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MEMORANDUM

DATE: October 3, 2017

TO: Rob Bartoli, County of San Mateo

FROM: Joshua Pilachowski, PE, DKS Associates

Kevin Carstens, EIT, DKS Associates

SUBJECT: Task 3: Intersection Control Evaluation Deliverable

This memorandum has been prepared by DKS Associates for the County of San Mateo to present the findings of our intersection control evaluation for Highway 1 and Cypress Avenue in Moss Beach. Conditions were assessed for the existing two-way stop control, signalization with the existing lane configuration, a single-lane roundabout, and a multi-lane roundabout for scenario years 2017 (existing), 2020, and 2040. After careful evaluation of safety, mobility measures, benefits and costs, and sensitivity to the local context, the recommended alternative is the multi-lane roundabout, which performs best in the majority of these criteria. The two-way stop control performs worst for the majority of these criteria. Between the signal and single-lane roundabout, the signal provides less delay and queueing, while the single-lane roundabout offers increased safety and local context sensitivity.

PROJECT OVERVIEW

Currently, the intersection of Highway 1 and Cypress Avenue in Moss Beach, California, is controlled by two-way stop control (TWSC), where Cypress Avenue is stop controlled and Highway 1 is uncontrolled. This intersection is in a rural community[1] of around 6,000 residents, isolated by mountains to the east and north, the Pacific Ocean to the west, and the Half Moon Bay Airport to the south. Figure 1 diagrams the study area.

Highway 1 is a major north-south highway along California's coast. Through the project area, the posted speed limit is 50-55 miles per hour (MPH) and the highway is two lanes, undivided. The west leg of Cypress Avenue connects several neighborhoods isolated by the Half Moon Bay airport, and the east leg provides a connection to a residential neighborhood. On Cypress Avenue, the posted speed is 25 MPH, there is on-street parking available, and there are no

[1] "Rural Community," as defined by the CaMUTCD, April 7, 2017, p. 830: "built-up area of an isolated community having a population of less than 10,000."

pavement markings. There is no nearby cycling or pedestrian infrastructure (sidewalks, crosswalks, bike lanes, etc.).

At present, Cypress Avenue suffers long delays and large queues, due to the free-flowing nature of Highway 1. It is difficult for drivers, especially left-turners, to enter Highway 1 as the high volumes on the highway prevent sufficient gaps for entry. As part of this project, a traffic signal warrant analysis was completed, and three of the nine warrants (specifically the volume-based warrants) from the California Manual on Uniform Traffic Control Devices (CaMUTCD) were met[2]. The signal warrant analysis is included in Appendix A.

Figure 1: Project Study Area

[2] *Task 2: Traffic Signal Warrant Analysis Deliverable*, DKS Associates, June 30, 2017

DATA OVERVIEW

Traffic Volume Data

Turning movement counts were collected on Tuesday, June 13th, 2017, during the 14 hour period from 6am to 8pm. Vehicle speeds and classifications on Highway 1 north of Cypress Avenue were gathered between June 9th and 18th, 2017. The AM peak hour was 7:15am-8:15am, with 3.9% heavy vehicles[3]. The PM peak hour was 4:30pm-5:30pm, with 1.5% heavy vehicles. There were no cyclists counted as pedestrians[4] during the peak hours, and one pedestrian during the PM peak hour. Bikes on the roadway were counted as cars.

On August 12th, 2017, additional traffic counts were gathered for the weekend midday peak, as required for impact analysis by the San Mateo Midcoast LCP. This peak was 11:30am-12:30pm, with 0.9% heavy vehicles. There was one cyclist counted as a pedestrian, and one actual pedestrian during this peak hour. Figure 2 shows the existing AM, weekend midday, and PM peak hour volumes by movement.

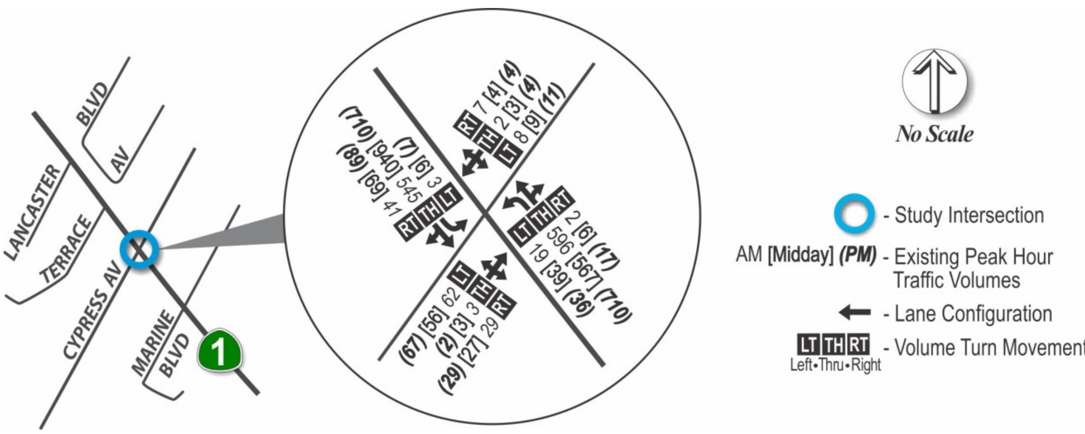

Figure 2: Existing Traffic Volumes at Highway 1 and Cypress Avenue

For future volumes, forecast methodology and project trips from the Big Wave Traffic Impact Analysis (TIA) report were used[5]. These forecast volumes account for estimated project trip generation from the nearby Big Wave development project, as well as the County of San Mateo's estimated 2% per year baseline growth rate. Figures 3 and 4 shows these future AM, midday, and PM peak hour volumes by movement for 2020 and 2040, respectively.

[3] Any vehicle with more than four tires or two axles, excluding six-wheeled pick-ups.
[4] For the purposes of this analysis, cyclists riding on the sidewalk were counted as pedestrians.
[5] *Big Wave North Parcel Alternative: Drafted Transportation Impact Analysis*, Hexagon Transportation Consultants, August 28, 2014.

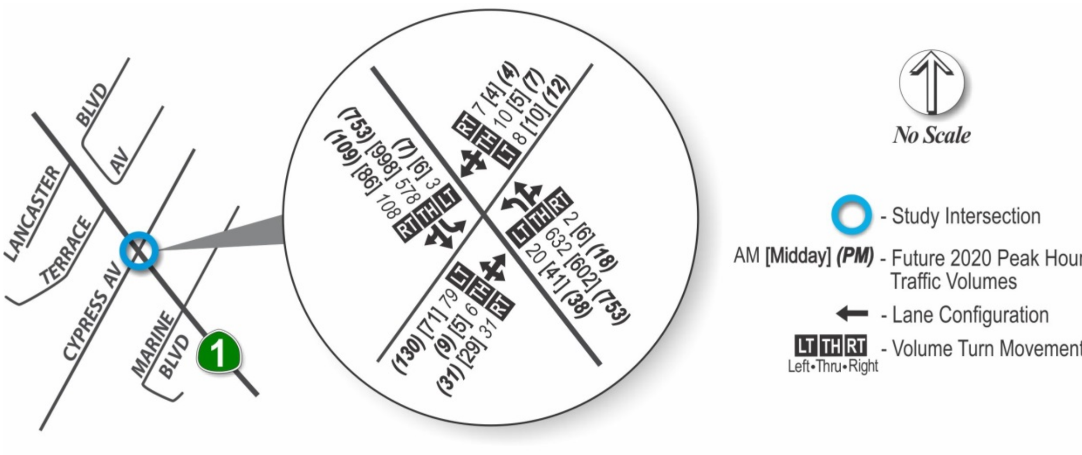

Figure 3: 2020 Traffic Volumes at Highway 1 and Cypress Avenue

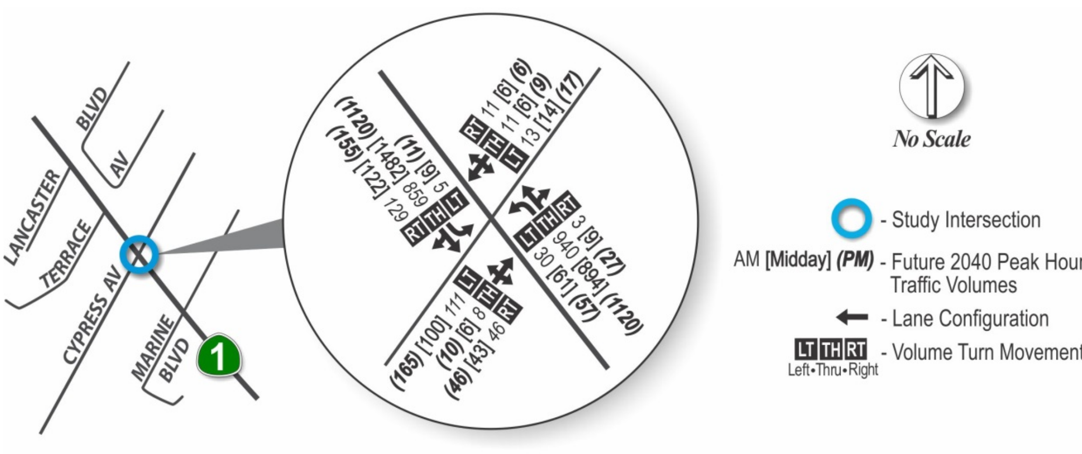

Figure 4: 2040 Traffic Volumes at Highway 1 and Cypress Avenue

Existing traffic volume data is included in Appendix B, and future project volume data from the Big Wave TIA is included in Appendix C.

Delay and Queue Length Data

A survey of delays and queue lengths for the existing PM peak hour (with two-way stop control) was conducted on August 15th, 2017, to validate model results. This survey found that the PM peak eastbound movements experienced an average delay of 36 seconds per vehicle and a 95% queue length of four vehicles, or about 100 feet. These values were used to ensure that the related simulation model was generating reasonable results.

Crash Data

For crash history, data was obtained on June 15th, 2017, for all crashes in San Mateo County and the City of Half Moon Bay starting January 1st, 2011, from the Statewide Integrated Traffic

Records System (SWITRS). Data was obtained for both San Mateo County and the City of Half Moon Bay because sometimes the reporting officer tags the crash to the nearest city rather than placing it in the county. The crashes were then isolated to those happening at the intersection of Cypress Avenue and Highway 1, for which there were 11 crashes reported during the study period, January 2011 to June 2017. Of these, eight involved only property damage, and one each resulted in minor, serious, and severe injury. No crashes resulted in a fatality. Collision data is provided in Appendix D.

Intersection Control Evaluation

As a fundamental part of this project moving forward, an intersection control evaluation (ICE) was completed to determine the best alternative. This process brought together a variety of criteria for consideration, including overall safety, pedestrian and bike safety, mobility standards (delay, volume to capacity ratio, queuing, level of service, and failure year), benefit/cost, and sensitivity to local context (would it “fit visually into the coastal landscape and reflect community values”).

Alternatives

For this intersection, there are four alternatives considered: TWSC, signalization, single-lane roundabout, and multi-lane roundabout.

Two-Way Stop Control

This alternative, where Cypress Avenue is stop controlled and Highway 1 is uncontrolled, reflects existing conditions, and represents the “no build” alternative. The advantage to this alternative is that it minimizes delay for Highway 1 by maintaining flow on the highway. The disadvantage is that there is already significant queuing and delays on Cypress Avenue, which will only get worse in the future. The amount of time until an acceptable gap in traffic on Highway 1 to allow for a safe left-turning movement is already considered deficient and will continue to increase.

Signalization

This alternative adds traffic signals to all approaches as well as pedestrian signal heads, crosswalks, curb ramps, and other improvements. The advantage of signalization is that it provides Cypress Avenue traffic an opportunity to safely enter the intersection, especially pedestrians or cyclists who wish to cross Highway 1. The disadvantage is an increase in delay on Highway 1, a potential increase rear-end collisions on Highway 1, and the cost of implementation and maintenance.

Single-Lane Roundabout

As part of Caltrans’s requirements for an intersection control evaluation, a roundabout alternative needs to be considered. Advantages of a roundabout include increased safety, lowered speeds, and that it provides equal priority to all approaches, which vastly improves operations on Cypress Avenue. However, this impacts operations on Highway 1, especially with high left-turn volumes from Cypress, since left turns require vehicles to travel most of the length of the roadway affecting two of the other three approaches. In terms of cost, roundabouts can be more expensive to build, as they require far more additional hardscape (roadway surface, curbs, sidewalks, etc.) than signals, which can often use existing hardscape. However, a roundabout's lack of electronics and need for signal timing means reduced maintenance costs as compared to signalization. A schematic layout of a single-lane roundabout is included in Appendix E.

Multi-Lane Roundabout

Since this intersection has very imbalanced traffic (much higher volumes on Highway 1 than Cypress Avenue), a second roundabout alternative was considered. A multi-lane roundabout alternative widens Highway 1 to two lanes per direction just before the intersection, through the roundabout, and tapers back to one lane just after the intersection. This gives Highway 1 additional capacity by allowing two vehicles through at a time. Figure 5 shows an example of a similar facility, also on Highway 1, near Fort Bragg, CA. Appendix F shows a more schematic view of a partial multi-lane roundabout.

Figure 5: Multi-Lane Roundabout at Highway 1 and Simpson Lane, Fort Bragg, CA

Safety

The alternatives vary in terms of safety. The existing control (TWSC) does well with avoiding rear-end collisions since Highway 1 is free-flowing and traffic on Cypress Avenue is slow-moving. This intersection experiences 0.22 crashes per million entering vehicles, slightly below the statewide average of 0.23 crashes per million entering vehicles at similar intersections[6]. However, of the 11 crashes at this location during the study period, eight were due to a right-of-way violation, and seven of those were broadside (right-angle), possibly from impatient drivers on Cypress Avenue taking too small of gaps in joining Highway 1 traffic. Signalization would reduce this temptation by providing drivers on Cypress Avenue sufficient green time to enter Highway 1. Additionally, signalization would provide a protected movement for pedestrians or cyclists crossing Highway 1. However, with signals, there is still the chance for broadside and head-on collisions, the most severe kind. As well, there could be an increase in rear-end collisions, as drivers on Highway 1 might not expect traffic stopped for a red light on an otherwise 5.5 mile stretch of uncontrolled high-speed roadway.

With roundabouts, broadside and head-on collisions are almost entirely eliminated in place of sideswipe collisions, which are far less severe. Properly designed, a roundabout will naturally slow traffic on Highway 1 and prepare drivers to stop if needed. Additionally, with a roundabout, a pedestrian only has to cross one direction of traffic at a time, taking refuge on a median between directions. This allows the pedestrian to focus on only one or two lanes of traffic coming from the same direction, rather than keeping an eye out for cars coming from all directions. The one safety downside of a roundabout involves unpredictable use by drivers unfamiliar with how to use the roundabout. Possible unsafe scenarios include failing to yield to vehicles already in the roundabout, coming to a stop when no vehicles are present in the roundabout, and driving the wrong way around a roundabout. Proper design, signage, and public outreach can mitigate this risk.

Safety benefits are greater for single-lane roundabouts than for multi-lane roundabouts because of fewer potential conflicts between road users, and because pedestrian crossing distances are shorter[7]. In addition, some types of conflict present in multi-lane roundabouts, such as drivers using the incorrect lane or making an improper turn, do not exist in single lane roundabouts. It has been shown that converting an intersection into a single-lane roundabout reduces the total amount of crashes by 36%, while converting an intersection into a multi-lane roundabout increases the total amount of crashes by 6%[8]. Multi-lane roundabouts accommodate higher average daily traffic (ADT) than single-lane roundabouts, and the *Roundabouts in the United States* report developed by the National Cooperative Highway Research Program advises that safety benefits appear to decrease with increasing ADT[9].

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[6] *2013 Collision Data on California State Highways*, Caltrans, 2016, p. 86
[7] *Roundabouts: An Informational Guide*, FHWA, June 2000, p. 103
[8] *Evaluation of Roundabout Safety*, Qin et al., 2013, p. 13, Table 6
[9] *Roundabouts in the United States*, NCHRP, 2007, p. 32

Mobility Standards

For assessing the TWSC and signal alternatives, Synchro and SimTraffic were used[10]. For the roundabout alternatives, SIDRA was used.[11] A full complement of output reports is included in Appendices G.1 through G.9.

Vehicle Delay

One mobility standard used for evaluating intersection alternatives is average vehicle delay. This measures how long the average vehicle waits at the intersection, in seconds. Appendix G.10 includes a full roster of the various alternatives and how they perform for existing, 2020, and 2040 conditions during the AM, midday and PM peak hours.

All intersections overall experience less than 10 seconds of delay for existing conditions, but the Cypress Avenue approaches have worse delays, including 61 seconds per eastbound vehicle during the midday peak for TWSC.

Looking to the future, these delays only increase. The TWSC alternative for the PM peak increases from an existing average delay across all approaches of four seconds, to 28 seconds in 2020 and 163 seconds in 2040. The average delay for Cypress Avenue approaches perform much worse. The signal fares better, with its worst result being 64 seconds for the 2040 PM peak. The single-lane roundabout performs acceptably with existing and 2020 conditions. However, it deteriorates to 98 seconds of delay per vehicle by the 2040 midday peak, mostly due to a 160 second delay to the average southbound vehicle. Using the delay metric, the multi-lane roundabout easily performs best, keeping overall delays to 6-7 seconds for all scenarios.

Volume-to-Capacity Ratio

The volume-to-capacity (V/C) ratio is a measure of how much of a roadway's capacity is being used, simply calculated as volume divided by capacity. A volume to capacity ratio of 1.000 represents a road exactly at capacity. As the value increases, more of the roadway's capacity is being used, resulting in slower speeds and increased crowding. Even as the V/C ratio reaches 0.800 or 0.900, conditions begin to deteriorate as minor variations in traffic are exacerbated by the high volumes of cars. Appendix G.11 details the V/C ratio by alternative.

One thing to note is that the single-lane roundabout was the only alternative with a V/C ratio over 0.800 for existing conditions (and worse for future conditions), and the multi-lane roundabout was the only alternative with a V/C ratio under 0.800 for 2040 conditions (and all earlier conditions). In most cases, the single-lane roundabout had the highest intersection V/C ratio, followed by the signal, then multi-lane roundabout with the lowest. There is no intersection V/C ratio available for the TWSC alternative, since theoretically there is no intersection capacity

[10] Synchro is an industry standard analysis tool used for the study of signalized and unsignalized by Caltrans. SimTraffic is an add-on to Synchro that better simulates microscopic conditions.
[11] SIDRA is one of the preferred analysis tools for studying roundabouts accepted by Caltrans.

limit for the uncontrolled Highway 1 through movements. Instead, Highway 1 through movement capacity is limited by other factors, such as roadway segment geometry or other intersections.

Vehicle Queuing

The queueing metric measures how far, in feet, the 95th percentile queue of vehicles waiting to enter the intersection extends. Higher numbers lead to unsafe conditions, as motorists might not be expecting stopped traffic that results from a long queue. As well, long queues result in extensive idling, increasing greenhouse gas emissions, and noise pollution from stopped vehicles. Lastly, queuing can result in gridlock, as the queue of traffic stopped at one intersection spills back into an upstream intersection, affecting its operations. Appendix G.12 lists the vehicle queue per alternative. One thing to note is that the approach queues generated are the longest queues by movement, per each approach. For example, the Highway 1 TWSC queues are for the left turn lanes, which are relevant because extensive left turn queues can spill into the mainline and block through traffic. This is why there are queues listed for an otherwise free-flowing approach.

For all existing and 2020 time periods except 2020 PM, the alternative with the longest queue is the single-lane roundabout. For 2020 PM, the TWSC alternative has the longest queue. The only scenarios with greater than 1000’ of queue were all in 2040, including the TWSC for all peak periods, the single-lane roundabout for the midday and PM peak periods, and the signal for the PM peak period. The multi-lane roundabout consistently has the smallest queues, such as 125’ for the 2040 PM peak.

Level of Service

A key mobility metric is level of service (LOS), which is based on average vehicle delay. This metric is like a report card, where an “A” is earned by free-flowing, efficient traffic. As traffic grows, slows down, becomes more aggressive, and ultimately throughput declines, the grade gets worse and bottoms out at an “F” which represents failing conditions. The County of San Mateo prescribes a minimum LOS of “C” for intersections as a whole, and “D” for individual movements. The LOS per movement for each scenario is listed in Appendix G.13.

All existing conditions scenarios have intersection LOS A, except TWSC during the PM peak, which operates at LOS B. By movement, however, the TWSC already has LOS F for the Cypress Avenue approaches for existing midday and PM peak conditions.

Moving into the future, the TWSC declines to intersection LOS F for all 2040 peak periods. The signal performs acceptably for the 2040 AM and midday peaks, but degrades to LOS E for the 2040 PM peak. The single-lane roundabout performs acceptably for the 2040 AM peak, but degrades to LOS F for the 2040 midday peak, and LOS D for the 2040 PM peak. Lastly, the multi-lane roundabout operates at LOS A for all peak periods now and in the future.

Failure Year

One last metric is the failure year. This is the earliest year that the intersection is projected to fail, using traffic growth rates. An intersection is considered failing when one movement has a LOS of “E” or worse, or the intersection overall has a LOS of “D” or worse.

The TWSC is failing under existing conditions for all peak periods. With a signal, the earliest failure year is 2019, when the PM peak period fails. With a single-lane roundabout, the earliest failure year is 2020, when the PM peak period fails. For the multi-lane roundabout, operations remain acceptable through 2040 for all peak periods. Table 2 lists the failure years by alternative and peak period.

Table 2: Failure Year by Alternative and Peak Period

Alternative	Time	Failure Year
Two-Way Stop Control	AM	2017
	MD	2017
	PM	2017
Signal	AM	2035
	MD	2023
	PM	2019
Single-Lane Roundabout	AM	2040+
	MD	2027
	PM	2020
Multi-Lane Roundabout	AM	2040+
	MD	2040+
	PM	2040+

Benefit/Cost Analysis

For the benefit/cost analysis, Caltrans’s own Intersection Control Evaluation worksheet provided valuable assistance. This tool converts ADT, collision data, and capital cost into a benefit/cost ratio.

Existing ADTs of 19,921 vehicles per day on Highway 1 and 1,413 vehicles per day on Cypress Avenue were used for this analysis. For 2040, ADTs of 32,251 vehicles per day on Highway 1 and 2,288 vehicles per day on Cypress Avenue were used. For the computation of these numbers, see Appendix H.

Collision data from SWITRS was utilized in the benefit/cost analysis. During the most recently available 6.5 year period there were 11 crashes, of which three resulted in injury and none were fatal.

Cost, construction and right-of-way acquisition were lumped together as the costs were based on the lump sum cost of the Highway 1 and Simpson Lane roundabout project near Fort Bragg. This project’s multi-lane roundabout alternative is of a similar size, design, and right-of-way take as the Fort Bragg roundabout, which cost around $4,750,000. The single-lane roundabout was assumed to have a somewhat lower cost for reduced design, paving, and right-of-way needs, at $3,000,000. The signal was assumed to cost around $700,000 based on the cost of similar projects involving minimal hardscape alteration and right-of-way take. This is assuming that the signal alternative will use the existing lane configurations. Lastly, the all-way stop control (which is included on the worksheet but not part of this analysis) was given a cost of $50,000 for the design and implementation of signage and striping on Highway 1.

These inputs result in the single-lane roundabout alternative having the highest B/C ratio, at 5.67. The multi-lane roundabout alternative has the next best, at 2.82, followed by the signal at 0.80. These ratios are based on the societal savings from reduced crashes divided by the cost of implementation. The full Caltrans benefit/cost worksheet is included in Appendix I.

Sensitivity to Local Context

The project is in a more rural and recreational area of San Mateo County, as compared with the bustling bay-side of the county. Likewise, Highway 1 is a world-famous recreational highway offering scenic views and a pleasant driving experience. Therefore, any change to the area’s transportation network should be sensitive to this local context. It should fit visually into the coastal landscape and reflect community values. As well, a decorative center to the roundabout could act as a gateway treatment into the community.

Extensive queues and delays do not reflect the recreational nature of Highway 1 or the project area, and so should be mitigated. This ranks the signal and multi-lane roundabout well above the TWSC and single-lane roundabout. Additionally, the landscaping features of a roundabout create visual appeal that could suit the community well, which puts the multi-lane roundabout ahead of the signal.

Summary

Between safety, mobility considerations, benefit/cost, and sensitivity to the local context, a variety of criteria have been assessed as part of this intersection control evaluation. Table 3 summarizes these criteria and how each alternative compares. An overall rank is generated by determining how each alternative ranks for each criterion. The multi-lane roundabout performs best and TWSC performs worst in most categories, with the signal and single-lane roundabout in between. The signal performs better than the single-lane roundabout on most of the mobility criteria, but the single-lane roundabout performs better under the safety, failure year, benefit/cost ratio, and sensitivity to local context criteria.

Table 3: Alternative Comparison

Criterion	Rank 1	Rank 2	Rank 3	Rank 4
Safety	SLRB	MLRB	SGNL	TWSC
Average Delay	MLRB	SGNL	SLRB	TWSC
Average Volume-to-Capacity Ratio	MLRB	SGNL	SLRB	TWSC
Average Queue	MLRB	TWSC	SGNL	SLRB
Intersection Level of Service	MLRB	SGNL	TWSC	SLRB
Failure Year	MLRB	SLRB	SGNL	TWSC
Benefit/Cost Ratio	SLRB	MLRB	SGNL	TWSC
Sensitivity to Local Context	MLRB	SLRB	SGNL	TWSC
Overall Rank	**MLRB**	**SLRB**	**SGNL**	**TWSC**

TWSC = Two-Way Stop Control, SGNL = Signal, SLRB = Single-Lane Roundabout, MLRB = Multi-Lane Roundabout

CONCLUSION

As evidenced by current operating conditions, the two-way stop control at Cypress Avenue and Highway 1 is failing to meet demand and operate in a safe and efficient manner. In the future, operations will continue to decline as traffic volumes increase. A signal will improve operations, as will a multi-lane roundabout. However, the multi-lane roundabout will better improve operations, increase safety, and be more contextually sound, as compared to the signal. A single-lane roundabout is the safest alternative, but the limited capacity of the roundabout itself hampers operations along Highway 1 to an unreasonable extent. For these reasons, a multi-lane roundabout is the preferred alternative, followed by a single-lane roundabout and signalization. The “no-build” alternative, keeping the current two-way stop control, is the worst alternative now and in the future, in terms of both operations and safety.

APPENDICES

Appendix A – Signal Warrant Analysis
Appendix B – Existing Traffic Volume Data
Appendix C – Future Traffic Volume Data (from Big Wave TIA)
Appendix D – Crash History Data
Appendix E – Schematic View of a Single-lane Roundabout
Appendix F – Schematic View of a Multi-lane Roundabout
Appendix G – Synchro and SIDRA Reports
Appendix H – Caltrans Intersection Control Evaluation Benefit/Cost Worksheet

APPENDIX A – SIGNAL WARRANT ANALYSIS

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MEMORANDUM

DATE: June 30, 2017

TO: Rob Bartoli, Planner III, County of San Mateo

FROM: Joshua Pilachowski, TE, Ph.D., Transportation Engineer, DKS Associates

Kevin Carstens, EIT, Transportation Engineering/Planning Assistant, DKS Associates

SUBJECT: Task 2: Traffic Signal Warrant Analysis Deliverable

This report has been prepared by DKS Associates for the County of San Mateo to present the findings of our signal warrant analysis for Highway 1 and Cypress Avenue in Moss Beach. Only existing conditions were studied. Overall, three of the nine traffic signal warrants from the California Manual on Uniform Traffic Control Devices (CaMUTCD) were met.

DATA COLLECTION

Data on turning movements, speed, vehicle class, and crash history were gathered for the intersection of Cypress Avenue and Highway 1, in Moss Beach, California. The turning movement counts were gathered on Tuesday, June 13th, 2017, during the 14 hour period from 6am to 8pm. The vehicle speeds and classifications were gathered between June 9th and 18th, 2017.

For crash history, data was pulled on June 15th, 2017, for all crashes in San Mateo County and the City of Half Moon Bay as early as January 1st, 2011, from the Statewide Integrated Traffic Records System (SWITRS). Data was collected for both San Mateo County and the City of Half Moon Bay since sometimes the reporting officer tags the crash to the nearest city, rather than placing it in the county. The crashes were then isolated to those happening at the intersection of Cypress Avenue and Highway 1, for which there were 11 crashes reported during the study period. Of these, eight involved only property damage, and one each resulted in minor, serious, and severe injury. No crashes resulted in fatality.

Traffic volume data and crash history data are included in Appendix A and Appendix B, respectively.

SIGNAL WARRANT ANALYSIS

Once the data was collected, it was processed utilizing the signal warrant analysis process prescribed in the CaMUTCD 2014 Edition Revision 2, last updated on April 7th, 2017. This manual is based on the Federal Highway Administration's 2009 MUTCD. Specifically, Chapter 4C on Traffic Control Signal Needs Studies was used. Worksheets from this chapter can be found in Appendix C.

For several of the warrants, there are different criteria for urban or rural conditions. A rural intersection is defined as existing in a built up area of an isolated community of less than 10,000 people, or where the speed limit/critical speed on the major street is greater than 40 mph. The intersection of Highway 1 and Cypress Avenue is considered rural as it is in a built up area of Moss Beach, a community of around 3,100 residents, adjacent to the nearby community of Montara with 2,900 residents, and isolated otherwise. As well, Highway 1 has a critical approach speed of 51 mph from one direction and 47 mph from the other, both well above the 40 mph requirement.

Warrant 1: Eight-Hour Vehicular Volume

This warrant is intended for locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal or where the traffic volume on a major street is so heavy that traffic on a minor street intersecting the street suffers excessive delay or conflict in entering or crossing the major street.

To meet the requirements of this warrant, the total number of vehicles per hour on the major street and the higher volume minor street approaches should meet the required minimum volumes. At least eight separate hours are needed to satisfy this warrant. This can be done using one of two conditions: high overall vehicle volume, or high interruption of continuous traffic, where the major road has higher traffic volumes that prevent side street traffic from entering. As well, an 80% satisfaction of the two conditions can be combined for overall warrant satisfaction.

For Cypress Avenue and Highway 1, no eight independent hours fulfill the first condition for high overall vehicle volume. This condition requires 350 vehicles per hour (VPH) on the major road in rural conditions with one approach lane in each direction, and 105 VPH on the higher volume minor road approach. While most of the day has over 1000 VPH on Highway 1, no one hour period for either approach of Cypress Avenue has over 105 VPH. For the 80% condition, only four hours surpass the 84 VPH threshold.

However, at least eight independent hours fulfill the second condition for interruption of continuous traffic, as it requires higher major approach traffic (525 VPH) and lower minor approach traffic (53 VPH). The eight hours from 6:30am to 2:30pm were chosen as they all fulfill this requirement, but hours throughout the rest of the day fulfill the condition as well.

The 80% satisfaction combination was not met, as the first condition's minor approach volumes were too low.

Since this warrant only requires that one of the two conditions (or 80% of both conditions) be met, and the second condition on interruption of continuous traffic meets the requirements, overall Warrant 1 is met.

Warrant 2: Four-Hour Vehicular Volume

This warrant is intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic signal. To meet the requirements for Warrant 2, the total number of vehicles per hour on the major street and the higher volume minor street approaches should meet the required minimum volumes, which are depicted graphically in Figure 4C-2 of the CaMUTCD. As major street volume increases, the corresponding minor street traffic threshold decreases. This condition must be met for four independent hours to satisfy this warrant.

A rural community with one approach lane from all directions commands the lowest minimum volumes, which bottom out at 60 VPH for the minor street higher volume approach when the major street total of both approaches is above 800 VPH. The 7am, 8am, 10am, and 11am hours (as well as others) all have above 800 VPH on Highway 1 and at least 60 VPH from the south leg of Cypress Avenue, and so satisfies this warrant.

Warrant 3: Peak Hour

This warrant is intended where traffic conditions are such that for a minimum of one hour of an average day, the minor street traffic suffers undue delay when entering the major street. This warrant is usually applied only in the vicinity of facilities that attract or discharge large numbers of vehicles over a short time (such as a school).

This warrant is split into two conditions, one of which must be met to satisfy the warrant. The first condition involves delay on the minor street due to waiting for a gap on the major street, peak hour volume on the minor street, and overall intersection entering volume during the peak hour. The second condition is a simple graphical threshold for major and minor approach volumes, similar to Warrant 2. Only one point has to be above this threshold to satisfy the warrant.

The intersection meets the second condition during the hour of 4:45pm-5:45pm. During this hour, 1,535 vehicles entered the intersection on Highway 1. The corresponding point on Figure 4C-4 of the CaMUTCD is 75 VPH for the greatest minor approach volume. During that same hour, 104 vehicles entered from the south leg of Cypress Avenue, satisfying the condition and thus the warrant.

Warrant 4: Pedestrian Volume

This warrant is intended for applications where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

The lowest pedestrian volume minimum for any of the various conditions of this warrant is 75 pedestrians per hour. Since there were only 13 pedestrians recorded at this location throughout the entire 14 hour study period, this warrant is not met.

Warrant 5: School Crossing

This warrant is intended for application where many school children crossing the major street is the principle reason to install a traffic signal. To satisfy this warrant, there must be a minimum of 20 students during the highest crossing hour across the major street as well as an insufficient number of adequate gaps in the traffic stream which allows for the students to safely cross the major street.

There are no schools located near this intersection, so this warrant does not apply.

Warrant 6: Coordinated Signal System

This warrant is applicable in situations where a coordinated signal system necessitates the installation of a traffic control signal to maintain proper platooning of vehicles.

There are neither nearby signals nor plans to install nearby signals, so this warrant does not apply.

Warrant 7: Crash Experience

This warrant is intended for applications where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal. To satisfy this warrant, there must be at least five crashes within a 12 month period that are significant enough to report, and would have been prevented by a traffic signal.

At this location, there were 11 reported collisions between January 1st, 2011 and June 15th, 2017. Only one block of five was within a rolling 12 month period, from August 31st, 2013 to August 10th, 2014. Four of the crashes might have been prevented with a signal, as they involved right of way or improper turning violations and all resulted in broadside collisions. However, the fifth crash in this time period was a sideswipe due to “unsafe starting or backing” (as reported), to which signalization would most likely have no effect. Therefore, this warrant is not met.

Warrant 8: Roadway Network

This warrant is intended for applications where it is desirable to encourage concentration and organization of traffic flow on a roadway network. To satisfy this warrant, the intersection must have a total existing, or immediately project, entering volume of at least 1,000 VPH during the peak hour of a typical day, as well as both intersecting streets being classified as major roads.

While this location has entering volumes of at least 1,000 VPH for many hours throughout the day, only Highway 1 is a major route. Since Cypress Avenue is not, this warrant is not met.

Warrant 9: Intersection near a Grade Crossing

This warrant is intended for applications where a nearby railway at-grade crossing presents operational issues. Aside from coordination issues, insufficient gap between the crossing and intersection might lead to storage issues, where vehicles queued at the intersection stop on the tracks. If there is the correct combination of vehicular traffic, rail traffic, and lack of distance between the intersection and crossing, then this warrant is met.

Since there are no at-grade crossings (or railroads at all) near the study intersection, this warrant does not apply.

CONCLUSIONS

While the CaMUTCD does not require that a warrant be met in order to install a signal, nor require that a signal be installed if at least one warrant is met, it nonetheless prescribes guidance that meeting signal warrants combined with engineering judgement could justify the implementation of a signal. At the intersection of Highway 1 and Cypress Avenue, Warrants 1, 2, and 3 are all met; Warrants 4, 7, and 8 are not met; and Warrants 5, 6, and 9 do not apply (and so are also not met). Since three warrants are met, signalization is thus highly recommended.

However, the CaMUTCD also prescribes that a roundabout shall be considered instead of, or alongside, signalization. This will be done in the next task, using the Caltrans's Intersection Control Evaluation process. The result of this evaluation will determine whether a signal or roundabout is more appropriate for this location. For now, the need for upgraded intersection control has been empirically established through this signal warrant analysis process.

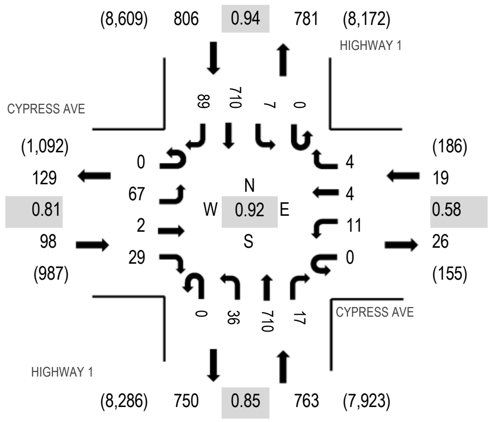
APPENDIX B – EXISTING TRAFFIC VOLUME DATA

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

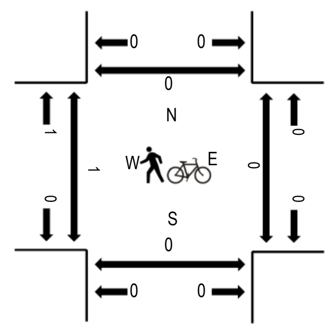
Location: 1 HIGHWAY 1 & CYPRESS AVE AM
Date and Start Time: Tuesday, June 13, 2017
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	CYPRESS AVE Eastbound U-Turn	Left	Thru	Right	CYPRESS AVE Westbound U-Turn	Left	Thru	Right	HIGHWAY 1 Northbound U-Turn	Left	Thru	Right	HIGHWAY 1 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
6:00 AM	0	6	1	1	0	1	0	1	0	0	65	0	0	0	62	3	140	810	0	0	0	0
6:15 AM	0	7	0	2	0	1	0	1	0	2	91	0	0	0	82	2	188	924	0	1	0	0
6:30 AM	0	7	0	5	0	1	0	1	0	3	115	0	0	1	104	6	243	1,062	0	0	0	0
6:45 AM	0	9	0	3	0	2	0	0	0	2	111	0	0	0	102	10	239	1,179	0	0	0	0
7:00 AM	0	11	0	6	0	4	2	4	1	1	120	0	0	0	100	5	254	1,257	0	0	0	0
7:15 AM	0	22	0	6	0	1	1	3	0	5	142	2	0	0	133	11	326	1,317	0	0	0	0
7:30 AM	0	13	2	11	0	2	0	1	0	5	157	0	0	2	158	9	360	1,309	0	0	0	0
7:45 AM	0	10	1	4	0	4	1	0	0	6	143	0	0	0	140	8	317	1,240	0	0	0	0
8:00 AM	0	17	0	8	0	1	0	3	0	3	154	0	0	1	114	13	314	1,196	0	0	0	0
8:15 AM	0	15	1	2	0	3	1	2	0	4	157	2	0	1	120	10	318	1,167	0	0	0	0
8:30 AM	0	11	0	5	0	3	1	1	0	5	103	0	0	0	150	12	291	1,109	0	0	0	0
8:45 AM	0	12	0	9	0	3	1	1	0	2	102	2	1	0	131	9	273	1,099	1	0	0	0
9:00 AM	0	8	0	5	0	2	0	1	0	4	117	1	0	0	136	11	285	1,122	0	0	0	0
9:15 AM	0	9	0	3	0	2	0	0	0	2	107	0	0	0	123	14	260	1,142	0	0	0	0
9:30 AM	0	11	1	6	0	2	0	0	0	2	100	0	0	0	152	7	281	1,165	0	0	0	0
9:45 AM	0	6	1	7	0	0	0	0	0	8	112	0	0	1	147	14	296	1,184	0	0	1	0
10:00 AM	0	8	1	2	0	5	0	1	0	3	124	0	0	1	147	13	305	1,194	0	0	0	0
10:15 AM	0	9	0	6	0	3	0	0	0	7	122	1	0	0	124	11	283	1,213	0	0	0	0
10:30 AM	0	10	1	3	0	2	0	0	0	4	114	4	0	0	148	14	300	1,220	0	0	0	0
10:45 AM	0	16	1	7	0	0	0	0	0	4	123	0	0	1	146	8	306	1,229	0	0	0	0
11:00 AM	0	8	0	3	0	2	2	1	0	8	124	0	0	1	163	12	324	1,232	0	0	0	0
11:15 AM	0	12	1	8	0	2	0	0	0	6	104	2	0	2	142	11	290	1,177	1	0	1	0
11:30 AM	0	19	0	8	0	3	1	0	0	7	107	2	0	1	158	3	309	1,213	0	0	0	0
11:45 AM	0	8	0	8	0	3	1	0	0	3	134	0	0	0	139	13	309	1,218	0	0	0	0
12:00 PM	0	10	0	5	0	5	0	0	0	7	120	0	0	0	113	9	269	1,263	0	0	0	0
12:15 PM	0	14	1	8	0	3	0	0	0	7	120	3	1	0	156	13	326	1,370	0	0	0	0
12:30 PM	0	11	0	3	0	4	1	2	0	7	142	2	1	1	128	12	314	1,421	0	0	0	0
12:45 PM	0	12	2	5	0	2	0	2	0	6	153	2	0	1	162	7	354	1,410	0	0	0	0
1:00 PM	0	9	0	2	0	1	1	1	0	7	172	2	0	0	168	13	376	1,341	0	0	0	0
1:15 PM	0	7	1	6	0	3	2	1	0	6	150	2	0	2	179	18	377	1,318	0	0	0	0
1:30 PM	0	10	1	4	0	1	1	1	0	5	129	0	0	0	140	11	303	1,235	0	0	0	0
1:45 PM	0	7	1	5	0	0	2	0	0	9	115	0	0	0	122	24	285	1,288	0	0	0	0
2:00 PM	0	11	0	9	0	1	0	0	1	10	158	2	0	1	151	9	353	1,312	0	0	0	0
2:15 PM	0	11	1	5	0	1	0	0	0	6	110	3	0	0	146	11	294	1,270	0	0	0	0
2:30 PM	0	13	0	9	0	1	1	1	0	3	148	2	1	1	163	13	356	1,353	0	0	0	0

2:45 PM	0	7	2	5	0	1	1	1	0	3	125	0	0	1	149	14	309	1,395	0	0	0	0
3:00 PM	0	12	0	4	0	3	0	0	0	9	120	0	0	0	149	14	311	1,419	0	0	0	0
3:15 PM	0	16	0	9	0	2	0	0	0	11	168	1	0	0	152	18	377	1,471	0	0	0	0
3:30 PM	0	13	0	7	0	3	0	0	0	6	166	3	0	1	174	25	398	1,479	5	0	0	0
3:45 PM	0	14	1	8	0	1	0	0	0	5	156	3	0	1	130	14	333	1,472	1	0	0	0
4:00 PM	0	12	0	8	0	1	1	0	2	7	141	0	0	1	175	15	363	1,550	0	0	0	0
4:15 PM	0	19	0	7	0	2	0	1	0	13	164	1	0	5	157	16	385	1,611	0	0	0	0
4:30 PM	0	11	0	6	0	4	0	1	0	9	167	4	0	2	164	23	391	1,686	1	0	0	0
4:45 PM	0	19	0	7	0	0	3	2	0	6	158	2	0	5	183	26	411	1,659	0	0	0	0
5:00 PM	0	19	1	12	0	4	0	1	0	6	184	3	0	0	169	25	424	1,582	0	0	0	0
5:15 PM	0	18	1	4	0	3	1	0	0	15	201	8	0	0	194	15	460	1,519	0	0	0	0
5:30 PM	0	8	5	10	0	5	0	1	0	6	164	2	0	0	151	12	364	1,419	0	0	0	0
5:45 PM	0	11	0	7	0	3	0	1	0	9	136	4	0	1	149	13	334	1,402	0	0	0	0
6:00 PM	0	14	1	4	0	1	0	0	0	9	145	3	0	0	168	16	361	1,368	0	0	0	0
6:15 PM	0	7	0	5	0	2	1	0	0	10	167	4	0	1	145	18	360	1,306	0	0	0	0
6:30 PM	0	14	0	5	0	1	0	0	0	8	159	3	0	0	141	16	347	1,225	0	0	0	0
6:45 PM	0	7	0	5	0	1	0	0	0	9	144	2	0	1	122	9	300	1,113	0	0	0	0
7:00 PM	0	13	1	1	0	0	2	1	0	3	136	3	0	0	118	21	299	1,059	0	0	0	0
7:15 PM	0	6	1	10	0	0	1	1	0	4	125	0	0	3	120	8	279		0	0	0	0
7:30 PM	0	8	0	3	0	2	1	3	0	14	90	1	0	1	97	15	235		1	0	0	0
7:45 PM	0	9	0	4	0	1	0	0	0	16	109	1	0	1	92	13	246		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
Lights	0	66	2	28	0	10	4	4	0	35	704	17	0	6	699	86	1,661
Mediums	0	1	0	1	0	1	0	0	0	0	6	0	0	1	10	3	23
Total	0	67	2	29	0	11	4	4	0	36	710	17	0	7	710	89	1,686

APPENDIX C – FUTURE TRAFFIC VOLUME DATA (FROM BIG WAVE TIA)

Big Wave North Parcel Alternative

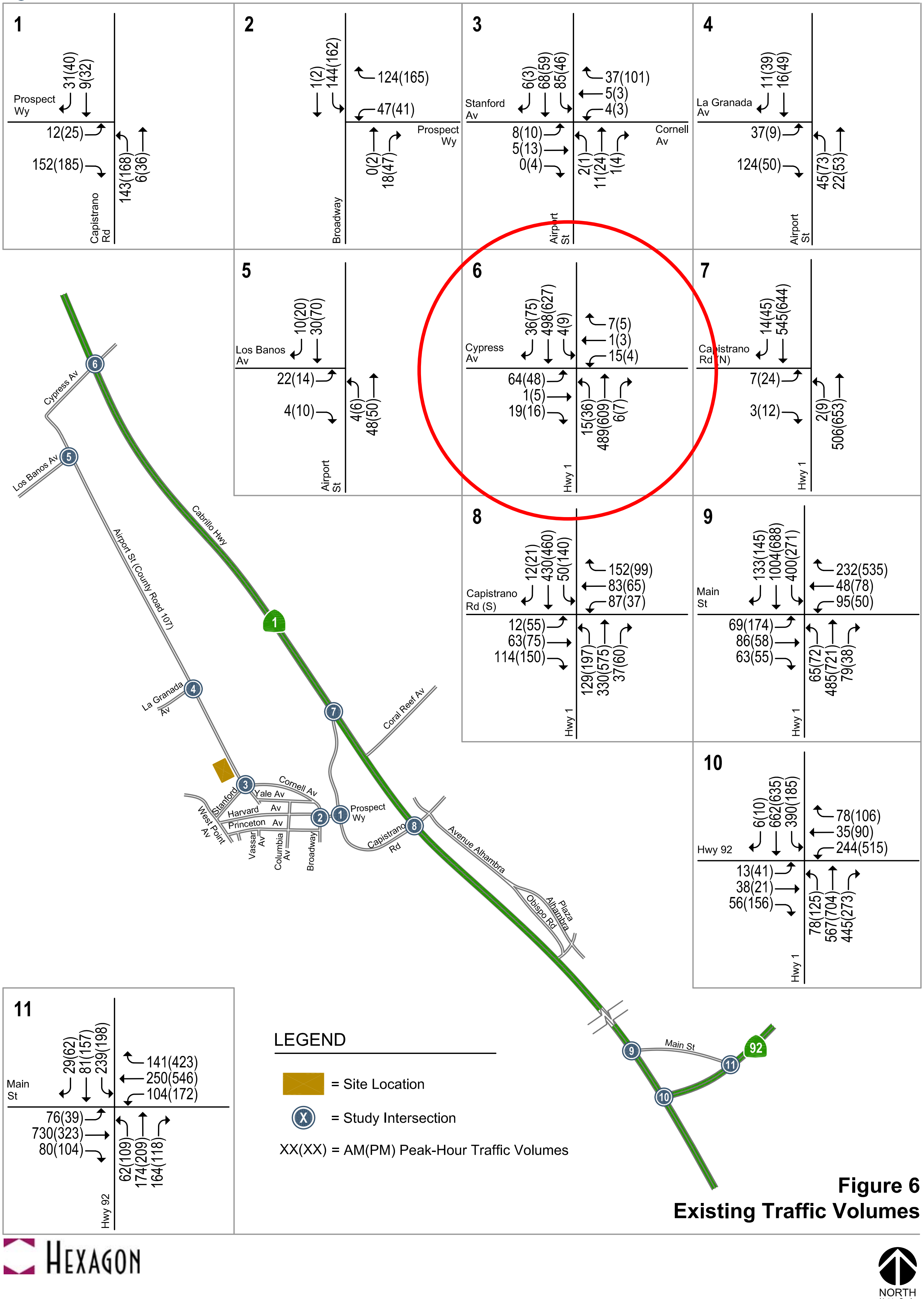


Figure 6
Existing Traffic Volumes

HEXAGON

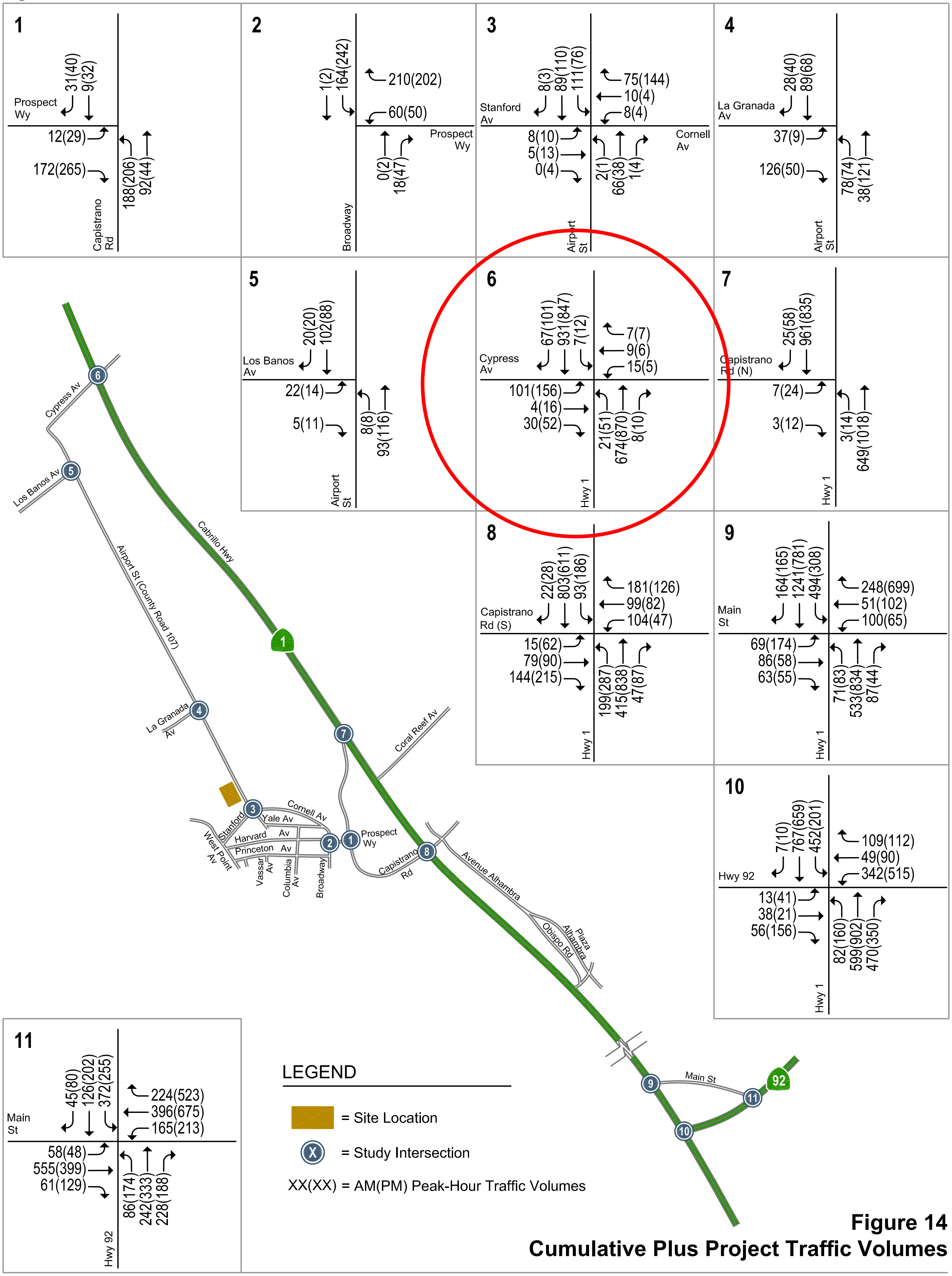


Figure 14
Cumulative Plus Project Traffic Volumes

APPENDIX D – CRASH HISTORY DATA

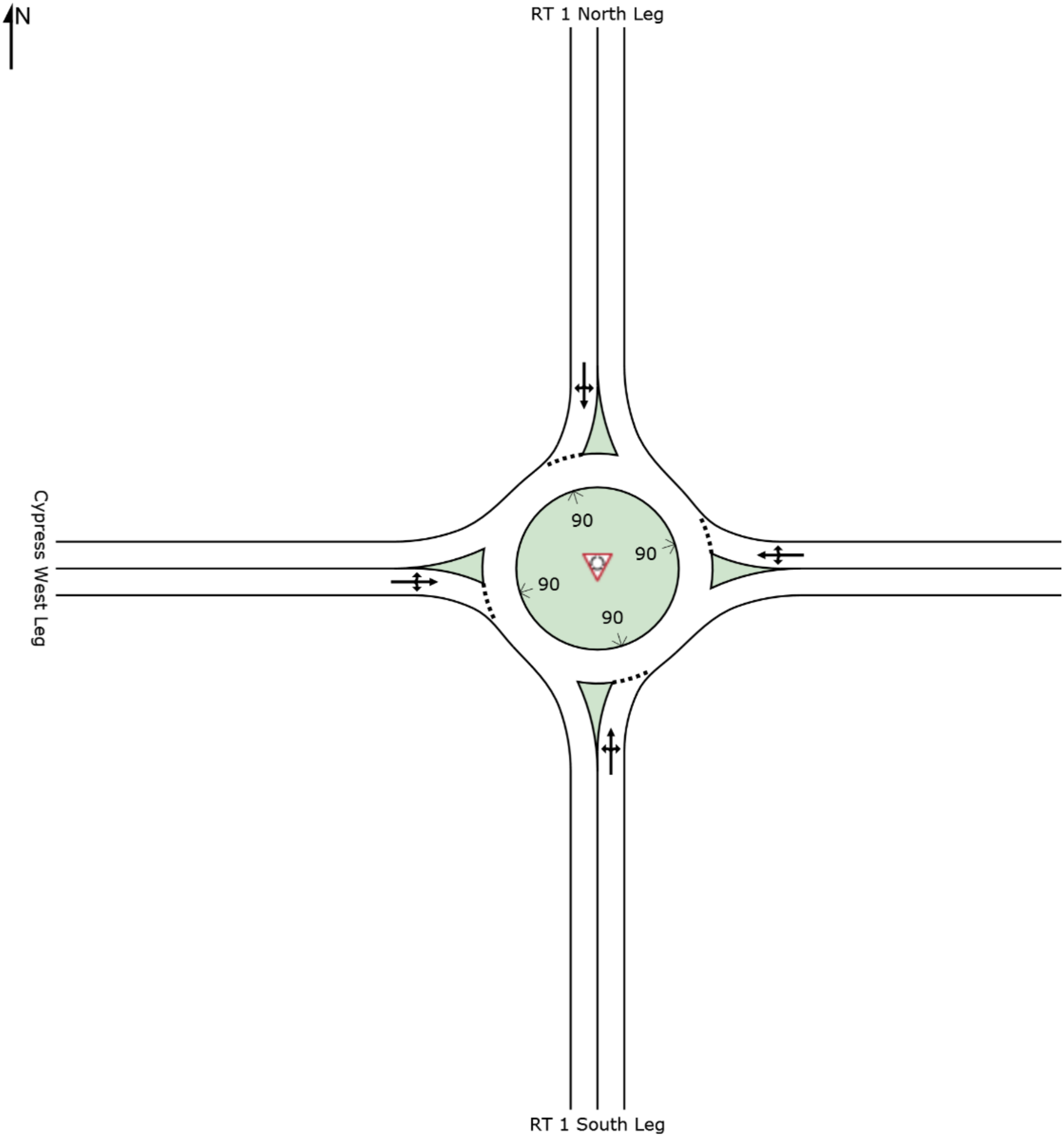
Case ID	Collision Date	Collision Time	Distance from Intersection	Direction	Collision Severity	Primary Collision Factor	Type of Collision	Motor Vehicle Involved With
5428417	20111028	1635	200	N	Property damage only (PDO)	Unsafe Speed	Rear End	Other Motor Vehicle
5475701	20111216	1612	100	S	PDO	Improper Turning	Sideswipe	Other Motor Vehicle
5788798	20120801	1135	0		PDO	Right-of-Way	Head-On	Other Motor Vehicle
5998513	20130204	1714	0		Minor injury	Right-of-Way	Broadside	Other Motor Vehicle
6204233	20130831	1315	100	S	PDO	Unsafe Starting or Backing	Sideswipe	Other Motor Vehicle
6357077	20140114	1708	0		Serious injury	Right-of-Way	Broadside	Other Motor Vehicle
6396756	20140219	2017	0		PDO	Right-of-Way	Broadside	Other Motor Vehicle
6574132	20140704	2240	0		PDO	Improper Turning	Broadside	Other Motor Vehicle
6599305	20140810	1025	0		PDO	Right-of-Way	Broadside	Other Motor Vehicle
90196570	20160526	1349	0		Severe Injury	Right-of-Way	Broadside	Other Motor Vehicle
90325670	20161021	1515	0		PDO	Right-of-Way	Broadside	Other Motor Vehicle

APPENDIX E – SCHEMATIC VIEW OF A SINGLE-LANE ROUNDABOUT

SITE LAYOUT

Site: 102 [1 Lane Roundabout Existing AM]

New Site
Roundabout

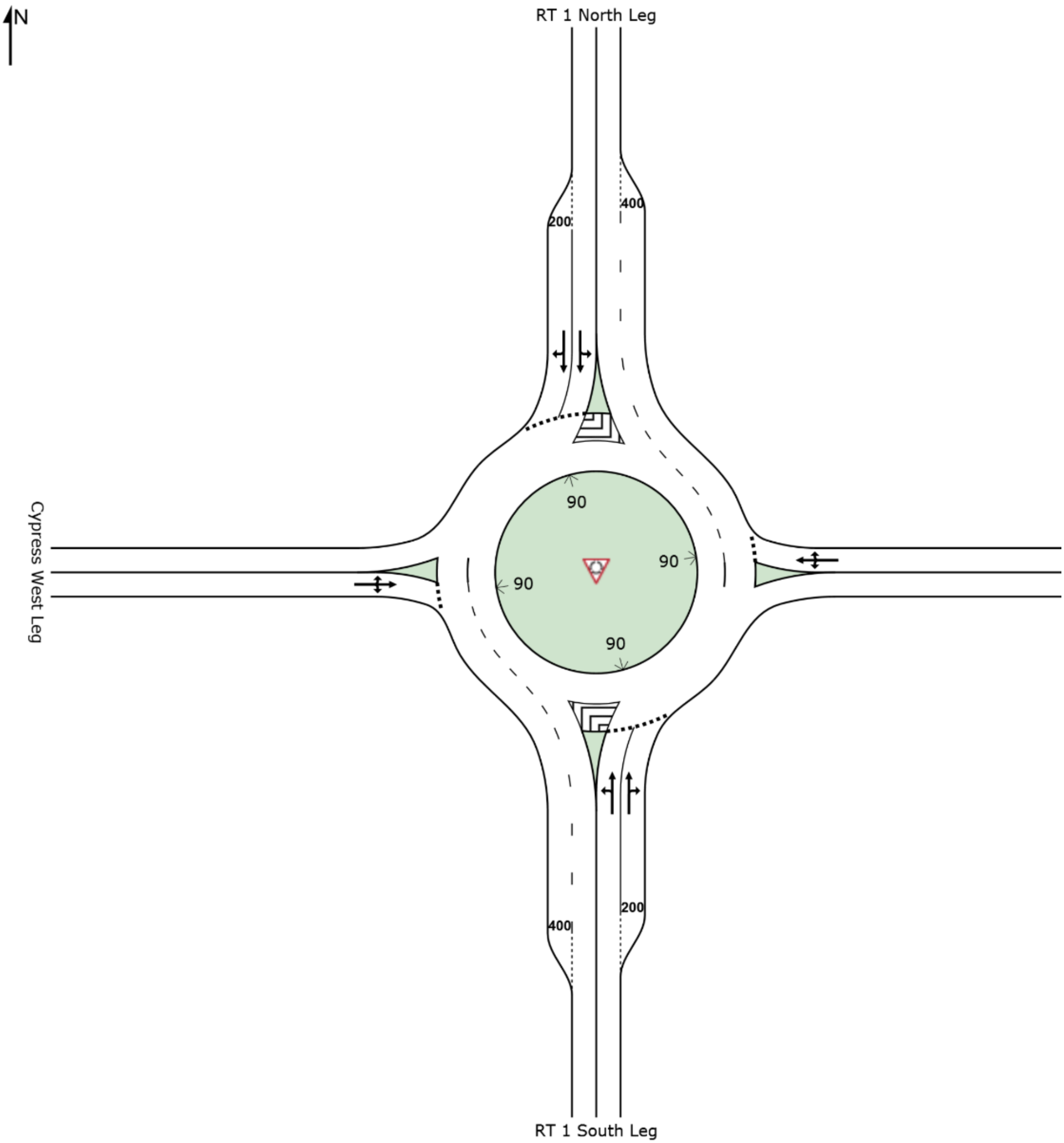


APPENDIX F – SCHEMATIC VIEW OF A MULTI-LANE ROUNDABOUT

SITE LAYOUT

Site: 102 [2 Lane Roundabout Existing AM]

New Site
Roundabout



APPENDIX G – SYNCHRO AND SIDRA REPORTS

G.1 – Existing AM Conditions

G.2 – Existing Midday Conditions

G.3 – Existing PM Conditions

G.4 – Future (2020) AM Conditions

G.5 – Future (2020) Midday Conditions

G.6 – Future (2020) PM Conditions

G.7 – Future (2040) AM Conditions

G.8 – Future (2040) Midday Conditions

G.9 – Future (2040) PM Conditions

G.10 – Output Summary: Control Delay (Seconds, Average)

G.11 – Output Summary: Vehicle to Capacity Ratio

G.12 – Output Summary: Vehicle Queuing (Feet, 95th Percentile)

G.13 – Output Summary: Level of Service (LOS)

G.1 – Existing AM Conditions

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	62	3	29	8	2	7	19	596	2	3	545	41
Future Vol, veh/h	62	3	29	8	2	7	19	596	2	3	545	41
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	68	3	32	9	2	8	21	655	2	3	599	45

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1327	1327	621	1328	1349	656	644	0	0	657	0	0
Stage 1	628	628	-	698	698	-	-	-	-	-	-	-
Stage 2	699	699	-	630	651	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	131	154	484	131	149	462	931	-	-	921	-	-
Stage 1	467	473	-	428	439	-	-	-	-	-	-	-
Stage 2	427	439	-	466	461	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	125	150	484	118	145	462	931	-	-	921	-	-
Mov Cap-2 Maneuver	125	150	-	118	145	-	-	-	-	-	-	-
Stage 1	456	471	-	418	429	-	-	-	-	-	-	-
Stage 2	408	429	-	431	459	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	49.4	27.1	0.3	0
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	931	-	-	126	484	123	462	921	-	-
HCM Lane V/C Ratio	0.022	-	-	0.567	0.066	0.089	0.017	0.004	-	-
HCM Control Delay (s)	9	-	-	65.7	13	37.1	12.9	8.9	-	-
HCM Lane LOS	A	-	-	F	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.8	0.2	0.3	0.1	0	-	-

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.7	1.8	0.5	0.3	0.4
Total Del/Veh (s)	18.0	12.9	1.3	1.3	2.7

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	3.4

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	R	LT	R	L	L
Maximum Queue (ft)	112	50	30	30	31	14
Average Queue (ft)	35	24	6	6	5	1
95th Queue (ft)	80	51	22	24	19	6
Link Distance (ft)	1566		429			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		25		25	70	50
Storage Blk Time (%)	23	5	4	1		
Queuing Penalty (veh)	7	4	0	0		

Network Summary

Network wide Queuing Penalty: 11

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	3	29	8	2	7	19	596	2	3	545	41
Future Volume (veh/h)	62	3	29	8	2	7	19	596	2	3	545	41
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827	1900	1827	1827	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	68	3	32	9	2	8	21	655	2	3	599	45
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	250	6	204	232	28	204	528	1065	3	522	982	74
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	2	43	1553	2	210	1553	768	1820	6	759	1679	126
Grp Volume(v), veh/h	71	0	32	11	0	8	21	0	657	3	0	644
Grp Sat Flow(s),veh/h/ln	46	0	1553	212	0	1553	768	0	1826	759	0	1805
Q Serve(g_s), s	0.0	0.0	0.5	0.0	0.0	0.1	0.5	0.0	6.6	0.1	0.0	6.5
Cycle Q Clear(g_c), s	3.7	0.0	0.5	3.7	0.0	0.1	7.0	0.0	6.6	6.7	0.0	6.5
Prop In Lane	0.96		1.00	0.82		1.00	1.00		0.00	1.00		0.07
Lane Grp Cap(c), veh/h	256	0	204	260	0	204	528	0	1069	522	0	1056
V/C Ratio(X)	0.28	0.00	0.16	0.04	0.00	0.04	0.04	0.00	0.61	0.01	0.00	0.61
Avail Cap(c_a), veh/h	860	0	880	874	0	880	786	0	1682	777	0	1662
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.8	0.0	10.9	10.9	0.0	10.7	6.0	0.0	3.8	5.9	0.0	3.8
Incr Delay (d2), s/veh	0.6	0.0	0.4	0.1	0.0	0.1	0.0	0.0	0.6	0.0	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.2	0.1	0.0	0.1	0.1	0.0	3.3	0.0	0.0	3.2
LnGrp Delay(d),s/veh	14.4	0.0	11.2	11.0	0.0	10.8	6.1	0.0	4.4	6.0	0.0	4.3
LnGrp LOS	B		B	B		B	A		A	A		A
Approach Vol, veh/h		103			19			678			647	
Approach Delay, s/veh		13.4			10.9			4.4			4.4	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.5		7.7		20.5		7.7
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		26.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s		9.0		5.7		8.7		5.7
Green Ext Time (p_c), s		7.5		0.3		7.6		0.3

Intersection Summary		
HCM 2010 Ctrl Delay		5.1
HCM 2010 LOS		A

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.3	1.8	0.5	0.3	0.4
Total Del/Veh (s)	7.0	5.7	4.7	5.1	5.0

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	8.2

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	63	50	21	30	29	111	18	97
Average Queue (ft)	24	19	4	5	6	31	1	32
95th Queue (ft)	51	46	18	23	21	81	7	78
Link Distance (ft)	1936		429			1118		2669
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	7	3	1	1		1		2
Queuing Penalty (veh)	2	2	0	0		0		0

Network Summary

Network wide Queuing Penalty: 4

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout Existing AM]

New Site
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: RT 1 South Leg											
3	L2	21	3.9	0.574	12.1	LOS B	5.7	147.9	0.45	0.48	31.5
8	T1	655	3.9	0.574	6.0	LOS A	5.7	147.9	0.45	0.48	37.5
18	R2	2	3.9	0.574	5.8	LOS A	5.7	147.9	0.45	0.48	30.1
Approach		678	3.9	0.574	6.2	LOS A	5.7	147.9	0.45	0.48	37.3
East: Cypress East Leg											
1	L2	9	3.9	0.030	10.3	LOS B	0.2	4.4	0.73	0.64	27.5
6	T1	2	3.9	0.030	5.1	LOS A	0.2	4.4	0.73	0.64	22.9
16	R2	8	3.9	0.030	6.0	LOS A	0.2	4.4	0.73	0.64	26.9
Approach		19	3.9	0.030	7.9	LOS A	0.2	4.4	0.73	0.64	26.6
North: RT 1 North Leg											
7	L2	3	3.9	0.519	12.2	LOS B	4.6	119.0	0.25	0.46	36.0
4	T1	599	3.9	0.519	6.2	LOS A	4.6	119.0	0.25	0.46	38.9
14	R2	45	3.9	0.519	5.8	LOS A	4.6	119.0	0.25	0.46	30.0
Approach		647	3.9	0.519	6.2	LOS A	4.6	119.0	0.25	0.46	38.1
West: Cypress West Leg											
5	L2	68	3.9	0.139	9.4	LOS A	0.8	20.0	0.67	0.70	27.1
2	T1	3	3.9	0.139	4.2	LOS A	0.8	20.0	0.67	0.70	22.9
12	R2	32	3.9	0.139	5.1	LOS A	0.8	20.0	0.67	0.70	26.2
Approach		103	3.9	0.139	7.9	LOS A	0.8	20.0	0.67	0.70	26.7
All Vehicles		1447	3.9	0.574	6.3	LOS A	5.7	147.9	0.38	0.49	36.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2017 AM]

New Site
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: RT 1 South Leg											
3	L2	21	3.9	0.280	11.7	LOS B	1.9	48.3	0.28	0.46	32.2
8	T1	655	3.9	0.280	5.8	LOS A	1.9	48.3	0.28	0.46	38.4
18	R2	2	3.9	0.227	5.6	LOS A	1.4	36.5	0.28	0.45	30.8
Approach		678	3.9	0.280	6.0	LOS A	1.9	48.3	0.28	0.46	38.2
East: Cypress East Leg											
1	L2	9	3.9	0.026	8.0	LOS A	0.1	2.5	0.53	0.59	29.2
6	T1	2	3.9	0.026	2.9	LOS A	0.1	2.5	0.53	0.59	24.2
16	R2	8	3.9	0.026	3.6	LOS A	0.1	2.5	0.53	0.59	28.6
Approach		19	3.9	0.026	5.6	LOS A	0.1	2.5	0.53	0.59	28.3
North: RT 1 North Leg											
7	L2	3	3.9	0.255	12.1	LOS B	1.5	39.6	0.15	0.45	36.6
4	T1	599	3.9	0.255	6.2	LOS A	1.5	39.6	0.15	0.46	39.5
14	R2	45	3.9	0.207	5.8	LOS A	1.2	30.4	0.16	0.46	30.2
Approach		647	3.9	0.255	6.2	LOS A	1.5	39.6	0.15	0.46	38.6
West: Cypress West Leg											
5	L2	68	3.9	0.132	7.8	LOS A	0.5	13.1	0.51	0.66	28.1
2	T1	3	3.9	0.132	2.7	LOS A	0.5	13.1	0.51	0.66	23.9
12	R2	32	3.9	0.132	3.5	LOS A	0.5	13.1	0.51	0.66	27.1
Approach		103	3.9	0.132	6.3	LOS A	0.5	13.1	0.51	0.66	27.6
All Vehicles		1447	3.9	0.280	6.1	LOS A	1.9	48.3	0.24	0.47	37.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.2 – Existing Midday Conditions

Intersection	
Int Delay, s/veh	9.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	56	3	27	9	3	4	39	567	6	6	940	69
Future Vol, veh/h	56	3	27	9	3	4	39	567	6	6	940	69
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	60	3	29	10	3	4	42	610	6	6	1011	74

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1759	1761	1048	1759	1795	613	1085	0	0	616	0	0
Stage 1	1061	1061	-	697	697	-	-	-	-	-	-	-
Stage 2	698	700	-	1062	1098	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	66	85	278	66	81	494	647	-	-	969	-	-
Stage 1	272	302	-	433	444	-	-	-	-	-	-	-
Stage 2	433	443	-	272	290	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 60	79	278	54	75	494	647	-	-	969	-	-
Mov Cap-2 Maneuver	~ 60	79	-	54	75	-	-	-	-	-	-	-
Stage 1	254	300	-	405	415	-	-	-	-	-	-	-
Stage 2	398	414	-	239	288	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	170.4	66.1	0.7	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	647	-	-	61	278	58	494	969	-	-
HCM Lane V/C Ratio	0.065	-	-	1.04	0.104	0.222	0.009	0.007	-	-
HCM Control Delay (s)	10.9	-	-	239.5	19.5	84	12.4	8.7	-	-
HCM Lane LOS	B	-	-	F	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	5	0.3	0.8	0	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.2	1.0	0.6	0.6	0.6
Total Del/Veh (s)	60.6	26.7	2.0	2.2	5.3

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	6.9

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	R	LT	R	L	L
Maximum Queue (ft)	197	40	34	24	41	14
Average Queue (ft)	58	22	7	4	12	2
95th Queue (ft)	152	51	24	20	31	11
Link Distance (ft)	1084		901			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		25		25	70	50
Storage Blk Time (%)	41	9	8	1		
Queuing Penalty (veh)	11	5	0	0		

Network Summary

Network wide Queuing Penalty: 17

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	3	27	9	3	4	39	567	6	6	940	69
Future Volume (veh/h)	56	3	27	9	3	4	39	567	6	6	940	69
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1881	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	60	3	29	10	3	4	42	610	6	6	1011	74
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	136	4	241	123	22	241	281	1297	13	583	1208	88
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.70	0.70	0.70	0.70	0.70	0.70
Sat Flow, veh/h	16	25	1599	11	145	1599	523	1860	18	811	1732	127
Grp Volume(v), veh/h	63	0	29	13	0	4	42	0	616	6	0	1085
Grp Sat Flow(s),veh/h/ln	41	0	1599	156	0	1599	523	0	1878	811	0	1859
Q Serve(g_s), s	0.1	0.0	0.8	0.1	0.0	0.1	3.3	0.0	7.8	0.2	0.0	22.3
Cycle Q Clear(g_c), s	7.9	0.0	0.8	7.9	0.0	0.1	25.5	0.0	7.8	8.0	0.0	22.3
Prop In Lane	0.95		1.00	0.77		1.00	1.00		0.01	1.00		0.07
Lane Grp Cap(c), veh/h	140	0	241	144	0	241	281	0	1310	583	0	1296
V/C Ratio(X)	0.45	0.00	0.12	0.09	0.00	0.02	0.15	0.00	0.47	0.01	0.00	0.84
Avail Cap(c_a), veh/h	359	0	486	370	0	486	323	0	1462	649	0	1447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	19.3	19.6	0.0	19.0	15.0	0.0	3.6	5.4	0.0	5.8
Incr Delay (d2), s/veh	2.3	0.0	0.2	0.3	0.0	0.0	0.2	0.0	0.3	0.0	0.0	4.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.4	0.2	0.0	0.1	0.5	0.0	4.0	0.0	0.0	12.6
LnGrp Delay(d),s/veh	28.2	0.0	19.6	19.9	0.0	19.1	15.3	0.0	3.9	5.4	0.0	9.9
LnGrp LOS	C		B	B		B	B		A	A		A
Approach Vol, veh/h		92			17			658			1091	
Approach Delay, s/veh		25.4			19.7			4.6			9.9	
Approach LOS		C			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.8		12.0		40.8		12.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		41.0		16.0		41.0		16.0
Max Q Clear Time (g_c+I1), s		27.5		9.9		24.3		9.9
Green Ext Time (p_c), s		9.3		0.2		10.9		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	8.9
HCM 2010 LOS	A

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.5	1.3	0.6	0.6	0.6
Total Del/Veh (s)	13.9	11.5	5.0	8.8	7.7

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	11.4

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	88	40	34	28	48	99	20	262
Average Queue (ft)	26	20	5	4	15	27	2	69
95th Queue (ft)	63	46	22	19	37	70	12	170
Link Distance (ft)	1936		429			1118		2669
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	14	7	3	1	0	0		5
Queuing Penalty (veh)	4	4	0	0	0	0		0

Network Summary

Network wide Queuing Penalty: 9

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout Existing MD]

New Site
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: RT 1 South Leg											
3	L2	42	0.9	0.538	11.8	LOS B	5.4	136.2	0.42	0.48	31.5
8	T1	610	0.9	0.538	5.8	LOS A	5.4	136.2	0.42	0.48	37.9
18	R2	6	0.9	0.538	5.6	LOS A	5.4	136.2	0.42	0.48	30.1
Approach		658	0.9	0.538	6.2	LOS A	5.4	136.2	0.42	0.48	37.4
East: Cypress East Leg											
1	L2	10	0.9	0.025	9.5	LOS A	0.1	3.5	0.69	0.61	28.1
6	T1	3	0.9	0.025	4.3	LOS A	0.1	3.5	0.69	0.61	23.1
16	R2	4	0.9	0.025	5.2	LOS A	0.1	3.5	0.69	0.61	27.4
Approach		17	0.9	0.025	7.5	LOS A	0.1	3.5	0.69	0.61	26.8
North: RT 1 North Leg											
7	L2	6	0.9	0.869	13.3	LOS B	19.0	478.5	0.78	0.47	32.6
4	T1	1011	0.9	0.869	7.3	LOS A	19.0	478.5	0.78	0.47	36.2
14	R2	74	0.9	0.869	6.9	LOS A	19.0	478.5	0.78	0.47	28.1
Approach		1091	0.9	0.869	7.3	LOS A	19.0	478.5	0.78	0.47	35.5
West: Cypress West Leg											
5	L2	60	0.9	0.233	14.5	LOS B	1.7	41.9	0.96	0.93	25.0
2	T1	3	0.9	0.233	9.3	LOS A	1.7	41.9	0.96	0.93	20.9
12	R2	29	0.9	0.233	10.2	LOS B	1.7	41.9	0.96	0.93	24.2
Approach		92	0.9	0.233	13.0	LOS B	1.7	41.9	0.96	0.93	24.6
All Vehicles		1859	0.9	0.869	7.2	LOS A	19.0	478.5	0.66	0.50	35.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2017 WE]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	42	0.9	0.262	11.6	LOS B	1.8	44.6	0.26	0.47	32.1
8	T1	610	0.9	0.262	5.7	LOS A	1.8	44.6	0.26	0.46	38.8
18	R2	6	0.9	0.213	5.5	LOS A	1.3	33.7	0.26	0.44	30.9
Approach		658	0.9	0.262	6.1	LOS A	1.8	44.6	0.26	0.46	38.2
East: Cypress East Leg											
1	L2	10	0.9	0.022	7.6	LOS A	0.1	2.1	0.51	0.57	29.5
6	T1	3	0.9	0.022	2.6	LOS A	0.1	2.1	0.51	0.57	24.1
16	R2	4	0.9	0.022	3.3	LOS A	0.1	2.1	0.51	0.57	28.7
Approach		17	0.9	0.022	5.6	LOS A	0.1	2.1	0.51	0.57	28.1
North: RT 1 North Leg											
7	L2	6	0.9	0.425	12.2	LOS B	3.2	79.4	0.25	0.46	35.9
4	T1	1011	0.9	0.425	6.4	LOS A	3.2	79.4	0.24	0.47	39.3
14	R2	74	0.9	0.346	6.0	LOS A	2.3	57.9	0.24	0.47	29.9
Approach		1091	0.9	0.425	6.4	LOS A	3.2	79.4	0.24	0.47	38.4
West: Cypress West Leg											
5	L2	60	0.9	0.139	9.0	LOS A	0.6	14.1	0.62	0.77	27.7
2	T1	3	0.9	0.139	4.0	LOS A	0.6	14.1	0.62	0.77	23.3
12	R2	29	0.9	0.139	4.7	LOS A	0.6	14.1	0.62	0.77	26.7
Approach		92	0.9	0.139	7.5	LOS A	0.6	14.1	0.62	0.77	27.2
All Vehicles		1859	0.9	0.425	6.3	LOS A	3.2	79.4	0.27	0.48	37.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.3 – Existing PM Conditions

Intersection	
Int Delay, s/veh	11.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	67	2	29	11	4	4	36	710	17	7	710	89
Future Vol, veh/h	67	2	29	11	4	4	36	710	17	7	710	89
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	73	2	32	12	4	4	39	772	18	8	772	97

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1696	1703	820	1695	1743	781	868	0	0	790	0	0
Stage 1	835	835	-	859	859	-	-	-	-	-	-	-
Stage 2	861	868	-	836	884	-	-	-	-	-	-	-
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	73	92	375	73	87	395	776	-	-	830	-	-
Stage 1	362	383	-	351	373	-	-	-	-	-	-	-
Stage 2	350	370	-	362	363	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 66	87	375	63	82	395	776	-	-	830	-	-
Mov Cap-2 Maneuver	~ 66	87	-	63	82	-	-	-	-	-	-	-
Stage 1	344	379	-	333	354	-	-	-	-	-	-	-
Stage 2	325	351	-	326	360	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	187.6	62.4	0.5	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	776	-	-	66	375	67	395	830	-	-
HCM Lane V/C Ratio	0.05	-	-	1.136	0.084	0.243	0.011	0.009	-	-
HCM Control Delay (s)	9.9	-	-	260	15.5	75.2	14.2	9.4	-	-
HCM Lane LOS	A	-	-	F	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	5.9	0.3	0.9	0	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.1	1.1	0.6	0.5	0.6
Total Del/Veh (s)	37.3	41.9	1.9	1.9	4.3

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	5.3

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	R	LT	R	L	L
Maximum Queue (ft)	145	51	50	34	38	19
Average Queue (ft)	48	23	10	5	11	3
95th Queue (ft)	113	52	36	23	30	14
Link Distance (ft)	1083		429			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		25		25	70	50
Storage Blk Time (%)	41	7	12	1	0	
Queuing Penalty (veh)	12	5	0	0	0	

Network Summary

Network wide Queuing Penalty: 17

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	2	29	11	4	4	36	710	17	7	710	89
Future Volume (veh/h)	67	2	29	11	4	4	36	710	17	7	710	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	73	2	32	12	4	4	39	772	18	8	772	97
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	161	2	282	142	28	282	365	1167	27	420	1044	131
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.64	0.64	0.64	0.64	0.64	0.64
Sat Flow, veh/h	14	13	1583	10	158	1583	635	1813	42	683	1623	204
Grp Volume(v), veh/h	75	0	32	16	0	4	39	0	790	8	0	869
Grp Sat Flow(s),veh/h/ln	27	0	1583	168	0	1583	635	0	1855	683	0	1827
Q Serve(g_s), s	0.1	0.0	0.8	0.1	0.0	0.1	2.0	0.0	11.9	0.3	0.0	14.5
Cycle Q Clear(g_c), s	8.0	0.0	0.8	8.0	0.0	0.1	16.4	0.0	11.9	12.1	0.0	14.5
Prop In Lane	0.97		1.00	0.75		1.00	1.00		0.02	1.00		0.11
Lane Grp Cap(c), veh/h	163	0	282	170	0	282	365	0	1194	420	0	1175
V/C Ratio(X)	0.46	0.00	0.11	0.09	0.00	0.01	0.11	0.00	0.66	0.02	0.00	0.74
Avail Cap(c_a), veh/h	415	0	564	432	0	564	465	0	1488	529	0	1465
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.2	0.0	15.5	15.9	0.0	15.2	11.0	0.0	5.0	8.7	0.0	5.4
Incr Delay (d2), s/veh	2.0	0.0	0.2	0.2	0.0	0.0	0.1	0.0	0.8	0.0	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.3	0.2	0.0	0.0	0.4	0.0	6.2	0.1	0.0	7.5
LnGrp Delay(d),s/veh	24.2	0.0	15.6	16.1	0.0	15.2	11.1	0.0	5.7	8.7	0.0	7.0
LnGrp LOS	C		B	B		B	B		A	A		A
Approach Vol, veh/h		107			20			829			877	
Approach Delay, s/veh		21.6			15.9			6.0			7.0	
Approach LOS		C			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		32.9		12.1		32.9		12.1				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		36.0		16.0		36.0		16.0				
Max Q Clear Time (g_c+I1), s		18.4		10.0		16.5		10.0				
Green Ext Time (p_c), s		10.5		0.2		11.3		0.2				
Intersection Summary												
HCM 2010 Ctrl Delay			7.5									
HCM 2010 LOS			A									

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.6	1.1	0.6	0.5	0.5
Total Del/Veh (s)	10.5	9.8	5.8	5.7	6.1

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	9.1

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	76	50	26	30	57	141	21	163
Average Queue (ft)	26	20	5	4	15	39	4	47
95th Queue (ft)	59	47	21	19	39	94	16	114
Link Distance (ft)	1720		430			1616		1297
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	12	5	3	1	0	1		3
Queuing Penalty (veh)	3	4	0	0	1	0		0

Network Summary

Network wide Queuing Penalty: 9

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout Existing PM]

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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
Movement Performance - Vehicles											
South: RT 1 South Leg											
3	L2	39	1.5	0.690	12.3	LOS B	8.7	219.5	0.58	0.50	30.9
8	T1	772	1.5	0.690	6.2	LOS A	8.7	219.5	0.58	0.50	37.0
18	R2	18	1.5	0.690	6.0	LOS A	8.7	219.5	0.58	0.50	29.5
Approach		829	1.5	0.690	6.5	LOS A	8.7	219.5	0.58	0.50	36.5
East: Cypress East Leg											
1	L2	12	1.5	0.038	11.6	LOS B	0.2	6.0	0.81	0.71	26.7
6	T1	4	1.5	0.038	6.4	LOS A	0.2	6.0	0.81	0.71	22.2
16	R2	4	1.5	0.038	7.3	LOS A	0.2	6.0	0.81	0.71	26.1
Approach		21	1.5	0.038	9.6	LOS A	0.2	6.0	0.81	0.71	25.5
North: RT 1 North Leg											
7	L2	8	1.5	0.703	12.6	LOS B	9.0	228.7	0.47	0.47	34.5
4	T1	772	1.5	0.703	6.6	LOS A	9.0	228.7	0.47	0.47	37.9
14	R2	97	1.5	0.703	6.3	LOS A	9.0	228.7	0.47	0.47	29.2
Approach		876	1.5	0.703	6.6	LOS A	9.0	228.7	0.47	0.47	36.7
West: Cypress West Leg											
5	L2	73	1.5	0.173	11.0	LOS B	1.1	27.5	0.79	0.80	26.5
2	T1	2	1.5	0.173	5.8	LOS A	1.1	27.5	0.79	0.80	22.2
12	R2	32	1.5	0.173	6.7	LOS A	1.1	27.5	0.79	0.80	25.6
Approach		107	1.5	0.173	9.6	LOS A	1.1	27.5	0.79	0.80	26.1
All Vehicles		1833	1.5	0.703	6.8	LOS A	9.0	228.7	0.54	0.51	35.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2017 PM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	39	1.5	0.336	11.7	LOS B	2.4	61.1	0.30	0.47	32.0
8	T1	772	1.5	0.336	5.8	LOS A	2.4	61.1	0.30	0.47	38.5
18	R2	18	1.5	0.273	5.6	LOS A	1.8	45.4	0.30	0.46	30.7
Approach		829	1.5	0.336	6.1	LOS A	2.4	61.1	0.30	0.47	38.0
East: Cypress East Leg											
1	L2	12	1.5	0.030	8.3	LOS A	0.1	2.9	0.57	0.63	28.9
6	T1	4	1.5	0.030	3.2	LOS A	0.1	2.9	0.57	0.63	23.8
16	R2	4	1.5	0.030	3.9	LOS A	0.1	2.9	0.57	0.63	28.2
Approach		21	1.5	0.030	6.3	LOS A	0.1	2.9	0.57	0.63	27.5
North: RT 1 North Leg											
7	L2	8	1.5	0.344	12.2	LOS B	2.3	58.4	0.23	0.46	36.0
4	T1	772	1.5	0.344	6.4	LOS A	2.3	58.4	0.23	0.47	39.3
14	R2	97	1.5	0.279	6.0	LOS A	1.7	43.7	0.23	0.48	30.0
Approach		876	1.5	0.344	6.4	LOS A	2.3	58.4	0.23	0.47	38.0
West: Cypress West Leg											
5	L2	73	1.5	0.145	8.3	LOS A	0.6	14.7	0.57	0.72	27.9
2	T1	2	1.5	0.145	3.3	LOS A	0.6	14.7	0.57	0.72	23.6
12	R2	32	1.5	0.145	4.0	LOS A	0.6	14.7	0.57	0.72	26.9
Approach		107	1.5	0.145	6.9	LOS A	0.6	14.7	0.57	0.72	27.5
All Vehicles		1833	1.5	0.344	6.3	LOS A	2.4	61.1	0.28	0.48	37.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.4 – Future (2020) AM Conditions

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	79	6	31	8	10	7	20	632	2	3	578	108
Future Vol, veh/h	79	6	31	8	10	7	20	632	2	3	578	108
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	79	6	31	8	10	7	20	632	2	3	578	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1316	1312	632	1314	1365	633	686	0	0	634	0	0
Stage 1	638	638	-	673	673	-	-	-	-	-	-	-
Stage 2	678	674	-	641	692	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	133	157	477	134	146	476	898	-	-	939	-	-
Stage 1	462	468	-	442	451	-	-	-	-	-	-	-
Stage 2	439	451	-	460	442	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	122	153	477	119	142	476	898	-	-	939	-	-
Mov Cap-2 Maneuver	122	153	-	119	142	-	-	-	-	-	-	-
Stage 1	452	467	-	432	441	-	-	-	-	-	-	-
Stage 2	413	441	-	423	441	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	63.1	30.1	0.3	0
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	898	-	-	124	477	131	476	939	-	-
HCM Lane V/C Ratio	0.022	-	-	0.685	0.065	0.137	0.015	0.003	-	-
HCM Control Delay (s)	9.1	-	-	81.4	13.1	36.8	12.7	8.8	-	-
HCM Lane LOS	A	-	-	F	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.7	0.2	0.5	0	0	-	-

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.2	0.5	0.4	0.4
Total Del/Veh (s)	33.3	20.3	1.5	1.7	4.5

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	5.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	R	LT	R	L	L
Maximum Queue (ft)	167	49	43	30	28	14
Average Queue (ft)	61	24	10	5	6	1
95th Queue (ft)	130	54	30	24	21	7
Link Distance (ft)	4574		429			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		25		25	70	50
Storage Blk Time (%)	42	5	8	1		
Queuing Penalty (veh)	13	4	1	0		

Network Summary

Network wide Queuing Penalty: 18

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	6	31	8	10	7	20	632	2	3	578	108
Future Volume (veh/h)	79	6	31	8	10	7	20	632	2	3	578	108
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827	1900	1827	1827	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	79	6	31	8	10	7	20	632	2	3	578	108
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	218	9	277	163	117	277	449	1041	3	492	856	160
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	7	49	1553	4	654	1553	738	1820	6	775	1498	280
Grp Volume(v), veh/h	85	0	31	18	0	7	20	0	634	3	0	686
Grp Sat Flow(s),veh/h/ln	56	0	1553	658	0	1553	738	0	1826	775	0	1778
Q Serve(g_s), s	0.0	0.0	0.5	0.0	0.0	0.1	0.6	0.0	7.3	0.1	0.0	8.6
Cycle Q Clear(g_c), s	5.7	0.0	0.5	5.7	0.0	0.1	9.2	0.0	7.3	7.4	0.0	8.6
Prop In Lane	0.93		1.00	0.44		1.00	1.00		0.00	1.00		0.16
Lane Grp Cap(c), veh/h	227	0	277	280	0	277	449	0	1044	492	0	1016
V/C Ratio(X)	0.37	0.00	0.11	0.06	0.00	0.03	0.04	0.00	0.61	0.01	0.00	0.68
Avail Cap(c_a), veh/h	672	0	776	784	0	776	626	0	1482	677	0	1443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.4	0.0	11.0	11.1	0.0	10.9	8.0	0.0	4.5	6.9	0.0	4.8
Incr Delay (d2), s/veh	1.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.2	0.1	0.0	0.1	0.1	0.0	3.7	0.0	0.0	4.2
LnGrp Delay(d),s/veh	16.5	0.0	11.2	11.2	0.0	10.9	8.0	0.0	5.1	6.9	0.0	5.6
LnGrp LOS	B		B	B		B	A		A	A		A
Approach Vol, veh/h		116			25			654			689	
Approach Delay, s/veh		15.1			11.1			5.2			5.6	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.3		9.7		22.3		9.7
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		26.0		16.0		26.0		16.0
Max Q Clear Time (g_c+I1), s		11.2		7.7		10.6		7.7
Green Ext Time (p_c), s		7.1		0.4		7.3		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	6.2
HCM 2010 LOS	A

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.2	0.5	0.5	0.5
Total Del/Veh (s)	10.3	7.5	9.9	11.1	10.4

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	18.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	91	49	30	30	34	130	18	180
Average Queue (ft)	31	20	6	5	9	47	2	59
95th Queue (ft)	69	47	23	22	27	105	11	135
Link Distance (ft)	5277		430			5533		5616
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	10	3	2	1		2		5
Queuing Penalty (veh)	3	3	0	0		0		0

Network Summary

Network wide Queuing Penalty: 6

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2020 AM]

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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
Movement Performance - Vehicles											
South: RT 1 South Leg											
3	L2	20	3.9	0.562	12.2	LOS B	5.4	139.6	0.47	0.50	31.4
8	T1	632	3.9	0.562	6.1	LOS A	5.4	139.6	0.47	0.50	37.4
18	R2	2	3.9	0.562	5.9	LOS A	5.4	139.6	0.47	0.50	30.0
Approach		654	3.9	0.562	6.3	LOS A	5.4	139.6	0.47	0.50	37.1
East: Cypress East Leg											
1	L2	8	3.9	0.040	10.2	LOS B	0.2	5.9	0.73	0.63	28.2
6	T1	10	3.9	0.040	5.0	LOS A	0.2	5.9	0.73	0.63	23.4
16	R2	7	3.9	0.040	5.9	LOS A	0.2	5.9	0.73	0.63	27.6
Approach		25	3.9	0.040	6.9	LOS A	0.2	5.9	0.73	0.63	25.9
North: RT 1 North Leg											
7	L2	3	3.9	0.557	12.3	LOS B	5.3	137.1	0.29	0.46	35.7
4	T1	578	3.9	0.557	6.3	LOS A	5.3	137.1	0.29	0.46	38.7
14	R2	108	3.9	0.557	5.9	LOS A	5.3	137.1	0.29	0.46	29.9
Approach		689	3.9	0.557	6.2	LOS A	5.3	137.1	0.29	0.46	37.0
West: Cypress West Leg											
5	L2	79	3.9	0.154	9.3	LOS A	0.9	22.5	0.67	0.71	27.1
2	T1	6	3.9	0.154	4.1	LOS A	0.9	22.5	0.67	0.71	23.0
12	R2	31	3.9	0.154	5.0	LOS A	0.9	22.5	0.67	0.71	26.2
Approach		116	3.9	0.154	7.9	LOS A	0.9	22.5	0.67	0.71	26.7
All Vehicles		1484	3.9	0.562	6.4	LOS A	5.4	139.6	0.41	0.50	35.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2020 AM]

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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
Movement Performance - Vehicles											
South: RT 1 South Leg											
3	L2	20	3.9	0.274	11.7	LOS B	1.8	46.8	0.30	0.47	32.1
8	T1	632	3.9	0.274	5.9	LOS A	1.8	46.8	0.30	0.46	38.3
18	R2	2	3.9	0.222	5.6	LOS A	1.4	35.4	0.30	0.46	30.7
Approach		654	3.9	0.274	6.1	LOS A	1.8	46.8	0.30	0.46	38.0
East: Cypress East Leg											
1	L2	8	3.9	0.035	8.0	LOS A	0.1	3.4	0.54	0.55	29.7
6	T1	10	3.9	0.035	2.9	LOS A	0.1	3.4	0.54	0.55	24.5
16	R2	7	3.9	0.035	3.6	LOS A	0.1	3.4	0.54	0.55	29.0
Approach		25	3.9	0.035	4.7	LOS A	0.1	3.4	0.54	0.55	27.2
North: RT 1 North Leg											
7	L2	3	3.9	0.273	12.1	LOS B	1.7	44.3	0.18	0.45	36.4
4	T1	578	3.9	0.273	6.3	LOS A	1.7	44.3	0.18	0.46	39.3
14	R2	108	3.9	0.222	5.9	LOS A	1.3	33.7	0.18	0.48	30.1
Approach		689	3.9	0.273	6.2	LOS A	1.7	44.3	0.18	0.47	37.5
West: Cypress West Leg											
5	L2	79	3.9	0.148	7.8	LOS A	0.6	15.1	0.52	0.67	28.0
2	T1	6	3.9	0.148	2.8	LOS A	0.6	15.1	0.52	0.67	23.8
12	R2	31	3.9	0.148	3.5	LOS A	0.6	15.1	0.52	0.67	27.0
Approach		116	3.9	0.148	6.4	LOS A	0.6	15.1	0.52	0.67	27.5
All Vehicles		1484	3.9	0.274	6.1	LOS A	1.8	46.8	0.26	0.48	36.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.5 – Future (2020) Midday Conditions

Intersection	
Int Delay, s/veh	13.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	71	5	29	10	5	4	41	602	6	6	998	86
Future Vol, veh/h	71	5	29	10	5	4	41	602	6	6	998	86
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	71	5	29	10	5	4	41	602	6	6	998	86

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1743	1743	1041	1743	1783	605	1084	0	0	608	0	0
Stage 1	1053	1053	-	687	687	-	-	-	-	-	-	-
Stage 2	690	690	-	1056	1096	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 67	86	277	67	81	494	636	-	-	961	-	-
Stage 1	271	301	-	434	444	-	-	-	-	-	-	-
Stage 2	432	443	-	270	287	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 60	80	277	54	75	494	636	-	-	961	-	-
Mov Cap-2 Maneuver	~ 60	80	-	54	75	-	-	-	-	-	-	-
Stage 1	254	299	-	406	415	-	-	-	-	-	-	-
Stage 2	396	414	-	236	285	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	229.4	68.8	0.7	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	636	-	-	61	277	60	494	961	-	-
HCM Lane V/C Ratio	0.064	-	-	1.246	0.105	0.25	0.008	0.006	-	-
HCM Control Delay (s)	11.1	-	-	$ 309.5	19.5	83.9	12.3	8.8	-	-
HCM Lane LOS	B	-	-	F	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	6.4	0.3	0.9	0	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.9	0.6	0.7	0.6
Total Del/Veh (s)	148.7	50.2	2.3	2.4	11.6

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	13.0

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	335	53	51	34	57	19	18	1
Average Queue (ft)	143	26	12	3	14	1	2	0
95th Queue (ft)	304	57	38	19	39	14	10	1
Link Distance (ft)	4574		429			419		457
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	77	11	16	1	0			
Queuing Penalty (veh)	22	8	1	0	2			

Network Summary

Network wide Queuing Penalty: 34

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	5	29	10	5	4	41	602	6	6	998	86
Future Volume (veh/h)	71	5	29	10	5	4	41	602	6	6	998	86
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1881	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	71	5	29	10	5	4	41	602	6	6	998	86
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	117	5	321	98	31	321	229	1251	12	536	1149	99
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.67	0.67	0.67	0.67	0.67	0.67
Sat Flow, veh/h	33	23	1599	16	156	1599	523	1859	19	817	1708	147
Grp Volume(v), veh/h	76	0	29	15	0	4	41	0	608	6	0	1084
Grp Sat Flow(s),veh/h/ln	56	0	1599	173	0	1599	523	0	1878	817	0	1855
Q Serve(g_s), s	0.3	0.0	0.9	0.1	0.0	0.1	4.2	0.0	9.9	0.2	0.0	29.1
Cycle Q Clear(g_c), s	12.7	0.0	0.9	12.6	0.0	0.1	32.8	0.0	9.9	10.1	0.0	29.1
Prop In Lane	0.93		1.00	0.67		1.00	1.00		0.01	1.00		0.08
Lane Grp Cap(c), veh/h	121	0	321	130	0	321	229	0	1264	536	0	1248
V/C Ratio(X)	0.63	0.00	0.09	0.12	0.00	0.01	0.18	0.00	0.48	0.01	0.00	0.87
Avail Cap(c_a), veh/h	197	0	405	209	0	405	257	0	1366	581	0	1350
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.9	0.0	20.6	21.4	0.0	20.3	20.9	0.0	5.0	7.4	0.0	8.1
Incr Delay (d2), s/veh	5.2	0.0	0.1	0.4	0.0	0.0	0.4	0.0	0.3	0.0	0.0	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.4	0.2	0.0	0.1	0.6	0.0	5.2	0.1	0.0	16.5
LnGrp Delay(d),s/veh	36.1	0.0	20.7	21.8	0.0	20.3	21.3	0.0	5.3	7.4	0.0	14.1
LnGrp LOS	D		C	C		C	C		A	A		B
Approach Vol, veh/h		105			19			649			1090	
Approach Delay, s/veh		31.9			21.5			6.3			14.1	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		46.7		16.9		46.7		16.9
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		46.0		16.0		46.0		16.0
Max Q Clear Time (g_c+I1), s		34.8		14.7		31.1		14.6
Green Ext Time (p_c), s		8.0		0.1		10.0		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.9	0.4	0.7	0.5
Total Del/Veh (s)	18.4	13.2	10.4	15.4	13.8

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	23.5

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	121	40	43	32	68	134	31	335
Average Queue (ft)	40	21	8	3	21	46	2	101
95th Queue (ft)	88	47	30	17	52	107	15	237
Link Distance (ft)	5277		430			5533		5616
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	20	7	4	0	1	2		9
Queuing Penalty (veh)	6	5	0	0	4	1		1

Network Summary

Network wide Queuing Penalty: 17

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2020 WE]

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	41	0.9	0.539	12.0	LOS B	5.3	134.6	0.46	0.49	31.4
8	T1	602	0.9	0.539	5.9	LOS A	5.3	134.6	0.46	0.49	37.7
18	R2	6	0.9	0.539	5.7	LOS A	5.3	134.6	0.46	0.49	30.0
Approach		649	0.9	0.539	6.3	LOS A	5.3	134.6	0.46	0.49	37.2
East: Cypress East Leg											
1	L2	10	0.9	0.028	9.6	LOS A	0.2	4.0	0.70	0.62	28.2
6	T1	5	0.9	0.028	4.4	LOS A	0.2	4.0	0.70	0.62	23.2
16	R2	4	0.9	0.028	5.3	LOS A	0.2	4.0	0.70	0.62	27.5
Approach		19	0.9	0.028	7.3	LOS A	0.2	4.0	0.70	0.62	26.5
North: RT 1 North Leg											
7	L2	6	0.9	0.869	13.3	LOS B	18.9	477.1	0.79	0.47	32.6
4	T1	998	0.9	0.869	7.3	LOS A	18.9	477.1	0.79	0.47	36.1
14	R2	86	0.9	0.869	7.0	LOS A	18.9	477.1	0.79	0.47	28.1
Approach		1090	0.9	0.869	7.3	LOS A	18.9	477.1	0.79	0.47	35.3
West: Cypress West Leg											
5	L2	71	0.9	0.260	14.4	LOS B	1.9	47.1	0.96	0.94	25.0
2	T1	5	0.9	0.260	9.2	LOS A	1.9	47.1	0.96	0.94	20.9
12	R2	29	0.9	0.260	10.1	LOS B	1.9	47.1	0.96	0.94	24.2
Approach		105	0.9	0.260	12.9	LOS B	1.9	47.1	0.96	0.94	24.6
All Vehicles		1863	0.9	0.869	7.3	LOS A	18.9	477.1	0.68	0.51	35.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2020 WE]

New Site
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: RT 1 South Leg											
3	L2	41	0.9	0.262	11.6	LOS B	1.8	44.4	0.28	0.48	32.0
8	T1	602	0.9	0.262	5.8	LOS A	1.8	44.4	0.28	0.47	38.6
18	R2	6	0.9	0.212	5.5	LOS A	1.3	33.6	0.28	0.45	30.8
Approach		649	0.9	0.262	6.1	LOS A	1.8	44.4	0.28	0.47	38.1
East: Cypress East Leg											
1	L2	10	0.9	0.025	7.7	LOS A	0.1	2.3	0.52	0.56	29.5
6	T1	5	0.9	0.025	2.6	LOS A	0.1	2.3	0.52	0.56	24.2
16	R2	4	0.9	0.025	3.3	LOS A	0.1	2.3	0.52	0.56	28.8
Approach		19	0.9	0.025	5.4	LOS A	0.1	2.3	0.52	0.56	27.8
North: RT 1 North Leg											
7	L2	6	0.9	0.425	12.2	LOS B	3.2	79.6	0.25	0.46	35.9
4	T1	998	0.9	0.425	6.4	LOS A	3.2	79.6	0.25	0.47	39.3
14	R2	86	0.9	0.346	6.0	LOS A	2.3	58.0	0.24	0.47	29.9
Approach		1090	0.9	0.425	6.4	LOS A	3.2	79.6	0.25	0.47	38.3
West: Cypress West Leg											
5	L2	71	0.9	0.158	9.1	LOS A	0.6	16.2	0.62	0.78	27.6
2	T1	5	0.9	0.158	4.0	LOS A	0.6	16.2	0.62	0.78	23.2
12	R2	29	0.9	0.158	4.7	LOS A	0.6	16.2	0.62	0.78	26.6
Approach		105	0.9	0.158	7.6	LOS A	0.6	16.2	0.62	0.78	27.2
All Vehicles		1863	0.9	0.425	6.4	LOS A	3.2	79.6	0.28	0.49	37.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.6 – Future (2020) PM Conditions

Intersection	
Int Delay, s/veh	45.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	130	9	31	12	7	4	38	753	18	7	753	109
Future Vol, veh/h	130	9	31	12	7	4	38	753	18	7	753	109
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	130	9	31	12	7	4	38	753	18	7	753	109

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1664	1669	808	1664	1714	762	862	0	0	771	0	0
Stage 1	822	822	-	838	838	-	-	-	-	-	-	-
Stage 2	842	847	-	826	876	-	-	-	-	-	-	-
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	~ 77	96	381	77	90	405	780	-	-	844	-	-
Stage 1	368	388	-	361	382	-	-	-	-	-	-	-
Stage 2	359	378	-	366	367	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 68	91	381	63	85	405	780	-	-	844	-	-
Mov Cap-2 Maneuver	~ 68	91	-	63	85	-	-	-	-	-	-	-
Stage 1	350	385	-	343	363	-	-	-	-	-	-	-
Stage 2	332	360	-	326	364	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 494	64.1	0.5	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	780	-	-	69	381	70	405	844	-	-
HCM Lane V/C Ratio	0.049	-	-	2.014	0.081	0.271	0.01	0.008	-	-
HCM Control Delay (s)	9.9	-	-	$ 600.7	15.3	74.6	14	9.3	-	-
HCM Lane LOS	A	-	-	F	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	12.8	0.3	1	0	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.7	0.5	0.5	0.5
Total Del/Veh (s)	248.0	51.3	4.5	4.9	28.2

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	33.2

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	R	LT	R	L	L
Maximum Queue (ft)	585	55	51	33	32	27
Average Queue (ft)	325	27	11	3	10	3
95th Queue (ft)	771	58	35	16	27	14
Link Distance (ft)	9621		429			
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		25		25	70	50
Storage Blk Time (%)	88	9	15	1		0
Queuing Penalty (veh)	27	12	1	0		0

Network Summary

Network wide Queuing Penalty: 40

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	9	31	12	7	4	38	753	18	7	753	109
Future Volume (veh/h)	130	9	31	12	7	4	38	753	18	7	753	109
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	130	9	31	12	7	4	38	753	18	7	753	109
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	4	419	97	36	419	277	1093	26	343	961	139
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	0	16	1583	0	136	1583	639	1812	43	696	1592	230
Grp Volume(v), veh/h	139	0	31	19	0	4	38	0	771	7	0	862
Grp Sat Flow(s),veh/h/ln	16	0	1583	136	0	1583	639	0	1855	696	0	1822
Q Serve(g_s), s	0.0	0.0	0.9	0.0	0.0	0.1	2.9	0.0	17.1	0.4	0.0	21.5
Cycle Q Clear(g_c), s	16.0	0.0	0.9	16.0	0.0	0.1	24.4	0.0	17.1	17.5	0.0	21.5
Prop In Lane	0.94		1.00	0.63		1.00	1.00		0.02	1.00		0.13
Lane Grp Cap(c), veh/h	119	0	419	133	0	419	277	0	1120	343	0	1100
V/C Ratio(X)	1.16	0.00	0.07	0.14	0.00	0.01	0.14	0.00	0.69	0.02	0.00	0.78
Avail Cap(c_a), veh/h	119	0	419	133	0	419	324	0	1257	394	0	1234
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.7	0.0	16.7	18.4	0.0	16.4	18.2	0.0	8.1	14.1	0.0	9.0
Incr Delay (d2), s/veh	133.3	0.0	0.1	0.5	0.0	0.0	0.2	0.0	1.4	0.0	0.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.0	0.4	0.3	0.0	0.0	0.5	0.0	9.0	0.1	0.0	11.5
LnGrp Delay(d),s/veh	163.0	0.0	16.8	18.9	0.0	16.4	18.4	0.0	9.5	14.1	0.0	12.1
LnGrp LOS	F		B	B		B	B		A	B		B
Approach Vol, veh/h		170			23			809			869	
Approach Delay, s/veh		136.3			18.4			9.9			12.1	
Approach LOS		F			B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.5		20.0		40.5		20.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		41.0		16.0		41.0		16.0
Max Q Clear Time (g_c+I1), s		26.4		18.0		23.5		18.0
Green Ext Time (p_c), s		10.1		0.0		11.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.7	0.5	0.5	0.5
Total Del/Veh (s)	16.4	13.4	12.2	11.8	12.4

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	19.5

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	141	56	33	29	94	335	20	261
Average Queue (ft)	57	24	7	2	21	119	3	121
95th Queue (ft)	113	53	24	14	58	247	15	226
Link Distance (ft)	2710		429			3241		3287
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	29	7	4	0	0	9		12
Queuing Penalty (veh)	9	10	0	0	2	3		1

Network Summary

Network wide Queuing Penalty: 26

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2020 PM]

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	38	1.5	0.843	24.3	LOS C	12.7	320.9	0.87	0.70	21.2
8	T1	753	1.5	0.843	24.3	LOS C	12.7	320.9	0.87	0.70	24.0
18	R2	18	1.5	0.843	24.3	LOS C	12.7	320.9	0.87	0.70	19.1
Approach		809	1.5	0.843	24.3	LOS C	12.7	320.9	0.87	0.70	23.7
East: Cypress East Leg											
1	L2	12	1.5	0.053	9.0	LOS A	0.2	4.1	0.62	0.62	25.0
6	T1	7	1.5	0.053	9.0	LOS A	0.2	4.1	0.62	0.62	21.0
16	R2	4	1.5	0.053	9.0	LOS A	0.2	4.1	0.62	0.62	24.6
Approach		23	1.5	0.053	9.0	LOS A	0.2	4.1	0.62	0.62	23.6
North: RT 1 North Leg											
7	L2	7	1.5	0.827	21.5	LOS C	11.8	299.7	0.63	0.32	21.7
4	T1	753	1.5	0.827	21.5	LOS C	11.8	299.7	0.63	0.32	25.2
14	R2	109	1.5	0.827	21.5	LOS C	11.8	299.7	0.63	0.32	21.1
Approach		869	1.5	0.827	21.5	LOS C	11.8	299.7	0.63	0.32	24.6
West: Cypress West Leg											
5	L2	130	1.5	0.334	12.3	LOS B	1.3	32.4	0.65	0.68	23.4
2	T1	9	1.5	0.334	12.3	LOS B	1.3	32.4	0.65	0.68	19.5
12	R2	31	1.5	0.334	12.3	LOS B	1.3	32.4	0.65	0.68	22.7
Approach		170	1.5	0.334	12.3	LOS B	1.3	32.4	0.65	0.68	23.1
All Vehicles		1871	1.5	0.843	21.7	LOS C	12.7	320.9	0.74	0.52	24.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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 SUMMARY

Site: 102 [2 Lane Roundabout 2020 PM]

New Site
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: RT 1 South Leg											
3	L2	38	1.5	0.348	12.0	LOS B	2.5	63.3	0.41	0.51	31.5
8	T1	753	1.5	0.348	6.2	LOS A	2.5	63.3	0.41	0.51	37.8
18	R2	18	1.5	0.283	6.0	LOS A	1.8	46.8	0.40	0.50	30.2
Approach		809	1.5	0.348	6.4	LOS A	2.5	63.3	0.41	0.51	37.3
East: Cypress East Leg											
1	L2	12	1.5	0.035	8.5	LOS A	0.1	3.5	0.59	0.64	29.0
6	T1	7	1.5	0.035	3.4	LOS A	0.1	3.5	0.59	0.64	23.8
16	R2	4	1.5	0.035	4.1	LOS A	0.1	3.5	0.59	0.64	28.2
Approach		23	1.5	0.035	6.2	LOS A	0.1	3.5	0.59	0.64	27.1
North: RT 1 North Leg											
7	L2	7	1.5	0.342	12.2	LOS B	2.3	59.0	0.23	0.46	36.0
4	T1	753	1.5	0.342	6.4	LOS A	2.3	59.0	0.23	0.47	39.3
14	R2	109	1.5	0.278	6.0	LOS A	1.7	44.1	0.23	0.48	29.9
Approach		869	1.5	0.342	6.4	LOS A	2.3	59.0	0.23	0.47	37.8
West: Cypress West Leg											
5	L2	130	1.5	0.230	8.5	LOS A	1.0	24.5	0.59	0.76	27.7
2	T1	9	1.5	0.230	3.4	LOS A	1.0	24.5	0.59	0.76	23.3
12	R2	31	1.5	0.230	4.2	LOS A	1.0	24.5	0.59	0.76	26.7
Approach		170	1.5	0.230	7.4	LOS A	1.0	24.5	0.59	0.76	27.3
All Vehicles		1871	1.5	0.348	6.5	LOS A	2.5	63.3	0.35	0.52	36.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.7 – Future (2040) AM Conditions

Intersection	
Int Delay, s/veh	63.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	111	8	46	13	11	11	30	940	3	5	859	129
Future Vol, veh/h	111	8	46	13	11	11	30	940	3	5	859	129
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	111	8	46	13	11	11	30	940	3	5	859	129

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1941	1937	924	1940	2000	942	988	0	0	943	0	0
Stage 1	934	934	-	1002	1002	-	-	-	-	-	-	-
Stage 2	1007	1003	-	938	998	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.236	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 49	65	324	49	59	316	692	-	-	719	-	-
Stage 1	316	342	-	290	318	-	-	-	-	-	-	-
Stage 2	288	317	-	315	319	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 39	62	324	36	56	316	692	-	-	719	-	-
Mov Cap-2 Maneuver	~ 39	62	-	36	56	-	-	-	-	-	-	-
Stage 1	302	340	-	277	304	-	-	-	-	-	-	-
Stage 2	256	303	-	262	317	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 800.7	118.5	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	692	-	-	40	324	43	316	719	-	-
HCM Lane V/C Ratio	0.043	-	-	2.975	0.142	0.558	0.035	0.007	-	-
HCM Control Delay (s)	10.4	-	-	$ 1103.3	17.9	165.1	16.8	10	-	-
HCM Lane LOS	B	-	-	F	C	F	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	13.2	0.5	2	0.1	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.6	0.8	0.7	0.7
Total Del/Veh (s)	899.4	99.6	2.2	2.5	80.4

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	81.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	L	L	TR
Maximum Queue (ft)	2156	49	103	40	44	18	3
Average Queue (ft)	1147	22	27	10	12	2	0
95th Queue (ft)	2160	54	78	35	32	11	2
Link Distance (ft)	4574		429				457
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		25		25	70	50	
Storage Blk Time (%)	98	10	38	4	0		
Queuing Penalty (veh)	45	12	4	1	0		

Network Summary

Network wide Queuing Penalty: 62

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	8	46	13	11	11	30	940	3	5	859	129
Future Volume (veh/h)	111	8	46	13	11	11	30	940	3	5	859	129
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1827	1900	1827	1827	1827	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	111	8	46	13	11	11	30	940	3	5	859	129
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	109	4	388	87	48	388	202	1137	4	243	970	146
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
Sat Flow, veh/h	0	16	1553	0	193	1553	557	1820	6	581	1553	233
Grp Volume(v), veh/h	119	0	46	24	0	11	30	0	943	5	0	988
Grp Sat Flow(s),veh/h/ln	16	0	1553	193	0	1553	557	0	1826	581	0	1786
Q Serve(g_s), s	0.0	0.0	1.5	0.0	0.0	0.3	3.1	0.0	25.6	0.4	0.0	29.7
Cycle Q Clear(g_c), s	16.0	0.0	1.5	16.0	0.0	0.3	32.8	0.0	25.6	26.1	0.0	29.7
Prop In Lane	0.93		1.00	0.54		1.00	1.00		0.00	1.00		0.13
Lane Grp Cap(c), veh/h	113	0	388	135	0	388	202	0	1141	243	0	1116
V/C Ratio(X)	1.05	0.00	0.12	0.18	0.00	0.03	0.15	0.00	0.83	0.02	0.00	0.89
Avail Cap(c_a), veh/h	113	0	388	135	0	388	211	0	1170	252	0	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	18.5	19.8	0.0	18.1	23.8	0.0	9.3	19.4	0.0	10.1
Incr Delay (d2), s/veh	100.1	0.0	0.1	0.6	0.0	0.0	0.3	0.0	4.9	0.0	0.0	8.4
Initial Q Delay(d3),s/veh	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.0	0.6	0.3	0.0	0.1	0.5	0.0	14.1	0.1	0.0	16.9
LnGrp Delay(d),s/veh	132.0	0.0	18.7	20.5	0.0	18.2	24.2	0.0	14.2	19.5	0.0	18.5
LnGrp LOS	F		B	C		B	C		B	B		B
Approach Vol, veh/h		165			35			973			993	
Approach Delay, s/veh		100.4			19.7			14.5			18.5	
Approach LOS		F			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		44.0		20.0		44.0		20.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		41.0		16.0		41.0		16.0
Max Q Clear Time (g_c+I1), s		34.8		18.0		31.7		18.0
Green Ext Time (p_c), s		5.2		0.0		7.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	23.0
HCM 2010 LOS	C

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.6	0.6	0.6	0.6
Total Del/Veh (s)	20.7	17.1	15.8	15.8	16.2

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	26.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	128	56	47	33	87	267	28	300
Average Queue (ft)	64	29	10	8	20	106	3	109
95th Queue (ft)	115	56	33	30	55	221	16	226
Link Distance (ft)	5277		430			5533		5616
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	29	12	6	3	1	8		12
Queuing Penalty (veh)	13	14	1	1	9	2		1

Network Summary

Network wide Queuing Penalty: 41

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2040 AM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	30	3.9	0.877	15.7	LOS B	18.6	480.4	1.00	0.68	29.3
8	T1	940	3.9	0.877	9.7	LOS A	18.6	480.4	1.00	0.68	34.4
18	R2	3	3.9	0.877	9.4	LOS A	18.6	480.4	1.00	0.68	27.6
Approach		973	3.9	0.877	9.8	LOS A	18.6	480.4	1.00	0.68	34.2
East: Cypress East Leg											
1	L2	13	3.9	0.116	16.6	LOS B	0.8	21.0	0.98	0.89	24.2
6	T1	11	3.9	0.116	11.4	LOS B	0.8	21.0	0.98	0.89	20.6
16	R2	11	3.9	0.116	12.3	LOS B	0.8	21.0	0.98	0.89	23.7
Approach		35	3.9	0.116	13.6	LOS B	0.8	21.0	0.98	0.89	22.8
North: RT 1 North Leg											
7	L2	5	3.9	0.819	13.1	LOS B	15.3	394.0	0.69	0.47	33.2
4	T1	859	3.9	0.819	7.1	LOS A	15.3	394.0	0.69	0.47	36.4
14	R2	129	3.9	0.819	6.7	LOS A	15.3	394.0	0.69	0.47	28.5
Approach		993	3.9	0.819	7.1	LOS A	15.3	394.0	0.69	0.47	35.1
West: Cypress West Leg											
5	L2	111	3.9	0.345	13.2	LOS B	2.4	62.0	0.92	0.94	25.4
2	T1	8	3.9	0.345	7.9	LOS A	2.4	62.0	0.92	0.94	21.4
12	R2	46	3.9	0.345	8.9	LOS A	2.4	62.0	0.92	0.94	24.5
Approach		165	3.9	0.345	11.7	LOS B	2.4	62.0	0.92	0.94	24.9
All Vehicles		2166	3.9	0.877	8.8	LOS A	18.6	480.4	0.85	0.61	33.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2040 AM]

New Site
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: RT 1 South Leg											
3	L2	30	3.9	0.423	12.1	LOS B	3.3	86.3	0.43	0.50	31.5
8	T1	940	3.9	0.423	6.2	LOS A	3.3	86.3	0.42	0.50	37.5
18	R2	3	3.9	0.344	6.0	LOS A	2.4	62.4	0.41	0.50	30.1
Approach		973	3.9	0.423	6.4	LOS A	3.3	86.3	0.42	0.50	37.3
East: Cypress East Leg											
1	L2	13	3.9	0.061	9.3	LOS A	0.2	6.3	0.64	0.70	28.7
6	T1	11	3.9	0.061	4.3	LOS A	0.2	6.3	0.64	0.70	23.8
16	R2	11	3.9	0.061	5.0	LOS A	0.2	6.3	0.64	0.70	28.0
Approach		35	3.9	0.061	6.4	LOS A	0.2	6.3	0.64	0.70	26.8
North: RT 1 North Leg											
7	L2	5	3.9	0.400	12.3	LOS B	2.9	75.8	0.25	0.46	35.9
4	T1	859	3.9	0.400	6.4	LOS A	2.9	75.8	0.25	0.47	38.8
14	R2	129	3.9	0.325	6.0	LOS A	2.2	55.6	0.25	0.48	29.9
Approach		993	3.9	0.400	6.4	LOS A	2.9	75.8	0.25	0.47	37.4
West: Cypress West Leg											
5	L2	111	3.9	0.247	9.2	LOS A	1.1	27.1	0.63	0.79	27.3
2	T1	8	3.9	0.247	4.1	LOS A	1.1	27.1	0.63	0.79	23.2
12	R2	46	3.9	0.247	4.9	LOS A	1.1	27.1	0.63	0.79	26.4
Approach		165	3.9	0.247	7.7	LOS A	1.1	27.1	0.63	0.79	26.9
All Vehicles		2166	3.9	0.423	6.5	LOS A	3.3	86.3	0.36	0.51	36.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.8 – Future (2040) Midday Conditions

Intersection	
Int Delay, s/veh	185.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	100	6	43	14	6	6	61	894	9	9	1482	122
Future Vol, veh/h	100	6	43	14	6	6	61	894	9	9	1482	122
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	100	6	43	14	6	6	61	894	9	9	1482	122

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2585	2586	1543	2585	2643	899	1604	0	0	903	0	0
Stage 1	1561	1561	-	1021	1021	-	-	-	-	-	-	-
Stage 2	1024	1025	-	1564	1622	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	~ 17	26	142	17	23	339	410	-	-	757	-	-
Stage 1	141	174	-	286	315	-	-	-	-	-	-	-
Stage 2	285	314	-	141	162	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 11	22	142	~ 8	19	339	410	-	-	757	-	-
Mov Cap-2 Maneuver	~ 11	22	-	~ 8	19	-	-	-	-	-	-	-
Stage 1	120	172	-	243	268	-	-	-	-	-	-	-
Stage 2	233	267	-	94	160	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 3252.1	$ 928.3	1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	410	-	-	11	142	10	339	757	-	-
HCM Lane V/C Ratio	0.149	-	-	9.636	0.303	2	0.018	0.012	-	-
HCM Control Delay (s)	15.3	-	-	$ 4554.7	41	$ 1202.1	15.8	9.8	-	-
HCM Lane LOS	C	-	-	F	E	F	C	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	14.6	1.2	3.4	0.1	0	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	1.1	4.1	1.5	2.3
Total Del/Veh (s)	1854.8	1254.4	23.2	10.3	137.6

Total Network Performance

Denied Del/Veh (s)	2.3
Total Del/Veh (s)	141.8

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	R	LT	R	L	TR	L
Maximum Queue (ft)	3426	32	348	32	90	573	23
Average Queue (ft)	1950	3	190	3	49	159	3
95th Queue (ft)	3481	18	421	22	99	795	15
Link Distance (ft)	5205		900			1348	
Upstream Blk Time (%)						4	
Queuing Penalty (veh)						0	
Storage Bay Dist (ft)		25		25	70		50
Storage Blk Time (%)	100	3	98	1	24		0
Queuing Penalty (veh)	43	3	6	0	216		0

Network Summary

Network wide Queuing Penalty: 268

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	5	29	10	5	4	41	602	6	6	998	86
Future Volume (veh/h)	71	5	29	10	5	4	41	602	6	6	998	86
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1881	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	71	5	29	10	5	4	41	602	6	6	998	86
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	105	4	333	87	28	333	226	1267	13	532	1164	100
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.68	0.68	0.68	0.68	0.68	0.68
Sat Flow, veh/h	40	20	1599	20	135	1599	523	1859	19	817	1708	147
Grp Volume(v), veh/h	76	0	29	15	0	4	41	0	608	6	0	1084
Grp Sat Flow(s),veh/h/ln	61	0	1599	155	0	1599	523	0	1878	817	0	1855
Q Serve(g_s), s	0.5	0.0	1.1	0.1	0.0	0.1	4.7	0.0	11.0	0.3	0.0	32.4
Cycle Q Clear(g_c), s	15.0	0.0	1.1	14.9	0.0	0.1	36.5	0.0	11.0	11.3	0.0	32.4
Prop In Lane	0.93		1.00	0.67		1.00	1.00		0.01	1.00		0.08
Lane Grp Cap(c), veh/h	109	0	333	115	0	333	226	0	1279	532	0	1264
V/C Ratio(X)	0.70	0.00	0.09	0.13	0.00	0.01	0.18	0.00	0.48	0.01	0.00	0.86
Avail Cap(c_a), veh/h	129	0	354	136	0	354	275	0	1456	609	0	1439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.4	0.0	23.1	24.1	0.0	22.7	22.6	0.0	5.4	8.1	0.0	8.8
Incr Delay (d2), s/veh	12.4	0.0	0.1	0.5	0.0	0.0	0.4	0.0	0.3	0.0	0.0	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.5	0.3	0.0	0.1	0.7	0.0	5.7	0.1	0.0	18.0
LnGrp Delay(d),s/veh	47.8	0.0	23.2	24.7	0.0	22.7	23.0	0.0	5.7	8.1	0.0	13.7
LnGrp LOS	D		C	C		C	C		A	A		B
Approach Vol, veh/h		105			19			649			1090	
Approach Delay, s/veh		41.0			24.2			6.8			13.7	
Approach LOS		D			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		53.4		19.3		53.4		19.3
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		56.0		16.0		56.0		16.0
Max Q Clear Time (g_c+I1), s		38.5		17.0		34.4		16.9
Green Ext Time (p_c), s		11.2		0.0		12.9		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		12.9
HCM 2010 LOS		B

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.4	0.9	0.6	0.7	0.6
Total Del/Veh (s)	19.2	20.5	6.1	10.6	9.6

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	13.8

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	124	40	38	34	67	111	20	301
Average Queue (ft)	42	21	9	2	19	32	2	91
95th Queue (ft)	92	48	29	15	49	78	12	206
Link Distance (ft)	1936		429			1118		2669
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	24	8	7	0	1	1		7
Queuing Penalty (veh)	7	6	0	0	4	0		0

Network Summary

Network wide Queuing Penalty: 18

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2040 WE]

New Site
Roundabout

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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
Movement Performance - Vehicles											
South: RT 1 South Leg											
3	L2	61	0.9	0.829	13.2	LOS B	14.0	352.1	0.90	0.59	29.7
8	T1	894	0.9	0.829	7.1	LOS A	14.0	352.1	0.90	0.59	35.3
18	R2	9	0.9	0.829	6.9	LOS A	14.0	352.1	0.90	0.59	28.0
Approach		964	0.9	0.829	7.5	LOS A	14.0	352.1	0.90	0.59	34.8
East: Cypress East Leg											
1	L2	14	0.9	0.070	14.4	LOS B	0.5	12.3	0.94	0.82	25.2
6	T1	6	0.9	0.070	9.2	LOS A	0.5	12.3	0.94	0.82	21.1
16	R2	6	0.9	0.070	10.1	LOS B	0.5	12.3	0.94	0.82	24.7
Approach		26	0.9	0.070	12.2	LOS B	0.5	12.3	0.94	0.82	24.0
North: RT 1 North Leg											
7	L2	9	0.9	1.330	166.0	LOS F	187.4	4717.7	1.00	1.74	6.2
4	T1	1482	0.9	1.330	160.0	LOS F	187.4	4717.7	1.00	1.74	7.7
14	R2	122	0.9	1.330	159.7	LOS F	187.4	4717.7	1.00	1.74	7.2
Approach		1613	0.9	1.330	160.0	LOS F	187.4	4717.7	1.00	1.74	7.6
West: Cypress West Leg											
5	L2	100	0.9	0.524	26.4	LOS C	4.6	115.7	1.00	1.13	20.8
2	T1	6	0.9	0.524	21.2	LOS C	4.6	115.7	1.00	1.13	17.2
12	R2	43	0.9	0.524	22.1	LOS C	4.6	115.7	1.00	1.13	20.2
Approach		149	0.9	0.524	24.9	LOS C	4.6	115.7	1.00	1.13	20.5
All Vehicles		2752	0.9	1.330	97.9	LOS F	187.4	4717.7	0.97	1.29	11.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2040 WE]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	61	0.9	0.403	11.9	LOS B	3.2	81.5	0.40	0.50	31.5
8	T1	894	0.9	0.403	6.0	LOS A	3.2	81.5	0.40	0.50	37.9
18	R2	9	0.9	0.327	5.8	LOS A	2.3	59.1	0.39	0.48	30.2
Approach		964	0.9	0.403	6.4	LOS A	3.2	81.5	0.40	0.50	37.4
East: Cypress East Leg											
1	L2	14	0.9	0.041	8.8	LOS A	0.2	4.2	0.62	0.68	28.8
6	T1	6	0.9	0.041	3.8	LOS A	0.2	4.2	0.62	0.68	23.6
16	R2	6	0.9	0.041	4.5	LOS A	0.2	4.2	0.62	0.68	28.0
Approach		26	0.9	0.041	6.7	LOS A	0.2	4.2	0.62	0.68	27.2
North: RT 1 North Leg											
7	L2	9	0.9	0.645	12.6	LOS B	6.9	172.7	0.43	0.48	34.6
4	T1	1482	0.9	0.645	6.8	LOS A	6.9	172.7	0.41	0.49	38.2
14	R2	122	0.9	0.524	6.3	LOS A	4.5	113.2	0.38	0.49	29.4
Approach		1613	0.9	0.645	6.8	LOS A	6.9	172.7	0.41	0.49	37.3
West: Cypress West Leg											
5	L2	100	0.9	0.312	12.2	LOS B	1.5	37.7	0.78	0.89	26.1
2	T1	6	0.9	0.312	7.1	LOS A	1.5	37.7	0.78	0.89	21.9
12	R2	43	0.9	0.312	7.8	LOS A	1.5	37.7	0.78	0.89	25.2
Approach		149	0.9	0.312	10.7	LOS B	1.5	37.7	0.78	0.89	25.7
All Vehicles		2752	0.9	0.645	6.9	LOS A	6.9	172.7	0.43	0.51	36.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.9 – Future (2040) PM Conditions

Intersection	
Int Delay, s/veh	404.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	165	10	46	17	9	6	57	1120	27	11	1120	155
Future Vol, veh/h	165	10	46	17	9	6	57	1120	27	11	1120	155
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	-	-	25	-	-	25	70	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	165	10	46	17	9	6	57	1120	27	11	1120	155

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2472	2481	1198	2473	2545	1134	1275	0	0	1147	0	0
Stage 1	1220	1220	-	1248	1248	-	-	-	-	-	-	-
Stage 2	1252	1261	-	1225	1297	-	-	-	-	-	-	-
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	~ 20	30	226	20	27	247	545	-	-	609	-	-
Stage 1	220	253	-	212	245	-	-	-	-	-	-	-
Stage 2	211	241	-	219	232	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 13	26	226	~ 10	24	247	545	-	-	609	-	-
Mov Cap-2 Maneuver	~ 13	26	-	~ 10	24	-	-	-	-	-	-	-
Stage 1	197	248	-	190	219	-	-	-	-	-	-	-
Stage 2	177	216	-	164	228	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 4894.4	$ 860.5	0.6	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	545	-	-	13	226	13	247	609	-	-
HCM Lane V/C Ratio	0.105	-	-	13.462	0.204	2	0.024	0.018	-	-
HCM Control Delay (s)	12.4	-	$ 6174.3		25	$ 1054.5	19.9	11	-	-
HCM Lane LOS	B	-	-	F	D	F	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-	23.1	0.7	4	0.1	0.1	-	-

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

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.9	0.8	0.9	0.8
Total Del/Veh (s)	1621.2	612.3	6.9	7.9	162.8

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	166.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	LT	R	LT	R	L	L	TR
Maximum Queue (ft)	4957	40	229	40	74	24	5
Average Queue (ft)	2695	5	130	6	21	4	0
95th Queue (ft)	4937	27	293	29	48	16	3
Link Distance (ft)	9621		429				3632
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		25		25	70	50	
Storage Blk Time (%)	100	4	88	2	1	0	
Queuing Penalty (veh)	46	7	5	1	10	0	

Network Summary

Network wide Queuing Penalty: 69

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	10	46	17	9	6	57	1120	27	11	1120	155
Future Volume (veh/h)	165	10	46	17	9	6	57	1120	27	11	1120	155
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	165	10	46	17	9	6	57	1120	27	11	1120	155
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	0	281	66	22	281	129	1328	32	227	1175	163
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.73	0.73	0.73	0.73	0.73	0.73
Sat Flow, veh/h	0	0	1583	0	123	1583	432	1811	44	488	1602	222
Grp Volume(v), veh/h	175	0	46	26	0	6	57	0	1147	11	0	1275
Grp Sat Flow(s),veh/h/ln	0	0	1583	123	0	1583	432	0	1855	488	0	1824
Q Serve(g_s), s	0.0	0.0	2.2	0.0	0.0	0.3	10.2	0.0	38.9	1.4	0.0	55.8
Cycle Q Clear(g_c), s	16.0	0.0	2.2	16.0	0.0	0.3	66.0	0.0	38.9	40.3	0.0	55.8
Prop In Lane	0.94		1.00	0.65		1.00	1.00		0.02	1.00		0.12
Lane Grp Cap(c), veh/h	78	0	281	88	0	281	129	0	1360	227	0	1337
V/C Ratio(X)	2.25	0.00	0.16	0.30	0.00	0.02	0.44	0.00	0.84	0.05	0.00	0.95
Avail Cap(c_a), veh/h	78	0	281	88	0	281	129	0	1360	227	0	1337
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	45.0	0.0	31.3	32.1	0.0	30.5	40.6	0.0	8.4	22.5	0.0	10.6
Incr Delay (d2), s/veh	602.3	0.0	0.3	1.8	0.0	0.0	2.4	0.0	5.0	0.1	0.0	14.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.9	0.0	1.0	0.6	0.0	0.1	1.5	0.0	21.3	0.2	0.0	32.8
LnGrp Delay(d),s/veh	647.3	0.0	31.6	33.9	0.0	30.6	43.0	0.0	13.4	22.6	0.0	25.6
LnGrp LOS	F		C	C		C	D		B	C		C
Approach Vol, veh/h		221			32			1204			1286	
Approach Delay, s/veh		519.1			33.3			14.8			25.5	
Approach LOS		F			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		70.0		20.0		70.0		20.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		66.0		16.0		66.0		16.0
Max Q Clear Time (g_c+I1), s		68.0		18.0		57.8		18.0
Green Ext Time (p_c), s		0.0		0.0		7.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	60.7
HCM 2010 LOS	E

1: Highway 1 & Cypress Avenue Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.9	0.8	0.9	0.8
Total Del/Veh (s)	40.8	30.9	109.0	27.7	64.3

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	74.6

Intersection: 1: Highway 1 & Cypress Avenue

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	241	48	55	37	94	2006	35	589
Average Queue (ft)	122	28	15	6	56	1098	6	287
95th Queue (ft)	204	53	41	25	108	3151	24	534
Link Distance (ft)	2710		429			4948		4698
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		25		25	70		50	
Storage Blk Time (%)	61	23	16	4	27	18	0	20
Queuing Penalty (veh)	28	40	1	1	307	10	0	2

Network Summary

Network wide Queuing Penalty: 390

MOVEMENT SUMMARY

Site: 102 [1 Lane Roundabout 2040 PM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows 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: RT 1 South Leg											
3	L2	57	1.5	1.127	79.6	LOS F	76.8	1943.2	1.00	1.74	13.0
8	T1	1120	1.5	1.127	73.6	LOS F	76.8	1943.2	1.00	1.74	14.0
18	R2	27	1.5	1.127	73.3	LOS F	76.8	1943.2	1.00	1.74	11.1
Approach		1204	1.5	1.127	73.8	LOS E	76.8	1943.2	1.00	1.74	13.9
East: Cypress East Leg											
1	L2	17	1.5	0.121	19.1	LOS B	0.9	22.1	1.00	0.91	22.9
6	T1	9	1.5	0.121	13.9	LOS B	0.9	22.1	1.00	0.91	19.5
16	R2	6	1.5	0.121	14.8	LOS B	0.9	22.1	1.00	0.91	22.5
Approach		32	1.5	0.121	16.8	LOS B	0.9	22.1	1.00	0.91	21.8
North: RT 1 North Leg											
7	L2	11	1.5	1.062	47.3	LOS F	78.8	1994.0	1.00	0.84	17.4
4	T1	1120	1.5	1.062	41.3	LOS F	78.8	1994.0	1.00	0.84	20.4
14	R2	155	1.5	1.062	40.9	LOS F	78.8	1994.0	1.00	0.84	17.6
Approach		1286	1.5	1.062	41.3	LOS D	78.8	1994.0	1.00	0.84	20.0
West: Cypress West Leg											
5	L2	165	1.5	0.716	35.6	LOS D	7.6	193.1	1.00	1.29	18.4
2	T1	10	1.5	0.716	30.4	LOS C	7.6	193.1	1.00	1.29	15.2
12	R2	46	1.5	0.716	31.3	LOS C	7.6	193.1	1.00	1.29	17.9
Approach		221	1.5	0.716	34.5	LOS C	7.6	193.1	1.00	1.29	18.1
All Vehicles		2743	1.5	1.127	54.7	LOS D	78.8	1994.0	1.00	1.27	16.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [2 Lane Roundabout 2040 PM]

New Site
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: RT 1 South Leg											
3	L2	57	1.5	0.541	12.5	LOS B	4.9	123.5	0.58	0.57	30.8
8	T1	1120	1.5	0.541	6.7	LOS A	4.9	123.5	0.56	0.57	36.9
18	R2	27	1.5	0.439	6.5	LOS A	3.4	86.1	0.54	0.56	29.5
Approach		1204	1.5	0.541	6.9	LOS A	4.9	123.5	0.56	0.57	36.4
East: Cypress East Leg											
1	L2	17	1.5	0.065	10.4	LOS B	0.3	7.2	0.72	0.79	27.8
6	T1	9	1.5	0.065	5.3	LOS A	0.3	7.2	0.72	0.79	23.0
16	R2	6	1.5	0.065	6.0	LOS A	0.3	7.2	0.72	0.79	27.1
Approach		32	1.5	0.065	8.1	LOS A	0.3	7.2	0.72	0.79	26.1
North: RT 1 North Leg											
7	L2	11	1.5	0.520	12.5	LOS B	4.6	116.0	0.37	0.48	35.0
4	T1	1120	1.5	0.520	6.6	LOS A	4.6	116.0	0.36	0.49	38.4
14	R2	155	1.5	0.422	6.2	LOS A	3.2	81.1	0.35	0.50	29.5
Approach		1286	1.5	0.520	6.6	LOS A	4.6	116.0	0.36	0.49	37.1
West: Cypress West Leg											
5	L2	165	1.5	0.378	11.0	LOS B	1.9	47.8	0.74	0.90	26.5
2	T1	10	1.5	0.378	6.0	LOS A	1.9	47.8	0.74	0.90	22.3
12	R2	46	1.5	0.378	6.7	LOS A	1.9	47.8	0.74	0.90	25.6
Approach		221	1.5	0.378	9.9	LOS A	1.9	47.8	0.74	0.90	26.1
All Vehicles		2743	1.5	0.541	7.1	LOS A	4.9	123.5	0.48	0.56	35.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
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: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

G.10 – Output Summary: Control Delay (Seconds, Average)

Scenario	Time	Alternative	Highway 1		Cypress Avenue		Intersection
			SB	NB	EB	WB	
Existing	AM	Two-Way Stop Control	1	1	18	13	3
		Signal	5	5	7	6	5
		Single-Lane Roundabout	6	6	8	8	6
		Multi-Lane Roundabout	6	6	6	6	6
	MD	Two-Way Stop Control	2	2	61	27	5
		Signal	9	5	14	12	8
		Single-Lane Roundabout	7	6	13	8	7
		Multi-Lane Roundabout	6	6	8	6	6
	PM	Two-Way Stop Control	2	2	37	42	4
		Signal	6	6	11	10	6
		Single-Lane Roundabout	7	7	10	10	7
		Multi-Lane Roundabout	6	6	7	6	6
Future (2020)	AM	Two-Way Stop Control	2	2	33	20	33
		Signal	11	10	10	8	10
		Single-Lane Roundabout	6	6	8	7	6
		Multi-Lane Roundabout	6	6	6	5	6
	MD	Two-Way Stop Control	2	2	149	50	12
		Signal	15	10	18	13	14
		Single-Lane Roundabout	7	6	13	7	7
		Multi-Lane Roundabout	6	6	8	5	6
	PM	Two-Way Stop Control	5	5	>180	51	28
		Signal	12	12	16	13	12
		Single-Lane Roundabout	22	24	12	9	22
		Multi-Lane Roundabout	6	6	7	6	7
Future (2040)	AM	Two-Way Stop Control	3	2	>180	100	80
		Signal	16	16	21	17	16
		Single-Lane Roundabout	7	10	12	14	9
		Multi-Lane Roundabout	6	6	8	6	7
	MD	Two-Way Stop Control	10	23	>180	>180	138
		Signal	11	6	19	21	10
		Single-Lane Roundabout	160	8	25	12	98
		Multi-Lane Roundabout	7	6	11	7	7
	PM	Two-Way Stop Control	8	7	>180	>180	163
		Signal	28	109	41	31	64
		Single-Lane Roundabout	41	74	35	17	55
		Multi-Lane Roundabout	7	7	10	8	7

G.11 – Output Summary: Vehicle to Capacity Ratio

Scenario	Time	Alternative	Highway 1		Cypress Avenue		Intersection
			SB	NB	EB	WB	
Existing	AM	Two-Way Stop Control	0.004	0.022	0.154	0.031	N/A
		Signal	0.373	0.387	0.204	0.037	0.321
		Single-Lane Roundabout	0.519	0.574	0.139	0.030	0.574
		Multi-Lane Roundabout	0.255	0.280	0.132	0.026	0.28
	MD	Two-Way Stop Control	0.007	0.065	0.254	0.029	N/A
		Signal	0.540	0.385	0.226	0.041	0.408
		Single-Lane Roundabout	0.869	0.538	0.233	0.025	0.869
		Multi-Lane Roundabout	0.425	0.262	0.139	0.022	0.425
	PM	Two-Way Stop Control	0.009	0.050	0.222	0.041	N/A
		Signal	0.505	0.489	0.220	0.042	0.416
		Single-Lane Roundabout	0.703	0.690	0.173	0.038	0.703
		Multi-Lane Roundabout	0.344	0.336	0.145	0.030	0.344
Future (2020)	AM	Two-Way Stop Control	0.000	0.022	0.193	0.041	N/A
		Signal	0.457	0.438	0.230	0.045	0.365
		Single-Lane Roundabout	0.557	0.562	0.154	0.040	0.562
		Multi-Lane Roundabout	0.273	0.274	0.148	0.035	0.274
	MD	Two-Way Stop Control	0.006	0.064	0.365	0.034	N/A
		Signal	0.611	0.435	0.237	0.042	0.447
		Single-Lane Roundabout	0.869	0.539	0.260	0.028	0.869
		Multi-Lane Roundabout	0.425	0.262	0.158	0.025	0.425
	PM	Two-Way Stop Control	0.008	0.049	0.378	0.048	N/A
		Signal	0.602	0.580	0.316	0.042	0.489
		Single-Lane Roundabout	0.827	0.843	0.334	0.053	0.843
		Multi-Lane Roundabout	0.342	0.348	0.230	0.035	0.348
Future (2040)	AM	Two-Way Stop Control	0.007	0.043	0.453	0.097	N/A
		Signal	0.731	0.724	0.329	0.067	0.581
		Single-Lane Roundabout	0.819	0.877	0.345	0.116	0.877
		Multi-Lane Roundabout	0.400	0.423	0.247	0.061	0.423
	MD	Two-Way Stop Control	0.012	0.149	0.974	0.074	N/A
		Signal	0.607	0.431	0.238	0.042	0.447
		Single-Lane Roundabout	1.330	0.829	0.524	0.070	1.33
		Multi-Lane Roundabout	0.645	0.403	0.312	0.041	0.645
	PM	Two-Way Stop Control	0.018	0.105	0.925	0.123	N/A
		Signal	0.822	0.809	0.616	0.087	0.725
		Single-Lane Roundabout	1.062	1.127	0.716	0.121	1.127
		Multi-Lane Roundabout	0.520	0.541	0.378	0.065	0.541

Note: The SB and NB V/C ratios for two-way stop control only includes left turns – theoretically there is no intersection capacity limit to the uncontrolled through movements. As such, total intersection V/C ratio is not available.

G.12 – Output Summary: Vehicle Queuing (Feet, 95th Percentile)

Scenario	Time	Alternative	Highway 1		Cypress Avenue		Intersection
			SB	NB	EB	WB	
Existing	AM	Two-Way Stop Control	<25	<25	100	<25	175
		Signal	100	100	75	<25	100
		Single-Lane Roundabout	125	150	<25	<25	150
		Multi-Lane Roundabout	50	50	<25	<25	50
	MD	Two-Way Stop Control	<25	50	175	<25	175
		Signal	175	75	75	<25	175
		Single-Lane Roundabout	500	150	50	<25	500
		Multi-Lane Roundabout	100	50	<25	<25	100
	PM	Two-Way Stop Control	<25	50	125	50	125
		Signal	125	100	75	<25	125
		Single-Lane Roundabout	250	225	50	<25	250
		Multi-Lane Roundabout	75	75	<25	<25	75
Future (2020)	AM	Two-Way Stop Control	<25	<25	150	50	150
		Signal	150	125	75	<25	150
		Single-Lane Roundabout	150	150	<25	<25	150
		Multi-Lane Roundabout	50	50	<25	<25	50
	MD	Two-Way Stop Control	<25	50	325	50	325
		Signal	250	125	100	50	250
		Single-Lane Roundabout	500	150	50	<25	500
		Multi-Lane Roundabout	100	50	<25	<25	100
	PM	Two-Way Stop Control	<25	50	775	50	775
		Signal	250	250	125	<25	250
		Single-Lane Roundabout	300	325	50	<25	325
		Multi-Lane Roundabout	75	75	<25	<25	75
Future (2040)	AM	Two-Way Stop Control	<25	50	>1000	100	>1000
		Signal	250	225	125	50	250
		Single-Lane Roundabout	400	500	75	<25	500
		Multi-Lane Roundabout	100	100	50	<25	100
	MD	Two-Way Stop Control	<25	800	>1000	425	>1000
		Signal	225	100	100	50	225
		Single-Lane Roundabout	>1000	375	125	<25	>1000
		Multi-Lane Roundabout	175	100	50	<25	175
	PM	Two-Way Stop Control	<25	50	>1000	300	>1000
		Signal	550	>1000	225	50	>1000
		Single-Lane Roundabout	>1000	>1000	200	<25	>1000
		Multi-Lane Roundabout	125	125	50	<25	125

DKS

G.13 – Output Summary: Level of Service (LOS)

Scenario	Time	Alternative	Highway 1		Cypress Avenue		Intersection
			SB	NB	EB	WB	
Existing	AM	Two-Way Stop Control	A	A	**E**	D	A
		Signal	A	A	B	B	A
		Single-Lane Roundabout	A	A	A	A	A
		Multi-Lane Roundabout	A	A	A	A	A
	MD	Two-Way Stop Control	A	A	**F**	**F**	A
		Signal	A	A	C	B	A
		Single-Lane Roundabout	A	A	B	A	A
		Multi-Lane Roundabout	A	A	A	A	A
	PM	Two-Way Stop Control	A	A	**F**	**F**	B
		Signal	A	A	B	C	A
		Single-Lane Roundabout	A	A	A	A	A
		Multi-Lane Roundabout	A	A	A	A	A
Future (2020)	AM	Two-Way Stop Control	A	A	**F**	D	A
		Signal	A	A	B	B	A
		Single-Lane Roundabout	A	A	A	A	A
		Multi-Lane Roundabout	A	A	A	A	A
	MD	Two-Way Stop Control	A	A	**F**	**F**	B
		Signal	B	A	C	C	B
		Single-Lane Roundabout	A	A	B	A	A
		Multi-Lane Roundabout	A	A	A	A	A
	PM	Two-Way Stop Control	A	A	**F**	**F**	**E**
		Signal	A	A	**F**	B	C
		Single-Lane Roundabout	C	C	B	A	C
		Multi-Lane Roundabout	A	A	A	A	A
Future (2040)	AM	Two-Way Stop Control	A	A	**F**	**F**	**F**
		Signal	B	B	**F**	B	C
		Single-Lane Roundabout	A	A	B	B	A
		Multi-Lane Roundabout	A	A	A	A	A
	MD	Two-Way Stop Control	A	A	**F**	**F**	**F**
		Signal	B	A	D	C	B
		Single-Lane Roundabout	**F**	A	C	B	**F**
		Multi-Lane Roundabout	A	A	B	A	A
	PM	Two-Way Stop Control	A	A	**F**	**F**	**F**
		Signal	B	C	**F**	C	**E**
		Single-Lane Roundabout	D	**E**	C	B	**D**
		Multi-Lane Roundabout	A	A	A	A	A

Note: Failing values in red bold (LOS E or F for individual approaches; LOS D, E, or F for overall intersection)

Appendix H – Average Daily Traffic (ADT) Computation

Since daily traffic counts on Highway 1 were collected for 10 days, these were averaged to get an ADT of 19,921 vehicles per day. Since the one day, 14 hour (6am-8pm) counts had 16,532 vehicles entering the intersection from Highway 1, but the 24 hour counts had 19,921 vehicles on Highway 1, this ratio was used to convert Cypress Avenue's 1,173 vehicles entering during the one day into an ADT of 1,413 vehicles per day.

For 2040 ADT, only intersection peak hour movements are provided for both existing and future conditions. Therefore, the ratio of 4,732 vehicles during the AM, MD, and PM peak hours today and 7,661 vehicles in the future was used to grow the ADT. This results in 32,251 vehicles per day on Highway 1, and 2,288 vehicles per day on Cypress Avenue for 2040.

APPENDIX I – CALTRANS INTERSECTION CONTROL EVALUATION BENEFIT/COST WORKSHEET

Intersection Control Evaluation
Collision Cost Analysis and B/C

-- Fill in tan boxes along with 'Area' --

County	Rte	Postmile	Location Description
SM	1	35	Cypress Avenue, Moss Beach

Area
- (●) Rural
- ( ) Suburban
- ( ) Urban

Intersection Types:
F - Four-Legged
M - Multi-Legged
S - Offsett -Tee
Y - "Y" Wye

Existing Condition	# of Years for Analysis	Rate Group
Stop Control (Minor Leg), Type F, M or S	23	I2

Existing ADT (x1000)		Future ADT (x1000)			
Mainline	Cross St	Mainline	Cross St	Average ADT	VCF
19.9	1.4	32.3	2.3	27.9	1.31

Est. Capital Cost (x1000) for Desired Improvement

Desired Improvement	Const	R/W	Total
Yield Control (Roundabout 1-Lane)	$ 3,000	$ -	$ 3,000
Yield Control (Roundabout 2-Lane)	$ 4,750	$ -	$ 4,750
Traffic Signal, Type F, M or S	$ 700	$ -	$ 700
All Way Stop, Type F, M or S	$ 50	$ -	$ 50

Existing Collision Data

Number of Years	5	Total Collisions	11
Injury	3	PDO	8
Fatal	0	Fat + Inj	3

Collision Cost (x1000)

	Existing Condition		Desired Improvement		Projected Savings	B/C
1	Stop Control (Minor Leg), Type F, M or S	$19,470	Yield Control (Roundabout 1-Lane)	$2,449	$17,021	5.67
2	Stop Control (Minor Leg), Type F, M or S	$19,470	Yield Control (Roundabout 2-Lane)	$6,076	$13,394	2.82
3	Stop Control (Minor Leg), Type F, M or S	$19,470	Traffic Signal, Type F, M or S	$18,907	$563	0.80
4	Stop Control (Minor Leg), Type F, M or S	$19,470	All Way Stop, Type F, M or S	$22,095	($2,625)	-52.49

v1.00

NOTE: Only average collision costs are used for calculation purposes.