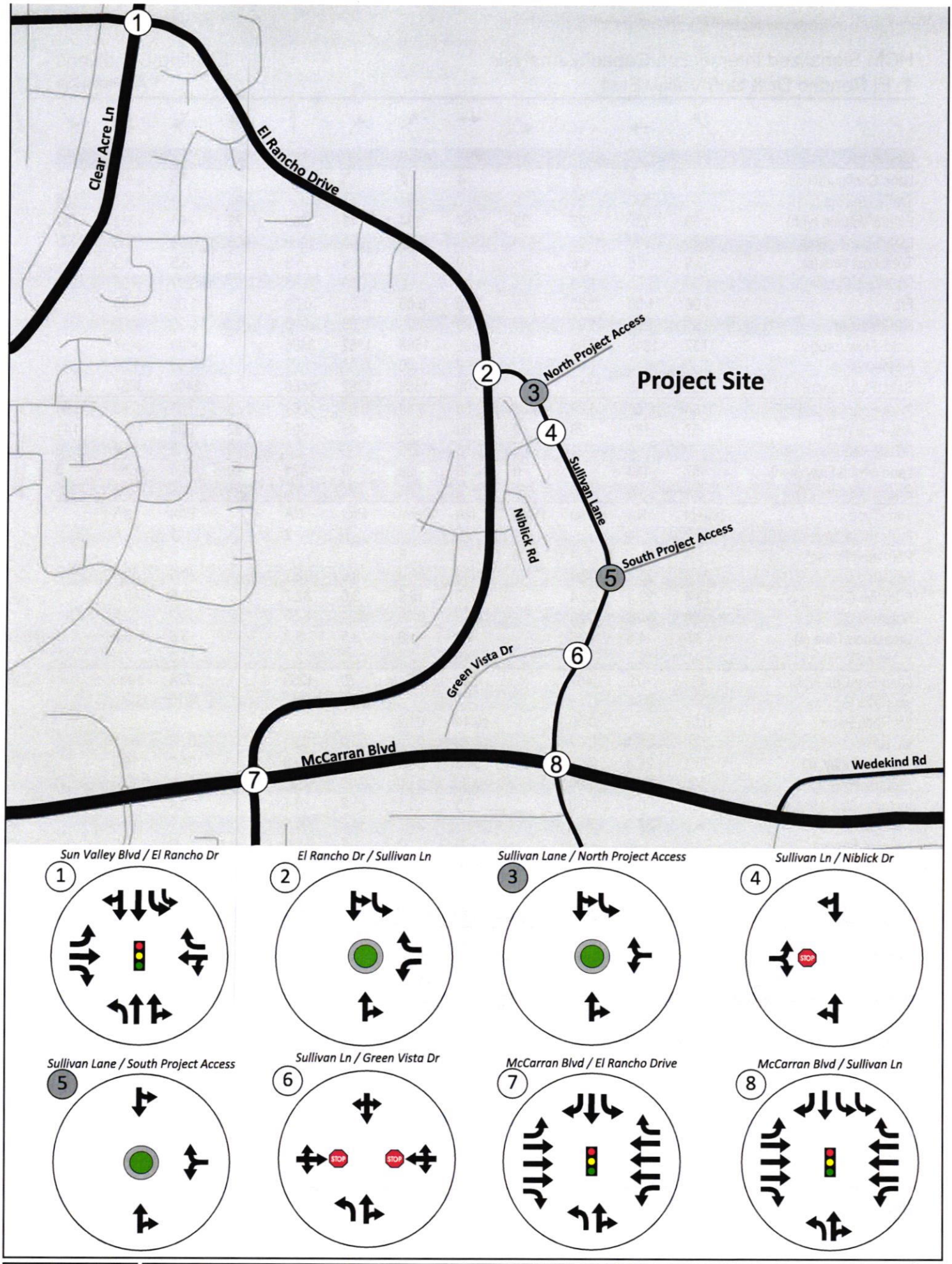


AM Peak Hour Volume (Afternoon Peak Hour Volume) PM Peak Hour Volume

TRAFFIC WORKS

xx,xxx - Daily Volumes

Figure 15
High School at Wildcreek
Traffic Impact Study



TRAFFIC WORKS

Figure 16
High School at Wildcreek
Traffic Impact Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	132	25	35	167	134	43	350	28	461	1253	124
Future Volume (vph)	50	132	25	35	167	134	43	350	28	461	1253	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1829	1568	1752	3466		3400	3457	
Flt Permitted	0.30	1.00	1.00		0.92	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	550	1845	1568		1700	1568	1752	3466		3400	3457	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	57	150	28	40	190	152	49	398	32	524	1424	141
RTOR Reduction (vph)	0	0	21	0	0	123	0	6	0	0	6	0
Lane Group Flow (vph)	57	150	7	0	230	29	49	424	0	524	1559	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	23.4	23.4	23.4		16.9	16.9	3.6	32.7		20.5	49.6	
Effective Green, g (s)	23.4	23.4	23.4		16.9	16.9	3.6	32.7		20.5	49.6	
Actuated g/C Ratio	0.26	0.26	0.26		0.19	0.19	0.04	0.36		0.23	0.55	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	191	479	407		319	294	70	1259		774	1905	
v/s Ratio Prot	0.01	c0.08					c0.03	0.12		0.15	c0.45	
v/s Ratio Perm	0.07		0.00		c0.14	0.02						
v/c Ratio	0.30	0.31	0.02		0.72	0.10	0.70	0.34		0.68	0.82	
Uniform Delay, d1	26.1	26.8	24.8		34.3	30.2	42.7	20.8		31.7	16.5	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0		7.3	0.1	21.8	0.7		2.4	4.1	
Delay (s)	26.4	27.1	24.8		41.7	30.3	64.5	21.5		34.1	20.6	
Level of Service	C	C	C		D	C	E	C		C	C	
Approach Delay (s)		26.7			37.2			25.9			24.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	291	81	9	422	275
Future Vol, veh/h	2	291	81	9	422	275
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	342	95	11	496	324

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1417	101	0	0	106	0
Stage 1	101	-	-	-	-	-
Stage 2	1316	-	-	-	-	-
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	151	954	-	-	1485	-
Stage 1	923	-	-	-	-	-
Stage 2	251	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	101	954	-	-	1485	-
Mov Cap-2 Maneuver	101	-	-	-	-	-
Stage 1	923	-	-	-	-	-
Stage 2	167	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.4	0	5.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	902	1485	-
HCM Lane V/C Ratio	-	-	0.382	0.334	-
HCM Control Delay (s)	-	-	11.4	8.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	1.8	1.5	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	2	288	426	5
Future Vol, veh/h	5	8	2	288	426	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	9	2	331	490	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	829	493	495	0	-	0
Stage 1	493	-	-	-	-	-
Stage 2	336	-	-	-	-	-
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	340	576	1069	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	724	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	339	576	1069	-	-	-
Mov Cap-2 Maneuver	339	-	-	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1069	-	454	-	-
HCM Lane V/C Ratio	0.002	-	0.033	-	-
HCM Control Delay (s)	8.4	0	13.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

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	10	0	35	4	0	1	77	279	29	6	401	27
Future Vol, veh/h	10	0	35	4	0	1	77	279	29	6	401	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	41	5	0	1	90	324	34	7	466	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1017	1033	482	1036	1032	341	498	0	0	358	0	0
Stage 1	496	496	-	520	520	-	-	-	-	-	-	-
Stage 2	521	537	-	516	512	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	216	232	584	210	233	701	1066	-	-	1201	-	-
Stage 1	556	545	-	539	532	-	-	-	-	-	-	-
Stage 2	539	523	-	542	536	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	200	211	584	182	212	701	1066	-	-	1201	-	-
Mov Cap-2 Maneuver	200	211	-	182	212	-	-	-	-	-	-	-
Stage 1	509	541	-	493	487	-	-	-	-	-	-	-
Stage 2	493	479	-	500	532	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	22.3	1.7	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1066	-	-	409	214	1201	-	-
HCM Lane V/C Ratio	0.084	-	-	0.128	0.027	0.006	-	-
HCM Control Delay (s)	8.7	-	-	15.1	22.3	8	0	-
HCM Lane LOS	A	-	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.4	0.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	686	59	45	1585	24	60	60	28	23	254	134
Future Volume (vph)	79	686	59	45	1585	24	60	60	28	23	254	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1774		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1774		1770	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	84	730	63	48	1686	26	64	64	30	24	270	143
RTOR Reduction (vph)	0	0	30	0	0	13	0	14	0	0	0	114
Lane Group Flow (vph)	84	730	33	48	1686	13	64	80	0	24	270	29
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	10.5	68.1	68.1	7.3	64.9	64.9	7.1	28.2		4.4	24.5	24.5
Effective Green, g (s)	10.5	68.1	68.1	7.3	64.9	64.9	7.1	28.2		4.4	24.5	24.5
Actuated g/C Ratio	0.08	0.52	0.52	0.06	0.50	0.50	0.05	0.22		0.03	0.19	0.19
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	142	1853	829	99	1766	790	96	384		59	351	298
v/s Ratio Prot	c0.05	c0.21		0.03	c0.48		c0.04	0.05		0.01	c0.14	
v/s Ratio Perm			0.02			0.01						0.02
v/c Ratio	0.59	0.39	0.04	0.48	0.95	0.02	0.67	0.21		0.41	0.77	0.10
Uniform Delay, d1	57.7	18.6	15.1	59.5	31.1	16.4	60.3	41.7		61.5	50.1	43.6
Progression Factor	1.00	1.00	1.00	0.49	1.71	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.3	0.6	0.1	0.6	7.4	0.0	12.7	0.1		1.7	8.8	0.1
Delay (s)	62.0	19.2	15.1	30.0	60.6	16.5	73.0	41.8		63.2	58.9	43.7
Level of Service	E	B	B	C	E	B	E	D		E	E	D
Approach Delay (s)		23.0			59.2			54.5			54.1	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	648	23	16	1591	247	40	72	11	333	84	23
Future Volume (vph)	66	648	23	16	1591	247	40	72	11	333	84	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98		0.95	0.97	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1811		1681	1718	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98		0.95	0.97	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1811		1681	1718	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	67	661	23	16	1623	252	41	73	11	340	86	23
RTOR Reduction (vph)	0	0	11	0	0	70	0	4	0	0	0	19
Lane Group Flow (vph)	67	661	12	16	1623	182	0	121	0	211	215	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.2	67.8	67.8	2.8	62.7	62.7		13.1		20.8	20.8	20.8
Effective Green, g (s)	8.2	67.8	67.8	2.8	62.7	62.7		13.1		20.8	20.8	20.8
Actuated g/C Ratio	0.06	0.52	0.52	0.02	0.48	0.48		0.10		0.16	0.16	0.16
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	111	1845	825	38	1706	763		182		268	274	253
v/s Ratio Prot	c0.04	c0.19		0.01	c0.46			c0.07		c0.13	0.13	
v/s Ratio Perm			0.01			0.11						0.00
v/c Ratio	0.60	0.36	0.01	0.42	0.95	0.24		0.67		0.79	0.78	0.01
Uniform Delay, d1	59.3	18.3	15.0	62.8	32.2	19.7		56.3		52.5	52.4	46.0
Progression Factor	1.22	0.37	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	5.9	0.5	0.0	2.7	13.0	0.7		7.0		13.1	12.7	0.0
Delay (s)	78.1	7.4	15.0	65.5	45.2	20.4		63.3		65.6	65.1	46.0
Level of Service	E	A	B	E	D	C		E		E	E	D
Approach Delay (s)		13.9			42.0			63.3			64.4	
Approach LOS		B			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	81.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	118	59	32	97	345	43	1054	30	240	741	50
Future Volume (vph)	86	118	59	32	97	345	43	1054	30	240	741	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1822	1568	1752	3490		3400	3471	
Flt Permitted	0.39	1.00	1.00		0.89	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	719	1845	1568		1639	1568	1752	3490		3400	3471	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	102	140	70	38	115	411	51	1255	36	286	882	60
RTOR Reduction (vph)	0	0	55	0	0	350	0	2	0	0	4	0
Lane Group Flow (vph)	102	140	15	0	153	61	51	1289	0	286	938	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	19.8	19.8	19.8		13.3	13.3	8.6	44.0		12.8	48.2	
Effective Green, g (s)	19.8	19.8	19.8		13.3	13.3	8.6	44.0		12.8	48.2	
Actuated g/C Ratio	0.22	0.22	0.22		0.15	0.15	0.10	0.49		0.14	0.54	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	199	405	344		242	231	167	1706		483	1858	
v/s Ratio Prot	c0.02	0.08					0.03	c0.37		c0.08	0.27	
v/s Ratio Perm	0.09		0.01		c0.09	0.04						
v/c Ratio	0.51	0.35	0.04		0.63	0.26	0.31	0.76		0.59	0.50	
Uniform Delay, d1	30.3	29.6	27.7		36.1	34.0	37.9	18.6		36.2	13.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.4	0.0		4.7	0.4	0.4	3.2		1.9	1.0	
Delay (s)	31.2	30.0	27.7		40.7	34.4	38.3	21.8		38.1	14.3	
Level of Service	C	C	C		D	C	D	C		D	B	
Approach Delay (s)		29.9			36.1			22.4			19.8	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	7.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	295	230	20	267	133
Future Vol, veh/h	5	295	230	20	267	133
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	364	284	25	330	164

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1119	296	0	0	309	0
Stage 1	296	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	228	741	-	-	1246	-
Stage 1	752	-	-	-	-	-
Stage 2	430	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	168	741	-	-	1246	-
Mov Cap-2 Maneuver	168	-	-	-	-	-
Stage 1	752	-	-	-	-	-
Stage 2	316	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	701	1246	-
HCM Lane V/C Ratio	-	-	0.528	0.265	-
HCM Control Delay (s)	-	-	15.7	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.1	1.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	11	300	286	1
Future Vol, veh/h	0	15	11	300	286	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	18	13	357	340	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	724	341	342	0	-	0
Stage 1	341	-	-	-	-	-
Stage 2	383	-	-	-	-	-
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	393	701	1217	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	388	701	1217	-	-	-
Mov Cap-2 Maneuver	388	-	-	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	680	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1217	-	701	-	-
HCM Lane V/C Ratio	0.011	-	0.025	-	-
HCM Control Delay (s)	8	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑			↕	
Traffic Vol, veh/h	10	0	78	27	1	15	60	286	10	4	293	4
Future Vol, veh/h	10	0	78	27	1	15	60	286	10	4	293	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	0	88	30	1	17	67	321	11	4	329	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	811	807	331	846	805	327	334	0	0	333	0	0
Stage 1	340	340	-	462	462	-	-	-	-	-	-	-
Stage 2	471	467	-	384	343	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	298	315	711	282	316	714	1225	-	-	1226	-	-
Stage 1	675	639	-	580	565	-	-	-	-	-	-	-
Stage 2	573	562	-	639	637	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	277	297	711	236	298	714	1225	-	-	1226	-	-
Mov Cap-2 Maneuver	277	297	-	236	298	-	-	-	-	-	-	-
Stage 1	638	636	-	548	534	-	-	-	-	-	-	-
Stage 2	528	531	-	558	634	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	18.7	1.4	0.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1225	-	-	604	310	1226	-	-
HCM Lane V/C Ratio	0.055	-	-	0.164	0.156	0.004	-	-
HCM Control Delay (s)	8.1	-	-	12.1	18.7	7.9	0	-
HCM Lane LOS	A	-	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.5	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	1159	15	50	1024	45	97	174	75	20	114	85
Future Volume (vph)	162	1159	15	50	1024	45	97	174	75	20	114	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1778		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1778		1770	1863	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	165	1183	15	51	1045	46	99	178	77	20	116	87
RTOR Reduction (vph)	0	0	7	0	0	23	0	12	0	0	0	76
Lane Group Flow (vph)	165	1183	8	51	1045	23	99	243	0	20	116	11
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	15.5	72.0	72.0	7.5	64.0	64.0	11.0	24.4		4.1	16.5	16.5
Effective Green, g (s)	15.5	72.0	72.0	7.5	64.0	64.0	11.0	24.4		4.1	16.5	16.5
Actuated g/C Ratio	0.12	0.55	0.55	0.06	0.49	0.49	0.08	0.19		0.03	0.13	0.13
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	211	1960	876	102	1742	779	149	333		55	236	200
v/s Ratio Prot	c0.09	c0.33		0.03	0.30		c0.06	c0.14		0.01	0.06	
v/s Ratio Perm			0.01			0.01						0.01
v/c Ratio	0.78	0.60	0.01	0.50	0.60	0.03	0.66	0.73		0.36	0.49	0.06
Uniform Delay, d1	55.6	19.4	13.0	59.4	23.8	17.0	57.7	49.7		61.7	52.8	49.9
Progression Factor	1.00	1.00	1.00	1.12	0.49	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.8	1.4	0.0	1.1	1.2	0.1	8.3	6.6		1.5	0.6	0.0
Delay (s)	71.4	20.8	13.0	67.5	12.8	17.1	66.1	56.3		63.2	53.4	49.9
Level of Service	E	C	B	E	B	B	E	E		E	D	D
Approach Delay (s)		26.9			15.4			59.0			52.9	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	1156	42	26	1009	196	46	104	22	273	61	64
Future Volume (vph)	56	1156	42	26	1009	196	46	104	22	273	61	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.97	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1806		1681	1715	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.97	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1806		1681	1715	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	62	1270	46	29	1109	215	51	114	24	300	67	70
RTOR Reduction (vph)	0	0	24	0	0	73	0	4	0	0	0	60
Lane Group Flow (vph)	62	1270	22	29	1109	142	0	185	0	183	184	10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.9	63.4	63.4	4.7	60.5	60.5		17.7		18.7	18.7	18.7
Effective Green, g (s)	7.9	63.4	63.4	4.7	60.5	60.5		17.7		18.7	18.7	18.7
Actuated g/C Ratio	0.06	0.49	0.49	0.04	0.47	0.47		0.14		0.14	0.14	0.14
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	107	1725	772	63	1646	736		245		241	246	227
v/s Ratio Prot	c0.04	c0.36		0.02	0.31			c0.10		c0.11	0.11	
v/s Ratio Perm			0.01			0.09						0.01
v/c Ratio	0.58	0.74	0.03	0.46	0.67	0.19		0.75		0.76	0.75	0.04
Uniform Delay, d1	59.4	26.6	17.3	61.4	27.1	20.4		54.1		53.5	53.4	48.0
Progression Factor	1.04	1.10	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	4.0	2.4	0.1	1.9	2.2	0.6		11.0		11.5	10.3	0.0
Delay (s)	65.9	31.7	17.4	63.3	29.3	21.0		65.1		65.1	63.8	48.0
Level of Service	E	C	B	E	C	C		E		E	E	D
Approach Delay (s)		32.7			28.7			65.1			61.8	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	179	64	55	109	505	41	1307	29	279	665	68
Future Volume (vph)	145	179	64	55	109	505	41	1307	29	279	665	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583		1832	1583	1770	3528		3433	3490	
Flt Permitted	0.40	1.00	1.00		0.83	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	751	1863	1583		1545	1583	1770	3528		3433	3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	195	70	60	118	549	45	1421	32	303	723	74
RTOR Reduction (vph)	0	0	51	0	0	331	0	2	0	0	7	0
Lane Group Flow (vph)	158	195	19	0	178	218	45	1451	0	303	790	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	24.5	24.5	24.5		17.1	17.1	8.9	39.6		12.5	43.2	
Effective Green, g (s)	24.5	24.5	24.5		17.1	17.1	8.9	39.6		12.5	43.2	
Actuated g/C Ratio	0.27	0.27	0.27		0.19	0.19	0.10	0.44		0.14	0.48	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	255	507	430		293	300	175	1552		476	1675	
v/s Ratio Prot	c0.03	0.10					0.03	c0.41		c0.09	0.23	
v/s Ratio Perm	0.14		0.01		0.12	c0.14						
v/c Ratio	0.62	0.38	0.04		0.61	0.73	0.26	0.94		0.64	0.47	
Uniform Delay, d1	28.5	26.6	24.1		33.4	34.2	37.5	24.0		36.6	15.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.4	0.0		3.0	7.9	0.3	11.9		2.8	1.0	
Delay (s)	31.7	27.0	24.2		36.4	42.2	37.8	35.9		39.4	16.7	
Level of Service	C	C	C		D	D	D	D		D	B	
Approach Delay (s)		28.3			40.8			35.9			22.9	
Approach LOS		C			D			D			C	

Intersection Summary				
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3	
Intersection Capacity Utilization	89.3%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Intersection	
Int Delay, s/veh	11.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	408	339	9	376	169
Future Vol, veh/h	6	408	339	9	376	169
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	458	381	10	422	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1421	386	0	0	391	0
Stage 1	386	-	-	-	-	-
Stage 2	1035	-	-	-	-	-
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	150	662	-	-	1168	-
Stage 1	687	-	-	-	-	-
Stage 2	342	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	96	662	-	-	1168	-
Mov Cap-2 Maneuver	96	-	-	-	-	-
Stage 1	687	-	-	-	-	-
Stage 2	218	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.3	0	6.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	610	1168	-
HCM Lane V/C Ratio	-	-	0.763	0.362	-
HCM Control Delay (s)	-	-	27.3	9.8	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	7	1.7	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	8	15	412	380	5
Future Vol, veh/h	2	8	15	412	380	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	9	17	468	432	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	937	435	438	0	-	0
Stage 1	435	-	-	-	-	-
Stage 2	502	-	-	-	-	-
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	294	621	1122	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	608	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	288	621	1122	-	-	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	596	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.3	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1122	-	504	-	-
HCM Lane V/C Ratio	0.015	-	0.023	-	-
HCM Control Delay (s)	8.3	0	12.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑			↕	
Traffic Vol, veh/h	21	0	150	30	1	4	55	402	22	10	368	10
Future Vol, veh/h	21	0	150	30	1	4	55	402	22	10	368	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	158	32	1	4	58	423	23	11	387	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	967	976	393	1044	970	435	398	0	0	446	0	0
Stage 1	414	414	-	551	551	-	-	-	-	-	-	-
Stage 2	553	562	-	493	419	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	234	251	656	207	253	621	1161	-	-	1114	-	-
Stage 1	616	593	-	519	515	-	-	-	-	-	-	-
Stage 2	517	510	-	558	590	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	221	235	656	150	237	621	1161	-	-	1114	-	-
Mov Cap-2 Maneuver	221	235	-	150	237	-	-	-	-	-	-	-
Stage 1	585	585	-	493	489	-	-	-	-	-	-	-
Stage 2	487	485	-	418	582	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.3	32.8	0.9	0.2
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1161	-	-	528	166	1114	-	-
HCM Lane V/C Ratio	0.05	-	-	0.341	0.222	0.009	-	-
HCM Control Delay (s)	8.3	-	-	15.3	32.8	8.3	0	-
HCM Lane LOS	A	-	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.5	0.8	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	1614	55	45	1281	52	96	260	71	30	90	105
Future Volume (vph)	168	1614	55	45	1281	52	96	260	71	30	90	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1803		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1803		1770	1863	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	173	1664	57	46	1321	54	99	268	73	31	93	108
RTOR Reduction (vph)	0	0	27	0	0	29	0	8	0	0	0	91
Lane Group Flow (vph)	173	1664	30	46	1321	25	99	333	0	31	93	17
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	16.2	68.2	68.2	7.3	59.3	59.3	11.0	27.7		4.8	20.5	20.5
Effective Green, g (s)	16.2	68.2	68.2	7.3	59.3	59.3	11.0	27.7		4.8	20.5	20.5
Actuated g/C Ratio	0.12	0.52	0.52	0.06	0.46	0.46	0.08	0.21		0.04	0.16	0.16
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	220	1856	830	99	1614	722	149	384		65	293	249
v/s Ratio Prot	c0.10	c0.47		0.03	0.37		c0.06	c0.18		0.02	0.05	
v/s Ratio Perm			0.02			0.02						0.01
v/c Ratio	0.79	0.90	0.04	0.46	0.82	0.03	0.66	0.87		0.48	0.32	0.07
Uniform Delay, d1	55.2	27.7	15.0	59.5	30.7	19.5	57.7	49.4		61.4	48.5	46.6
Progression Factor	1.00	1.00	1.00	0.77	1.54	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.6	7.3	0.1	0.8	3.2	0.1	8.3	17.7		2.0	0.2	0.0
Delay (s)	70.8	35.0	15.1	46.8	50.4	19.6	66.1	67.1		63.4	48.8	46.7
Level of Service	E	D	B	D	D	B	E	E		E	D	D
Approach Delay (s)		37.7			49.1			66.9			49.7	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	45.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	1609	35	40	1151	271	52	137	38	268	105	175
Future Volume (vph)	71	1609	35	40	1151	271	52	137	38	268	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1800		1681	1732	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1800		1681	1732	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	75	1694	37	42	1212	285	55	144	40	282	111	184
RTOR Reduction (vph)	0	0	21	0	0	84	0	6	0	0	0	142
Lane Group Flow (vph)	75	1694	16	42	1212	201	0	233	0	195	198	42
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.7	56.8	56.8	6.6	55.0	55.0		21.3		19.8	19.8	19.8
Effective Green, g (s)	8.7	56.8	56.8	6.6	55.0	55.0		21.3		19.8	19.8	19.8
Actuated g/C Ratio	0.07	0.44	0.44	0.05	0.42	0.42		0.16		0.15	0.15	0.15
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	118	1546	691	89	1497	669		294		256	263	241
v/s Ratio Prot	c0.04	c0.48		0.02	0.34			c0.13		c0.12	0.11	
v/s Ratio Perm			0.01			0.13						0.03
v/c Ratio	0.64	1.10	0.02	0.47	0.81	0.30		0.79		0.76	0.75	0.17
Uniform Delay, d1	59.1	36.6	20.8	60.0	32.9	24.8		52.2		52.8	52.8	48.0
Progression Factor	1.39	0.69	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	4.4	49.4	0.0	1.4	4.8	1.1		12.8		11.4	10.3	0.1
Delay (s)	86.5	74.8	20.9	61.4	37.7	25.9		65.0		64.2	63.1	48.1
Level of Service	F	E	C	E	D	C		E		E	E	D
Approach Delay (s)		74.1			36.2			65.0			58.7	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	57.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	154	25	42	178	298	43	350	43	794	1253	124
Future Volume (vph)	50	154	25	42	178	298	43	350	43	794	1253	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1827	1568	1752	3444		3400	3457	
Flt Permitted	0.29	1.00	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	527	1845	1568		1669	1568	1752	3444		3400	3457	
Peak-hour factor, PHF	0.88	0.86	0.88	0.85	0.87	0.80	0.88	0.88	0.83	0.82	0.88	0.88
Adj. Flow (vph)	57	179	28	49	205	372	49	398	52	968	1424	141
RTOR Reduction (vph)	0	0	20	0	0	296	0	11	0	0	6	0
Lane Group Flow (vph)	57	179	8	0	254	77	49	439	0	968	1559	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	24.6	24.6	24.6		18.5	18.5	3.3	20.3		31.7	48.7	
Effective Green, g (s)	24.6	24.6	24.6		18.5	18.5	3.3	20.3		31.7	48.7	
Actuated g/C Ratio	0.27	0.27	0.27		0.21	0.21	0.04	0.23		0.35	0.54	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	187	504	428		343	322	64	776		1197	1870	
v/s Ratio Prot	0.01	c0.10					c0.03	0.13		0.28	c0.45	
v/s Ratio Perm	0.07		0.00		c0.15	0.05						
v/c Ratio	0.30	0.36	0.02		0.74	0.24	0.77	0.57		0.81	0.83	
Uniform Delay, d1	25.3	26.3	23.9		33.5	29.9	43.0	30.9		26.4	17.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0		7.9	0.3	37.9	3.0		4.1	4.5	
Delay (s)	25.6	26.6	23.9		41.4	30.1	80.8	33.9		30.5	21.8	
Level of Service	C	C	C		D	C	F	C		C	C	
Approach Delay (s)		26.1			34.7			38.5			25.1	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1945.7

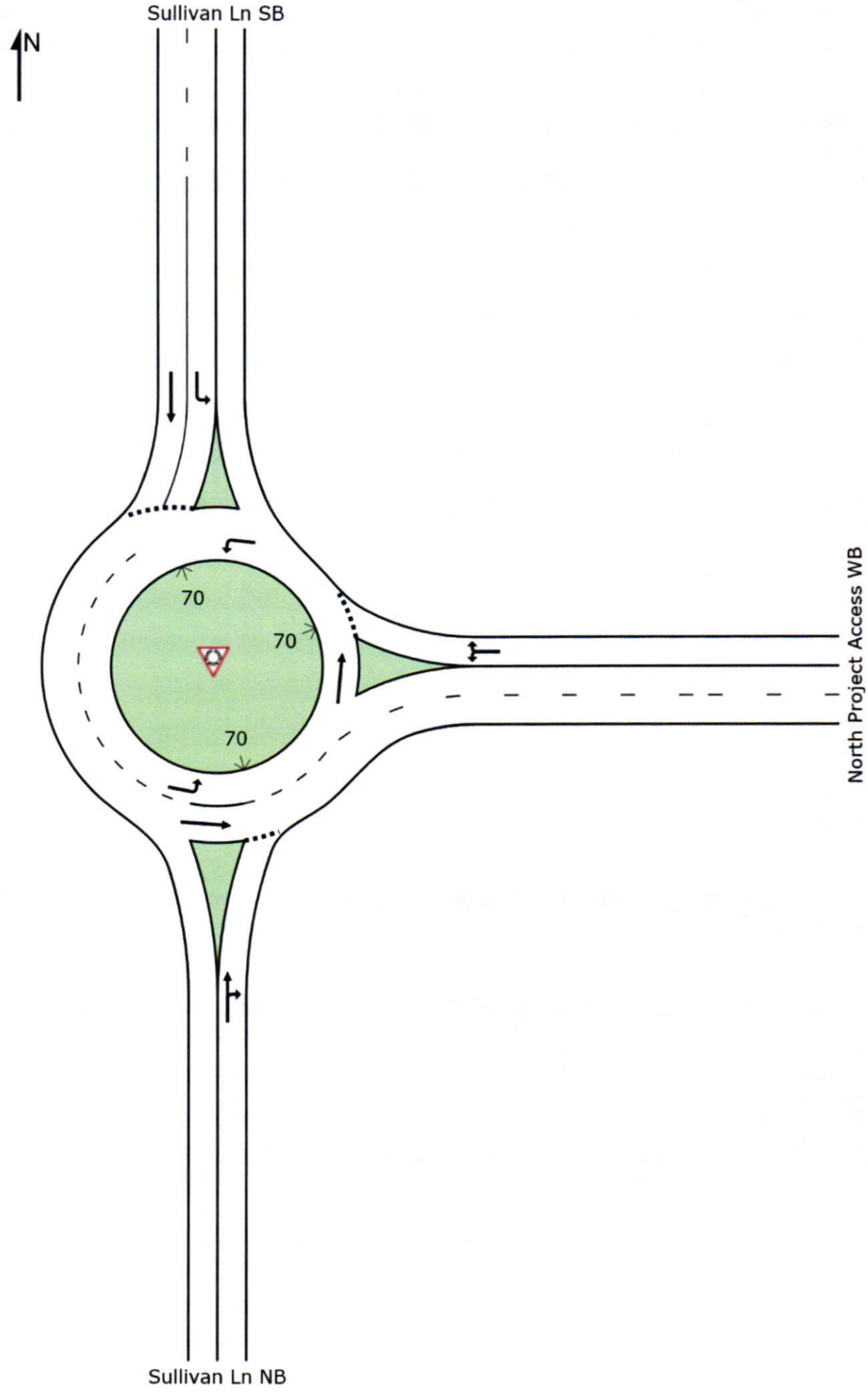
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	75	473	81	157	792	275
Future Vol, veh/h	75	473	81	157	792	275
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	80	84	75	80	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	100	591	96	209	990	324

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2505	201	0	0	306	0
Stage 1	201	-	-	-	-	-
Stage 2	2304	-	-	-	-	-
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	~ 31	840	-	-	1255	-
Stage 1	833	-	-	-	-	-
Stage 2	~ 80	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 7	840	-	-	1255	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	~ 17	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, $	6478.2	0	13.3
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	46	1255	-
HCM Lane V/C Ratio	-	-	15.027	0.789	-
HCM Control Delay (s)	-	-	$ 6478.2	17.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	83.8	8.8	-

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


N
Sullivan Ln SB
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

Existing Plus Project Conditions
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	441	2.0	0.671	16.4	LOS C	3.8	97.7	0.63	0.69	29.3
18	R2	100	2.0	0.671	16.4	LOS C	3.8	97.7	0.63	0.69	28.7
Approach		541	2.0	0.671	16.4	LOS C	3.8	97.7	0.63	0.69	29.2
East: North Project Access WB											
1	L2	48	2.0	0.378	10.0	LOS B	1.6	41.2	0.58	0.58	31.4
16	R2	219	2.0	0.378	10.0	LOS B	1.6	41.2	0.58	0.58	30.8
Approach		267	2.0	0.378	10.0	LOS B	1.6	41.2	0.58	0.58	30.9
North: Sullivan Ln SB											
7	L2	444	2.0	0.421	8.0	LOS A	2.3	58.0	0.22	0.10	30.8
4	T1	716	2.0	0.679	13.7	LOS B	6.1	155.2	0.36	0.17	30.3
Approach		1160	2.0	0.679	11.5	LOS B	6.1	155.2	0.31	0.14	30.5
All Vehicles		1968	2.0	0.679	12.7	LOS B	6.1	155.2	0.43	0.35	30.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

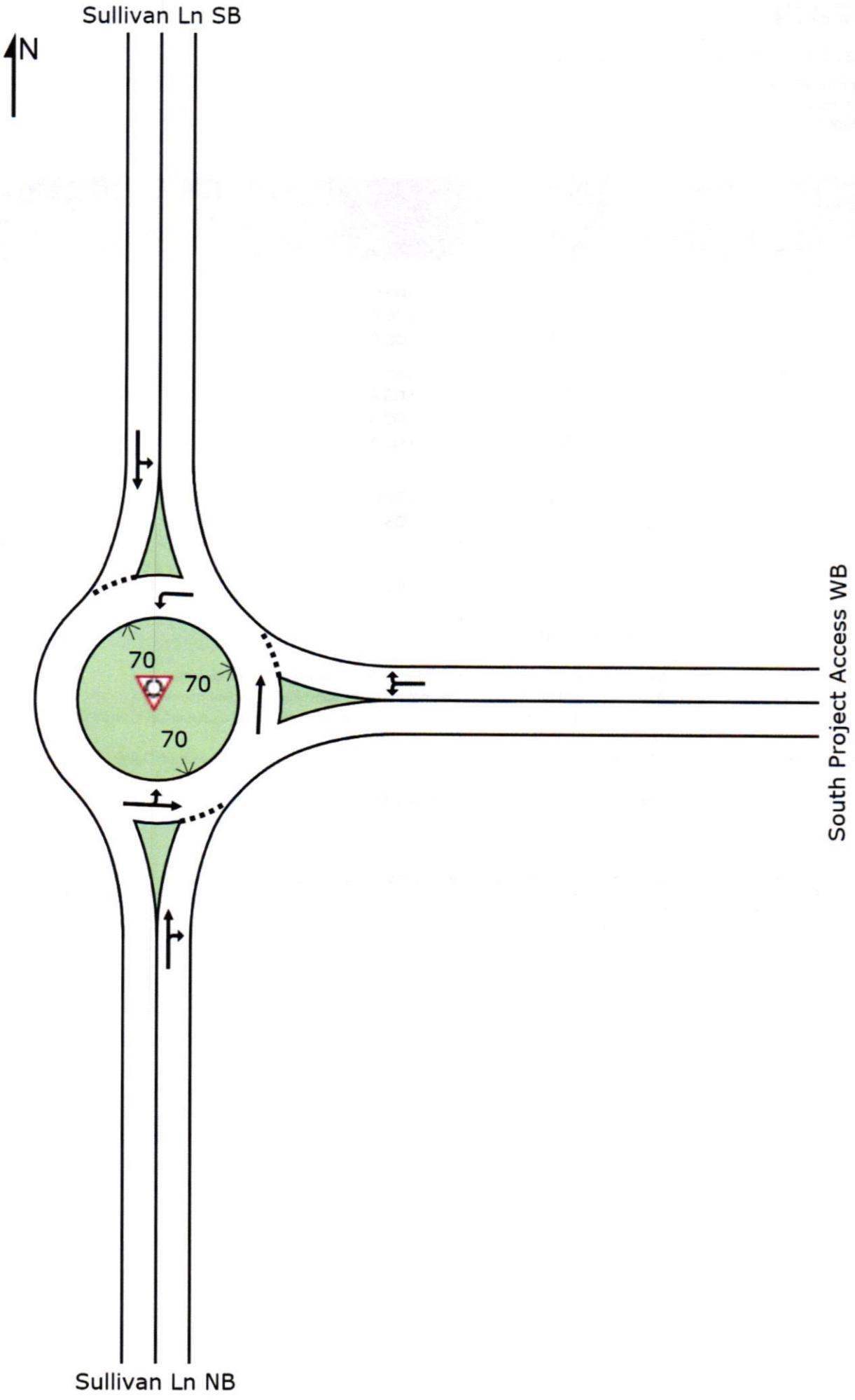
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	2	453	648	5
Future Vol, veh/h	5	8	2	453	648	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	50	82	83	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	9	4	552	781	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1344	784	786	0	-	0
Stage 1	784	-	-	-	-	-
Stage 2	560	-	-	-	-	-
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	167	393	833	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	572	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	166	393	833	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	568	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.8	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	833	-	258	-	-
HCM Lane V/C Ratio	0.005	-	0.058	-	-
HCM Control Delay (s)	9.3	0	19.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

Existing Plus Project Conditions
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	414	2.0	0.706	17.1	LOS C	6.3	159.5	0.72	0.68	29.0
18	R2	195	2.0	0.706	17.1	LOS C	6.3	159.5	0.72	0.68	28.4
Approach		608	2.0	0.706	17.1	LOS C	6.3	159.5	0.72	0.68	28.8
East: South Project Access WB											
1	L2	96	2.0	0.297	8.5	LOS A	1.2	29.8	0.53	0.51	31.5
16	R2	120	2.0	0.297	8.5	LOS A	1.2	29.8	0.53	0.51	30.9
Approach		216	2.0	0.297	8.5	LOS A	1.2	29.8	0.53	0.51	31.2
North: Sullivan Ln SB											
7	L2	247	2.0	0.761	17.8	LOS C	7.7	196.1	0.61	0.38	28.2
4	T1	518	2.0	0.761	17.8	LOS C	7.7	196.1	0.61	0.38	28.2
Approach		764	2.0	0.761	17.8	LOS C	7.7	196.1	0.61	0.38	28.2
All Vehicles		1588	2.0	0.761	16.3	LOS C	7.7	196.1	0.64	0.51	28.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑			↕	
Traffic Vol, veh/h	10	0	35	4	0	1	77	501	29	6	511	27
Future Vol, veh/h	10	0	35	4	0	1	77	501	29	6	511	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	86	86	86	86	86	86	81	86	75	83	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	41	5	0	1	90	619	34	8	616	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1463	1479	632	1482	1478	635	648	0	0	652	0	0
Stage 1	648	648	-	814	814	-	-	-	-	-	-	-
Stage 2	815	831	-	668	664	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	107	126	480	103	126	478	938	-	-	935	-	-
Stage 1	459	466	-	372	391	-	-	-	-	-	-	-
Stage 2	371	384	-	448	458	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	98	112	480	86	112	478	938	-	-	935	-	-
Mov Cap-2 Maneuver	98	112	-	86	112	-	-	-	-	-	-	-
Stage 1	415	460	-	336	353	-	-	-	-	-	-	-
Stage 2	335	347	-	405	452	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.9	42	1.1	0.1
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	938	-	-	254	103	935	-	-
HCM Lane V/C Ratio	0.095	-	-	0.208	0.056	0.009	-	-
HCM Control Delay (s)	9.2	-	-	22.9	42	8.9	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.8	0.2	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	153	723	59	82	1603	24	60	134	102	23	290	171
Future Volume (vph)	153	723	59	82	1603	24	60	134	102	23	290	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1740		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1740		1770	1863	1583
Peak-hour factor, PHF	0.83	0.93	0.92	0.85	0.94	0.94	0.94	0.82	0.80	0.94	0.91	0.89
Adj. Flow (vph)	184	777	64	96	1705	26	64	163	128	24	319	192
RTOR Reduction (vph)	0	0	33	0	0	14	0	22	0	0	0	142
Lane Group Flow (vph)	184	777	31	96	1705	12	64	269	0	24	319	50
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	13.8	63.9	63.9	11.1	61.2	61.2	7.9	29.6		3.5	24.2	24.2
Effective Green, g (s)	13.8	63.9	63.9	11.1	61.2	61.2	7.9	29.6		3.5	24.2	24.2
Actuated g/C Ratio	0.11	0.49	0.49	0.09	0.47	0.47	0.06	0.23		0.03	0.19	0.19
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	187	1738	777	151	1664	744	107	395		47	346	294
v/s Ratio Prot	c0.10	0.22		0.05	c0.48		c0.04	0.15		0.01	c0.17	
v/s Ratio Perm			0.02			0.01						0.03
v/c Ratio	0.98	0.45	0.04	0.64	1.02	0.02	0.60	0.68		0.51	0.92	0.17
Uniform Delay, d1	58.0	21.6	17.2	57.5	34.4	18.4	59.6	45.9		62.5	52.0	44.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	60.6	0.3	0.0	6.3	28.6	0.0	5.9	3.8		3.8	28.9	0.1
Delay (s)	118.6	21.8	17.2	63.8	63.0	18.4	65.4	49.8		66.3	80.9	44.6
Level of Service	F	C	B	E	E	B	E	D		E	F	D
Approach Delay (s)		38.9			62.4			52.6			67.2	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	55.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	130.1	Sum of lost time (s)	23.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

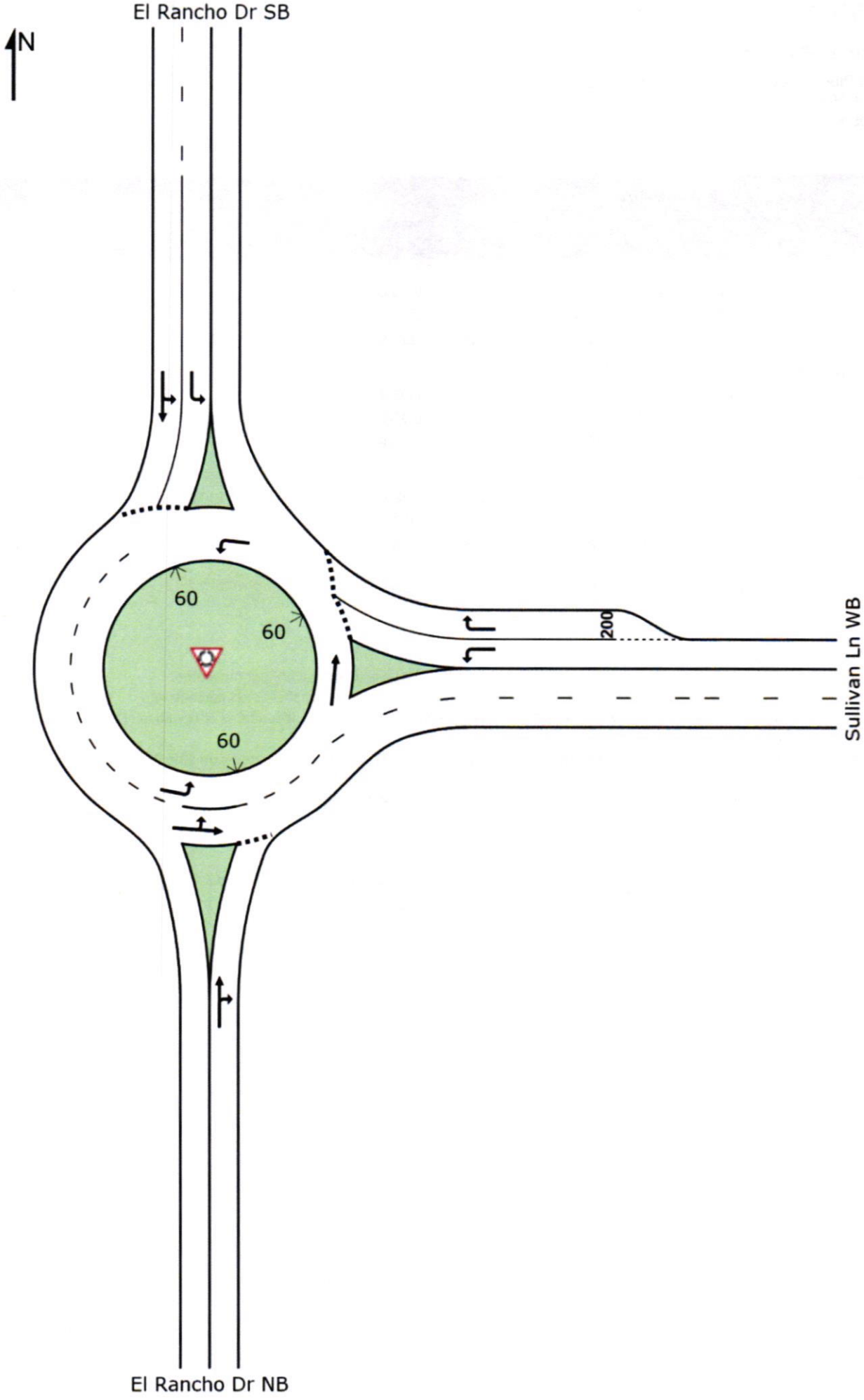
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	648	23	16	1591	284	40	146	11	351	121	78
Future Volume (vph)	177	648	23	16	1591	284	40	146	11	351	121	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1833		1681	1728	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1833		1681	1728	1583
Peak-hour factor, PHF	0.82	0.98	0.96	0.98	0.98	0.95	0.98	0.85	0.92	0.96	0.92	0.81
Adj. Flow (vph)	216	661	24	16	1623	299	41	172	12	366	132	96
RTOR Reduction (vph)	0	0	13	0	0	74	0	2	0	0	0	79
Lane Group Flow (vph)	216	661	11	16	1623	225	0	223	0	245	253	17
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	10.4	59.1	59.1	1.8	50.8	50.8		19.6		22.1	22.1	22.1
Effective Green, g (s)	10.4	59.1	59.1	1.8	50.8	50.8		19.6		22.1	22.1	22.1
Actuated g/C Ratio	0.08	0.46	0.46	0.01	0.40	0.40		0.15		0.17	0.17	0.17
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	143	1632	730	24	1403	627		280		290	298	273
v/s Ratio Prot	c0.12	0.19		0.01	c0.46			c0.12		0.15	c0.15	
v/s Ratio Perm			0.01			0.14						0.01
v/c Ratio	1.51	0.41	0.02	0.67	1.16	0.36		0.80		0.84	0.85	0.06
Uniform Delay, d1	58.8	22.9	18.7	62.9	38.6	27.2		52.3		51.3	51.4	44.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	262.3	0.5	0.0	42.9	79.0	1.0		13.7		18.9	18.9	0.0
Delay (s)	321.2	23.3	18.7	105.8	117.7	28.2		66.0		70.3	70.3	44.4
Level of Service	F	C	B	F	F	C		E		E	E	D
Approach Delay (s)		94.6			103.8			66.0			66.1	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	93.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	128.1	Sum of lost time (s)	25.5
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	154	25	42	178	298	43	350	43	794	1253	124
Future Volume (vph)	50	154	25	42	178	298	43	350	43	794	1253	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1827	1568	1752	3444		3400	3457	
Flt Permitted	0.28	1.00	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	523	1845	1568		1669	1568	1752	3444		3400	3457	
Peak-hour factor, PHF	0.88	0.86	0.88	0.85	0.87	0.80	0.88	0.88	0.83	0.82	0.88	0.88
Adj. Flow (vph)	57	179	28	49	205	372	49	398	52	968	1424	141
RTOR Reduction (vph)	0	0	20	0	0	0	0	11	0	0	6	0
Lane Group Flow (vph)	57	179	8	0	254	373	49	439	0	968	1559	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	24.5	24.5	24.5		18.4	90.0	3.3	20.3		31.8	48.8	
Effective Green, g (s)	24.5	24.5	24.5		18.4	90.0	3.3	20.3		31.8	48.8	
Actuated g/C Ratio	0.27	0.27	0.27		0.20	1.00	0.04	0.23		0.35	0.54	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	186	502	426		341	1568	64	776		1201	1874	
v/s Ratio Prot	0.01	0.10					c0.03	0.13		0.28	c0.45	
v/s Ratio Perm	0.07		0.00		c0.15	c0.24						
v/c Ratio	0.31	0.36	0.02		0.74	0.24	0.77	0.57		0.81	0.83	
Uniform Delay, d1	25.4	26.4	24.0		33.6	0.0	43.0	30.9		26.3	17.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0		8.1	0.4	37.9	3.0		4.0	4.5	
Delay (s)	25.7	26.7	24.0		41.7	0.4	80.8	33.9		30.4	21.7	
Level of Service	C	C	C		D	A	F	C		C	C	
Approach Delay (s)		26.2			17.1			38.5			25.0	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			


El Rancho Dr SB
N
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

Existing Plus Project Conditions - with Mitigation
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	96	2.0	0.560	17.4	LOS C	2.2	55.7	0.69	0.76	28.7
18	R2	209	2.0	0.560	17.4	LOS C	2.2	55.7	0.69	0.76	28.2
Approach		306	2.0	0.560	17.4	LOS C	2.2	55.7	0.69	0.76	28.3
East: Sullivan Ln WB											
1	L2	100	2.0	0.100	4.5	LOS A	0.4	9.1	0.22	0.11	32.1
16	R2	591	2.0	0.589	11.5	LOS B	4.1	103.0	0.41	0.25	30.1
Approach		691	2.0	0.589	10.5	LOS B	4.1	103.0	0.39	0.23	30.4
North: El Rancho Dr SB											
7	L2	990	2.0	0.656	13.5	LOS B	5.1	130.7	0.48	0.30	28.8
4	T1	324	2.0	0.656	13.5	LOS B	5.1	130.7	0.48	0.30	29.3
Approach		1314	2.0	0.656	13.5	LOS B	5.1	130.7	0.48	0.30	28.9
All Vehicles		2311	2.0	0.656	13.1	LOS B	5.1	130.7	0.48	0.34	29.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	648	23	16	1591	284	40	146	11	351	121	78
Future Volume (vph)	177	648	23	16	1591	284	40	146	11	351	121	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1845		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1845		3433	1863	1583
Peak-hour factor, PHF	0.82	0.98	0.96	0.98	0.98	0.95	0.98	0.85	0.92	0.96	0.92	0.81
Adj. Flow (vph)	216	661	24	16	1623	299	41	172	12	366	132	96
RTOR Reduction (vph)	0	0	10	0	0	97	0	2	0	0	0	83
Lane Group Flow (vph)	216	661	14	16	1623	202	41	182	0	366	132	13
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.8	84.6	84.6	2.9	65.0	65.0	16.6	20.5		16.5	20.4	20.4
Effective Green, g (s)	22.8	84.6	84.6	2.9	65.0	65.0	16.6	20.5		16.5	20.4	20.4
Actuated g/C Ratio	0.15	0.56	0.56	0.02	0.43	0.43	0.11	0.14		0.11	0.14	0.14
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	269	1995	892	34	1533	685	195	252		377	253	215
v/s Ratio Prot	c0.12	0.19		0.01	c0.46		0.02	c0.10		c0.11	0.07	
v/s Ratio Perm			0.01			0.13						0.01
v/c Ratio	0.80	0.33	0.02	0.47	1.06	0.30	0.21	0.72		0.97	0.52	0.06
Uniform Delay, d1	61.4	17.5	14.4	72.8	42.5	27.6	60.7	62.0		66.5	60.3	56.5
Progression Factor	0.76	0.83	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.7	0.3	0.0	3.7	40.3	1.1	0.2	8.4		38.3	0.9	0.0
Delay (s)	60.4	14.9	14.4	76.5	82.8	28.7	60.9	70.4		104.8	61.2	56.5
Level of Service	E	B	B	E	F	C	E	E		F	E	E
Approach Delay (s)		25.8			74.4			68.7			87.3	
Approach LOS		C			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	64.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	125	59	42	111	560	43	1054	34	341	741	50
Future Volume (vph)	86	125	59	42	111	560	43	1054	34	341	741	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1819	1568	1752	3489		3400	3471	
Flt Permitted	0.49	1.00	1.00		0.88	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	897	1845	1568		1624	1568	1752	3489		3400	3471	
Peak-hour factor, PHF	0.83	0.84	0.82	0.81	0.82	0.80	0.83	0.84	0.84	0.81	0.84	0.83
Adj. Flow (vph)	104	149	72	52	135	700	52	1255	40	421	882	60
RTOR Reduction (vph)	0	0	47	0	0	261	0	2	0	0	4	0
Lane Group Flow (vph)	104	149	25	0	187	439	52	1293	0	421	938	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	45.9	45.9	45.9		39.0	39.0	16.8	51.5		19.2	53.9	
Effective Green, g (s)	45.9	45.9	45.9		39.0	39.0	16.8	51.5		19.2	53.9	
Actuated g/C Ratio	0.35	0.35	0.35		0.30	0.30	0.13	0.40		0.15	0.41	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	343	651	553		487	470	226	1382		502	1439	
v/s Ratio Prot	c0.01	0.08					0.03	c0.37		c0.12	0.27	
v/s Ratio Perm	0.10		0.02		0.12	c0.28						
v/c Ratio	0.30	0.23	0.05		0.38	0.93	0.23	0.94		0.84	0.65	
Uniform Delay, d1	31.2	29.6	27.7		36.0	44.2	50.8	37.7		53.9	30.5	
Progression Factor	1.00	1.00	1.00		1.02	1.09	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.0		0.4	25.6	0.2	13.1		11.7	2.3	
Delay (s)	31.3	29.7	27.7		37.0	73.7	51.0	50.7		65.6	32.8	
Level of Service	C	C	C		D	E	D	D		E	C	
Approach Delay (s)		29.8			66.0			50.7			43.0	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	49.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	319.1

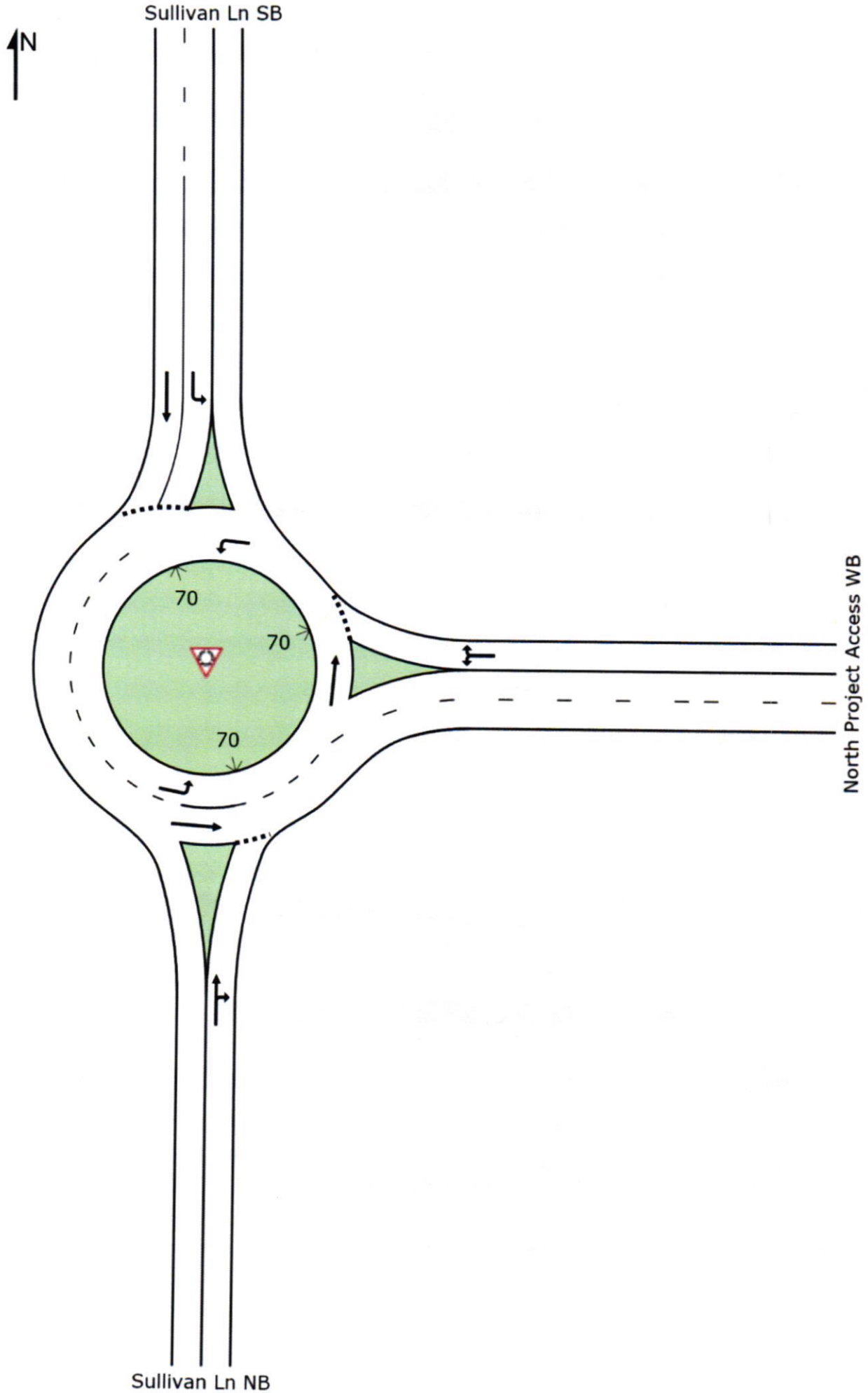
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	100	534	230	65	379	133
Future Vol, veh/h	100	534	230	65	379	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	74	78	81	77	80	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	135	685	284	84	474	164

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1438	326	0	0	368	0
Stage 1	326	-	-	-	-	-
Stage 2	1112	-	-	-	-	-
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	147	715	-	-	1191	-
Stage 1	731	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 88	715	-	-	1191	-
Mov Cap-2 Maneuver	~ 88	-	-	-	-	-
Stage 1	731	-	-	-	-	-
Stage 2	190	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 705	0	7.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	329	1191	-
HCM Lane V/C Ratio	-	-	2.492	0.398	-
HCM Control Delay (s)	-	-	$ 705	10	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	66	1.9	-

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


Sullivan Ln SB
N
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

Existing Plus Project Conditions
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	487	2.0	0.513	9.8	LOS A	2.2	56.0	0.31	0.21	32.0
18	R2	28	2.0	0.513	9.8	LOS A	2.2	56.0	0.31	0.21	31.4
Approach		515	2.0	0.513	9.8	LOS A	2.2	56.0	0.31	0.21	32.0
East: North Project Access WB											
1	L2	64	2.0	0.520	13.6	LOS B	2.8	70.9	0.67	0.71	29.9
16	R2	287	2.0	0.520	13.6	LOS B	2.8	70.9	0.67	0.71	29.3
Approach		351	2.0	0.520	13.6	LOS B	2.8	70.9	0.67	0.71	29.4
North: Sullivan Ln SB											
7	L2	136	2.0	0.132	4.7	LOS A	0.5	12.5	0.18	0.08	32.2
4	T1	390	2.0	0.376	7.4	LOS A	1.9	47.9	0.24	0.12	33.2
Approach		526	2.0	0.376	6.7	LOS A	1.9	47.9	0.22	0.11	32.9
All Vehicles		1392	2.0	0.520	9.6	LOS A	2.8	70.9	0.37	0.30	31.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

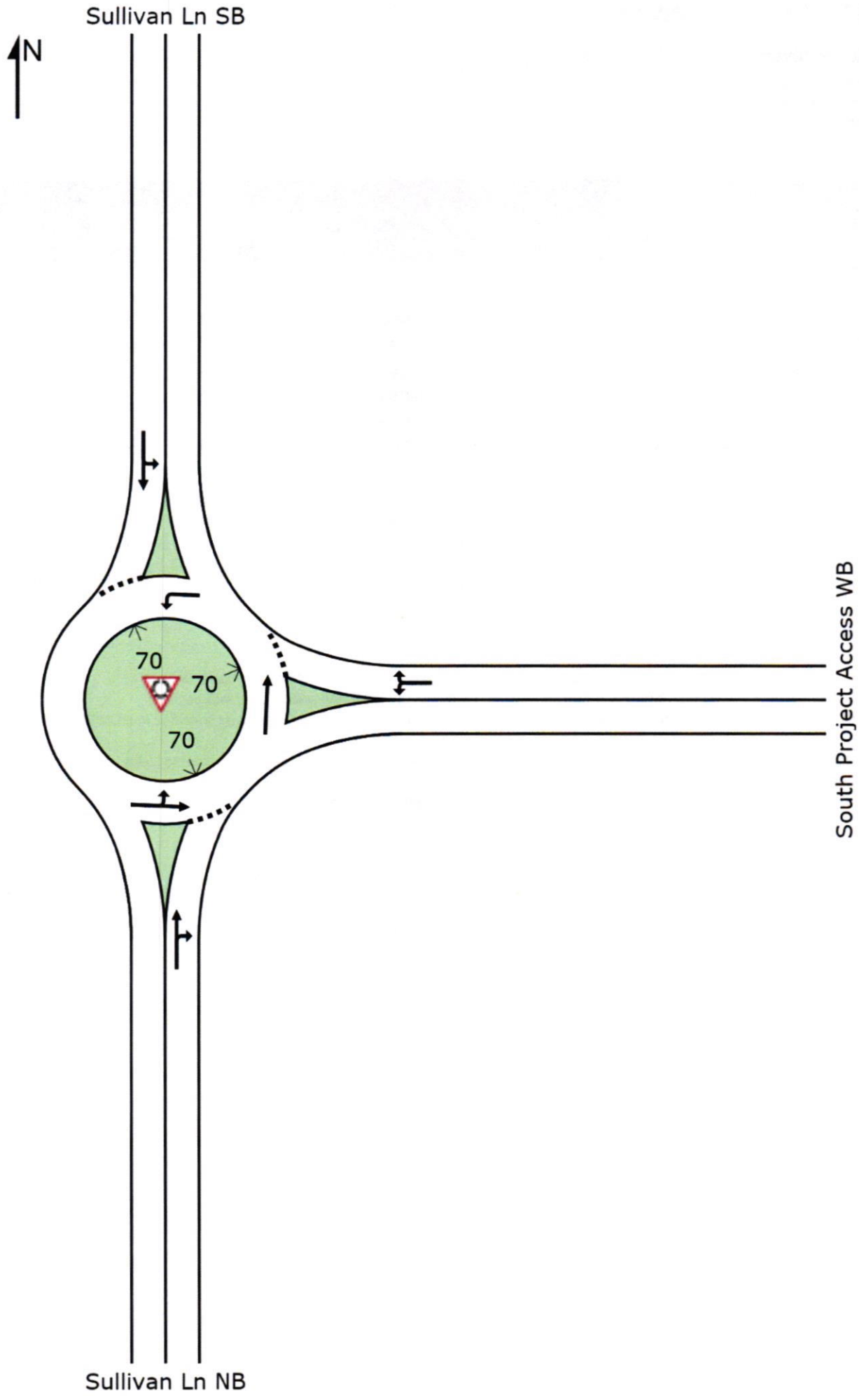
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	15	11	441	390	1
Future Vol, veh/h	0	15	11	441	390	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	81	81	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	18	13	544	481	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1053	482	483	0	-	0
Stage 1	482	-	-	-	-	-
Stage 2	571	-	-	-	-	-
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	251	584	1080	-	-	-
Stage 1	621	-	-	-	-	-
Stage 2	565	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	247	584	1080	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	621	-	-	-	-	-
Stage 2	555	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1080	-	584	-	-
HCM Lane V/C Ratio	0.012	-	0.031	-	-
HCM Control Delay (s)	8.4	0	11.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

Existing Plus Project Conditions
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	370	2.0	0.419	8.1	LOS A	2.2	56.5	0.28	0.15	32.8
18	R2	60	2.0	0.419	8.1	LOS A	2.2	56.5	0.28	0.15	32.1
Approach		430	2.0	0.419	8.1	LOS A	2.2	56.5	0.28	0.15	32.7
East: South Project Access WB											
1	L2	128	2.0	0.381	9.5	LOS A	1.6	41.7	0.54	0.51	31.1
16	R2	161	2.0	0.381	9.5	LOS A	1.6	41.7	0.54	0.51	30.5
Approach		289	2.0	0.381	9.5	LOS A	1.6	41.7	0.54	0.51	30.8
North: Sullivan Ln SB											
7	L2	76	2.0	0.481	9.5	LOS A	2.7	68.4	0.40	0.26	31.7
4	T1	392	2.0	0.481	9.5	LOS A	2.7	68.4	0.40	0.26	31.8
Approach		468	2.0	0.481	9.5	LOS A	2.7	68.4	0.40	0.26	31.8
All Vehicles		1187	2.0	0.481	9.0	LOS A	2.7	68.4	0.39	0.28	31.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	10	0	78	27	1	15	60	353	10	4	436	4
Future Vol, veh/h	10	0	78	27	1	15	60	353	10	4	436	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	89	89	84	89	89	88	87	83	89	84	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	88	32	1	17	68	406	12	4	519	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1087	1084	521	1122	1081	412	524	0	0	418	0	0
Stage 1	530	530	-	548	548	-	-	-	-	-	-	-
Stage 2	557	554	-	574	533	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	194	217	555	183	218	640	1043	-	-	1141	-	-
Stage 1	533	527	-	521	517	-	-	-	-	-	-	-
Stage 2	515	514	-	504	525	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	178	202	555	146	203	640	1043	-	-	1141	-	-
Mov Cap-2 Maneuver	178	202	-	146	203	-	-	-	-	-	-	-
Stage 1	498	524	-	487	483	-	-	-	-	-	-	-
Stage 2	468	480	-	422	522	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	29.1	1.2	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1043	-	-	442	199	1141	-	-
HCM Lane V/C Ratio	0.065	-	-	0.226	0.252	0.004	-	-
HCM Control Delay (s)	8.7	-	-	15.5	29.1	8.2	0	-
HCM Lane LOS	A	-	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	1170	15	98	1048	45	97	197	98	20	161	133
Future Volume (vph)	184	1170	15	98	1048	45	97	197	98	20	161	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1767		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1767		1770	1863	1583
Peak-hour factor, PHF	0.96	0.98	0.94	0.84	0.97	0.98	0.97	0.95	0.91	0.98	0.89	0.88
Adj. Flow (vph)	192	1194	16	117	1080	46	100	207	108	20	181	151
RTOR Reduction (vph)	0	0	8	0	0	25	0	15	0	0	0	128
Lane Group Flow (vph)	192	1194	8	117	1080	21	100	300	0	20	181	23
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	17.3	64.0	64.0	12.2	58.9	58.9	11.1	27.7		4.1	19.7	19.7
Effective Green, g (s)	17.3	64.0	64.0	12.2	58.9	58.9	11.1	27.7		4.1	19.7	19.7
Actuated g/C Ratio	0.13	0.49	0.49	0.09	0.45	0.45	0.09	0.21		0.03	0.15	0.15
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	235	1742	779	166	1603	717	151	376		55	282	239
v/s Ratio Prot	c0.11	c0.34		0.07	0.31		c0.06	c0.17		0.01	0.10	
v/s Ratio Perm			0.00			0.01						0.01
v/c Ratio	0.82	0.69	0.01	0.70	0.67	0.03	0.66	0.80		0.36	0.64	0.10
Uniform Delay, d1	54.8	25.3	16.8	57.2	28.0	19.7	57.6	48.5		61.7	51.8	47.5
Progression Factor	1.00	1.00	1.00	1.10	0.70	1.00	1.00	1.00		0.96	0.84	0.87
Incremental Delay, d2	18.4	2.2	0.0	7.1	1.5	0.0	8.2	10.5		1.4	3.6	0.1
Delay (s)	73.2	27.5	16.9	69.9	21.1	19.8	65.8	59.0		60.7	46.9	41.3
Level of Service	E	C	B	E	C	B	E	E		E	D	D
Approach Delay (s)		33.6			25.6			60.6			45.3	
Approach LOS		C			C			E			D	

Intersection Summary				
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0	
Intersection Capacity Utilization	77.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

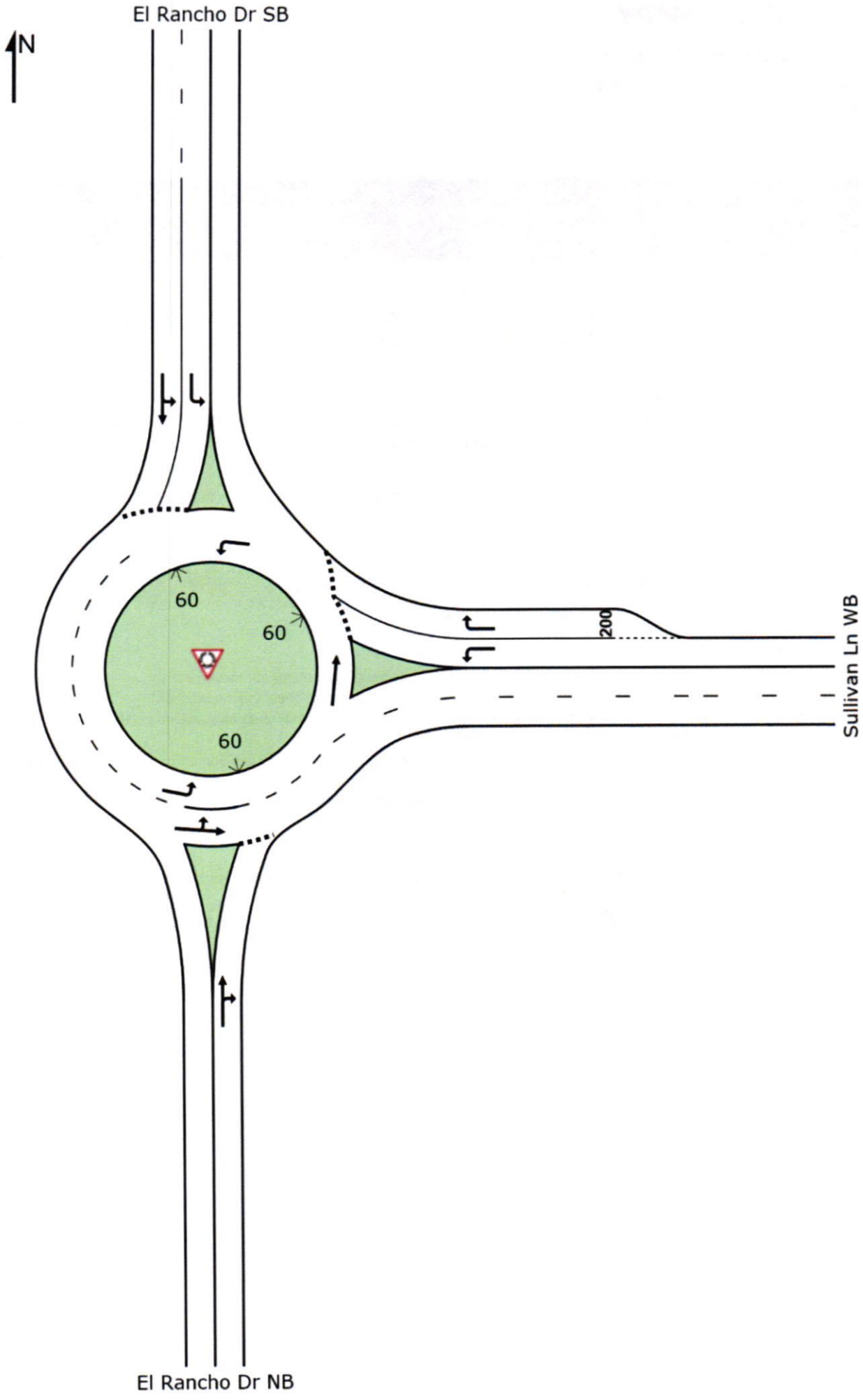
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1156	42	26	1009	207	46	126	22	297	108	136
Future Volume (vph)	90	1156	42	26	1009	207	46	126	22	297	108	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1814		1681	1731	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1814		1681	1731	1583
Peak-hour factor, PHF	0.87	0.91	0.88	0.91	0.91	0.89	0.88	0.88	0.91	0.89	0.82	0.81
Adj. Flow (vph)	103	1270	48	29	1109	233	52	143	24	334	132	168
RTOR Reduction (vph)	0	0	27	0	0	83	0	4	0	0	0	110
Lane Group Flow (vph)	103	1270	21	29	1109	150	0	215	0	230	236	58
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.2	57.4	57.4	4.7	50.2	50.2		19.8		22.6	22.6	22.6
Effective Green, g (s)	12.2	57.4	57.4	4.7	50.2	50.2		19.8		22.6	22.6	22.6
Actuated g/C Ratio	0.09	0.44	0.44	0.04	0.39	0.39		0.15		0.17	0.17	0.17
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	166	1562	698	63	1366	611		276		292	300	275
v/s Ratio Prot	c0.06	c0.36		0.02	0.31			c0.12		c0.14	0.14	
v/s Ratio Perm			0.01			0.09						0.04
v/c Ratio	0.62	0.81	0.03	0.46	0.81	0.24		0.78		0.79	0.79	0.21
Uniform Delay, d1	56.7	31.6	20.5	61.4	35.7	27.0		53.0		51.4	51.4	46.1
Progression Factor	1.04	1.33	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	4.0	3.8	0.1	1.9	5.3	1.0		11.9		12.2	11.8	0.1
Delay (s)	63.1	45.8	20.6	63.3	41.0	28.0		64.8		63.6	63.2	46.2
Level of Service	E	D	C	E	D	C		E		E	E	D
Approach Delay (s)		46.2			39.3			64.8			58.8	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	46.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	125	59	42	111	560	43	1054	34	341	741	50
Future Volume (vph)	86	125	59	42	111	560	43	1054	34	341	741	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1819	1568	1752	3489		3400	3471	
Flt Permitted	0.35	1.00	1.00		0.87	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	644	1845	1568		1603	1568	1752	3489		3400	3471	
Peak-hour factor, PHF	0.83	0.84	0.82	0.81	0.82	0.80	0.83	0.84	0.84	0.81	0.84	0.83
Adj. Flow (vph)	104	149	72	52	135	700	52	1255	40	421	882	60
RTOR Reduction (vph)	0	0	55	0	0	0	0	2	0	0	4	0
Lane Group Flow (vph)	104	149	17	0	187	700	52	1293	0	421	938	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	21.3	21.3	21.3		15.1	90.0	8.6	37.9		17.4	46.7	
Effective Green, g (s)	21.3	21.3	21.3		15.1	90.0	8.6	37.9		17.4	46.7	
Actuated g/C Ratio	0.24	0.24	0.24		0.17	1.00	0.10	0.42		0.19	0.52	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	193	436	371		268	1568	167	1469		657	1801	
v/s Ratio Prot	0.02	0.08					0.03	c0.37		c0.12	0.27	
v/s Ratio Perm	0.11		0.01		c0.12	c0.45						
v/c Ratio	0.54	0.34	0.05		0.70	0.45	0.31	0.88		0.64	0.52	
Uniform Delay, d1	30.0	28.5	26.5		35.3	0.0	37.9	24.0		33.4	14.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.3	0.0		7.1	0.9	0.4	7.8		2.1	1.1	
Delay (s)	31.4	28.9	26.5		42.4	0.9	38.3	31.8		35.6	15.4	
Level of Service	C	C	C		D	A	D	C		D	B	
Approach Delay (s)		29.2			9.7			32.1			21.6	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			


El Rancho Dr SB
N
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

Existing Plus Project Conditions - with Mitigation
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	284	2.0	0.466	10.8	LOS B	1.8	46.0	0.50	0.53	31.3
18	R2	84	2.0	0.466	10.8	LOS B	1.8	46.0	0.50	0.53	30.8
Approach		368	2.0	0.466	10.8	LOS B	1.8	46.0	0.50	0.53	31.2
East: Sullivan Ln WB											
1	L2	135	2.0	0.163	6.0	LOS A	0.6	15.2	0.40	0.32	31.4
16	R2	685	2.0	0.826	25.4	LOS D	10.2	259.1	0.90	0.98	25.3
Approach		820	2.0	0.826	22.2	LOS C	10.2	259.1	0.82	0.87	26.2
North: El Rancho Dr SB											
7	L2	474	2.0	0.330	7.2	LOS A	1.5	38.3	0.33	0.22	31.3
4	T1	164	2.0	0.330	7.2	LOS A	1.5	38.3	0.33	0.22	32.0
Approach		638	2.0	0.330	7.2	LOS A	1.5	38.3	0.33	0.22	31.5
All Vehicles		1826	2.0	0.826	14.7	LOS B	10.2	259.1	0.59	0.57	28.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1156	42	26	1009	207	46	126	22	297	108	136
Future Volume (vph)	90	1156	42	26	1009	207	46	126	22	297	108	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1823		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1823		3433	1863	1583
Peak-hour factor, PHF	0.87	0.91	0.88	0.91	0.91	0.89	0.88	0.88	0.91	0.89	0.82	0.81
Adj. Flow (vph)	103	1270	48	29	1109	233	52	143	24	334	132	168
RTOR Reduction (vph)	0	0	23	0	0	110	0	5	0	0	0	145
Lane Group Flow (vph)	103	1270	25	29	1109	123	52	162	0	334	132	23
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.7	64.6	64.6	4.7	57.9	57.9	13.7	16.9		14.3	17.5	17.5
Effective Green, g (s)	11.7	64.6	64.6	4.7	57.9	57.9	13.7	16.9		14.3	17.5	17.5
Actuated g/C Ratio	0.09	0.51	0.51	0.04	0.46	0.46	0.11	0.13		0.11	0.14	0.14
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	164	1814	811	66	1626	727	192	244		389	258	219
v/s Ratio Prot	0.06	c0.36		0.02	c0.31		0.03	c0.09		c0.10	0.07	
v/s Ratio Perm			0.02			0.08						0.01
v/c Ratio	0.63	0.70	0.03	0.44	0.68	0.17	0.27	0.66		0.86	0.51	0.11
Uniform Delay, d1	55.1	23.3	15.2	59.4	26.8	20.0	51.6	51.8		54.9	50.3	47.4
Progression Factor	0.64	0.26	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.1	1.8	0.1	1.7	2.3	0.5	0.3	5.2		16.3	0.7	0.1
Delay (s)	39.3	7.7	15.2	61.1	29.1	20.5	51.8	57.0		71.2	51.0	47.5
Level of Service	D	A	B	E	C	C	D	E		E	D	D
Approach Delay (s)		10.3			28.3			55.8			60.7	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	28.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	183	64	58	114	575	41	1307	32	343	665	68
Future Volume (vph)	145	183	64	58	114	575	41	1307	32	343	665	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583		1832	1583	1770	3526		3433	3490	
Flt Permitted	0.47	1.00	1.00		0.84	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	873	1863	1583		1560	1583	1770	3526		3433	3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	199	70	63	124	625	45	1421	35	373	723	74
RTOR Reduction (vph)	0	0	47	0	0	203	0	2	0	0	8	0
Lane Group Flow (vph)	158	199	23	0	187	422	45	1454	0	373	789	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	33.3	33.3	33.3		26.9	26.9	12.8	41.7		11.6	40.5	
Effective Green, g (s)	33.3	33.3	33.3		26.9	26.9	12.8	41.7		11.6	40.5	
Actuated g/C Ratio	0.33	0.33	0.33		0.27	0.27	0.13	0.42		0.12	0.40	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	322	620	527		419	425	226	1470		398	1413	
v/s Ratio Prot	c0.02	0.11					0.03	c0.41		c0.11	0.23	
v/s Ratio Perm	0.15		0.01		0.12	c0.27						
v/c Ratio	0.49	0.32	0.04		0.45	0.99	0.20	0.99		0.94	0.56	
Uniform Delay, d1	27.9	24.9	22.6		30.4	36.4	39.0	28.9		43.8	22.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.2	0.0		0.6	41.5	0.2	21.1		29.4	1.6	
Delay (s)	28.3	25.1	22.6		30.9	77.9	39.2	50.0		73.2	24.5	
Level of Service	C	C	C		C	E	D	D		E	C	
Approach Delay (s)		25.9			67.1			49.7			40.0	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

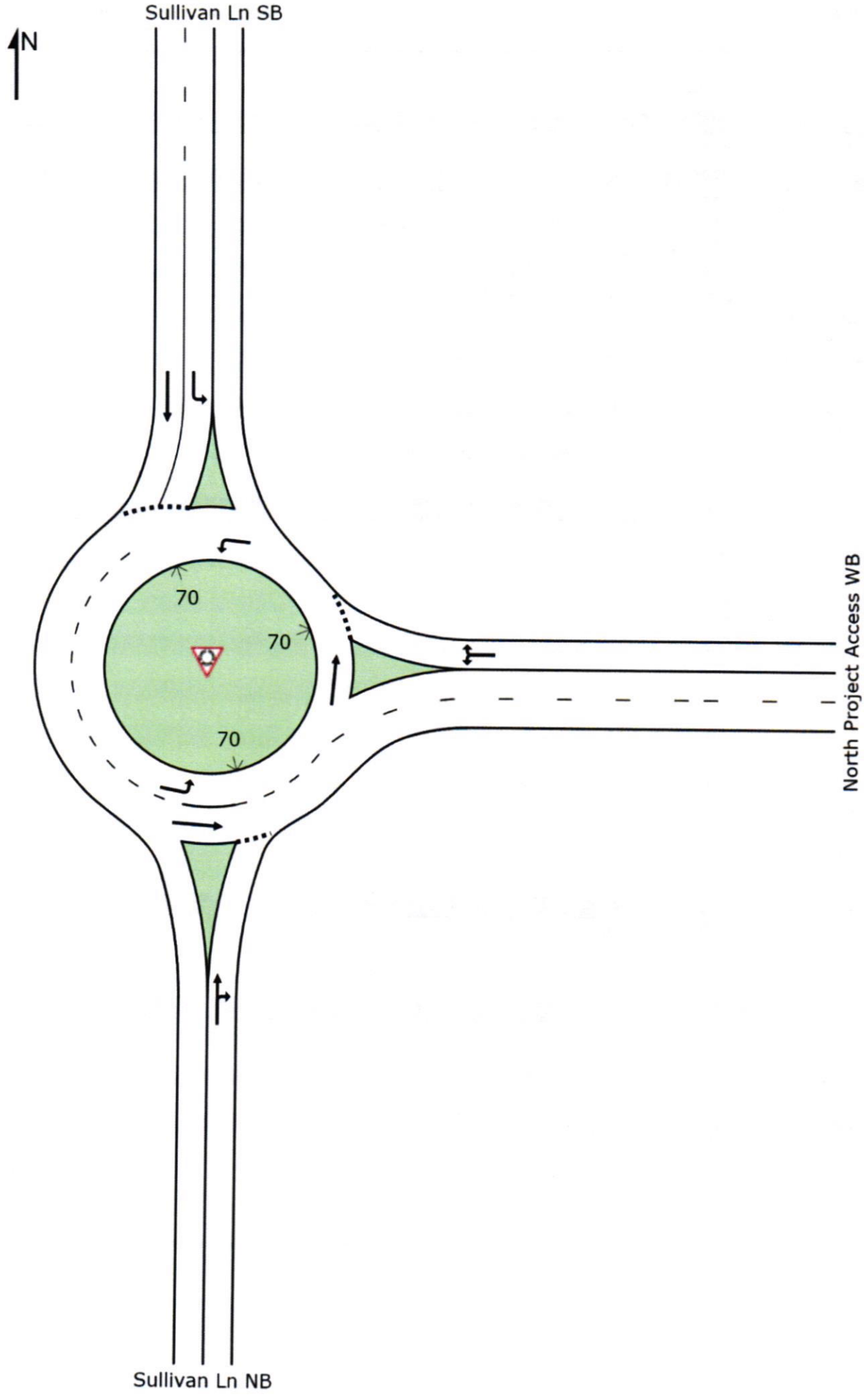
Intersection	
Int Delay, s/veh	91.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	486	339	38	447	169
Future Vol, veh/h	37	486	339	38	447	169
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	42	546	381	43	502	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1596	402	0	0	424	0
Stage 1	402	-	-	-	-	-
Stage 2	1194	-	-	-	-	-
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	117	648	-	-	1135	-
Stage 1	676	-	-	-	-	-
Stage 2	287	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	65	648	-	-	1135	-
Mov Cap-2 Maneuver	65	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	160	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	256.9	0	7.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	396	1135	-
HCM Lane V/C Ratio	-	-	1.484	0.443	-
HCM Control Delay (s)	-	-	256.9	10.7	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	31.1	2.3	-


N
Sullivan Ln SB
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

Existing Plus Project Conditions
PM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	492	2.0	0.482	9.0	LOS A	2.0	51.7	0.21	0.11	32.4
18	R2	15	2.0	0.482	9.0	LOS A	2.0	51.7	0.21	0.11	31.8
Approach		508	2.0	0.482	9.0	LOS A	2.0	51.7	0.21	0.11	32.4
East: North Project Access WB											
1	L2	16	2.0	0.138	6.9	LOS A	0.5	12.1	0.50	0.47	32.8
16	R2	76	2.0	0.138	6.9	LOS A	0.5	12.1	0.50	0.47	32.2
Approach		92	2.0	0.138	6.9	LOS A	0.5	12.1	0.50	0.47	32.3
North: Sullivan Ln SB											
7	L2	70	2.0	0.064	3.8	LOS A	0.2	5.7	0.07	0.02	32.6
4	T1	458	2.0	0.420	7.8	LOS A	2.3	59.2	0.12	0.03	33.0
Approach		527	2.0	0.420	7.3	LOS A	2.3	59.2	0.11	0.03	32.9
All Vehicles		1127	2.0	0.482	8.0	LOS A	2.3	59.2	0.19	0.10	32.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

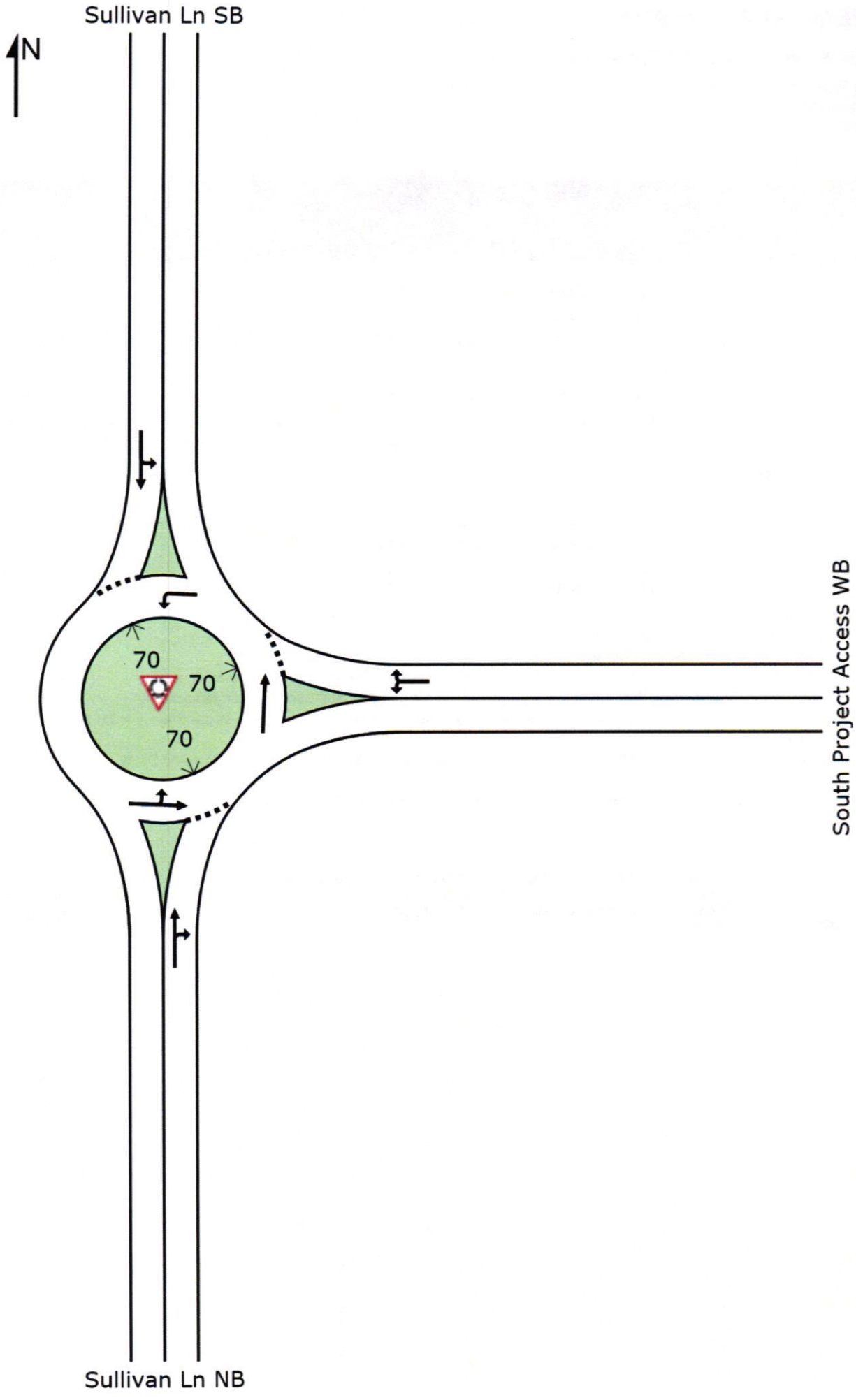
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	8	15	465	431	5
Future Vol, veh/h	2	8	15	465	431	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	9	17	528	490	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1056	493	495	0	-	0
Stage 1	493	-	-	-	-	-
Stage 2	563	-	-	-	-	-
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	250	576	1069	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	244	576	1069	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	614	-	-	-	-	-
Stage 2	557	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1069	-	453	-	-
HCM Lane V/C Ratio	0.016	-	0.025	-	-
HCM Control Delay (s)	8.4	0	13.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

Existing Plus Project Conditions
PM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	479	2.0	0.480	8.9	LOS A	2.9	73.3	0.21	0.09	32.5
18	R2	32	2.0	0.480	8.9	LOS A	2.9	73.3	0.21	0.09	31.7
Approach		511	2.0	0.480	8.9	LOS A	2.9	73.3	0.21	0.09	32.4
East: South Project Access WB											
1	L2	34	2.0	0.112	6.5	LOS A	0.4	9.7	0.49	0.45	32.4
16	R2	42	2.0	0.112	6.5	LOS A	0.4	9.7	0.49	0.45	31.8
Approach		76	2.0	0.112	6.5	LOS A	0.4	9.7	0.49	0.45	32.1
North: Sullivan Ln SB											
7	L2	39	2.0	0.446	8.3	LOS A	2.5	64.6	0.19	0.07	32.5
4	T1	438	2.0	0.446	8.3	LOS A	2.5	64.6	0.19	0.07	32.6
Approach		477	2.0	0.446	8.3	LOS A	2.5	64.6	0.19	0.07	32.6
All Vehicles		1064	2.0	0.480	8.4	LOS A	2.9	73.3	0.22	0.11	32.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑			↕	
Traffic Vol, veh/h	21	0	150	30	1	4	55	445	22	10	414	10
Future Vol, veh/h	21	0	150	30	1	4	55	445	22	10	414	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	158	32	1	4	58	468	23	11	436	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1060	1069	441	1137	1063	480	446	0	0	492	0	0
Stage 1	462	462	-	596	596	-	-	-	-	-	-	-
Stage 2	598	607	-	541	467	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	202	221	616	179	223	586	1114	-	-	1071	-	-
Stage 1	580	565	-	490	492	-	-	-	-	-	-	-
Stage 2	489	486	-	525	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	190	207	616	126	208	586	1114	-	-	1071	-	-
Mov Cap-2 Maneuver	190	207	-	126	208	-	-	-	-	-	-	-
Stage 1	550	557	-	464	466	-	-	-	-	-	-	-
Stage 2	459	461	-	385	554	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.8	39.7	0.9	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1114	-	-	483	140	1071	-	-
HCM Lane V/C Ratio	0.052	-	-	0.373	0.263	0.01	-	-
HCM Control Delay (s)	8.4	-	-	16.8	39.7	8.4	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.7	1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	1621	55	60	1288	52	96	275	85	30	105	121
Future Volume (vph)	182	1621	55	60	1288	52	96	275	85	30	105	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1797		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1797		1770	1863	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	188	1671	57	62	1328	54	99	284	88	31	108	125
RTOR Reduction (vph)	0	0	29	0	0	30	0	9	0	0	0	103
Lane Group Flow (vph)	188	1671	28	62	1328	24	99	363	0	31	108	22
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	16.6	64.6	64.6	9.0	57.0	57.0	11.0	29.6		4.8	22.4	22.4
Effective Green, g (s)	16.6	64.6	64.6	9.0	57.0	57.0	11.0	29.6		4.8	22.4	22.4
Actuated g/C Ratio	0.13	0.50	0.50	0.07	0.44	0.44	0.08	0.23		0.04	0.17	0.17
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	226	1758	786	122	1551	694	149	409		65	321	272
v/s Ratio Prot	0.11	c0.47		0.04	c0.38		c0.06	c0.20		0.02	0.06	
v/s Ratio Perm			0.02			0.01						0.01
v/c Ratio	0.83	0.95	0.04	0.51	0.86	0.03	0.66	0.89		0.48	0.34	0.08
Uniform Delay, d1	55.3	31.2	16.8	58.4	32.8	20.8	57.7	48.6		61.4	47.3	45.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.3	12.6	0.1	0.7	3.8	0.1	8.3	19.5		2.0	0.2	0.0
Delay (s)	76.7	43.7	16.8	59.3	36.7	20.9	66.1	68.1		63.4	47.5	45.2
Level of Service	E	D	B	E	D	C	E	E		E	D	D
Approach Delay (s)		46.2			37.1			67.7			48.3	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	1609	35	40	1151	278	52	152	38	276	121	197
Future Volume (vph)	92	1609	35	40	1151	278	52	152	38	276	121	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1804		1681	1735	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1804		1681	1735	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	97	1694	37	42	1212	293	55	160	40	291	127	207
RTOR Reduction (vph)	0	0	21	0	0	92	0	6	0	0	0	152
Lane Group Flow (vph)	97	1694	16	42	1212	201	0	249	0	207	211	55
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.5	54.7	54.7	6.6	50.1	50.1		22.4		20.8	20.8	20.8
Effective Green, g (s)	11.5	54.7	54.7	6.6	50.1	50.1		22.4		20.8	20.8	20.8
Actuated g/C Ratio	0.09	0.42	0.42	0.05	0.39	0.39		0.17		0.16	0.16	0.16
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	156	1489	666	89	1363	610		310		268	277	253
v/s Ratio Prot	0.05	c0.48		0.02	c0.34			c0.14		c0.12	0.12	
v/s Ratio Perm			0.01			0.13						0.03
v/c Ratio	0.62	1.14	0.02	0.47	0.89	0.33		0.80		0.77	0.76	0.22
Uniform Delay, d1	57.2	37.6	22.0	60.0	37.4	28.1		51.7		52.3	52.2	47.5
Progression Factor	0.54	0.34	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	66.3	0.0	1.4	9.0	1.4		13.2		11.8	10.6	0.2
Delay (s)	33.7	79.1	22.1	61.4	46.3	29.6		64.9		64.2	62.8	47.7
Level of Service	C	E	C	E	D	C		E		E	E	D
Approach Delay (s)		75.6			43.6			64.9			58.3	
Approach LOS		E			D			E			E	

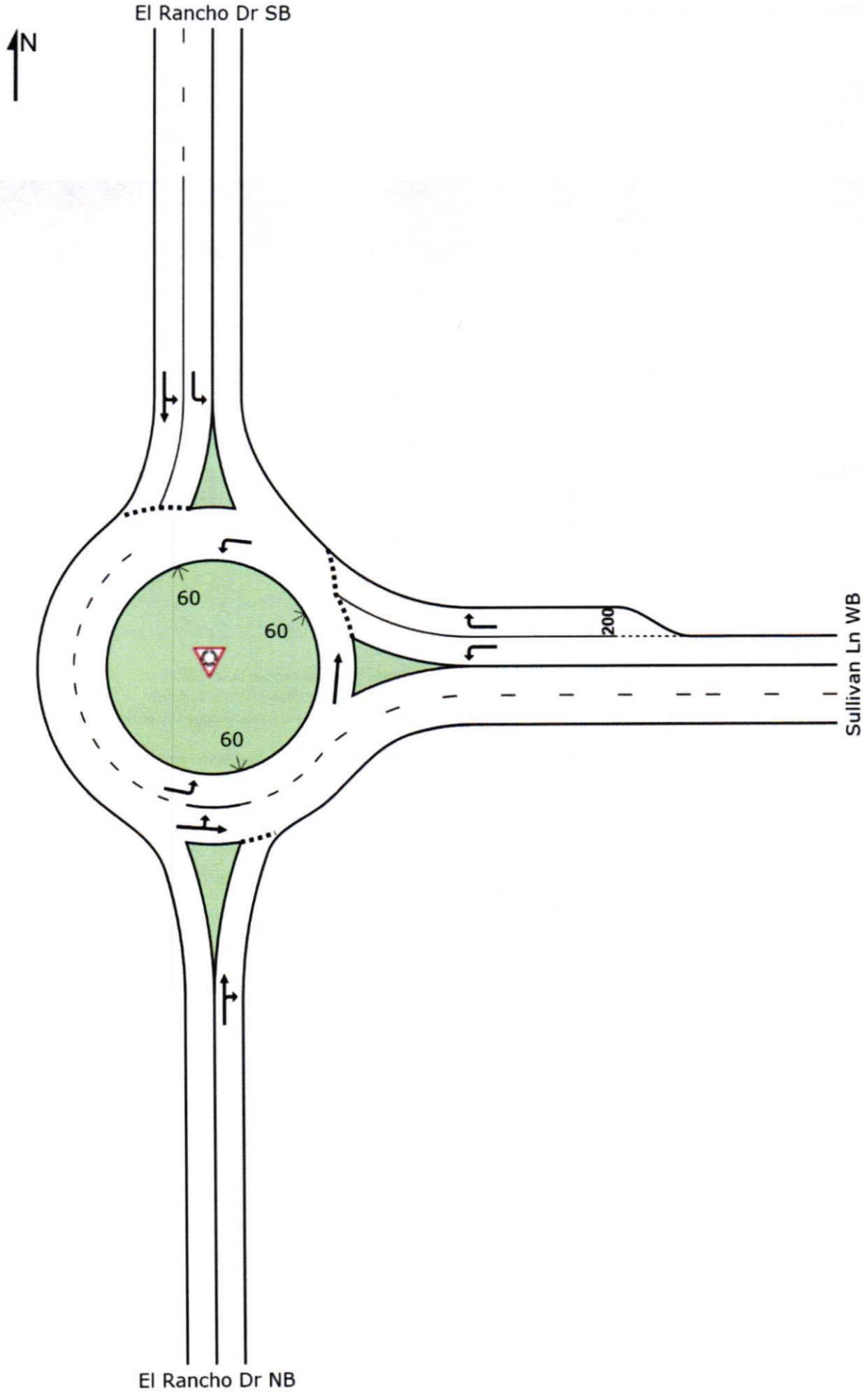
Intersection Summary			
HCM 2000 Control Delay	60.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	183	64	58	114	575	41	1307	32	343	665	68
Future Volume (vph)	145	183	64	58	114	575	41	1307	32	343	665	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583		1832	1583	1770	3526		3433	3490	
Flt Permitted	0.34	1.00	1.00		0.82	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	638	1863	1583		1529	1583	1770	3526		3433	3490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	199	70	63	124	625	45	1421	35	373	723	74
RTOR Reduction (vph)	0	0	53	0	0	0	0	2	0	0	7	0
Lane Group Flow (vph)	158	199	17	0	187	625	45	1454	0	373	790	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	24.0	24.0	24.0		16.8	100.0	13.9	46.4		16.2	48.7	
Effective Green, g (s)	24.0	24.0	24.0		16.8	100.0	13.9	46.4		16.2	48.7	
Actuated g/C Ratio	0.24	0.24	0.24		0.17	1.00	0.14	0.46		0.16	0.49	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	201	447	379		256	1583	246	1636		556	1699	
v/s Ratio Prot	c0.03	0.11					0.03	c0.41		c0.11	0.23	
v/s Ratio Perm	c0.15		0.01		0.12	0.39						
v/c Ratio	0.79	0.45	0.04		0.73	0.39	0.18	0.89		0.67	0.46	
Uniform Delay, d1	35.9	32.3	29.2		39.5	0.0	38.0	24.5		39.4	17.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.8	0.5	0.0		9.7	0.7	0.1	7.6		3.2	0.9	
Delay (s)	52.7	32.9	29.2		49.1	0.7	38.2	32.1		42.6	17.9	
Level of Service	D	C	C		D	A	D	C		D	B	
Approach Delay (s)		39.6			11.9			32.3			25.8	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group


El Rancho Dr SB
N
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

Existing Plus Project Conditions - with Mitigation
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	381	2.0	0.547	12.9	LOS B	2.4	61.6	0.56	0.60	30.5
18	R2	43	2.0	0.547	12.9	LOS B	2.4	61.6	0.56	0.60	29.9
Approach		424	2.0	0.547	12.9	LOS B	2.4	61.6	0.56	0.60	30.4
East: Sullivan Ln WB											
1	L2	42	2.0	0.055	5.3	LOS A	0.2	4.7	0.43	0.34	31.7
16	R2	546	2.0	0.727	20.1	LOS C	6.2	157.4	0.79	0.90	27.0
Approach		588	2.0	0.727	19.0	LOS C	6.2	157.4	0.77	0.86	27.3
North: El Rancho Dr SB											
7	L2	502	2.0	0.326	6.7	LOS A	1.5	39.3	0.17	0.07	31.5
4	T1	190	2.0	0.326	6.7	LOS A	1.5	39.3	0.17	0.07	32.3
Approach		692	2.0	0.326	6.7	LOS A	1.5	39.3	0.17	0.07	31.7
All Vehicles		1703	2.0	0.727	12.5	LOS B	6.2	157.4	0.48	0.47	29.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM Signalized Intersection Capacity Analysis Existing Plus Project Conditions with Mitigation

8: Sullivan Ln & McCarran Blvd

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	1609	35	40	1151	278	52	152	38	276	121	197
Future Volume (vph)	92	1609	35	40	1151	278	52	152	38	276	121	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1807		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1807		3433	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	97	1694	37	42	1212	293	55	160	40	291	127	207
RTOR Reduction (vph)	0	0	17	0	0	100	0	7	0	0	0	169
Lane Group Flow (vph)	97	1694	20	42	1212	193	55	193	0	291	127	38
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	19.2	74.2	74.2	7.4	62.7	62.7	7.1	20.6		12.3	25.8	25.8
Effective Green, g (s)	19.2	74.2	74.2	7.4	62.7	62.7	7.1	20.6		12.3	25.8	25.8
Actuated g/C Ratio	0.14	0.53	0.53	0.05	0.45	0.45	0.05	0.15		0.09	0.18	0.18
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	242	1875	838	93	1584	708	89	265		301	343	291
v/s Ratio Prot	0.05	c0.48		0.02	c0.34		0.03	c0.11		c0.08	c0.07	
v/s Ratio Perm			0.01			0.12						0.02
v/c Ratio	0.40	0.90	0.02	0.45	0.77	0.27	0.62	0.73		0.97	0.37	0.13
Uniform Delay, d1	55.1	29.7	15.7	64.3	32.5	24.3	65.1	57.0		63.6	50.0	47.7
Progression Factor	0.63	0.31	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.2	4.5	0.0	1.3	3.6	0.9	8.7	8.2		42.2	0.2	0.1
Delay (s)	35.0	13.8	15.7	65.6	36.0	25.2	73.8	65.2		105.9	50.2	47.8
Level of Service	D	B	B	E	D	C	E	E		F	D	D
Approach Delay (s)		15.0			34.8			67.1			75.3	
Approach LOS		B			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	87.2%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	133	25	41	172	154	43	385	32	518	1380	124
Future Volume (vph)	50	133	25	41	172	154	43	385	32	518	1380	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1827	1568	1752	3464		3400	3461	
Flt Permitted	0.30	1.00	1.00		0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	550	1845	1568		1683	1568	1752	3464		3400	3461	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	145	27	45	187	167	47	418	35	563	1500	135
RTOR Reduction (vph)	0	0	20	0	0	135	0	7	0	0	6	0
Lane Group Flow (vph)	54	145	7	0	232	32	47	446	0	563	1629	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	23.9	23.9	23.9		17.1	17.1	2.7	30.5		22.2	50.0	
Effective Green, g (s)	23.9	23.9	23.9		17.1	17.1	2.7	30.5		22.2	50.0	
Actuated g/C Ratio	0.27	0.27	0.27		0.19	0.19	0.03	0.34		0.25	0.56	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	198	489	416		319	297	52	1173		838	1922	
v/s Ratio Prot	0.01	c0.08					c0.03	0.13		0.17	c0.47	
v/s Ratio Perm	0.06		0.00		c0.14	0.02						
v/c Ratio	0.27	0.30	0.02		0.73	0.11	0.90	0.38		0.67	0.85	
Uniform Delay, d1	25.7	26.3	24.4		34.3	30.1	43.5	22.6		30.6	16.8	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.0		7.5	0.1	88.0	0.9		2.1	4.9	
Delay (s)	25.9	26.6	24.4		41.8	30.3	131.5	23.5		32.7	21.7	
Level of Service	C	C	C		D	C	F	C		C	C	
Approach Delay (s)		26.2			37.0			33.7			24.5	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	310	109	9	429	330
Future Vol, veh/h	10	310	109	9	429	330
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	337	118	10	466	359

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1414	123	0	0	128	0
Stage 1	123	-	-	-	-	-
Stage 2	1291	-	-	-	-	-
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	152	928	-	-	1458	-
Stage 1	902	-	-	-	-	-
Stage 2	258	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	103	928	-	-	1458	-
Mov Cap-2 Maneuver	103	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	176	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	4.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	742	1458	-
HCM Lane V/C Ratio	-	-	0.469	0.32	-
HCM Control Delay (s)	-	-	14.1	8.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	2.5	1.4	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	5	315	433	5
Future Vol, veh/h	5	8	5	315	433	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	9	6	362	498	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	875	501	503	0	-	0
Stage 1	501	-	-	-	-	-
Stage 2	374	-	-	-	-	-
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	320	570	1061	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	318	570	1061	-	-	-
Mov Cap-2 Maneuver	318	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	691	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.5	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1061	-	437	-	-
HCM Lane V/C Ratio	0.005	-	0.034	-	-
HCM Control Delay (s)	8.4	0	13.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

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	10	0	35	4	0	1	77	309	29	6	408	27
Future Vol, veh/h	10	0	35	4	0	1	77	309	29	6	408	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	41	5	0	1	90	359	34	7	474	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1060	1076	490	1079	1075	376	506	0	0	393	0	0
Stage 1	504	504	-	555	555	-	-	-	-	-	-	-
Stage 2	556	572	-	524	520	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	202	219	578	196	220	670	1059	-	-	1166	-	-
Stage 1	550	541	-	516	513	-	-	-	-	-	-	-
Stage 2	515	504	-	537	532	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	187	199	578	169	200	670	1059	-	-	1166	-	-
Mov Cap-2 Maneuver	187	199	-	169	200	-	-	-	-	-	-	-
Stage 1	503	537	-	472	469	-	-	-	-	-	-	-
Stage 2	470	461	-	495	528	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	23.6	1.6	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1059	-	-	395	199	1166	-	-
HCM Lane V/C Ratio	0.085	-	-	0.132	0.029	0.006	-	-
HCM Control Delay (s)	8.7	-	-	15.5	23.6	8.1	0	-
HCM Lane LOS	A	-	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	0.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	855	70	56	1908	29	72	72	35	30	254	160
Future Volume (vph)	94	855	70	56	1908	29	72	72	35	30	254	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1772		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1772		1770	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	100	910	74	60	2030	31	77	77	37	32	270	170
RTOR Reduction (vph)	0	0	36	0	0	16	0	14	0	0	0	135
Lane Group Flow (vph)	100	910	38	60	2030	15	77	100	0	32	270	35
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.6	67.2	67.2	7.9	63.5	63.5	7.4	28.2		4.7	24.5	24.5
Effective Green, g (s)	11.6	67.2	67.2	7.9	63.5	63.5	7.4	28.2		4.7	24.5	24.5
Actuated g/C Ratio	0.09	0.52	0.52	0.06	0.49	0.49	0.06	0.22		0.04	0.19	0.19
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	157	2628	818	107	2483	773	100	384		63	351	298
v/s Ratio Prot	c0.06	c0.18		0.03	c0.40		c0.04	0.06		0.02	c0.14	
v/s Ratio Perm			0.02			0.01						0.02
v/c Ratio	0.64	0.35	0.05	0.56	0.82	0.02	0.77	0.26		0.51	0.77	0.12
Uniform Delay, d1	57.2	18.5	15.5	59.4	28.3	17.2	60.5	42.2		61.5	50.1	43.8
Progression Factor	1.00	1.00	1.00	0.46	1.67	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.1	0.4	0.1	2.4	1.9	0.0	27.6	0.1		2.3	8.8	0.1
Delay (s)	63.3	18.8	15.7	29.5	49.2	17.2	88.1	42.4		63.8	58.9	43.9
Level of Service	E	B	B	C	D	B	F	D		E	E	D
Approach Delay (s)		22.7			48.2			60.8			53.8	
Approach LOS		C			D			E			D	

Intersection Summary				
HCM 2000 Control Delay	42.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0	
Intersection Capacity Utilization	78.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	820	34	49	1912	258	58	91	34	333	91	23
Future Volume (vph)	66	820	34	49	1912	258	58	91	34	333	91	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98		0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1787		1681	1720	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98		0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1787		1681	1720	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	67	837	35	50	1951	263	59	93	35	340	93	23
RTOR Reduction (vph)	0	0	19	0	0	75	0	8	0	0	0	19
Lane Group Flow (vph)	67	837	16	50	1951	188	0	179	0	214	219	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.2	58.8	58.8	7.1	58.0	58.0		17.5		21.1	21.1	21.1
Effective Green, g (s)	8.2	58.8	58.8	7.1	58.0	58.0		17.5		21.1	21.1	21.1
Actuated g/C Ratio	0.06	0.45	0.45	0.05	0.45	0.45		0.13		0.16	0.16	0.16
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	111	2299	716	96	2268	706		240		272	279	256
v/s Ratio Prot	c0.04	0.16		0.03	c0.38			c0.10		0.13	c0.13	
v/s Ratio Perm			0.01			0.12						0.00
v/c Ratio	0.60	0.36	0.02	0.52	0.86	0.27		0.75		0.79	0.78	0.01
Uniform Delay, d1	59.3	23.3	19.7	59.8	32.4	22.6		54.1		52.3	52.3	45.7
Progression Factor	0.87	0.55	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.0	0.4	0.1	2.3	4.6	0.9		10.5		12.9	12.5	0.0
Delay (s)	57.8	13.3	19.7	62.1	36.9	23.5		64.6		65.2	64.8	45.7
Level of Service	E	B	B	E	D	C		E		E	E	D
Approach Delay (s)		16.7			35.9			64.6			64.0	
Approach LOS		B			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	120	59	40	110	400	43	1161	34	271	818	50
Future Volume (vph)	86	120	59	40	110	400	43	1161	34	271	818	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1821	1568	1752	3490		3400	3475	
Flt Permitted	0.38	1.00	1.00		0.88	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	702	1845	1568		1630	1568	1752	3490		3400	3475	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	130	64	43	120	435	47	1262	37	295	889	54
RTOR Reduction (vph)	0	0	49	0	0	365	0	2	0	0	4	0
Lane Group Flow (vph)	93	130	15	0	163	70	47	1297	0	295	939	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	20.5	20.5	20.5		14.0	14.0	8.3	43.1		13.0	47.8	
Effective Green, g (s)	20.5	20.5	20.5		14.0	14.0	8.3	43.1		13.0	47.8	
Actuated g/C Ratio	0.23	0.23	0.23		0.16	0.16	0.09	0.48		0.14	0.53	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	201	420	357		253	243	161	1671		491	1845	
v/s Ratio Prot	c0.02	0.07					0.03	c0.37		c0.09	0.27	
v/s Ratio Perm	0.09		0.01		c0.10	0.04						
v/c Ratio	0.46	0.31	0.04		0.64	0.29	0.29	0.78		0.60	0.51	
Uniform Delay, d1	29.1	28.9	27.1		35.7	33.6	38.1	19.5		36.1	13.6	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.3	0.0		4.9	0.5	0.4	3.6		2.1	1.0	
Delay (s)	29.7	29.2	27.1		40.6	34.1	38.5	23.1		38.1	14.6	
Level of Service	C	C	C		D	C	D	C		D	B	
Approach Delay (s)		28.9			35.8			23.6			20.2	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	7.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	307	305	25	277	175
Future Vol, veh/h	10	307	305	25	277	175
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	11	334	332	27	301	190

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1137	345	0	0	359	0
Stage 1	345	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	222	696	-	-	1194	-
Stage 1	715	-	-	-	-	-
Stage 2	444	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	696	-	-	1194	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	332	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.3	0	5.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	632	1194	-
HCM Lane V/C Ratio	-	-	0.545	0.252	-
HCM Control Delay (s)	-	-	17.3	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.3	1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	15	11	316	300	2
Future Vol, veh/h	1	15	11	316	300	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	18	13	376	357	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	760	358	360	0	-	0
Stage 1	358	-	-	-	-	-
Stage 2	402	-	-	-	-	-
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	374	686	1199	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	369	686	1199	-	-	-
Mov Cap-2 Maneuver	369	-	-	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	667	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1199	-	651	-	-
HCM Lane V/C Ratio	0.011	-	0.029	-	-
HCM Control Delay (s)	8	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	10	0	80	30	1	15	60	302	10	4	307	4
Future Vol, veh/h	10	0	80	30	1	15	60	302	10	4	307	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	0	90	34	1	17	67	339	11	4	345	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	845	841	347	881	838	345	349	0	0	351	0	0
Stage 1	356	356	-	480	480	-	-	-	-	-	-	-
Stage 2	489	485	-	401	358	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	283	301	696	267	302	698	1210	-	-	1208	-	-
Stage 1	661	629	-	567	554	-	-	-	-	-	-	-
Stage 2	561	552	-	626	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	263	283	696	222	284	698	1210	-	-	1208	-	-
Mov Cap-2 Maneuver	263	283	-	222	284	-	-	-	-	-	-	-
Stage 1	624	626	-	536	523	-	-	-	-	-	-	-
Stage 2	516	521	-	543	625	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	20.3	1.3	0.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1210	-	-	588	287	1208	-	-
HCM Lane V/C Ratio	0.056	-	-	0.172	0.18	0.004	-	-
HCM Control Delay (s)	8.2	-	-	12.4	20.3	8	0	-
HCM Lane LOS	A	-	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.6	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	194	1404	18	60	1245	57	116	208	95	30	137	102
Future Volume (vph)	194	1404	18	60	1245	57	116	208	95	30	137	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1775		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1775		1770	1863	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	198	1433	18	61	1270	58	118	212	97	31	140	104
RTOR Reduction (vph)	0	0	9	0	0	32	0	13	0	0	0	89
Lane Group Flow (vph)	198	1433	9	61	1270	26	118	296	0	31	140	15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	18.1	67.3	67.3	8.0	57.2	57.2	13.0	27.9		4.8	18.7	18.7
Effective Green, g (s)	18.1	67.3	67.3	8.0	57.2	57.2	13.0	27.9		4.8	18.7	18.7
Actuated g/C Ratio	0.14	0.52	0.52	0.06	0.44	0.44	0.10	0.21		0.04	0.14	0.14
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	246	2632	819	108	2237	696	177	380		65	267	227
v/s Ratio Prot	c0.11	c0.28		0.03	0.25		c0.07	c0.17		0.02	0.08	
v/s Ratio Perm			0.01			0.02						0.01
v/c Ratio	0.80	0.54	0.01	0.56	0.57	0.04	0.67	0.78		0.48	0.52	0.07
Uniform Delay, d1	54.2	21.1	15.2	59.3	27.2	20.7	56.4	48.2		61.4	51.5	48.1
Progression Factor	1.00	1.00	1.00	1.11	0.60	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.3	0.8	0.0	3.3	0.9	0.1	7.1	9.2		2.0	0.9	0.0
Delay (s)	70.5	21.9	15.2	69.0	17.3	20.8	63.6	57.4		63.4	52.4	48.1
Level of Service	E	C	B	E	B	C	E	E		E	D	D
Approach Delay (s)		27.6			19.7			59.1			52.0	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	1411	62	26	1225	196	73	120	51	278	75	64
Future Volume (vph)	56	1411	62	26	1225	196	73	120	51	278	75	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.97	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1784		1681	1720	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.97	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1784		1681	1720	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	1534	67	28	1332	213	79	130	55	302	82	70
RTOR Reduction (vph)	0	0	37	0	0	82	0	8	0	0	0	60
Lane Group Flow (vph)	61	1534	30	28	1332	131	0	256	0	190	194	10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	7.9	57.6	57.6	4.6	54.6	54.6		23.0		19.3	19.3	19.3
Effective Green, g (s)	7.9	57.6	57.6	4.6	54.6	54.6		23.0		19.3	19.3	19.3
Actuated g/C Ratio	0.06	0.44	0.44	0.04	0.42	0.42		0.18		0.15	0.15	0.15
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	107	2253	701	62	2135	664		315		249	255	235
v/s Ratio Prot	c0.03	c0.30		0.02	0.26			c0.14		c0.11	0.11	
v/s Ratio Perm			0.02			0.08						0.01
v/c Ratio	0.57	0.68	0.04	0.45	0.62	0.20		0.81		0.76	0.76	0.04
Uniform Delay, d1	59.4	28.9	20.5	61.5	29.6	23.8		51.4		53.2	53.1	47.4
Progression Factor	1.12	1.12	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	4.0	1.5	0.1	1.9	1.4	0.7		13.9		11.7	11.4	0.0
Delay (s)	70.7	33.8	20.6	63.4	31.0	24.5		65.4		64.7	64.3	47.5
Level of Service	E	C	C	E	C	C		E		E	E	D
Approach Delay (s)		34.7			30.7			65.4			61.9	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	68.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	183	64	70	125	564	41	1440	33	318	734	68
Future Volume (vph)	145	183	64	70	125	564	41	1440	33	318	734	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583		1830	1583	1770	3527		3433	3494	
Flt Permitted	0.39	1.00	1.00		0.82	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	723	1863	1583		1520	1583	1770	3527		3433	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	199	70	76	136	613	45	1565	36	346	798	74
RTOR Reduction (vph)	0	0	48	0	0	316	0	2	0	0	7	0
Lane Group Flow (vph)	158	199	22	0	212	297	45	1599	0	346	865	0
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	27.7	27.7	27.7		20.3	20.3	6.7	35.9		13.0	42.2	
Effective Green, g (s)	27.7	27.7	27.7		20.3	20.3	6.7	35.9		13.0	42.2	
Actuated g/C Ratio	0.31	0.31	0.31		0.23	0.23	0.07	0.40		0.14	0.47	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	274	573	487		342	357	131	1406		495	1638	
v/s Ratio Prot	c0.03	0.11					0.03	c0.45		c0.10	0.25	
v/s Ratio Perm	0.15		0.01		0.14	c0.19						
v/c Ratio	0.58	0.35	0.04		0.62	0.83	0.34	1.14		0.70	0.53	
Uniform Delay, d1	26.1	24.1	21.9		31.4	33.2	39.6	27.1		36.6	16.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.3	0.0		2.9	14.9	0.6	71.1		4.3	1.2	
Delay (s)	27.9	24.4	21.9		34.2	48.1	40.1	98.1		40.9	18.1	
Level of Service	C	C	C		C	D	D	F		D	B	
Approach Delay (s)		25.3			44.6			96.5			24.6	
Approach LOS		C			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	57.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	18.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	436	414	20	389	209
Future Vol, veh/h	10	436	414	20	389	209
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	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	474	450	22	423	227

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1534	461	0	0	472	0
Stage 1	461	-	-	-	-	-
Stage 2	1073	-	-	-	-	-
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	128	600	-	-	1090	-
Stage 1	635	-	-	-	-	-
Stage 2	328	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	78	600	-	-	1090	-
Mov Cap-2 Maneuver	78	-	-	-	-	-
Stage 1	635	-	-	-	-	-
Stage 2	201	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	51.9	0	6.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	522	1090	-
HCM Lane V/C Ratio	-	-	0.929	0.388	-
HCM Control Delay (s)	-	-	51.9	10.4	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	11.4	1.9	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	15	441	404	5
Future Vol, veh/h	5	10	15	441	404	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	11	17	501	459	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	997	462	465	0	-	0
Stage 1	462	-	-	-	-	-
Stage 2	535	-	-	-	-	-
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	271	600	1096	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	265	600	1096	-	-	-
Mov Cap-2 Maneuver	265	-	-	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.9	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1096	-	422	-	-
HCM Lane V/C Ratio	0.016	-	0.04	-	-
HCM Control Delay (s)	8.3	0	13.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	21	0	150	35	1	4	55	431	30	10	394	10
Future Vol, veh/h	21	0	150	35	1	4	55	431	30	10	394	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	158	37	1	4	58	454	32	11	415	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1029	1042	420	1105	1031	469	425	0	0	485	0	0
Stage 1	441	441	-	585	585	-	-	-	-	-	-	-
Stage 2	588	601	-	520	446	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	212	230	633	188	233	594	1134	-	-	1078	-	-
Stage 1	595	577	-	497	498	-	-	-	-	-	-	-
Stage 2	495	489	-	539	574	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	200	215	633	134	218	594	1134	-	-	1078	-	-
Mov Cap-2 Maneuver	200	215	-	134	218	-	-	-	-	-	-	-
Stage 1	565	569	-	472	473	-	-	-	-	-	-	-
Stage 2	465	464	-	399	567	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	39	0.9	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1134	-	-	500	147	1078	-	-
HCM Lane V/C Ratio	0.051	-	-	0.36	0.286	0.01	-	-
HCM Control Delay (s)	8.3	-	-	16.2	39	8.4	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.6	1.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	201	1951	66	60	1552	70	115	311	90	40	108	126
Future Volume (vph)	201	1951	66	60	1552	70	115	311	90	40	108	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1800		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1800		1770	1863	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	207	2011	68	62	1600	72	119	321	93	41	111	130
RTOR Reduction (vph)	0	0	36	0	0	43	0	8	0	0	0	118
Lane Group Flow (vph)	207	2011	32	62	1600	29	119	406	0	41	111	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	17.7	61.8	61.8	8.4	52.5	52.5	24.7	31.4		6.4	12.1	12.1
Effective Green, g (s)	17.7	61.8	61.8	8.4	52.5	52.5	24.7	31.4		6.4	12.1	12.1
Actuated g/C Ratio	0.14	0.48	0.48	0.06	0.40	0.40	0.19	0.24		0.05	0.09	0.09
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	240	2417	752	114	2053	639	336	434		87	173	147
v/s Ratio Prot	0.12	c0.40		0.04	c0.31		c0.07	c0.23		0.02	0.06	
v/s Ratio Perm			0.02			0.02						0.01
v/c Ratio	0.86	0.83	0.04	0.54	0.78	0.05	0.35	0.93		0.47	0.64	0.08
Uniform Delay, d1	55.0	29.6	18.3	58.9	33.7	23.5	45.7	48.3		60.2	56.9	53.9
Progression Factor	1.00	1.00	1.00	1.15	1.26	17.28	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.0	3.5	0.1	1.8	2.0	0.1	0.2	27.0		1.5	6.0	0.1
Delay (s)	80.0	33.1	18.4	69.8	44.3	406.7	46.0	75.3		61.6	62.8	54.0
Level of Service	F	C	B	E	D	F	D	E		E	E	D
Approach Delay (s)		36.9			60.2			68.8			58.6	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	50.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	1955	55	77	1419	271	88	174	77	268	136	175
Future Volume (vph)	71	1955	55	77	1419	271	88	174	77	268	136	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1782		1681	1740	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1782		1681	1740	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	75	2058	58	81	1494	285	93	183	81	282	143	184
RTOR Reduction (vph)	0	0	38	0	0	109	0	9	0	0	0	152
Lane Group Flow (vph)	75	2058	20	81	1494	176	0	348	0	209	216	32
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	8.2	44.9	44.9	9.7	46.7	46.7		28.8		21.1	21.1	21.1
Effective Green, g (s)	8.2	44.9	44.9	9.7	46.7	46.7		28.8		21.1	21.1	21.1
Actuated g/C Ratio	0.06	0.35	0.35	0.07	0.36	0.36		0.22		0.16	0.16	0.16
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	111	1756	546	132	1826	568		394		272	282	256
v/s Ratio Prot	0.04	c0.40		0.05	c0.29			c0.20		c0.12	0.12	
v/s Ratio Perm			0.01			0.11						0.02
v/c Ratio	0.68	1.17	0.04	0.61	0.82	0.31		0.88		0.77	0.77	0.13
Uniform Delay, d1	59.6	42.5	28.2	58.3	37.8	30.0		49.0		52.1	52.1	46.6
Progression Factor	0.50	0.39	1.00	1.00	1.00	1.00		1.00		0.99	0.99	0.94
Incremental Delay, d2	7.5	81.4	0.1	5.8	4.2	1.4		19.8		11.1	10.6	0.1
Delay (s)	37.3	98.2	28.3	64.2	42.0	31.4		68.8		62.7	62.2	43.9
Level of Service	D	F	C	E	D	C		E		E	E	D
Approach Delay (s)		94.3			41.4			68.8			56.8	
Approach LOS		F			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	68.3	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	155	25	48	183	318	43	385	47	851	1380	124
Future Volume (vph)	50	155	25	48	183	318	43	385	47	851	1380	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1826	1568	1752	3443		3400	3461	
Flt Permitted	0.29	1.00	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	527	1845	1568		1661	1568	1752	3443		3400	3461	
Peak-hour factor, PHF	0.89	0.90	0.89	0.92	0.90	0.82	0.90	0.92	0.84	0.84	0.92	0.91
Adj. Flow (vph)	56	172	28	52	203	388	48	418	56	1013	1500	136
RTOR Reduction (vph)	0	0	20	0	0	308	0	12	0	0	6	0
Lane Group Flow (vph)	56	172	8	0	255	80	48	462	0	1013	1630	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	24.7	24.7	24.7		18.6	18.6	3.2	19.2		32.7	48.7	
Effective Green, g (s)	24.7	24.7	24.7		18.6	18.6	3.2	19.2		32.7	48.7	
Actuated g/C Ratio	0.27	0.27	0.27		0.21	0.21	0.04	0.21		0.36	0.54	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	188	506	430		343	324	62	734		1235	1872	
v/s Ratio Prot	0.01	c0.09					c0.03	0.13		0.30	c0.47	
v/s Ratio Perm	0.07		0.00		c0.15	0.05						
v/c Ratio	0.30	0.34	0.02		0.74	0.25	0.77	0.63		0.82	0.87	
Uniform Delay, d1	25.2	26.1	23.8		33.5	29.8	43.0	32.2		26.0	17.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0		8.0	0.3	41.1	4.1		4.5	5.9	
Delay (s)	25.5	26.4	23.8		41.5	30.1	84.1	36.2		30.5	23.8	
Level of Service	C	C	C		D	C	F	D		C	C	
Approach Delay (s)		25.9			34.6			40.6			26.4	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2042.7

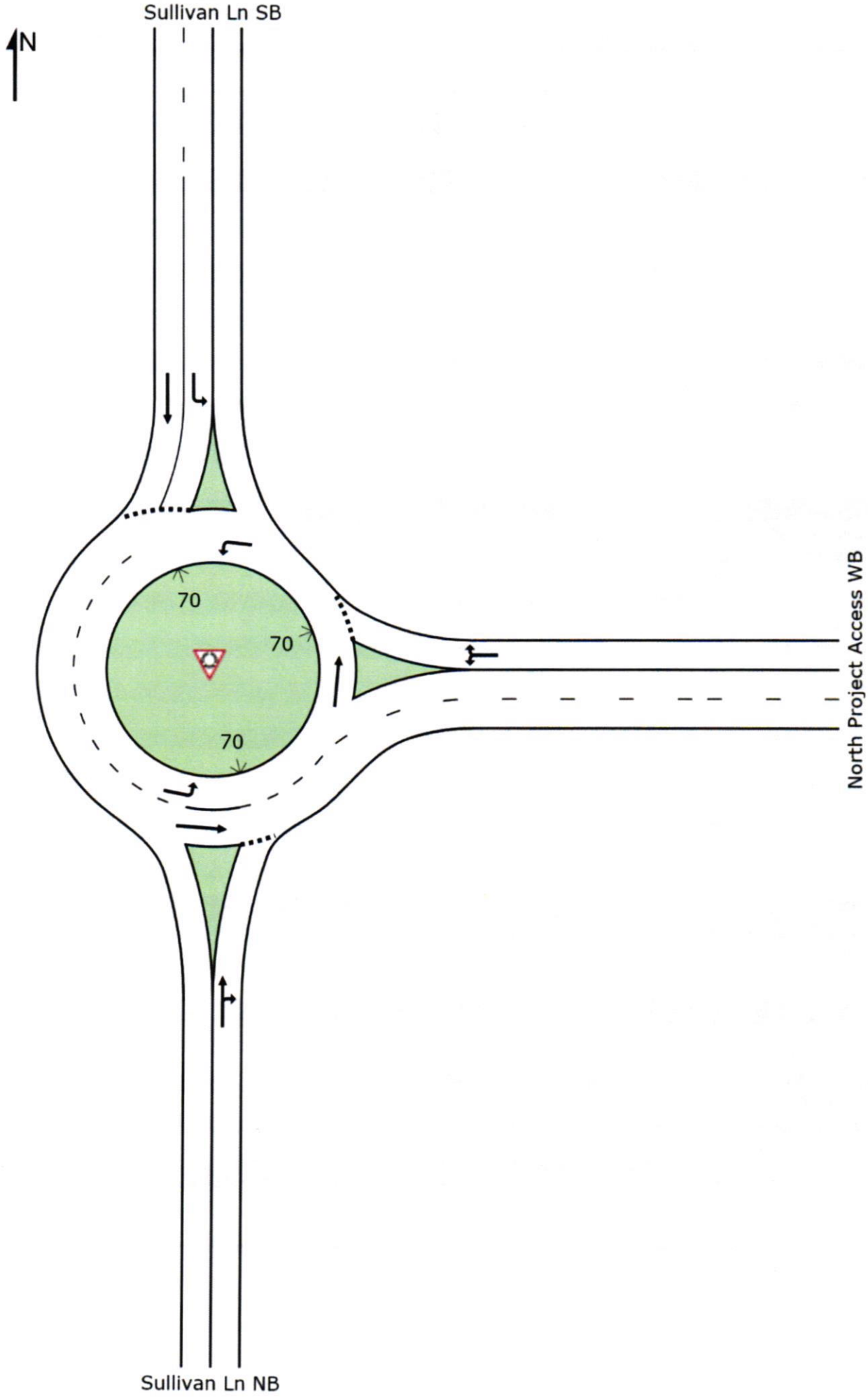
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	83	492	109	157	799	330
Future Vol, veh/h	83	492	109	157	799	330
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	77	85	91	77	83	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	579	120	204	963	359

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2506	222	0	0	324	0
Stage 1	222	-	-	-	-	-
Stage 2	2284	-	-	-	-	-
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	~ 31	818	-	-	1236	-
Stage 1	815	-	-	-	-	-
Stage 2	~ 82	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 7	818	-	-	1236	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	~ 18	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, $	6912.4	0	12.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	43	1236	-
HCM Lane V/C Ratio	-	-	15.968	0.779	-
HCM Control Delay (s)	-	-	$ 6912.4	17.3	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	83.5	8.5	-

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


Sullivan Ln SB
N
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

2040 Plus Project Conditions
AM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	467	2.0	0.703	17.8	LOS C	4.3	109.7	0.66	0.73	28.8
18	R2	100	2.0	0.703	17.8	LOS C	4.3	109.7	0.66	0.73	28.2
Approach		567	2.0	0.703	17.8	LOS C	4.3	109.7	0.66	0.73	28.7
East: North Project Access WB											
1	L2	48	2.0	0.388	10.4	LOS B	1.7	42.9	0.59	0.60	31.2
16	R2	219	2.0	0.388	10.4	LOS B	1.7	42.9	0.59	0.60	30.6
Approach		267	2.0	0.388	10.4	LOS B	1.7	42.9	0.59	0.60	30.7
North: Sullivan Ln SB											
7	L2	444	2.0	0.421	8.0	LOS A	2.3	58.0	0.22	0.10	30.8
4	T1	724	2.0	0.687	14.0	LOS B	6.3	160.1	0.37	0.17	30.2
Approach		1168	2.0	0.687	11.7	LOS B	6.3	160.1	0.31	0.14	30.5
All Vehicles		2002	2.0	0.703	13.3	LOS B	6.3	160.1	0.45	0.37	30.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

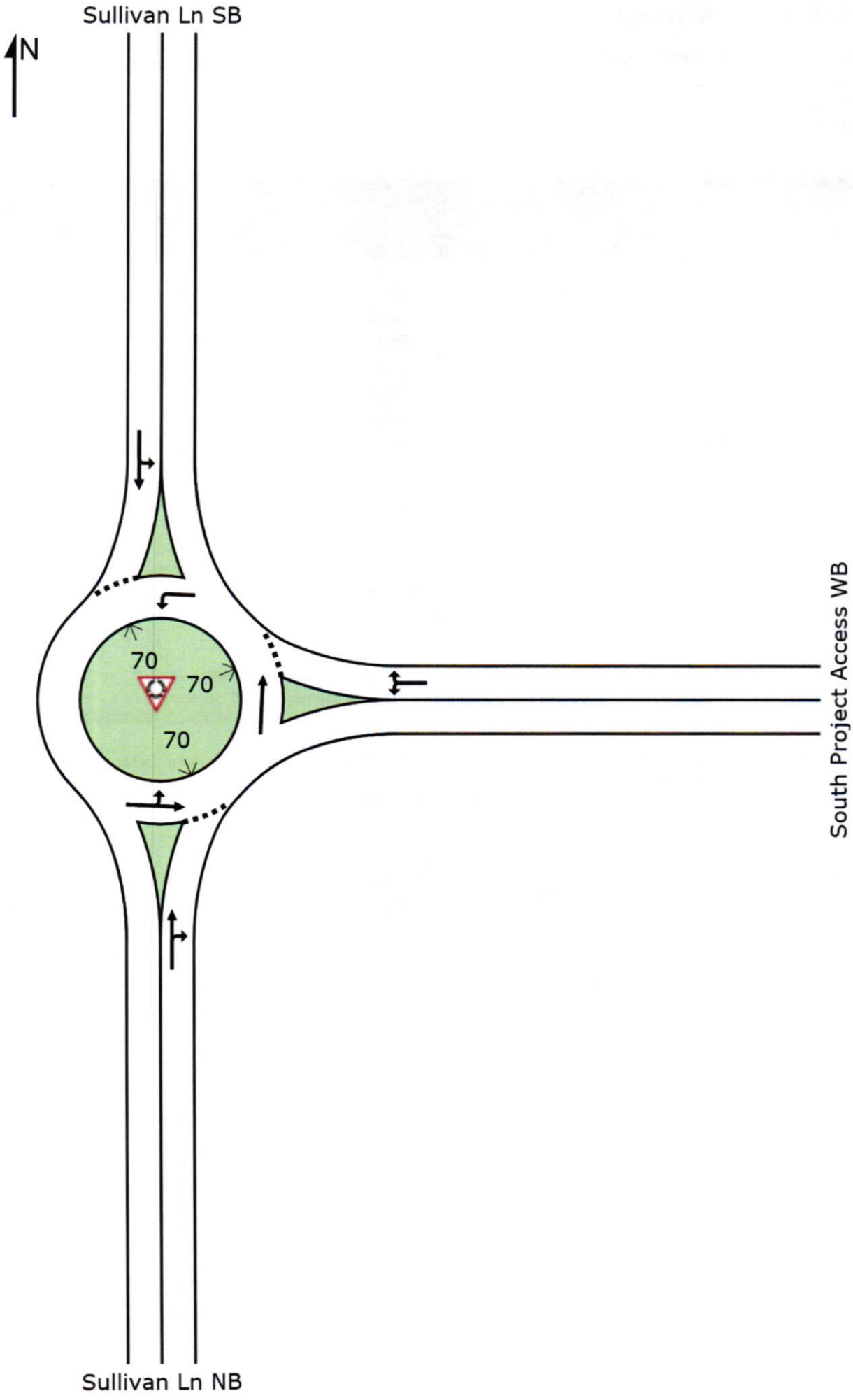
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	5	480	655	5
Future Vol, veh/h	5	8	5	480	655	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	82	83	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	9	6	585	789	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1389	792	795	0	-	0
Stage 1	792	-	-	-	-	-
Stage 2	597	-	-	-	-	-
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	157	389	826	-	-	-
Stage 1	446	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	155	389	826	-	-	-
Mov Cap-2 Maneuver	155	-	-	-	-	-
Stage 1	446	-	-	-	-	-
Stage 2	544	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	826	-	246	-	-
HCM Lane V/C Ratio	0.007	-	0.061	-	-
HCM Control Delay (s)	9.4	0	20.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

2040 Plus Project Conditions
AM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	448	2.0	0.746	19.1	LOS C	7.4	188.1	0.77	0.75	28.3
18	R2	195	2.0	0.746	19.1	LOS C	7.4	188.1	0.77	0.75	27.7
Approach		642	2.0	0.746	19.1	LOS C	7.4	188.1	0.77	0.75	28.1
East: South Project Access WB											
1	L2	96	2.0	0.308	8.9	LOS A	1.2	30.8	0.55	0.54	31.3
16	R2	120	2.0	0.308	8.9	LOS A	1.2	30.8	0.55	0.54	30.8
Approach		216	2.0	0.308	8.9	LOS A	1.2	30.8	0.55	0.54	31.0
North: Sullivan Ln SB											
7	L2	247	2.0	0.769	18.2	LOS C	8.0	202.3	0.62	0.38	28.0
4	T1	525	2.0	0.769	18.2	LOS C	8.0	202.3	0.62	0.38	28.1
Approach		772	2.0	0.769	18.2	LOS C	8.0	202.3	0.62	0.38	28.1
All Vehicles		1630	2.0	0.769	17.3	LOS C	8.0	202.3	0.67	0.55	28.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	10	0	35	4	0	1	77	531	29	6	518	27
Future Vol, veh/h	10	0	35	4	0	1	77	531	29	6	518	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	86	86	86	86	86	86	81	86	75	83	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	41	5	0	1	90	656	34	8	624	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1508	1524	640	1528	1523	672	656	0	0	689	0	0
Stage 1	656	656	-	851	851	-	-	-	-	-	-	-
Stage 2	852	868	-	677	672	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	99	118	475	96	118	456	931	-	-	905	-	-
Stage 1	454	462	-	355	376	-	-	-	-	-	-	-
Stage 2	354	370	-	443	454	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	90	105	475	80	105	456	931	-	-	905	-	-
Mov Cap-2 Maneuver	90	105	-	80	105	-	-	-	-	-	-	-
Stage 1	410	456	-	321	340	-	-	-	-	-	-	-
Stage 2	319	334	-	399	448	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.2	44.9	1.1	0.1
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	931	-	-	240	96	905	-	-
HCM Lane V/C Ratio	0.096	-	-	0.22	0.061	0.009	-	-
HCM Control Delay (s)	9.3	-	-	24.2	44.9	9	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.8	0.2	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	892	70	93	1926	29	72	146	109	30	290	197
Future Volume (vph)	168	892	70	93	1926	29	72	146	109	30	290	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1741		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1741		1770	1863	1583
Peak-hour factor, PHF	0.84	0.93	0.92	0.86	0.94	0.91	0.94	0.83	0.80	0.94	0.91	0.90
Adj. Flow (vph)	200	959	76	108	2049	32	77	176	136	32	319	219
RTOR Reduction (vph)	0	0	41	0	0	19	0	23	0	0	0	142
Lane Group Flow (vph)	200	959	35	108	2049	13	77	289	0	32	319	77
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	20.3	60.3	60.3	11.5	51.5	51.5	7.4	31.5		4.7	27.8	27.8
Effective Green, g (s)	20.3	60.3	60.3	11.5	51.5	51.5	7.4	31.5		4.7	27.8	27.8
Actuated g/C Ratio	0.16	0.46	0.46	0.09	0.40	0.40	0.06	0.24		0.04	0.21	0.21
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	276	2358	734	156	2014	627	100	421		63	398	338
v/s Ratio Prot	c0.11	0.19		0.06	c0.40		c0.04	0.17		0.02	c0.17	
v/s Ratio Perm			0.02			0.01						0.05
v/c Ratio	0.72	0.41	0.05	0.69	1.02	0.02	0.77	0.69		0.51	0.80	0.23
Uniform Delay, d1	52.2	23.0	19.1	57.5	39.2	23.9	60.5	44.8		61.5	48.5	42.2
Progression Factor	1.00	1.00	1.00	0.50	1.26	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.8	0.5	0.1	1.0	11.1	0.0	27.6	3.7		2.3	10.5	0.1
Delay (s)	59.9	23.6	19.2	29.6	60.6	23.9	88.1	48.5		63.8	58.9	42.3
Level of Service	E	C	B	C	E	C	F	D		E	E	D
Approach Delay (s)		29.2			58.5			56.3			52.8	
Approach LOS		C			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	49.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

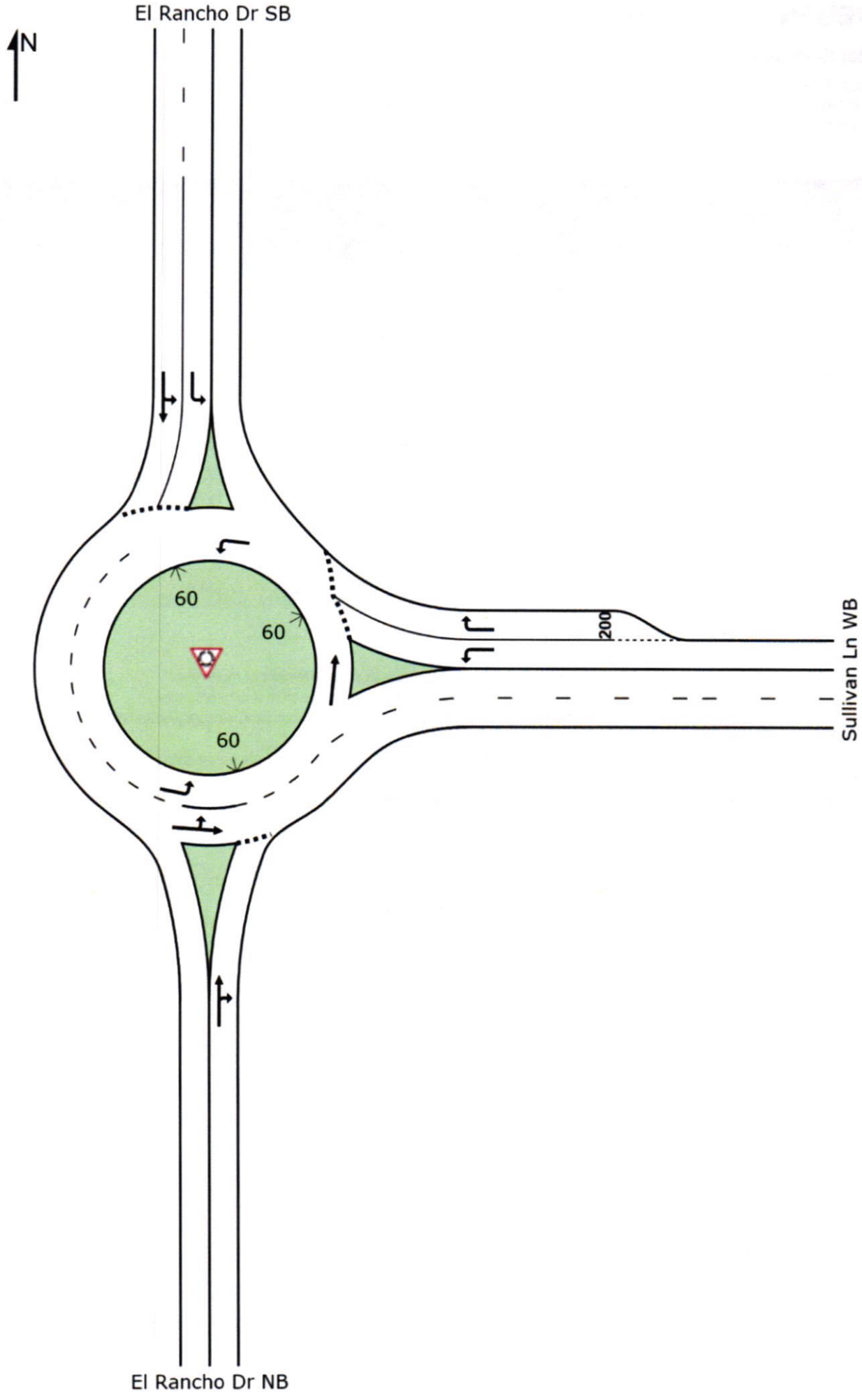
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	820	34	49	1912	295	58	165	34	351	128	78
Future Volume (vph)	177	820	34	49	1912	295	58	165	34	351	128	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1812		1681	1730	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1812		1681	1730	1583
Peak-hour factor, PHF	0.82	0.98	0.94	0.94	0.98	0.95	0.97	0.86	0.94	0.96	0.91	0.81
Adj. Flow (vph)	216	837	36	52	1951	311	60	192	36	366	141	96
RTOR Reduction (vph)	0	0	22	0	0	109	0	4	0	0	0	79
Lane Group Flow (vph)	216	837	14	52	1951	202	0	284	0	249	258	17
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.0	49.5	49.5	6.7	34.5	34.5		24.7		23.6	23.6	23.6
Effective Green, g (s)	22.0	49.5	49.5	6.7	34.5	34.5		24.7		23.6	23.6	23.6
Actuated g/C Ratio	0.17	0.38	0.38	0.05	0.27	0.27		0.19		0.18	0.18	0.18
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	299	1936	602	91	1349	420		344		305	314	287
v/s Ratio Prot	c0.12	0.16		0.03	c0.38			c0.16		0.15	c0.15	
v/s Ratio Perm			0.01			0.13						0.01
v/c Ratio	0.72	0.43	0.02	0.57	1.45	0.48		0.83		0.82	0.82	0.06
Uniform Delay, d1	51.1	29.8	25.1	60.2	47.8	40.2		50.6		51.1	51.2	44.0
Progression Factor	0.64	0.70	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	6.6	0.7	0.1	5.3	205.1	3.9		14.2		14.7	15.0	0.0
Delay (s)	39.4	21.4	25.2	65.5	252.8	44.1		64.7		65.8	66.2	44.1
Level of Service	D	C	C	E	F	D		E		E	E	D
Approach Delay (s)		25.1			220.5			64.7			62.5	
Approach LOS		C			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	138.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	155	25	48	183	318	43	385	47	851	1380	124
Future Volume (vph)	50	155	25	48	183	318	43	385	47	851	1380	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1826	1568	1752	3443		3400	3461	
Flt Permitted	0.28	1.00	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	523	1845	1568		1660	1568	1752	3443		3400	3461	
Peak-hour factor, PHF	0.89	0.90	0.89	0.92	0.90	0.82	0.90	0.92	0.84	0.84	0.92	0.91
Adj. Flow (vph)	56	172	28	52	203	388	48	418	56	1013	1500	136
RTOR Reduction (vph)	0	0	20	0	0	0	0	12	0	0	6	0
Lane Group Flow (vph)	56	172	8	0	255	388	48	462	0	1013	1630	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	24.6	24.6	24.6		18.5	90.0	3.2	19.1		32.9	48.8	
Effective Green, g (s)	24.6	24.6	24.6		18.5	90.0	3.2	19.1		32.9	48.8	
Actuated g/C Ratio	0.27	0.27	0.27		0.21	1.00	0.04	0.21		0.37	0.54	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	186	504	428		341	1568	62	730		1242	1876	
v/s Ratio Prot	0.01	0.09					0.03	c0.13		0.30	c0.47	
v/s Ratio Perm	0.07		0.00		c0.15	c0.25						
v/c Ratio	0.30	0.34	0.02		0.75	0.25	0.77	0.63		0.82	0.87	
Uniform Delay, d1	25.3	26.2	23.9		33.6	0.0	43.0	32.3		25.8	17.8	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0		8.2	0.4	41.1	4.2		4.2	5.8	
Delay (s)	25.6	26.5	23.9		41.8	0.4	84.1	36.4		30.1	23.6	
Level of Service	C	C	C		D	A	F	D		C	C	
Approach Delay (s)		26.0			16.8			40.8			26.1	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			


El Rancho Dr SB
N
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

2040 Plus Project Conditions - with Mitigation
AM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	120	2.0	0.581	17.9	LOS C	2.4	59.9	0.70	0.77	28.5
18	R2	204	2.0	0.581	17.9	LOS C	2.4	59.9	0.70	0.77	28.0
Approach		324	2.0	0.581	17.9	LOS C	2.4	59.9	0.70	0.77	28.2
East: Sullivan Ln WB											
1	L2	108	2.0	0.110	4.7	LOS A	0.4	10.1	0.25	0.14	32.0
16	R2	579	2.0	0.590	11.8	LOS B	4.0	100.8	0.46	0.30	30.0
Approach		687	2.0	0.590	10.7	LOS B	4.0	100.8	0.42	0.27	30.3
North: El Rancho Dr SB											
7	L2	963	2.0	0.666	13.9	LOS B	5.3	133.6	0.51	0.32	28.7
4	T1	359	2.0	0.666	13.9	LOS B	5.3	133.6	0.51	0.32	29.3
Approach		1321	2.0	0.666	13.9	LOS B	5.3	133.6	0.51	0.32	28.8
All Vehicles		2332	2.0	0.666	13.5	LOS B	5.3	133.6	0.51	0.37	29.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	177	820	34	49	1912	295	58	165	34	351	128	78
Future Volume (vph)	177	820	34	49	1912	295	58	165	34	351	128	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1819		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1819		3433	1863	1583
Peak-hour factor, PHF	0.82	0.98	0.94	0.94	0.98	0.95	0.97	0.86	0.94	0.96	0.91	0.81
Adj. Flow (vph)	216	837	36	52	1951	311	60	192	36	366	141	96
RTOR Reduction (vph)	0	0	19	0	0	106	0	5	0	0	0	72
Lane Group Flow (vph)	216	837	17	52	1951	205	60	223	0	366	141	24
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	22.4	72.3	72.3	7.2	57.4	57.4	8.0	22.8		22.2	37.0	37.0
Effective Green, g (s)	22.4	72.3	72.3	7.2	57.4	57.4	8.0	22.8		22.2	37.0	37.0
Actuated g/C Ratio	0.15	0.48	0.48	0.05	0.38	0.38	0.05	0.15		0.15	0.25	0.25
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	264	2450	763	84	1945	605	94	276		508	459	390
v/s Ratio Prot	c0.12	0.16		0.03	c0.38		0.03	c0.12		c0.11	0.08	
v/s Ratio Perm			0.01			0.13						0.01
v/c Ratio	0.82	0.34	0.02	0.62	1.00	0.34	0.64	0.81		0.72	0.31	0.06
Uniform Delay, d1	61.8	24.1	20.3	70.1	46.3	32.9	69.6	61.5		60.9	46.1	43.2
Progression Factor	0.55	0.10	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.5	0.3	0.1	9.2	21.1	1.5	10.0	14.9		4.2	0.1	0.0
Delay (s)	49.7	2.7	20.4	79.2	67.4	34.4	79.6	76.4		65.2	46.2	43.2
Level of Service	D	A	C	E	E	C	E	E		E	D	D
Approach Delay (s)		12.6			63.3			77.1			57.2	
Approach LOS		B			E			E			E	

Intersection Summary				
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	88.5%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	127	59	50	124	615	43	1161	38	372	818	50
Future Volume (vph)	86	127	59	50	124	615	43	1161	38	372	818	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1819	1568	1752	3488		3400	3474	
Flt Permitted	0.38	1.00	1.00		0.87	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	694	1845	1568		1607	1568	1752	3488		3400	3474	
Peak-hour factor, PHF	0.92	0.91	0.92	0.89	0.89	0.85	0.90	0.92	0.92	0.86	0.92	0.89
Adj. Flow (vph)	93	140	64	56	139	724	48	1262	41	433	889	56
RTOR Reduction (vph)	0	0	47	0	0	521	0	2	0	0	4	0
Lane Group Flow (vph)	93	140	17	0	195	203	48	1301	0	433	941	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	23.6	23.6	23.6		17.5	17.5	7.1	36.4		16.6	45.9	
Effective Green, g (s)	23.6	23.6	23.6		17.5	17.5	7.1	36.4		16.6	45.9	
Actuated g/C Ratio	0.26	0.26	0.26		0.19	0.19	0.08	0.40		0.18	0.51	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	219	483	411		312	304	138	1410		627	1771	
v/s Ratio Prot	c0.02	0.08					0.03	c0.37		c0.13	0.27	
v/s Ratio Perm	0.10		0.01		0.12	c0.13						
v/c Ratio	0.42	0.29	0.04		0.62	0.67	0.35	0.92		0.69	0.53	
Uniform Delay, d1	27.2	26.5	24.8		33.2	33.6	39.3	25.5		34.3	14.8	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.2	0.0		3.4	4.9	0.6	11.5		3.3	1.1	
Delay (s)	27.7	26.8	24.8		36.6	38.5	39.8	36.9		37.6	16.0	
Level of Service	C	C	C		D	D	D	D		D	B	
Approach Delay (s)		26.6			38.1			37.0			22.8	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	325.1

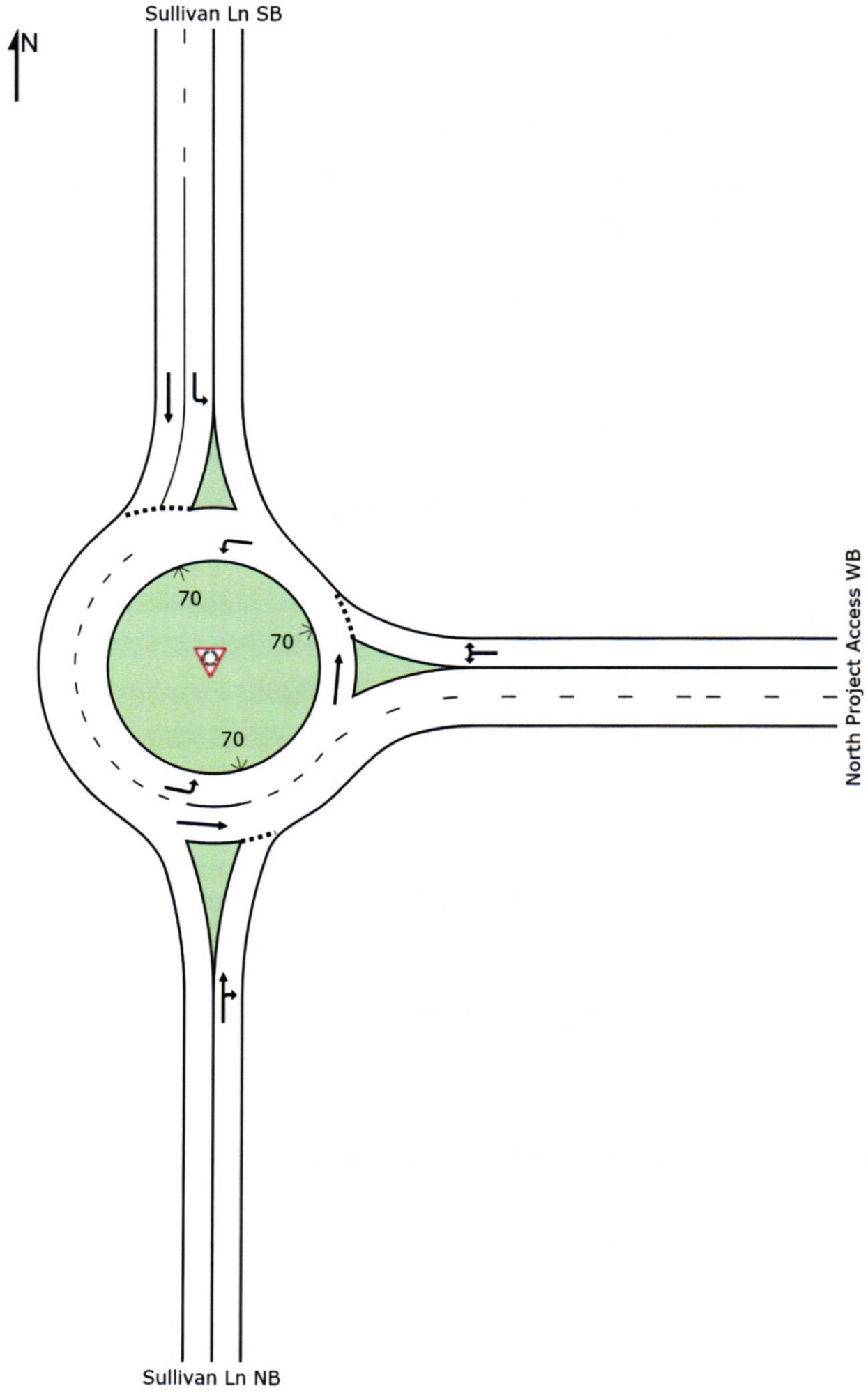
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	105	546	305	70	389	175
Future Vol, veh/h	105	546	305	70	389	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	84	92	80	87	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	140	650	332	88	447	192

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1462	375	0	0	419	0
Stage 1	375	-	-	-	-	-
Stage 2	1087	-	-	-	-	-
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	142	671	-	-	1140	-
Stage 1	695	-	-	-	-	-
Stage 2	323	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 86	671	-	-	1140	-
Mov Cap-2 Maneuver	~ 86	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	196	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 755	0	7.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	304	1140	-
HCM Lane V/C Ratio	-	-	2.599	0.392	-
HCM Control Delay (s)	-	-	$ 755	10.2	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	65.3	1.9	-

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


N
Sullivan Ln SB
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

2040 Plus Project Conditions
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	501	2.0	0.526	10.1	LOS B	2.3	58.8	0.32	0.22	31.9
18	R2	28	2.0	0.526	10.1	LOS B	2.3	58.8	0.32	0.22	31.3
Approach		529	2.0	0.526	10.1	LOS B	2.3	58.8	0.32	0.22	31.9
East: North Project Access WB											
1	L2	64	2.0	0.528	13.9	LOS B	2.9	72.4	0.67	0.73	29.7
16	R2	287	2.0	0.528	13.9	LOS B	2.9	72.4	0.67	0.73	29.2
Approach		351	2.0	0.528	13.9	LOS B	2.9	72.4	0.67	0.73	29.3
North: Sullivan Ln SB											
7	L2	136	2.0	0.132	4.7	LOS A	0.5	12.5	0.18	0.08	32.2
4	T1	402	2.0	0.388	7.6	LOS A	2.0	50.3	0.24	0.12	33.1
Approach		539	2.0	0.388	6.8	LOS A	2.0	50.3	0.23	0.11	32.9
All Vehicles		1418	2.0	0.528	9.8	LOS A	2.9	72.4	0.37	0.30	31.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

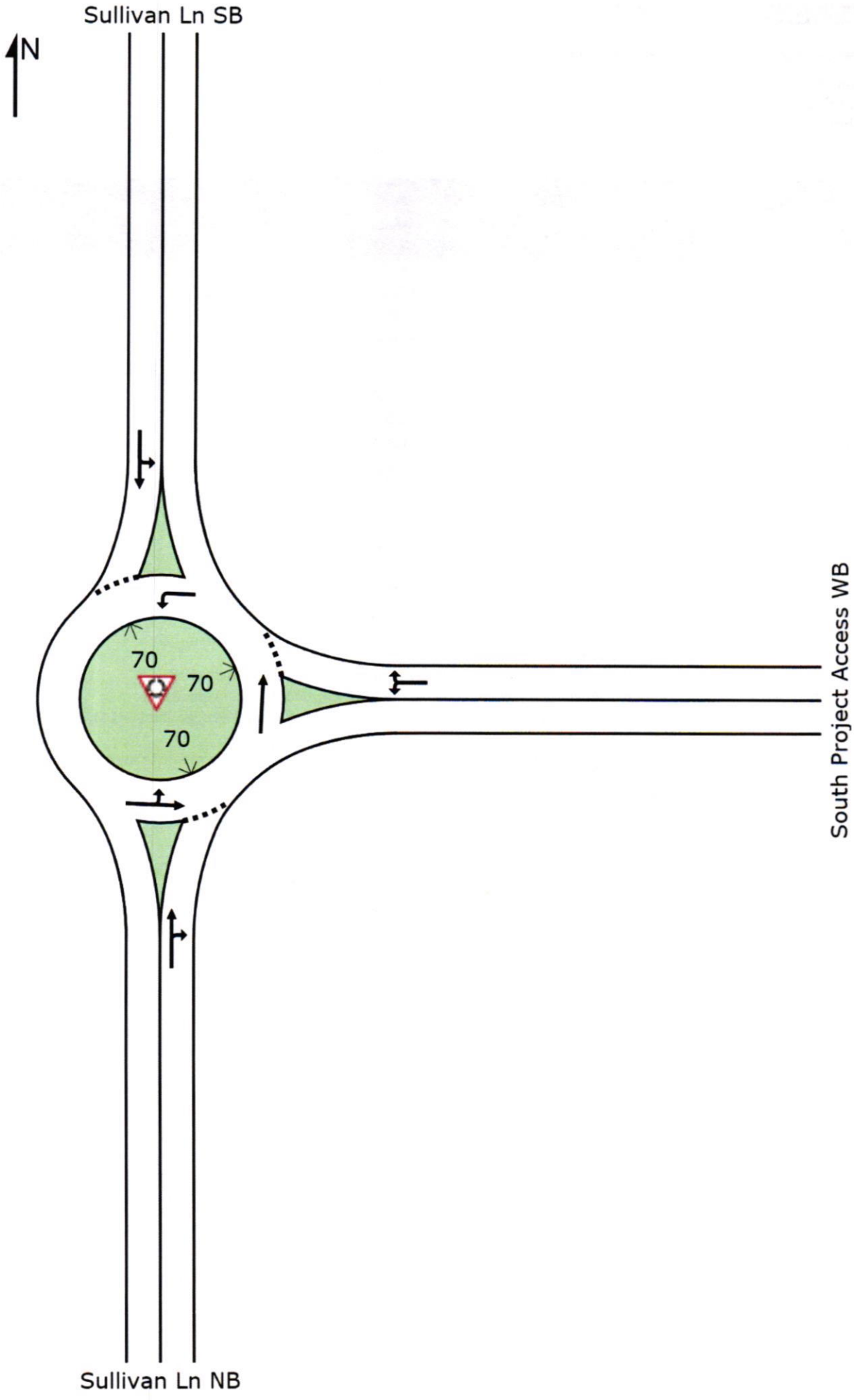
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	15	11	457	404	2
Future Vol, veh/h	1	15	11	457	404	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	81	81	50
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	18	13	564	499	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1091	501	503	0	-	0
Stage 1	501	-	-	-	-	-
Stage 2	590	-	-	-	-	-
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	238	570	1061	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	234	570	1061	-	-	-
Mov Cap-2 Maneuver	234	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	544	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1061	-	523	-	-
HCM Lane V/C Ratio	0.012	-	0.036	-	-
HCM Control Delay (s)	8.4	0	12.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

2040 Plus Project Conditions
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	384	2.0	0.432	8.3	LOS A	2.3	59.5	0.28	0.15	32.7
18	R2	60	2.0	0.432	8.3	LOS A	2.3	59.5	0.28	0.15	32.0
Approach		444	2.0	0.432	8.3	LOS A	2.3	59.5	0.28	0.15	32.6
East: South Project Access WB											
1	L2	128	2.0	0.386	9.7	LOS A	1.7	42.8	0.55	0.53	31.0
16	R2	161	2.0	0.386	9.7	LOS A	1.7	42.8	0.55	0.53	30.4
Approach		289	2.0	0.386	9.7	LOS A	1.7	42.8	0.55	0.53	30.7
North: Sullivan Ln SB											
7	L2	76	2.0	0.498	9.8	LOS A	2.8	72.4	0.41	0.27	31.6
4	T1	408	2.0	0.498	9.8	LOS A	2.8	72.4	0.41	0.27	31.7
Approach		484	2.0	0.498	9.8	LOS A	2.8	72.4	0.41	0.27	31.7
All Vehicles		1216	2.0	0.498	9.2	LOS A	2.8	72.4	0.40	0.29	31.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	10	0	80	30	1	15	60	369	10	4	450	4
Future Vol, veh/h	10	0	80	30	1	15	60	369	10	4	450	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	89	89	89	89	89	88	86	83	89	84	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	0	90	34	1	17	68	429	12	4	536	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1127	1124	538	1163	1120	435	540	0	0	441	0	0
Stage 1	547	547	-	571	571	-	-	-	-	-	-	-
Stage 2	580	577	-	592	549	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	182	205	543	172	206	621	1028	-	-	1119	-	-
Stage 1	521	517	-	506	505	-	-	-	-	-	-	-
Stage 2	500	502	-	493	516	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	167	190	543	136	191	621	1028	-	-	1119	-	-
Mov Cap-2 Maneuver	167	190	-	136	191	-	-	-	-	-	-	-
Stage 1	487	514	-	473	472	-	-	-	-	-	-	-
Stage 2	453	469	-	409	513	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16	32	1.2	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1028	-	-	429	184	1119	-	-
HCM Lane V/C Ratio	0.066	-	-	0.238	0.281	0.004	-	-
HCM Control Delay (s)	8.8	-	-	16	32	8.2	0	-
HCM Lane LOS	A	-	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	1.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	1415	18	108	1269	57	116	231	118	30	184	150
Future Volume (vph)	216	1415	18	108	1269	57	116	231	118	30	184	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1766		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1766		1770	1863	1583
Peak-hour factor, PHF	0.96	0.98	0.90	0.87	0.97	0.95	0.97	0.95	0.92	0.94	0.90	0.89
Adj. Flow (vph)	225	1444	20	124	1308	60	120	243	128	32	204	169
RTOR Reduction (vph)	0	0	11	0	0	39	0	15	0	0	0	138
Lane Group Flow (vph)	225	1444	9	124	1308	21	120	356	0	32	204	31
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	24.9	57.0	57.0	13.1	45.2	45.2	12.7	33.2		4.7	24.2	24.2
Effective Green, g (s)	24.9	57.0	57.0	13.1	45.2	45.2	12.7	33.2		4.7	24.2	24.2
Actuated g/C Ratio	0.19	0.44	0.44	0.10	0.35	0.35	0.10	0.26		0.04	0.19	0.19
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	339	2229	694	178	1768	550	172	451		63	346	294
v/s Ratio Prot	c0.13	c0.28		0.07	c0.26		c0.07	c0.20		0.02	0.11	
v/s Ratio Perm			0.01			0.01						0.02
v/c Ratio	0.66	0.65	0.01	0.70	0.74	0.04	0.70	0.79		0.51	0.59	0.11
Uniform Delay, d1	48.7	28.6	20.6	56.5	37.2	28.0	56.8	45.1		61.5	48.4	43.9
Progression Factor	1.00	1.00	1.00	0.44	1.17	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	1.5	0.0	6.3	1.9	0.1	9.5	8.3		2.3	1.7	0.1
Delay (s)	52.4	30.1	20.6	31.4	45.4	28.1	66.3	53.4		63.8	50.0	44.0
Level of Service	D	C	C	C	D	C	E	D		E	D	D
Approach Delay (s)		33.0			43.5			56.6			48.6	
Approach LOS		C			D			E			D	

Intersection Summary				
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0	
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

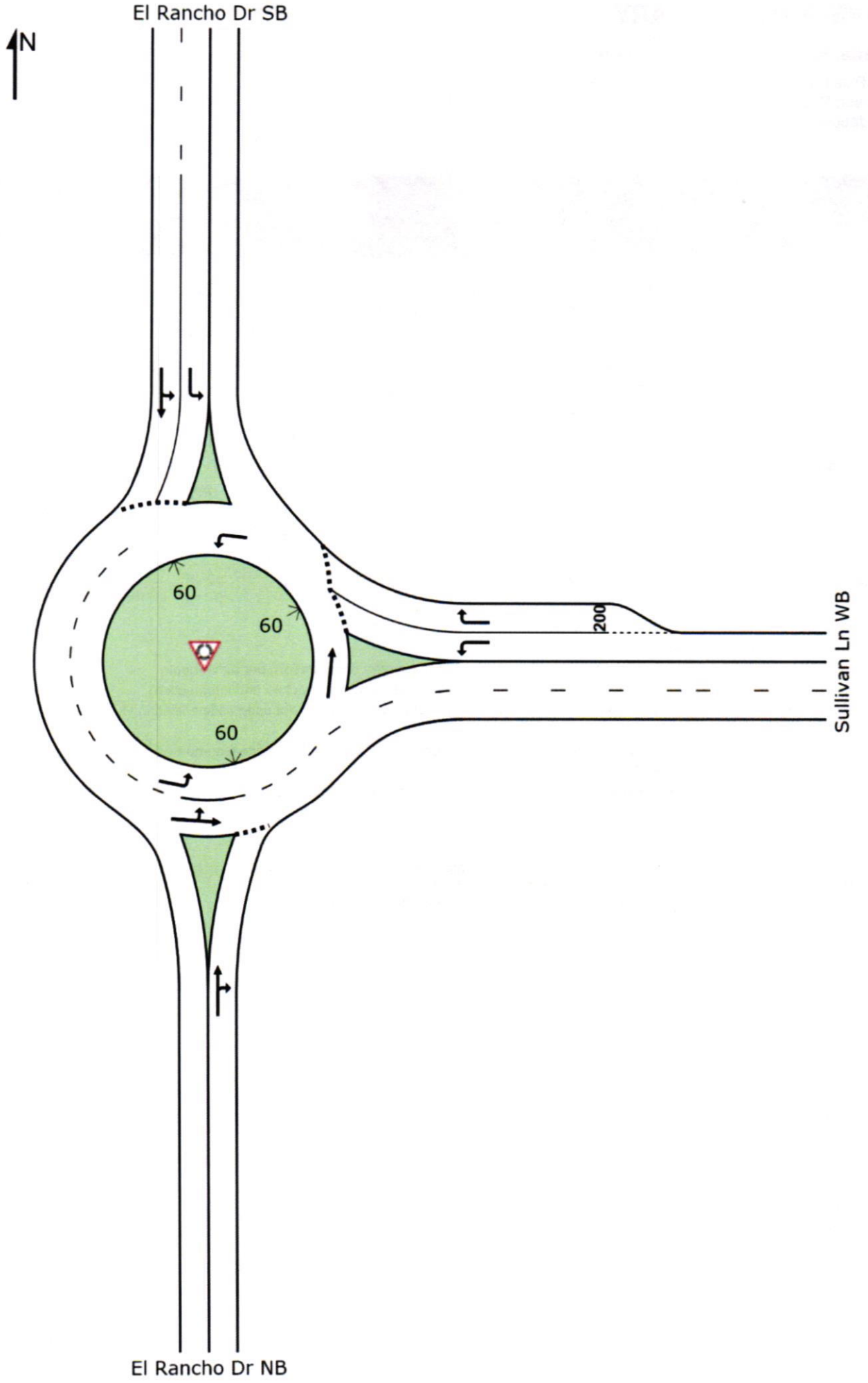
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1411	62	26	1225	207	73	142	51	302	122	136
Future Volume (vph)	90	1411	62	26	1225	207	73	142	51	302	122	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1791		1681	1734	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.98	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1791		1681	1734	1583
Peak-hour factor, PHF	0.87	0.92	0.91	0.92	0.92	0.91	0.91	0.89	0.91	0.90	0.85	0.83
Adj. Flow (vph)	103	1534	68	28	1332	227	80	160	56	336	144	164
RTOR Reduction (vph)	0	0	41	0	0	105	0	7	0	0	0	115
Lane Group Flow (vph)	103	1534	27	28	1332	122	0	289	0	235	245	49
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.7	51.8	51.8	4.6	44.0	44.0		25.2		22.9	22.9	22.9
Effective Green, g (s)	12.7	51.8	51.8	4.6	44.0	44.0		25.2		22.9	22.9	22.9
Actuated g/C Ratio	0.10	0.40	0.40	0.04	0.34	0.34		0.19		0.18	0.18	0.18
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	172	2026	630	62	1721	535		347		296	305	278
v/s Ratio Prot	c0.06	c0.30		0.02	0.26			c0.16		0.14	c0.14	
v/s Ratio Perm			0.02			0.08						0.03
v/c Ratio	0.60	0.76	0.04	0.45	0.77	0.23		0.83		0.79	0.80	0.18
Uniform Delay, d1	56.2	33.7	23.9	61.5	38.5	30.8		50.4		51.3	51.4	45.5
Progression Factor	0.79	0.74	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	3.0	2.2	0.1	1.9	3.5	1.0		14.9		12.8	13.4	0.1
Delay (s)	47.4	27.1	24.0	63.4	42.0	31.8		65.3		64.1	64.8	45.7
Level of Service	D	C	C	E	D	C		E		E	E	D
Approach Delay (s)		28.2			40.9			65.3			59.6	
Approach LOS		C			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	127	59	50	124	615	43	1161	38	372	818	50
Future Volume (vph)	86	127	59	50	124	615	43	1161	38	372	818	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1819	1568	1752	3488		3400	3474	
Flt Permitted	0.34	1.00	1.00		0.87	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	631	1845	1568		1599	1568	1752	3488		3400	3474	
Peak-hour factor, PHF	0.92	0.91	0.92	0.89	0.89	0.85	0.90	0.92	0.92	0.86	0.92	0.89
Adj. Flow (vph)	93	140	64	56	139	724	48	1262	41	433	889	56
RTOR Reduction (vph)	0	0	48	0	0	0	0	2	0	0	4	0
Lane Group Flow (vph)	93	140	16	0	195	724	48	1301	0	433	941	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	21.8	21.8	21.8		15.6	90.0	8.5	37.2		17.6	46.3	
Effective Green, g (s)	21.8	21.8	21.8		15.6	90.0	8.5	37.2		17.6	46.3	
Actuated g/C Ratio	0.24	0.24	0.24		0.17	1.00	0.09	0.41		0.20	0.51	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	193	446	379		277	1568	165	1441		664	1787	
v/s Ratio Prot	0.02	0.08					0.03	c0.37		c0.13	0.27	
v/s Ratio Perm	0.10		0.01		c0.12	c0.46						
v/c Ratio	0.48	0.31	0.04		0.70	0.46	0.29	0.90		0.65	0.53	
Uniform Delay, d1	28.7	28.0	26.1		35.0	0.0	37.9	24.7		33.4	14.6	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3	0.0		7.3	1.0	0.4	9.5		2.3	1.1	
Delay (s)	29.4	28.3	26.1		42.3	1.0	38.3	34.2		35.7	15.7	
Level of Service	C	C	C		D	A	D	C		D	B	
Approach Delay (s)		28.2			9.8			34.4			22.0	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			


El Rancho Dr SB
N
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

2040 Plus Project Conditions - with Mitigation
Afternoon Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	332	2.0	0.520	11.8	LOS B	2.2	56.6	0.52	0.55	30.9
18	R2	87	2.0	0.520	11.8	LOS B	2.2	56.6	0.52	0.55	30.3
Approach		419	2.0	0.520	11.8	LOS B	2.2	56.6	0.52	0.55	30.8
East: Sullivan Ln WB											
1	L2	140	2.0	0.177	6.4	LOS A	0.7	16.6	0.44	0.37	31.2
16	R2	650	2.0	0.823	26.0	LOS D	9.6	243.6	0.90	1.05	25.1
Approach		790	2.0	0.823	22.6	LOS C	9.6	243.6	0.82	0.93	26.1
North: El Rancho Dr SB											
7	L2	447	2.0	0.333	7.3	LOS A	1.5	38.6	0.34	0.22	31.3
4	T1	192	2.0	0.333	7.3	LOS A	1.5	38.6	0.34	0.22	32.1
Approach		639	2.0	0.333	7.3	LOS A	1.5	38.6	0.34	0.22	31.5
All Vehicles		1848	2.0	0.823	14.8	LOS B	9.6	243.6	0.59	0.60	28.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1411	62	26	1225	207	73	142	51	302	122	136
Future Volume (vph)	90	1411	62	26	1225	207	73	142	51	302	122	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1790		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1790		3433	1863	1583
Peak-hour factor, PHF	0.87	0.92	0.91	0.92	0.92	0.91	0.91	0.89	0.91	0.90	0.85	0.83
Adj. Flow (vph)	103	1534	68	28	1332	227	80	160	56	336	144	164
RTOR Reduction (vph)	0	0	35	0	0	118	0	12	0	0	0	140
Lane Group Flow (vph)	103	1534	33	28	1332	109	80	204	0	336	144	24
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.5	60.5	60.5	4.6	52.9	52.9	16.8	20.1		15.3	18.6	18.6
Effective Green, g (s)	12.5	60.5	60.5	4.6	52.9	52.9	16.8	20.1		15.3	18.6	18.6
Actuated g/C Ratio	0.10	0.48	0.48	0.04	0.42	0.42	0.13	0.16		0.12	0.15	0.15
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	175	2441	760	64	2134	664	236	285		416	275	233
v/s Ratio Prot	0.06	c0.30		0.02	c0.26		0.05	c0.11		c0.10	0.08	
v/s Ratio Perm			0.02			0.07						0.02
v/c Ratio	0.59	0.63	0.04	0.44	0.62	0.16	0.34	0.72		0.81	0.52	0.10
Uniform Delay, d1	54.3	24.4	17.4	59.4	28.7	22.8	49.6	50.2		53.9	49.6	46.5
Progression Factor	0.54	0.19	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	1.0	0.1	1.7	1.4	0.5	0.3	7.0		10.4	0.8	0.1
Delay (s)	31.7	5.5	17.5	61.2	30.1	23.3	49.9	57.2		64.3	50.4	46.6
Level of Service	C	A	B	E	C	C	D	E		E	D	D
Approach Delay (s)		7.6			29.7			55.2			56.7	
Approach LOS		A			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	71.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	187	64	73	130	634	41	1440	36	382	734	68
Future Volume (vph)	145	187	64	73	130	634	41	1440	36	382	734	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1812	1568	1752	3492		3400	3460	
Flt Permitted	0.42	1.00	1.00		0.81	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	774	1845	1568		1500	1568	1752	3492		3400	3460	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	203	70	79	141	689	45	1565	39	415	798	74
RTOR Reduction (vph)	0	0	47	0	0	192	0	1	0	0	6	0
Lane Group Flow (vph)	158	203	23	0	220	497	45	1603	0	415	866	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	46.6	46.6	46.6		39.0	39.0	19.4	62.5		17.5	60.6	
Effective Green, g (s)	46.6	46.6	46.6		39.0	39.0	19.4	62.5		17.5	60.6	
Actuated g/C Ratio	0.33	0.33	0.33		0.28	0.28	0.14	0.45		0.12	0.43	
Clearance Time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5	2.5	2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	290	614	521		417	436	242	1558		425	1497	
v/s Ratio Prot	c0.02	0.11					0.03	c0.46		c0.12	0.25	
v/s Ratio Perm	0.16		0.01		0.15	c0.32						
v/c Ratio	0.54	0.33	0.04		0.53	1.14	0.19	1.03		0.98	0.58	
Uniform Delay, d1	40.6	35.0	31.6		42.7	50.5	53.3	38.8		61.0	30.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.2	0.0		0.9	87.3	0.1	30.5		37.1	1.6	
Delay (s)	41.8	35.2	31.7		43.6	137.8	53.5	69.3		98.2	31.7	
Level of Service	D	D	C		D	F	D	E		F	C	
Approach Delay (s)		37.0			115.0			68.8			53.1	
Approach LOS		D			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	70.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	132.7

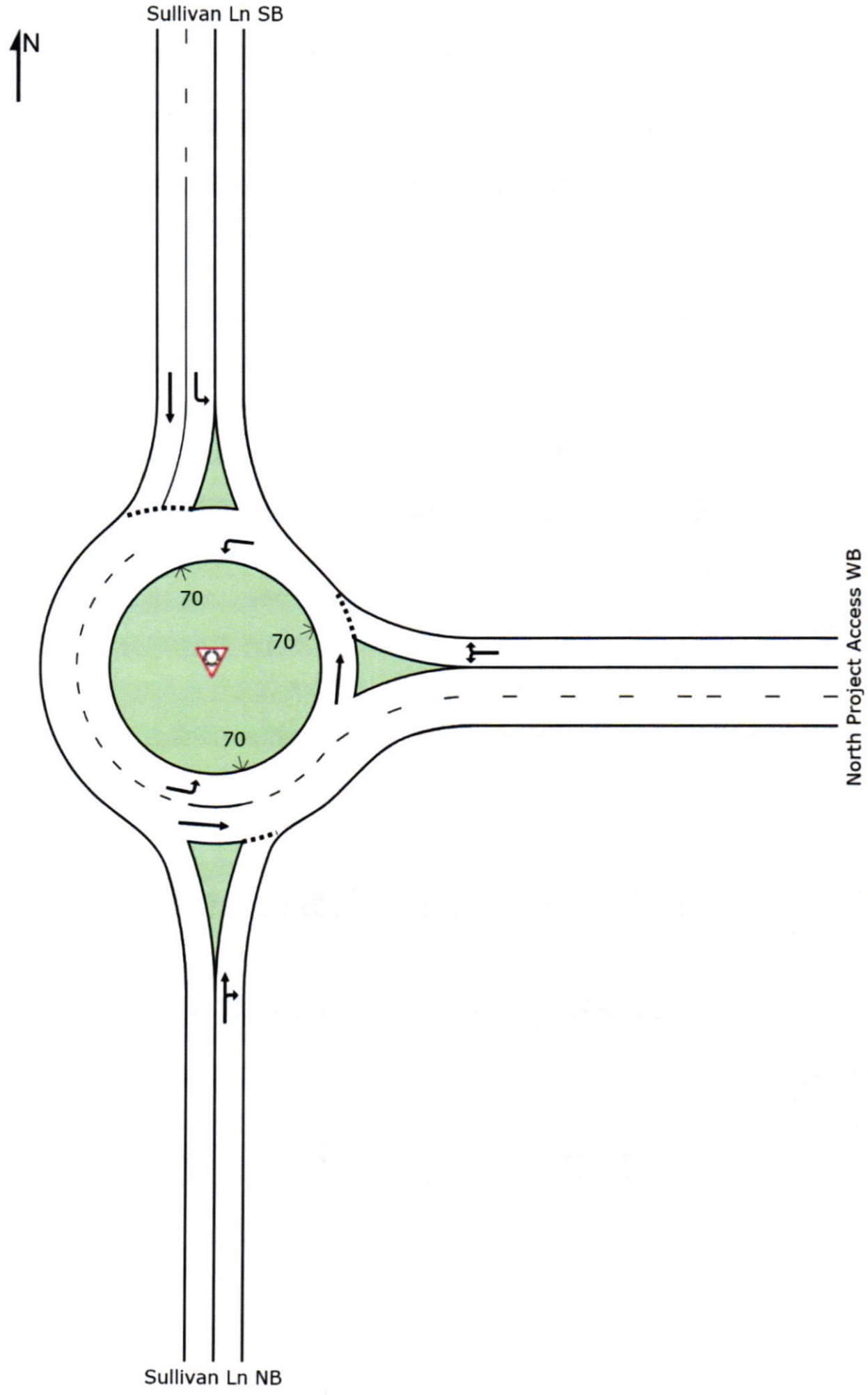
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	514	414	49	460	209
Future Vol, veh/h	41	514	414	49	460	209
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	559	450	53	500	227

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1704	477	0	0	503	0
Stage 1	477	-	-	-	-	-
Stage 2	1227	-	-	-	-	-
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	101	588	-	-	1061	-
Stage 1	624	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	53	588	-	-	1061	-
Mov Cap-2 Maneuver	53	-	-	-	-	-
Stage 1	624	-	-	-	-	-
Stage 2	146	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 394	0	7.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	337	1061	-
HCM Lane V/C Ratio	-	-	1.79	0.471	-
HCM Control Delay (s)	-	-	$ 394	11.4	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	39.1	2.6	-

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


N
Sullivan Ln SB
70
70
70
North Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/North Project Access

2040 Plus Project Conditions
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	527	2.0	0.515	9.5	LOS A	2.3	58.5	0.22	0.12	32.2
18	R2	15	2.0	0.515	9.5	LOS A	2.3	58.5	0.22	0.12	31.5
Approach		542	2.0	0.515	9.5	LOS A	2.3	58.5	0.22	0.12	32.1
East: North Project Access WB											
1	L2	16	2.0	0.143	7.2	LOS A	0.5	12.5	0.52	0.50	32.7
16	R2	76	2.0	0.143	7.2	LOS A	0.5	12.5	0.52	0.50	32.1
Approach		92	2.0	0.143	7.2	LOS A	0.5	12.5	0.52	0.50	32.2
North: Sullivan Ln SB											
7	L2	70	2.0	0.064	3.8	LOS A	0.2	5.7	0.07	0.02	32.6
4	T1	484	2.0	0.444	8.1	LOS A	2.6	65.1	0.12	0.04	32.8
Approach		553	2.0	0.444	7.6	LOS A	2.6	65.1	0.12	0.03	32.8
All Vehicles		1188	2.0	0.515	8.5	LOS A	2.6	65.1	0.20	0.11	32.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

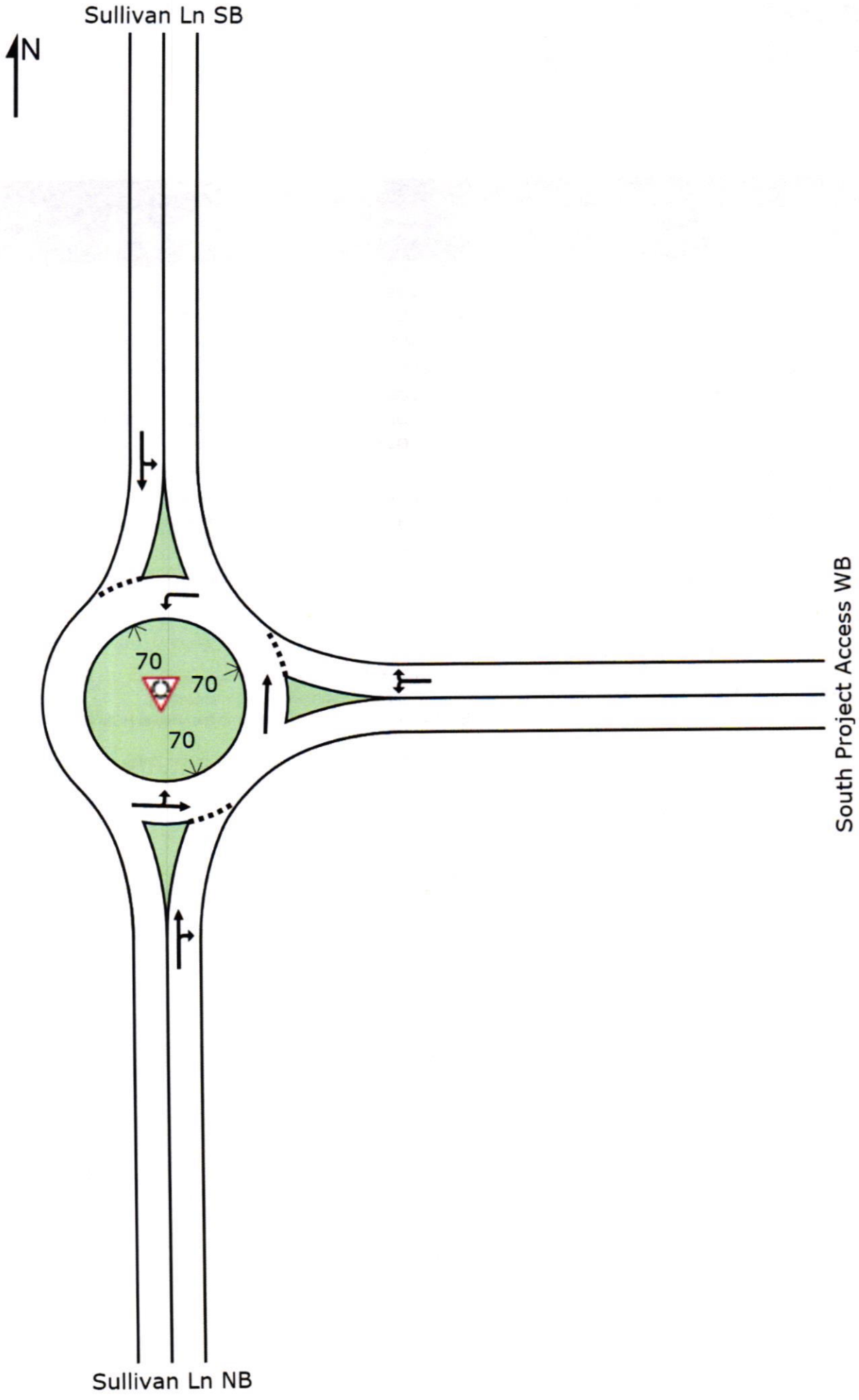
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	15	494	455	5
Future Vol, veh/h	5	10	15	494	455	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	11	17	561	517	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1115	520	523	0	-	0
Stage 1	520	-	-	-	-	-
Stage 2	595	-	-	-	-	-
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	230	556	1043	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	224	556	1043	-	-	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	538	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.1	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1043	-	372	-	-
HCM Lane V/C Ratio	0.016	-	0.046	-	-
HCM Control Delay (s)	8.5	0	15.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-


Sullivan Ln SB
N
70
70
70
South Project Access WB
Sullivan Ln NB

MOVEMENT SUMMARY

Site: Sullivan Ln/South Project Access

2040 Plus Project Conditions
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Sullivan Ln NB											
8	T1	511	2.0	0.510	9.4	LOS A	3.2	82.0	0.23	0.09	32.2
18	R2	32	2.0	0.510	9.4	LOS A	3.2	82.0	0.23	0.09	31.5
Approach		542	2.0	0.510	9.4	LOS A	3.2	82.0	0.23	0.09	32.2
East: South Project Access WB											
1	L2	34	2.0	0.116	6.8	LOS A	0.4	10.0	0.50	0.47	32.3
16	R2	42	2.0	0.116	6.8	LOS A	0.4	10.0	0.50	0.47	31.7
Approach		76	2.0	0.116	6.8	LOS A	0.4	10.0	0.50	0.47	32.0
North: Sullivan Ln SB											
7	L2	39	2.0	0.472	8.7	LOS A	2.8	71.5	0.19	0.08	32.3
4	T1	466	2.0	0.472	8.7	LOS A	2.8	71.5	0.19	0.08	32.4
Approach		505	2.0	0.472	8.7	LOS A	2.8	71.5	0.19	0.08	32.4
All Vehicles		1124	2.0	0.510	8.9	LOS A	3.2	82.0	0.23	0.11	32.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱			↕	
Traffic Vol, veh/h	21	0	150	35	1	4	55	474	30	10	440	10
Future Vol, veh/h	21	0	150	35	1	4	55	474	30	10	440	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	140	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	0	158	37	1	4	58	499	32	11	463	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1122	1135	468	1199	1126	515	474	0	0	531	0	0
Stage 1	489	489	-	631	631	-	-	-	-	-	-	-
Stage 2	633	646	-	568	495	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	183	202	595	162	205	560	1088	-	-	1036	-	-
Stage 1	561	549	-	469	474	-	-	-	-	-	-	-
Stage 2	468	467	-	508	546	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	172	189	595	113	191	560	1088	-	-	1036	-	-
Mov Cap-2 Maneuver	172	189	-	113	191	-	-	-	-	-	-	-
Stage 1	531	541	-	444	449	-	-	-	-	-	-	-
Stage 2	439	442	-	368	538	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	48.3	0.8	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1088	-	-	457	124	1036	-	-
HCM Lane V/C Ratio	0.053	-	-	0.394	0.34	0.01	-	-
HCM Control Delay (s)	8.5	-	-	17.9	48.3	8.5	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.9	1.4	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	1958	66	75	1559	70	115	326	104	40	123	142
Future Volume (vph)	215	1958	66	75	1559	70	115	326	104	40	123	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1795		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1795		1770	1863	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	222	2019	68	77	1607	72	119	336	107	41	127	146
RTOR Reduction (vph)	0	0	37	0	0	45	0	9	0	0	0	113
Lane Group Flow (vph)	222	2019	31	77	1607	27	119	434	0	41	127	33
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	18.5	60.1	60.1	7.8	49.4	49.4	9.7	33.9		6.2	29.4	29.4
Effective Green, g (s)	18.5	60.1	60.1	7.8	49.4	49.4	9.7	33.9		6.2	29.4	29.4
Actuated g/C Ratio	0.14	0.46	0.46	0.06	0.38	0.38	0.07	0.26		0.05	0.23	0.23
Clearance Time (s)	5.4	6.3	6.3	5.7	6.6	6.6	4.5	4.7		5.3	6.5	6.5
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	251	2350	731	106	1932	601	132	468		84	421	358
v/s Ratio Prot	c0.13	c0.40		0.04	0.32		c0.07	c0.24		0.02	0.07	
v/s Ratio Perm			0.02			0.02						0.02
v/c Ratio	0.88	0.86	0.04	0.73	0.83	0.05	0.90	0.93		0.49	0.30	0.09
Uniform Delay, d1	54.7	31.2	19.2	60.1	36.5	25.4	59.7	46.9		60.4	41.8	39.8
Progression Factor	1.00	1.00	1.00	0.43	1.28	26.13	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	28.0	4.4	0.1	10.0	2.2	0.1	48.7	24.2		1.6	0.1	0.0
Delay (s)	82.7	35.5	19.3	35.8	49.0	664.5	108.4	71.1		62.0	41.9	39.8
Level of Service	F	D	B	D	D	F	F	E		E	D	D
Approach Delay (s)		39.6			73.7			79.0			43.6	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	56.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

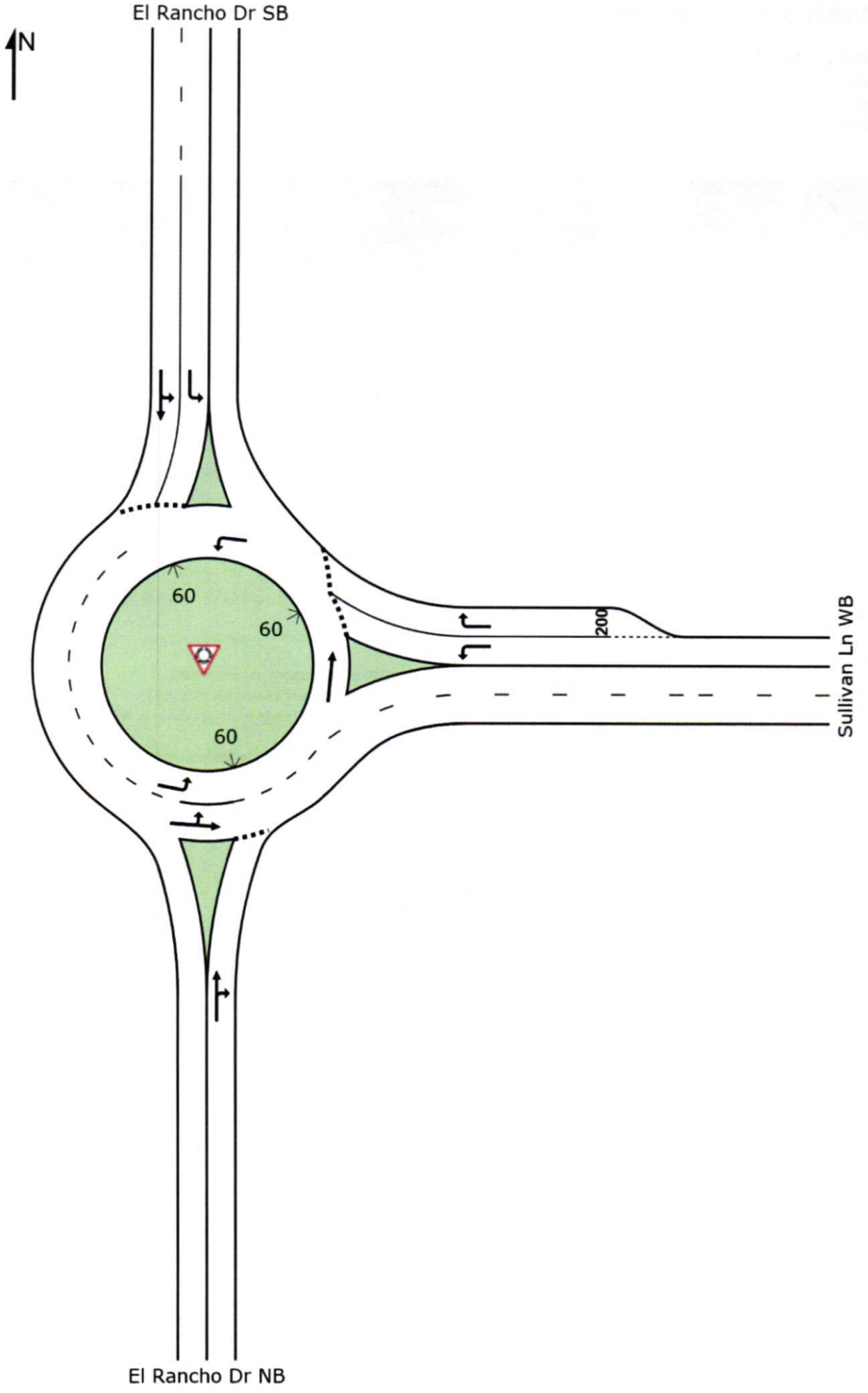
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	1955	55	77	1419	278	88	189	77	276	152	197
Future Volume (vph)	92	1955	55	77	1419	278	88	189	77	276	152	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00		1.00		0.95	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.99	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583		1786		1681	1743	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99		0.95	0.99	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583		1786		1681	1743	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	97	2058	58	81	1494	293	93	199	81	291	160	207
RTOR Reduction (vph)	0	0	39	0	0	123	0	8	0	0	0	135
Lane Group Flow (vph)	97	2058	19	81	1494	170	0	365	0	221	230	72
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.3	43.5	43.5	9.5	42.0	42.0		29.5		22.0	22.0	22.0
Effective Green, g (s)	11.3	43.5	43.5	9.5	42.0	42.0		29.5		22.0	22.0	22.0
Actuated g/C Ratio	0.09	0.33	0.33	0.07	0.32	0.32		0.23		0.17	0.17	0.17
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3		6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0		2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	153	1701	529	129	1642	511		405		284	294	267
v/s Ratio Prot	c0.05	c0.40		0.05	0.29			c0.20		0.13	c0.13	
v/s Ratio Perm			0.01			0.11						0.05
v/c Ratio	0.63	1.21	0.04	0.63	0.91	0.33		0.90		0.78	0.78	0.27
Uniform Delay, d1	57.4	43.2	29.1	58.5	42.2	33.4		48.8		51.7	51.7	47.0
Progression Factor	1.09	0.64	1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	3.6	97.8	0.1	6.7	9.0	1.7		22.3		11.6	11.8	0.2
Delay (s)	66.1	125.6	29.2	65.2	51.2	35.1		71.1		63.2	63.5	47.2
Level of Service	E	F	C	E	D	D		E		E	E	D
Approach Delay (s)		120.5			49.3			71.1			58.3	
Approach LOS		F			D			E			E	

Intersection Summary				
HCM 2000 Control Delay	82.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	0.99			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	94.4%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	187	64	73	130	634	41	1440	36	382	734	68
Future Volume (vph)	145	187	64	73	130	634	41	1440	36	382	734	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.6	4.6		4.0	4.0	3.5	5.3		3.5	5.3	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1845	1568		1812	1568	1752	3492		3400	3460	
Flt Permitted	0.30	1.00	1.00		0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	560	1845	1568		1483	1568	1752	3492		3400	3460	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	203	70	79	141	689	45	1565	39	415	798	74
RTOR Reduction (vph)	0	0	52	0	0	0	0	2	0	0	7	0
Lane Group Flow (vph)	158	203	18	0	220	689	45	1602	0	415	865	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Free	Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		Free						
Actuated Green, G (s)	27.9	27.9	27.9		20.5	110.0	15.0	51.2		17.5	53.7	
Effective Green, g (s)	27.9	27.9	27.9		20.5	110.0	15.0	51.2		17.5	53.7	
Actuated g/C Ratio	0.25	0.25	0.25		0.19	1.00	0.14	0.47		0.16	0.49	
Clearance Time (s)	3.5	4.6	4.6		4.0		3.5	5.3		3.5	5.3	
Vehicle Extension (s)	2.0	2.5	2.5		2.5		2.0	2.5		3.0	2.5	
Lane Grp Cap (vph)	190	467	397		276	1568	238	1625		540	1689	
v/s Ratio Prot	c0.03	0.11					0.03	c0.46		c0.12	0.25	
v/s Ratio Perm	c0.18		0.01		0.15	0.44						
v/c Ratio	0.83	0.43	0.04		0.80	0.44	0.19	0.99		0.77	0.51	
Uniform Delay, d1	39.4	34.4	31.0		42.8	0.0	42.1	29.0		44.3	19.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	24.5	0.5	0.0		14.3	0.9	0.1	19.3		6.5	1.1	
Delay (s)	64.0	34.9	31.0		57.0	0.9	42.2	48.3		50.8	20.3	
Level of Service	E	C	C		E	A	D	D		D	C	
Approach Delay (s)		44.9			14.5			48.1			30.2	
Approach LOS		D			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.3
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			


N
El Rancho Dr SB
60
60
60
200
Sullivan Ln WB
El Rancho Dr NB

MOVEMENT SUMMARY

Site: El Rancho Dr/Sullivan Ln

2040 Plus Project Conditions - with Mitigation
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: El Rancho Dr NB											
8	T1	450	2.0	0.649	16.1	LOS C	3.5	88.1	0.63	0.69	29.2
18	R2	53	2.0	0.649	16.1	LOS C	3.5	88.1	0.63	0.69	28.7
Approach		503	2.0	0.649	16.1	LOS C	3.5	88.1	0.63	0.69	29.1
East: Sullivan Ln WB											
1	L2	45	2.0	0.064	5.8	LOS A	0.2	5.4	0.46	0.39	31.5
16	R2	559	2.0	0.798	26.2	LOS D	7.7	195.7	0.88	1.05	25.1
Approach		603	2.0	0.798	24.7	LOS C	7.7	195.7	0.85	1.00	25.5
North: El Rancho Dr SB											
7	L2	500	2.0	0.343	6.9	LOS A	1.7	42.4	0.19	0.08	31.4
4	T1	227	2.0	0.343	6.9	LOS A	1.7	42.4	0.19	0.08	32.3
Approach		727	2.0	0.343	6.9	LOS A	1.7	42.4	0.19	0.08	31.7
All Vehicles		1834	2.0	0.798	15.3	LOS C	7.7	195.7	0.53	0.55	28.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	1955	55	77	1419	278	88	189	77	276	152	197
Future Volume (vph)	92	1955	55	77	1419	278	88	189	77	276	152	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5085	1583	1770	5085	1583	1770	1782		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5085	1583	1770	5085	1583	1770	1782		3433	1863	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	97	2058	58	81	1494	293	93	199	81	291	160	207
RTOR Reduction (vph)	0	0	33	0	0	94	0	11	0	0	0	176
Lane Group Flow (vph)	97	2058	25	81	1494	199	93	269	0	291	160	31
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.4	64.9	64.9	15.5	68.3	68.3	26.8	27.0		17.1	17.3	17.3
Effective Green, g (s)	12.4	64.9	64.9	15.5	68.3	68.3	26.8	27.0		17.1	17.3	17.3
Actuated g/C Ratio	0.08	0.43	0.43	0.10	0.46	0.46	0.18	0.18		0.11	0.12	0.12
Clearance Time (s)	6.7	6.3	6.3	6.0	5.3	5.3	6.6	6.6		6.6	6.6	6.6
Vehicle Extension (s)	2.0	6.0	6.0	2.0	6.0	6.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	146	2200	684	182	2315	720	316	320		391	214	182
v/s Ratio Prot	0.05	c0.40		0.05	c0.29		0.05	c0.15		c0.08	0.09	
v/s Ratio Perm			0.02			0.13						0.02
v/c Ratio	0.66	0.94	0.04	0.45	0.65	0.28	0.29	0.84		0.74	0.75	0.17
Uniform Delay, d1	66.8	40.6	24.5	63.2	31.5	25.4	53.4	59.4		64.3	64.2	59.9
Progression Factor	0.62	0.39	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.2	5.9	0.1	0.6	1.4	1.0	0.2	17.2		6.6	11.7	0.2
Delay (s)	46.3	21.5	24.6	63.8	32.9	26.4	53.6	76.6		70.9	76.0	60.0
Level of Service	D	C	C	E	C	C	D	E		E	E	E
Approach Delay (s)		22.7			33.2			70.9			68.7	
Approach LOS		C			C			E			E	

Intersection Summary				
HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.5	
Intersection Capacity Utilization	85.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group