Appendix G

Traffic Technical Memo

SR 89/Fanny Bridge Community Revitalization Project Traffic Forecasts and Operations Analysis

PREPARED FOR: Caltrans District 3
Tahoe Transportation District
Tahoe Regional Planning Agency
Federal Highway Administration Central Federal Lands Division

PREPARED BY: CH2M HILL / Wood Rogers

DATE: December 18, 2014

This technical memorandum documents the traffic analysis performed by CH2MHILL in November, 2014 to support the traffic impact assessment for the State Route (SR) 89 / Fanny Bridge Community Revitalization Project Draft Environmental Impact Report / Environmental Impact Statement / Environmental Assessment (EIR/EIS/EA). The information presented in this technical memorandum supersedes the traffic analysis results and volume forecasts previously prepared and published by the Wood Rogers consulting firm in January, 2014. Revisions to the original EIR/EIS/EA traffic analysis were necessary because it was based on forecast traffic volumes that are not currently valid due to changes in basin-wide average daily traffic volumes and implementation of planned development projects. This technical memorandum, prepared by CH2M HILL, includes the background, historical traffic and pedestrian/bicyclist count information presented in the January, 2014 Wood Rogers technical memorandum.

Introduction

The proposed SR 89 / Fanny Bridge Community Revitalization Project study area is located within the vicinity of Fanny Bridge in Tahoe City at the North Shore of Lake Tahoe in Placer County, CA. The Tahoe Regional Planning Agency (TRPA), the Tahoe Metropolitan Planning Organization (TMPO) and Tahoe Transportation District (TTD) have collectively taken a lead role in identifying transportation strategies and improvements throughout the Tahoe Region. In 2003, TRPA completed a traffic study for transportation improvements to the SR 89 segment from Granlibakken Road to just north of Fairway Drive, and the SR 28 segment east of the SR 89 / SR 28 intersection. A Project Study Report (Project Development Support) [PSR (PDS)] for the project was completed and approved by Caltrans District 3 in March 2002. A subsequent traffic study evaluated six project alternatives identified in the PSR, and TRPA approved the resultant draft SR 89 Realignment Traffic Study report (LSC, Inc., dated April 2003). Initiated by TTD in 2011, this recent effort is focused on evaluating the six improvement alternatives for the SR 89 / Fanny Bridge Community Revitalization Project carried forward from the PSR phase to the Project Report (PR) phase. This *Traffic Forecasts and Operations Analysis Technical Memorandum* includes the following elements:

- Findings and conclusions
- Existing conditions in the study area
- Analysis methodology
- Description of project alternatives
- Roadway segment and operational analysis results
- Safety assessment

Findings and Conclusions

This section summarizes the traffic analysis methodology, existing and expected future levels of congestion, and likely impacts and benefits of the project:

Existing study area congestion. The Field Conditions section discusses the traffic flow issues associated with the summer tourist and recreational season in the study area. During the summer peak hour conditions, factors such as pedestrian/bicyclist activity at/near Fanny Bridge and Grove Street, additional traffic volume, and drivers unfamiliar with the area play a role in reducing the capacity of the study roadway segments. Extremely long vehicular queues result at signalized locations, especially on northbound SR 89 and westbound SR 28. Since the queuing is not effectively discharged in every cycle or even within a single peak hour, the un-serviced queues tend to extend through multiple peak hour periods.

Representation of existing congestion by computer models. The computer software analysis tools used in this analysis are typical for the traffic modeling industry. These models assume random traffic arrival/discharge patterns occurring within the peak hour, and not the actual field-observed saturated traffic arrival/discharge conditions resulting from “un-serviced” residual queues from prior peak hours. Furthermore, it should also be noted that without an extensive calibration effort, this analysis tool does not adequately account for all of the driver-based field behaviors and human factors that contribute to the congestion. Therefore, the observed queuing and congestion in the Tahoe City area is worse than the analysis results indicate in this study. However, this issue with the analysis is common to all the alternatives and does not bias the selection of one alternative over the other.

Projected Level of Service analysis results. All of the build alternatives are projected improve the intersection operations at the existing wye intersection between SR 89 and SR 28. At the new intersection between existing SR 89 and the relocated segment of SR 89, the single-lane, hybrid roundabout with Alternative 1 is projected to provide adequate levels of service in 2018 and 2038 with an exclusive right-turn lane for the eastbound to southbound through movement. A higher volume would travel through the new SR 89/28 intersection due to varying degrees of closure for the existing segment of SR 89 south of Fanny Bridge for Alternatives 2, 3, and 4. This additional volume necessitates a configuration with additional capacity for the western roundabout proposed in Alternatives 2 and 3. For opening day, an exclusive right-turn lane for the northbound direction along with the exclusive right-turn lane for the eastbound direction is projected to provide adequate levels of service for Alternatives 2 and 3. The volumes forecasted for the design year in 2038 necessitate increasing the capacity of this configuration to a two-lane circulating roundabout to achieve acceptable levels of service. A signal as proposed in Alternative 4 is projected to provide acceptable levels of service in 2018 and 2038.

Roundabout benefits with regard to pedestrian/bicyclist crossing and safety. Alternatives 1, 2, 3, and 6A include roundabouts. At a roundabout, the pedestrian crosswalks allow pedestrians to cross one direction of travel at a time using a refuge island. Thus, a shorter crossing distance reduces the amount of time the pedestrian/bicyclist is in the roadway and can reduce the delay incurred by motorists while yielding to pedestrians. Roundabouts tend to reduce the severity of traffic crashes because the geometric design of the entry points eliminates right angle crashes and high entry speeds as well as reduces conflict points.

Reduction in congestion and enhanced safety. All of the build alternatives will result in reduced congestion for all transportation modes in the study area. The features that will reduce congestion will improve traffic flow and will also enhance safety by reducing the potential for crashes to occur. For example, the grade-separated crossings for the bike path will eliminate the need for motorists on SR 89 to stop prior to the bridge; likewise pedestrians/bicyclists will not have to wait for a signal indication or an adequate gap in vehicular traffic at the crosswalk to continue along the bike path. Also, although not directly included in the operations analysis, it can be concluded that emergency vehicle access will improve with all of the build alternatives. The second river crossing provided under Alternatives 1 through 4 will reduce congestion and

improve travel times through the study area for emergency services. Likewise, reduced response times can be achieved with the reconstructed Fanny Bridge and wye intersection under Alternatives 6 and 6A. Reduced emergency response times also enhance safety by reducing the time between an incident and the initiation of critical care.

Benefits for the business community. Although not included in the traffic operations analysis, it can be concluded that the local business community would benefit from the action alternatives because delivery times could be more accurately predicted and, hence, customers better served. Throughout this study process, business owners have expressed concern about the congestion-related impacts to just-in-time delivery of goods and services.

Benefits for local residents. Relocating the SR 89 through movements would reduce volumes and queue lengths currently experienced on the existing segment of SR 89 near Granlibakken Road. This improved operational efficiency would likely eliminate the cut-through traffic traveling through neighborhoods adjacent to SR 89 between Sequoia Avenue and Granlibakken Road; local residents have expressed concern about this issue to Placer County. Also, local residents would benefit from the reduced congestion and travel time in the study area with the action alternatives.

Transit center. Transit service would improve with the action alternatives because congestion and travel times through the study area will be reduced. Alternative 1 would provide the best access to the transit center of all the action alternatives. The relocated SR 89 and existing SR 89 roadways provide two routes to the transit center from SR 89 and 28.

Existing Conditions

This section describes the roadways and operations under existing volume conditions in the study area. A discussion of historical traffic volumes is presented along with existing traffic count information to explain the fluctuating volumes in the Tahoe Basin area and the decision to revise the previous traffic analysis. A discussion of recent crash data is presented at the end of the section.

Roadways

The primary transportation corridors in the study area are State Route 89 and State Route 28. Placer County maintains a network of local roads in the study area. The United States Forest Service (USFS) maintains roads in the Tahoe National Forest and Lake Tahoe Basin Management Unit (LTBMU). Existing roadways in the study area, as shown on Figure 1, include SR 89, SR 28, Fairway Drive, Granlibakken Road, and Grove Street. These facilities are described as follows.

SR 89. SR 89 is a state highway that traverses north-south through the project site. Caltrans District 3's *SR 89 Transportation Concept Report* (TCR, dated April 2012) categorizes SR 89 as a "two-lane conventional highway" from the El Dorado/Placer County line to Tahoe City. The SR 89 study corridor segment is functionally classified as a "Minor Arterial." The corridor is not a National Highway System route, but it is part of the Federal Aid Primary System, the Interregional Highway System (IRRS), and the Surface Transportation Assistance Act (STAA) truck network. SR 89 is not a lifeline route (a route that is likely to be intact after a major earthquake event) in Placer County. Regionally, SR 89 begins in Mono County, north of the town of Topaz, and continues predominantly northward until reaching Interstate 5, near Mt. Shasta in Siskiyou County. To the north, SR 89 is the most direct all-weather road connecting the Tahoe area to the Interstate 80 corridor and the Sacramento and San Francisco Bay areas; therefore the route carries the majority of traffic through the basin. SR 89 also serves as a critical roadway for traffic circulation within the Tahoe Basin.

Within the project site, SR 89 is generally a two-lane arterial with left-turn lanes at major intersections. SR 89 operates as a traffic signal-controlled intersection with SR 28. The side-street movements are stop-controlled at the SR 89 intersections with Fairway Drive, Tahoe Tavern Shores Access Road, 64-Acres Tract Recreational Access, and Granlibakken Road. Per Caltrans 2010 traffic count data, the SR 89 segment west of the wye intersection experiences an Average Annual Daily Traffic (AADT) of 10,600 vehicles and a peak month average daily traffic (ADT) of 14,800 vehicles. SR 89, just south of Fanny Bridge, carries an AADT of 13,200 and a summer peak month ADT of 22,300. The ADT on Fanny Bridge during the summer peak month is approximately 70 percent higher than the AADT at this location.

SR 28. SR 28 is a state highway that provides a link between Incline Village, Nevada and Tahoe City along the North Shore of Lake Tahoe. SR 28 also serves as a critical roadway for traffic circulation within the Tahoe Basin. Within the project site, SR 28 generally operates as a two-lane arterial with a continuous two-way left-turn lane. SR 28 intersects SR 89 at the signalized wye intersection, and intersects with Grove Street at a side-street stop-controlled intersection. The signalized wye intersection has dual through lanes on eastbound and westbound approaches and dual left-turn lanes on the westbound and northbound approaches. Per Caltrans 2010 traffic count data, the SR 28 segment east of the wye intersection experiences an AADT of 12,400 vehicles and a peak month ADT of 17,000 vehicles.

Fairway Drive. Fairway Drive is a two-lane, local major collector roadway serving Tahoe City. This roadway provides direct access to some of the schools in the area. Fairway Drive intersects with SR 89 to the west of wye intersection at a stop-controlled intersection.

Granlibakken Road. Granlibakken Road is a two-lane, local roadway in the Tahoe City area. Granlibakken Road intersects with SR 89 at a stop controlled intersection.

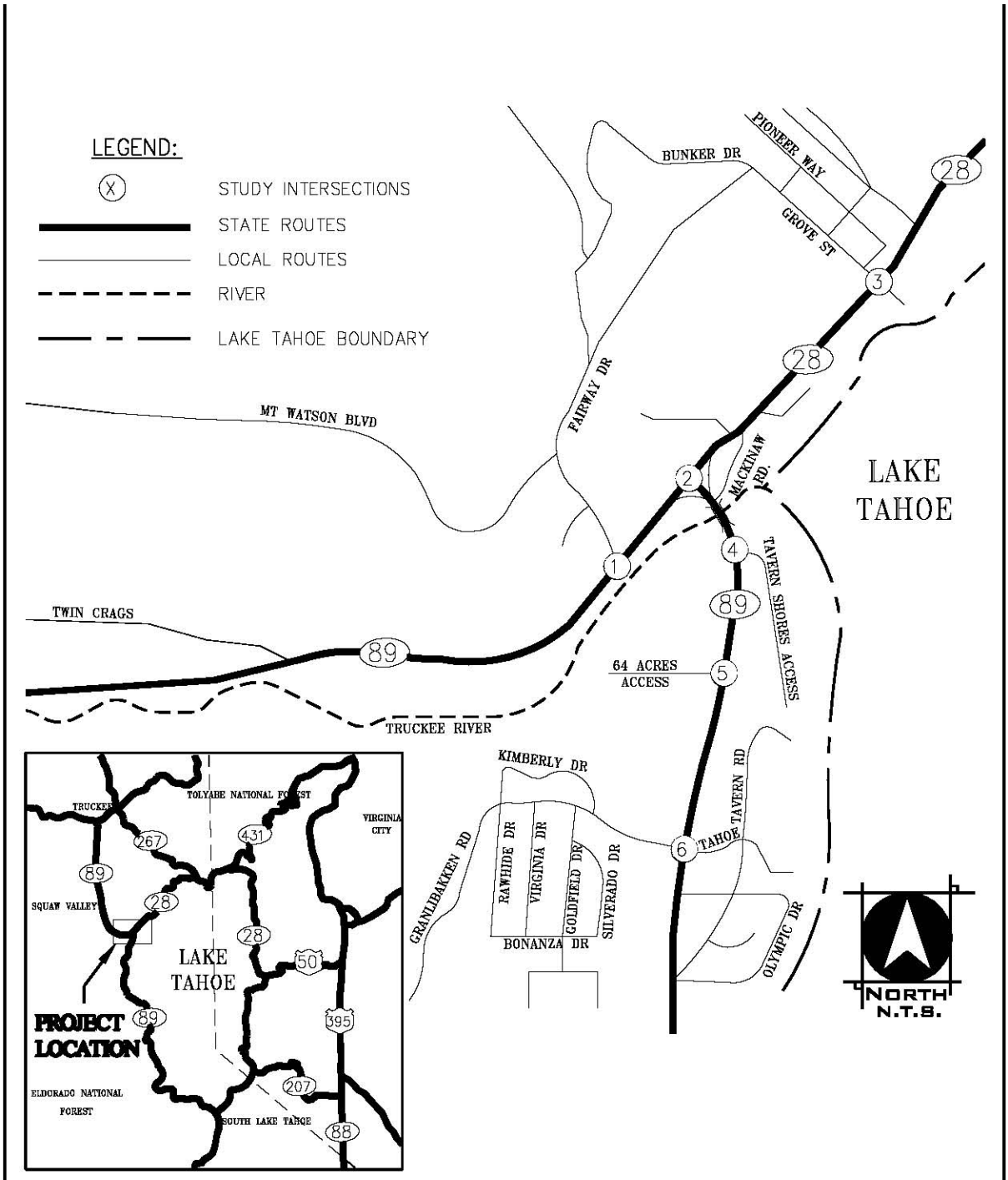

FIGURE 1

PROJECT LOCATION AND VICINITY MAP

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Grove Street. Grove Street is a two-lane, major collector roadway in the Tahoe City area that provides access to the beach and other recreational uses. Grove Street intersects with SR 28 at a stop-controlled intersection east of the wye intersection.

Fanny Bridge. Fanny Bridge consists of one 12-foot lane in each direction with a 5-foot shoulder on the west side and a 3-foot shoulder and 5-foot sidewalk on the east side. Fanny Bridge serves as the main artery for vehicles, cyclists, and pedestrians between Lake Tahoe's West Shore and Tahoe City or Truckee. It is currently the only vehicular bridge crossing the Truckee River that provides access to the West Shore from the north.

Historical and Existing Traffic Volumes

Multiple analyses for this project have been performed due to changing traffic conditions and forecasts. Traffic counts and volume data used prior to this current traffic operations analysis is discussed in the *Historical* section whereas current traffic count and volume data is discussed in the *Existing* section.

Historical Traffic Volumes. Wood Rodgers reviewed 2003 traffic count data published in the SR 89 Realignment Project Traffic Study (Draft Report, LSC, Inc., dated April 2003) as well as more-recent (2009-2010) traffic count data obtained from Caltrans and TRPA. TRPA also provided summer 2009 peak hour traffic counts for the SR 89/SR 28 wye intersection. Caltrans count data publications provided 2010 AADT, peak month ADT volume data, and truck-axle classification data for SR 89 and SR 28 study segments.

Table 1 summarizes traffic volumes provided by Caltrans for the years 1992-2010 for SR 89 and SR 28 segments through the project site. As shown in Table 1 and Figure 2, traffic volumes on SR 89 and SR 28 study segments through the wye have been fluctuating over the last 18 years. Some of the fluctuation can be attributed to economic downturns in recent years. Between 1992 and 2010, the overall AADT decrease on SR 89 and SR 28 study segments ranged between 3,200-4,400 ADT, or a decrease of approximately 23 to 26 percent. This translates to an approximately 1.5 to 1.8 percent annual rate of traffic decrease. The decrease was more pronounced in the five-year period leading up to 2010. Furthermore, year 2009-10 traffic counts at the SR 89/SR 28 wye intersection provided by TRPA showed an approximately 14 percent decrease in comparison to the year 2003 counts. The historic traffic volume trends from 1974 through 2009, based on data provided by TRPA, are summarized in Appendix A.

***Year 2003 Traffic Counts*.** Based on a review of 2003 traffic counts from the Draft *SR 89 Realignment Project Traffic Study* and 2009-10 count data provided by Caltrans and TRPA, the project site facilities appear to experience significant seasonal traffic peaking during summer months (July through August). Overall, summer peak month traffic counts were observed to be approximately 31 to 41 percent higher than the annual average counts. Annual average travel conditions are used in the evaluation and design of transportation facilities in typical suburban areas. However, *Caltrans Traffic Impact Analysis Guidelines* (December 2002) states that "Seasonal and weekend variations in traffic should also be considered where appropriate (i.e., recreational routes, tourist attractions, harvest season, etc.)." The project site represents a region where tourist/recreation-related seasonal travel is significantly higher than annual average conditions. Therefore "summer p.m. peak hour" conditions are evaluated in this study as the most critical operating season, above and beyond the typical evaluation of annual average conditions. Per Caltrans 2003 traffic count data, the SR 89 segment west of wye experienced an AADT of 15,500 vehicles and a peak month ADT of 20,200 vehicles.

Y***ear 2009-11 Traffic Volumes*.** For the SR 89/SR 28 intersection, TRPA provided year 2009 p.m. peak hour traffic counts, collected on August 7, 2009 (Friday). To estimate traffic volumes representative of the years 2009-11 for study intersections where count data were not readily available, the year 2003

traffic counts (from the Draft *SR 89 Realignment Project Traffic Study*) were appropriately factored or adjusted based on a review of 2009 counts and recent data trends summarized in Table 1. Between year 2003 and year 2009-11 conditions, a general traffic count reduction factor in the range of 14 to 30 percent was used. Similar to year 2003 conditions, the year 2009-11 summer peak month traffic volumes were also estimated to be approximately 31 to 41 percent higher than the annual average traffic counts.

Table 1. SR 89 and SR 28 Segments through Tahoe City Wye - Historic Traffic Trends

Year	Two-Way Annual Average Daily Traffic (AADT) Volume		
	SR 89 just west of wye	SR 89 just south of wye (Fanny Bridge)	SR 28 just east of wye
1992	14,000	16,500	16,700
1993	14,000	16,500	16,700
1994	14,900	16,800	16,700
1995	9,800	15,000	16,700
1996	11,900	16,000	16,700
1997	12,000	16,000	17,200
1998	14,600	15,000	17,600
1999	15,300	15,600	17,000
2000	15,500	15,600	17,000
2001	15,500	15,600	17,000
2002	15,500	15,600	17,000
2003	15,500	15,800	17,000
2004	16,000	16,300	17,000
2005	16,200	16,300	16,200
2006	12,700	13,200	16,000
2007	12,700	13,200	16,000
2008	12,000	13,200	14,000
2009	10,800	13,200	12,800
2010	10,600	13,200	12,400

Source: Caltrans Traffic Volumes Publications
Notes: At certain locations, Caltrans counts may have been actually conducted only once in every three years

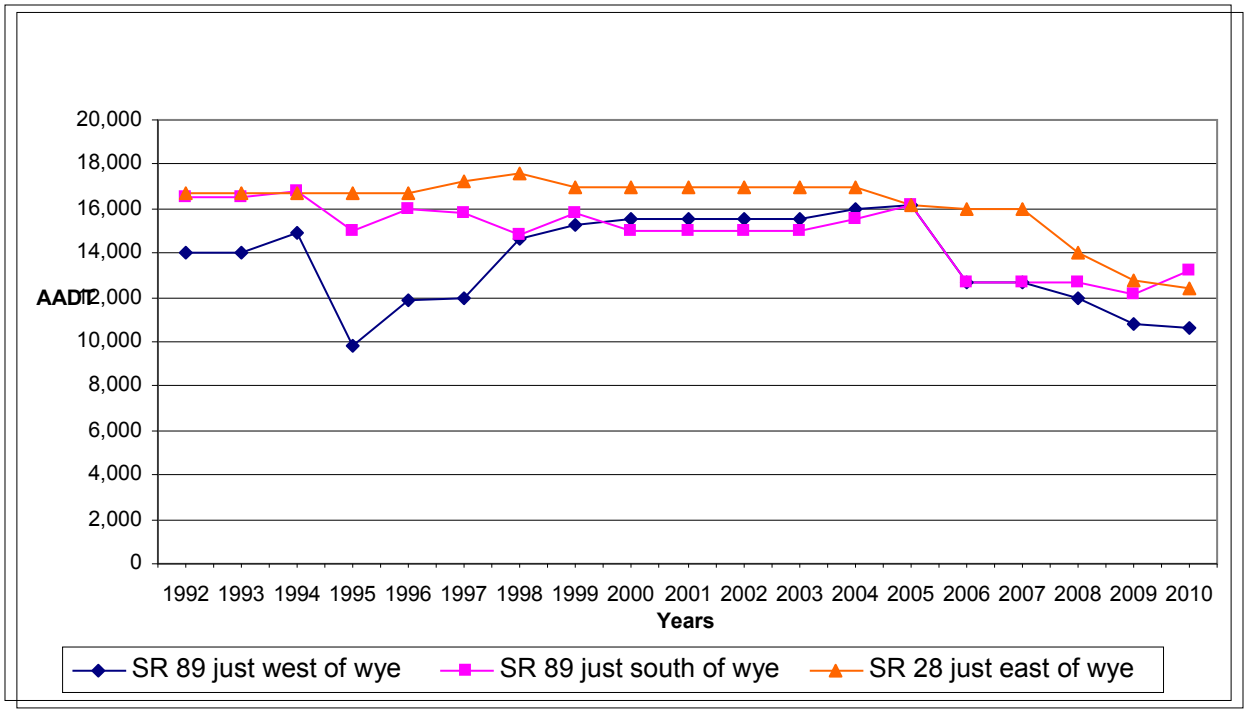

Figure 2. Historical Traffic Volumes on SR 89 and SR 28 Study Segments

Existing Traffic Volumes. The existing traffic volumes discussion includes counts taken in the years 2013 and 2014 during the summer peak hours. The volumes used for the existing conditions analysis were derived from these counts.

Year 2013 Traffic Counts. Wood Rodgers conducted new a.m. and p.m. peak hour intersection turning movement traffic counts on Friday, August 2, 2013 at the six study intersections. The field-collected p.m. peak hour counts were regarded as the "2013 summer peak hour" counts. Using the same relative ratios between annual average and summer daily average volumes from count years 2003 and 2009-10, "2013 annual average" daily traffic counts were then derived. Appendix B contains the count data.

The peak hour traffic counts at the six study intersections increased by approximately 0.1 percent between years 2009-10 and year 2013. Some movements at a few study intersections noticeably increased (such as, by 16 percent in both peak hours on eastbound SR 89 at Fairway Drive). On the other hand, some movements decreased during this timeframe (such as, by 3 to 4 percent on northbound and southbound SR 89 at 64-Acres Access and Granlibakken Road). These changes can be attributed to a new Fire Station which opened off Fairway Drive and relocation of the Tahoe City Public Utility District offices to Fairway Drive, and the opening of a transit center on 64-Acres Access Road. These recently constructed uses caused a slight increase in peak hour traffic to/from Fairway Drive and 64-Acres Access driveways that both intersect with SR 89.

***Year 2014 Traffic Counts*.** For the SR 89/SR 28 intersection, TRPA provided year 2014 summer peak traffic counts, collected on August 15, 2014 (Friday). Northbound and southbound volumes at the wye stayed the same between 2013 and 2014 traffic counts. While the eastbound volumes on SR 89 were higher in 2014, there was a slight reduction in westbound volumes on SR 28.

Although some marginal variations were observed between years 2013 and 2014, the differences are not significant. In addition, traffic counts were not collected at the other five study intersections in 2014.

Therefore, year 2013 volumes are used to represent current-year traffic operations within and through the project site and were used to develop year 2018 and year 2038 conditions. These 2013 traffic volumes, shown in Figure 3, represent the baseline condition for the study area and were used to reassess the roadway segment and intersection peak hour traffic operations in the study area. A reassessment of the existing traffic operations was necessary because previous volume assumptions are no longer applicable in the study area (three developments are no longer planned to move forward and a ski area is planned to be developed) and a lower level of confidence was associated with the previous volumes because they were based on estimates rather than actual field counts.

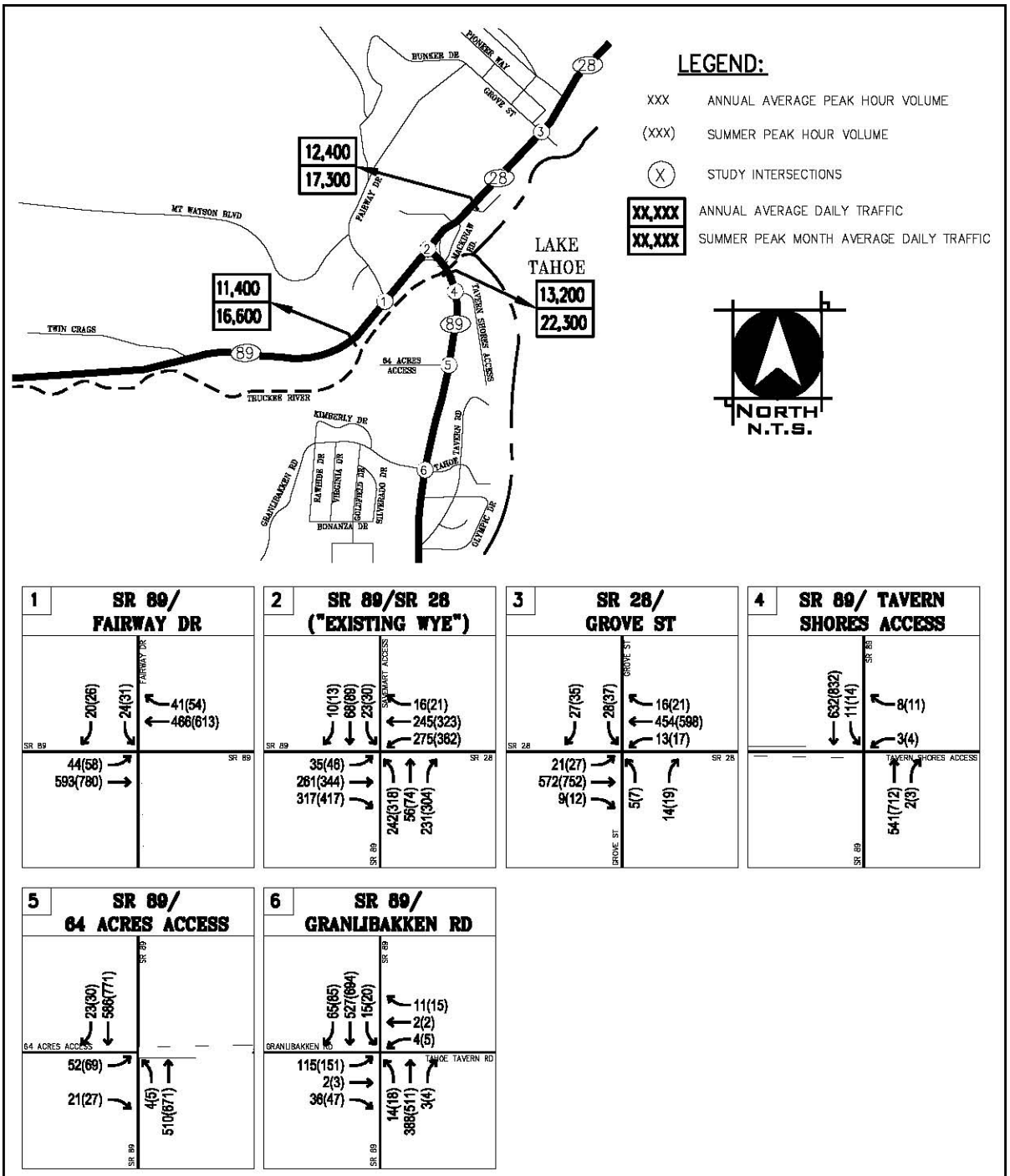

FIGURE 3

EXISTING (2013) TRAFFIC VOLUMES

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Traffic Crashes

Crash data were collected for the project roadways for the five-year period of September 1, 2008 through August 31, 2013. During this timeframe, there were a total of 82 reported crashes involving 151 motor vehicles, 7 bicycles, and 5 pedestrians. These 82 crashes occurred at intersections and along roadway segments. Two of the bicycle crashes did not involve a motor vehicle. In only 1 of the 5 pedestrian-involved crashes was the pedestrian in a marked crosswalk (Grove Street). No fatalities were reported during this timeframe within the project study area. Seven of the crashes involved an impaired driver.

Of the 82 reported crashes, 23 resulted in injuries and 59 resulted in property-damage only. As Figure 4 shows, the highest percentage of crashes was of the rear-end type, which is typical for congested traffic conditions. The majority of the broadside crashes were a result of a vehicle making either a left-turn or a U-turn in front of oncoming traffic.

Figure 4. Crash Type Distribution for Study Area, September 1, 2008 – August 31, 2013

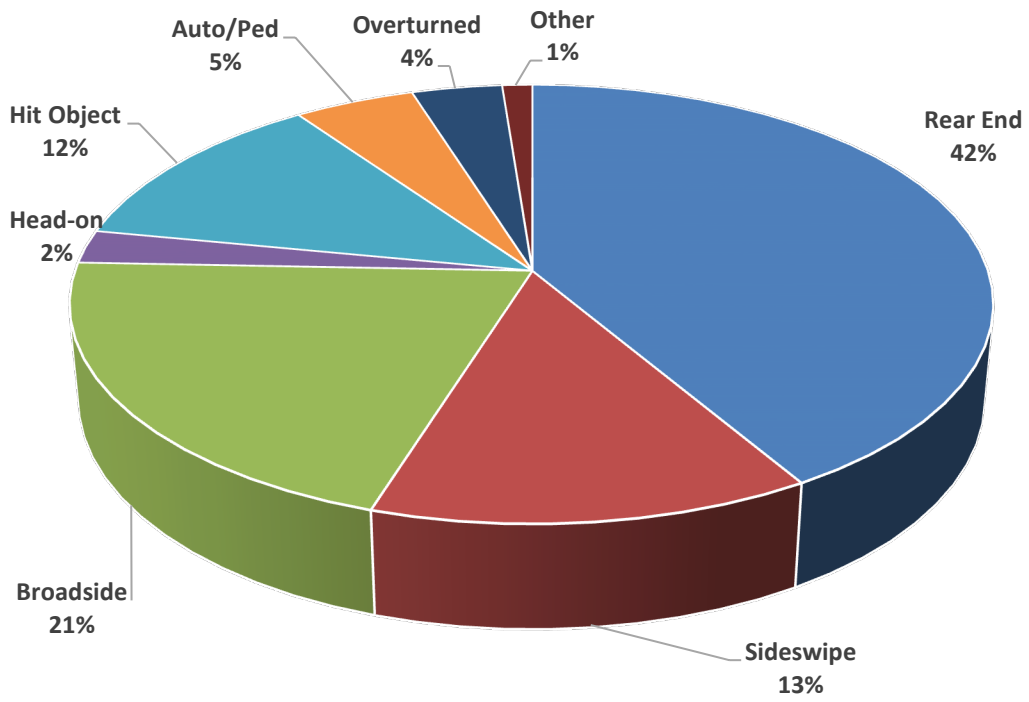

Table 2a shows the reported crashes per intersection in the project area. A total of 21 crashes were recorded at intersections during this timeframe. The intersection crashes represent approximately 25 percent of the 82 total crashes reported in the study area. The Grove Street and Commons Beach Road intersections had the highest number of reported crashes.

Table 2a: Intersection Crash Breakdown September 1, 2008 through August 31, 2013

Route	Cross Street	Crashes	Involved			Severity		
			Vehicles	Bicycles	Pedestrians	Fatal	Injury	PDO
SR89	64 Acre Tract Access	2	4				1	1
SR89	Fairway Dr	1	2					1
SR89	Granlibakken Rd	1	2					1
SR28	Grove St	6	12		1		1	5
SR28	SR 89	5	9		1		1	4
SR28	Commons Beach Rd	6	11	1			2	4
Note: PDO indicates property-damage only crashes								

Table 2b shows the reported crashes per roadway segment in the project area and the associated crash rate, which is a measure of the number of crashes per one million vehicle miles of travel. SR 28 on the east end of the study area had the highest number of reported crashes and resultant crash rate during this timeframe.

Table 2b: Roadway Segment Crash Breakdown September 1, 2008 through August 31, 2013

Roadway Segments	Total Crashes	Involved			Severity			Crash Rates	
		Vehicles	Bicycles	Pedestrians	Fatal	Injury	PDO	Injury	Total
SR89, Twin Crags Way to existing wye	6	10					6	0.00	0.419
SR89, Granlibakken Rd to existing wye	22	37	3	1		8	14	0.620	1.704
SR28, Existing wye to Grove St	33	62	3	2		9	24	0.955	3.500

Notes: PDO indicates property-damage only crashes
Crash rates are based on crashes per 1,000,000 miles traveled
Sources: Crashes are from California Highway Patrol Statewide Integrated Traffic Records System (SWITRS)
Data Compilation and Calculations by CH2M Hill

Bicycle and Pedestrian Facilities and Activity Levels

The project site is currently served by separated Class I bicycle facilities along SR 89 and SR 28. Class I bicycle facilities provide a separated right-of-way for the exclusive use of bicyclists and pedestrians, and crossings with roads are minimized. SR 89 crosses the Truckee River on Fanny Bridge and bicyclists share the road with motor vehicles or the sidewalk with pedestrians to cross the bridge. Class I bicycle facilities consists of the (1) Truckee River Trail, which extends from 64 acres down river to Squaw, (2) the West Shore Trail, which extends from 64-Acre Tract south down the West Shore, (3) the Lakeside Trail, which extends from 64-Acre Tract towards and through Tahoe City along the lakefront, and (4) the North Shore Trail, which extends north from the end of Lakeside Trail along Highway 28 to Dollar Hill. The Truckee River Trail, West Shore Trail, and Lakeside Trail all connect and run through the 64-Acre Tract.

Fanny Bridge is a popular destination for the attraction of fish viewing and visiting the Gatekeeper's Museum. The sidewalk adjacent to the northbound traffic lane on the bridge is the best location to view the large fish that congregate just upstream of the bridge. The south end of the bridge also provides access to trail heads and bicycle paths in the area. Due to these attractions, there are high levels of

pedestrians and bicyclists traveling across and along SR 89 at Fanny Bridge. A pedestrian/bicycle bridge downstream of Fanny Bridge, which is part of the overall trail system, does not have the attraction of fish viewing or commercial activity.

According to the 2003 study, approximately 445 pedestrians and 99 bicyclists were observed on Fanny Bridge on a Saturday afternoon during the summer peak visitation period (2:45 p.m. to 3:45 p.m., in August 2002). (Note: the vehicular peak hour is not necessarily the same as the pedestrian/bicyclist peak hour because the vehicular peak hour includes weekday commuter, recreational, and tourist traffic whereas vehicular traffic on Saturdays during the pedestrian/bicyclists peak period most likely includes a lower amount of weekday commuter volume.)The bicycle counts were observed to be approximately equal on the two sides of the bridge, indicating that nearly all of the bicycle trips are through trips. However, the pedestrian counts indicated substantial (approximately 70 percent) pedestrian traffic on the sidewalk located on the east side of the bridge, which is a popular location for the attraction of viewing fish. The count data also indicated that approximately 60 percent of the total pedestrians were at the north end and approximately 45 percent at the south end of the bridge. The count data indicated a pattern of pedestrians walking onto the bridge from the north observing the fish and then returning to the north. This pattern is more prevalent than the similar pattern to/from the south of the bridge.

From bike path counts conducted by TRPA in 2009, approximately 274 bicyclists and 121 pedestrians were observed on a Saturday afternoon during the summer peak visitation period (12:30 p.m. to 1:30 p.m. on August 8, 2009) crossing the bridge on the south side of Truckee River in the picnic area. Tahoe City Public Utility District's 2008 Recreational Survey Results indicated that the number of bicyclists and pedestrians during the peak hour of the peak day observed on Commons Beach was approximately 250 persons. Approximately 20 people were observed on the Lake Forest Ramp/Pomin and approximately 100 on the 64-Acre Tract.

Field Observations

Per discussion contained in the 2003 study, large traffic volumes were observed on southbound SR 89 just south of the existing wye on peak summer days between 10 a.m. and 5 p.m., with the peak hour occurring in the mid-afternoon. However, peak volumes in the northbound direction were observed at/around 11 a.m. and 5 p.m., with a drop in traffic volumes between these two peaks. This period of relatively low volume demand north of the bridge corresponds to the observed high period of pedestrian/bicycle activity on Fanny Bridge and the period of traffic queues forming along northbound SR 89 to the south of Fanny Bridge. The observed mid-day "drop" in traffic volumes represents saturated conditions when the outgoing/discharge capacity of SR 89 southbound across Fanny Bridge is lower than the incoming traffic demand level. The key factors responsible for this drop in capacity of SR 89 in the vicinity of Fanny Bridge are as follows:

- Pedestrian and bicycling activity on the bridge: During the summer peak period from 11 a.m. to 5 p.m. the pedestrian and bicycle traffic activities in the Fanny Bridge vicinity are also at their peak. The sidewalk on Fanny Bridge adjacent to the northbound lane is the most popular spot for pedestrians to watch fish. Drivers on northbound SR 89 react to the presence of large amounts of pedestrian and bicycle traffic adjacent to their travel lane by slowing down significantly. This lower travel speed reduces the vehicular capacity of northbound SR 89. Also, vehicular traffic is frequently required to stop at a pedestrian crossing signal at the south end of the bridge where significant pedestrian and bicycle traffic crosses SR 89. This causes further reduction in SR 89 travel capacity at the south end of the Fanny Bridge. These influences reduce

the capacity of Fanny Bridge below that of the SR 89 roadway, so the bridge is effectively the limiting factor in the capacity of this segment of SR 89.

- Unlimited access for vehicle movements just south of the wye intersection: Several atypical roadway features and traffic controls exist at the south end of the wye intersection where the eastbound to southbound free right-turn lane, Macinaw Street, and parking access on both sides of SR 89 create the potential for a variety of unexpected and uncontrolled traffic movements. This lack of driver expectancy results in further slowing down/stopping of vehicular traffic which leads to decreased capacity on SR 89 at the north end of the bridge.

- Driver Behavior: Observations taken during a 2003 field study indicate that, under summer peak saturated traffic conditions on SR 89, side-street drivers (from Granlibakken Road, 64 Acres Access, Grove Street etc.) often force their way into the slow-moving through traffic stream on SR 89, or drivers on SR 89 courteously wave side-street drivers ahead of them. This situation wherein side-street traffic gains “priority” over major street traffic as a result of driver yielding behavior is one of the factors in further reducing the traffic capacity of SR 89 through the wye intersection area during peak saturated demand conditions.

- Unfamiliar Drivers: The areas in the vicinity of Fanny Bridge are generally recreational by use. Some travelers passing through/visiting this area are not familiar with the unique traffic conditions encountered due to large amount of pedestrian/bicycle activity and atypical roadway features at the south end of the wye intersection. The unfamiliar drivers, typically from other regions outside of the project site, generally react to the observed conditions by traveling at slow speeds. The presence of unfamiliar drivers in the traffic stream on the highways through Tahoe City results in a further reduction in the traffic-carrying capacity of these study segments during the summer peak hour.

- Mid-block Pedestrian Crossing Activity: During summer peak periods, pedestrians frequently cross SR 28 at various locations northeast of the existing wye intersection near Grove Street. When drivers slow down or stop because of pedestrians in the roadway, the through capacity of this roadway segment is reduced and drivers incur delay. The queues that form occasionally extend into the wye intersection.

- Traffic Operations on SR 28: On some days, the capacity of eastbound SR 28 east of the existing wye intersection is not adequate to handle the summer peak period volume demands. Queuing and slower speeds result. The mid-block pedestrian crossings near Grove Street further exacerbate these conditions. Lack of capacity on this segment of SR 28 contributes to the long queues on northbound SR 89 in the vicinity of Fanny Bridge and the existing wye intersection.

During the summer peak hour conditions, some or all of the above-described factors play a role in reducing the capacity of the study segments. Extremely long vehicular queues result, especially on northbound SR 89 and westbound SR 28. These queues are sometimes so long that they do not dissipate in every signal cycle or within a single peak hour. Thus, the queuing tends to extend through multiple peak-hour periods. Up to approximately 1.43 mile-long traffic queues on northbound SR 89 south of Fanny Bridge and up to 1.46 mile-long traffic queues on westbound SR 28 east of the wye intersection have been observed during the summer peak hour periods.

It is important to note that arterial progression evaluation completed in this traffic analysis (using Synchro/SimTraffic 8 software) assumes/models random traffic arrival/discharge patterns occurring within the peak hour, and not the actual field-observed saturated traffic arrival/discharge conditions resulting from “un-serviced” residual queues from the prior peak hours. Furthermore, it should also be noted that without an extensive calibration effort, this analysis tool does not adequately account for all of the driver-based field behaviors and human factors previously discussed. Therefore, the observed queuing and congestion in the Tahoe City area may be worse than the analysis results indicate in this study.

It is important to note that the arterial progression evaluation completed in this traffic analysis (using Synchro/SimTraffic 8 software) assumes/models random traffic arrival/discharge patterns occurring within the peak hour, and not the actual field-observed saturated traffic arrival/discharge conditions resulting from “un-serviced” residual queues from the prior peak hours. Furthermore, it should also be noted that without an extensive calibration effort, this analysis tool does not adequately account for all of the driver-based field behaviors and human factors previously discussed. Therefore, the observed queuing and congestion in the Tahoe City area is worse than the analysis results indicate in this study. For instance, high levels of pedestrian activity at/near Fanny Bridge and at Grove Street along with driving behavior of out-of-town vacationers typically exacerbate the duration of long queues on the northbound SR 89 and westbound SR 28 approaches to Tahoe City during the peak summer season.

The Synchro/SimTraffic software is an industry standard tool for analysis of intersection and roadway operations, respectively. Synchro and SimTraffic are intended to be used as companion models. Synchro is used to first determine macro level LOS and delays at intersections, and then SimTraffic is used to simulate real world conditions. While Synchro looks at individual intersections independently without the impact of queuing or blocking from downstream intersections, SimTraffic measures the full impacts of queuing and blocking by individually tracking each vehicle in the roadway system and collecting comprehensive measures of effectiveness for them at 0.1-second intervals during the simulation. For the purposes of this arterial roadway segment analysis, the following steps were undertaken to reduce variability in results:

- Multiple simulation runs (five) were averaged to account for different arrival/discharge patterns.
- The default SimTraffic seed and recording times of 3 and 10 minutes were increased to 10 and 60 minutes, respectively, for generating more reliable results.

However, a calibration to match real-world conditions was not performed as part of this analysis. Calibrating simulation models is a time-intensive effort that involves multiple data collection efforts across all modes of travel. For instance, the pedestrian/bicyclist activity at the Fanny Bridge signal crossing and other mid-block pedestrian crossings on eastbound SR 28 between the existing wye and Grove Street would have to be counted and entered as model inputs into the SimTraffic microscopic analysis tool. After a re-run with these parameters, observed field conditions would then need to be compared with the model outputs to verify the calibration of the model. These steps would be repeated until the results match real-world operating conditions. Microscopic models like SimTraffic are resource intensive.

Analysis Methodology

This section discusses the development of the volume forecasts used in the roadway and intersection operational analysis. This section also discusses the computer-based simulation tools used to assess existing levels of service and predict future levels of service for the roadway segments and intersections in the study area. The existing year is 2013; the opening day year is 2018; and the design year is 2038.

Traffic Volumes

For traffic operations analysis purposes, it is anticipated and assumed at this time that the SR 89/Fanny Bridge Community Revitalization Project would initiate construction by 2015 and would fully complete construction and be opened to the public by 2018. As discussed previously, the 2013 traffic counts and forecasts are used to illustrate existing conditions. The proposed project and project alternatives would not result in the generation of new traffic trips in the study area; therefore "existing plus project" conditions for this analysis does not address the addition of project traffic onto existing conditions but rather addresses the traffic effects of the redistribution of existing and forecasted traffic in the study area due to implementation of the project alternatives. In order to do so, the traffic analysis developed 2018 forecasted traffic volumes and distributions, and 2038 future conditions. Roadway segment and intersection operations for the action alternatives are discussed in relation to the No Action (Alternative 5) scenario.

The LOS results presented in this section represent the best available information based upon modeling efforts. Actual, opening day and design year conditions may differ from those projected because the required model calibration effort to accurately simulate random, mid-block pedestrian crossings and queues that do not discharge within the peak hour was not undertaken as part of this traffic analysis. For example, the models cannot adequately account for pedestrian/bicyclist crossing activity at the at-grade crosswalk on the south end of the bridge. The pedestrian signal at this location has been observed to cause delay for motorists on this existing segment of SR 89, particularly during the peak summer hour, as they stop when the pedestrian signal is actuated. More delay is experienced in the summer peak periods on the northbound SR 89 approach to the existing wye intersection than predicted, due to turbulence in the traffic stream associated with uncontrolled movements and unexpected situations likely to be encountered with multiple access points and high volumes of pedestrians/bicyclists.

To develop "project opening day" (i.e. year 2018) traffic forecasts for study facilities, the year 2010 traffic forecasts, as published in the Draft *SR 89 Realignment Project Traffic Study*, were reviewed. Per discussions with TRPA staff, this traffic study updates the status of all approved / pending development projects. These approved / pending development projects are listed as follows:

- Village at Squaw Valley: This proposed development project is currently being reviewed by Placer County and has not yet been approved. Therefore, traffic generated by this project was not included for the purpose of forecasting opening day conditions.
- Lake of the Sky (LOTS) Interpretive Center: This development project was approved over a decade ago. Because it is not funded and not planned for construction at this time, the traffic generated by this project was not included for the purpose of forecasting opening day conditions.
- 64-Acre Recreational Tract Intermodal Center: This project is constructed and volumes in / out of the development project were captured in the 2013 traffic counts.

In addition to the above-mentioned approved/pending development projects, a new development (Homewood Ski Resort) is projected to be completed by 2018. Based on discussions with

CFL/TTD/TRPA/Caltrans staff, traffic generated by this development is included in opening day conditions.

Year 2018 traffic forecasts for project site facilities were estimated by incrementally adding the following two components to the base year (2013) traffic count database:

- A general background traffic growth rate of 0.5 percent per year compounded over 5 years. *Note:* The 0.5% annual growth rate is an interpolated rate estimated based on review of cumulative long-term growth rates and was agreed among the lead agencies based on a review of historical data and development projections.
- Homewood Ski Resort: The traffic volumes associated with this development project were drawn from the *Homewood Mountain Resort Ski Area Master Plan EIR/EIS (*Hauge Brueck Associates, January 2011).

Based on the above estimates, an overall growth in study area site traffic of approximately 3 percent is projected between the baseline (year 2013) and project opening day (year 2018) conditions. This is a lower estimate than the 5 to 10 percent growth projected by the 2012 RTP. The 0.5 percent annual growth rate for the years 2018 through 2038 was agreed among the lead agencies based on a review of historical data and development projections. Figure 5 shows the opening year traffic volumes for the study area roadway segments and intersections. These volumes were redistributed as necessary to determine the appropriate volumes for each action alternative. The redistribution is based on turn and through movement percentages at each intersection that were determined during previous traffic studies and based on discussions with local agencies. To develop “20-year planning horizon” (i.e. “year 2038”) traffic forecasts for study area segments and intersections, the annual background traffic growth rate of 0.5 percent per year was applied to the year 2018 volumes. Figure 11 in the 2038 subsection shows these volumes.

To determine whether LOS E operations occur for more than four hours, hourly traffic volume data were obtained from Caltrans’ PeMS database (http://pems.dot.ca.gov/) for a Friday in August, 2011 for SR 89. On the segment 0.3 miles south of the existing wye, the 5th highest travel hour carried about 8 percent less traffic than the highest travel hour. The hourly counts are in Appendix C.

Operational Analysis

Analysis Tools. *Synchro/SimTraffic 8* operational analysis software was used to implement the Transportation Research Board's *Highway Capacity Manual, 2010* (HCM-2010) analysis procedures for signalized and unsignalized intersections. Where counts were available, pedestrian crossing volumes are included in the analysis. Signal timings were optimized by *Synchro 8* for all the Action versus No Action Alternatives.

The *Georgia Department of Transportation (GDOT) Roundabout Analysis Tool* (http://www.dot.ga.gov/travelingingeorgia/trafficcontrol/roundabout/Documents/AnalysisTool.zip) was used to implement HCM-2010 analysis and calibrated analysis (2014 FHWA Capacity Adjustment for Single Lane Roundabouts) procedures for roundabouts. In addition, *SIDRA* operational analysis software was used for the analysis of roundabout intersections with two different calibrations (Environmental Factors 1.2 and 1.1). *SIDRA's* Environmental Factor is used to calibrate roundabout capacity based on local road and driver behavior characteristics. Environmental factors range between 0.5 and 2.0. Lower environmental factors are applied to regions where roundabouts are common and drivers are familiar using them. Lower environmental factors increase a roundabout's capacity while higher environmental factors decrease capacity. For United States driving conditions, the recommended default value is 1.2, which can be lowered to 1.1 to represent future conditions assuming more driver familiarity and aggressive behavior. Based on discussions with FHWA Resource Center for Roundabouts and Caltrans staff, a sensitivity analysis of roundabout operations was performed with these two analysis tools with four different calibrations across multiple scenarios. Of the four different options, the GDOT Calibrated methodology was selected as the preferred option for presenting the results. The GDOT Calibrated methodology results are conservative compared to the SIDRA (EF = 1.1) calibration, which might be a better representation of design year conditions due to road user's familiarity with the roundabouts.

Level of Service. Traffic operations have been quantified through the determination of level of service (LOS). LOS is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment, representing progressively worsening traffic operations.

In this analysis, LOS was calculated for all intersection control types using methods documented in the HCM-2010. For signalized and all-way-stop-controlled intersections, the intersection delays and LOS are reported for each approach as well as the average for the whole intersection. For roundabouts and two-way-stop-controlled intersections, movement delays and LOS for all approaches are reported. The delay-based HCM-2010 LOS criteria for signalized and stop-controlled intersections are outlined in Table 3**.**

The roadway segment analysis uses average travel speed to determine LOS. For this analysis, the average speed as determined from five runs in *SimTraffic* is compared to the free-flow speed of the roadway segment to estimate the percentage of base free-flow speed. Free-flow speed along the roadway segment is calculated based on *Equations 17-2, 17-3, 17-4 and Exhibit 17-11* from the *2010 Highway Capacity Manual.* Table 4 shows the speed-based LOS threshold for different types of urban street classifications. *SimTraffic* assigns random arrival platoons for each individual model run and the speeds collected over the course of a single hour vary depending on the arrival patterns. Poor operations at downstream intersections can affect the arrival patterns and reduce travel speeds along roadway segments.

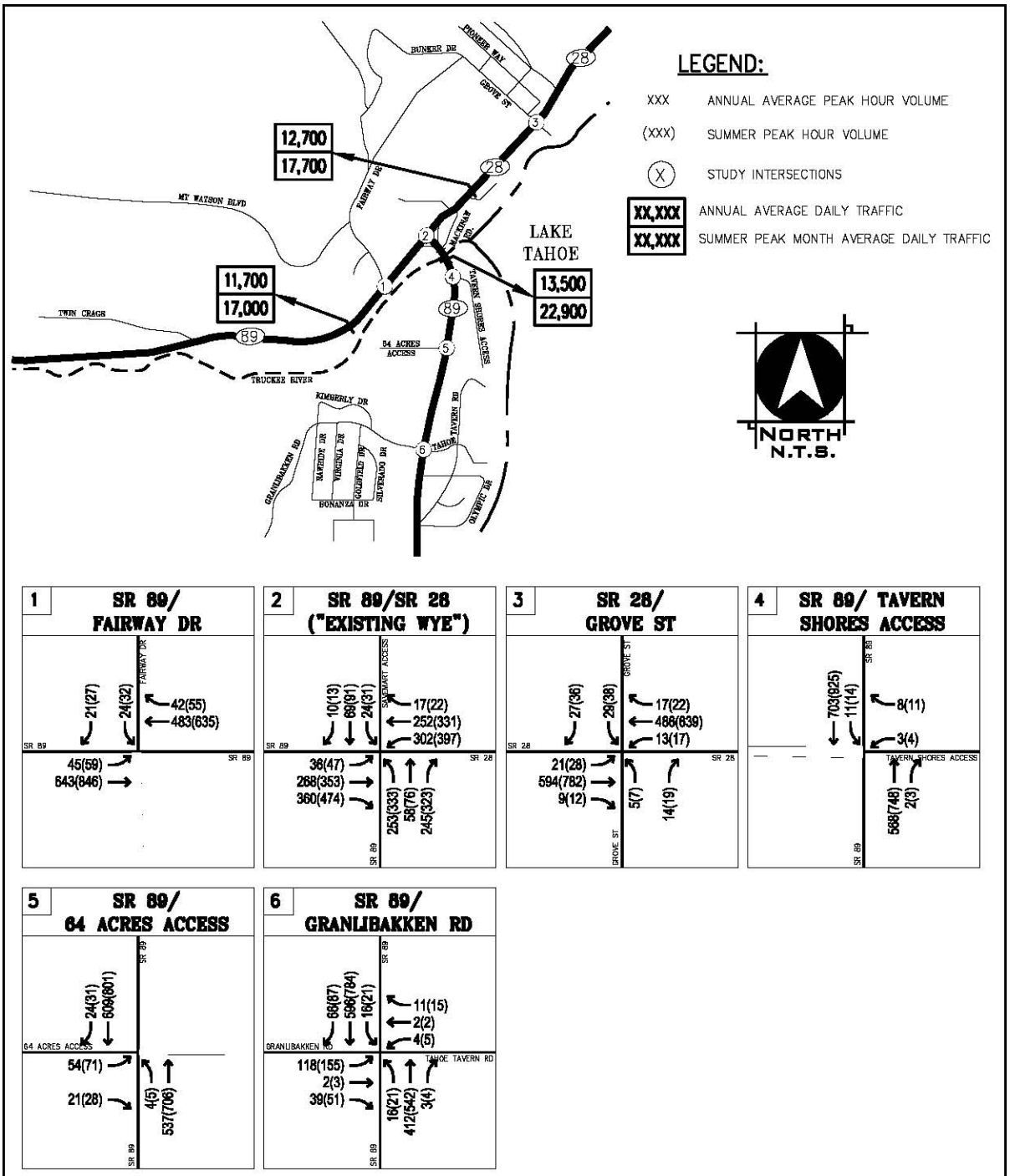

FIGURE 5

YEAR 2018 NO BUILD TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

Table 3. Level-of-Service Definitions and Criteria for Intersections

Level of Service	Flow Type	Operational Characteristics	Intersection Control Delay (seconds/vehicle)	
			Signal Control	Roundabouts or Two-Way-Stop or All-Way Stop Control
"A"	Stable Flow	Free-flow conditions with negligible to minimal delays. Excellent progression with most vehicles arriving during the green phase and not having to stop at all. Nearly all drivers find freedom of operation.	≤ 10	0 – 10
"B"	Stable Flow	Good progression with slight delays. Short cycle-lengths typical. Relatively more vehicles stop than under LOS "A." Vehicle platoons are formed. Drivers begin to feel somewhat restricted within groups of vehicles.	> 10 – 20	> 10 – 15
"C"	Stable Flow	Relatively higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, although many still pass through without stopping. Most drivers feel somewhat restricted.	> 20 – 35	> 15 – 25
"D"	Approaching Unstable Flow	Somewhat congested conditions. Longer but tolerable delays may result from unfavorable progression, long cycle lengths, and/or high volume-to-capacity ratios. Many vehicles are stopped. Individual cycle failures may be noticeable. Drivers feel restricted during short periods due to temporary back-ups.	> 35 – 55	> 25 – 35
"E"	Unstable Flow	Congested conditions. Significant delays result from poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures occur frequently. Typically long queues of vehicles waiting upstream of the intersection. Driver maneuverability is very restricted.	> 55 – 80	> 35 – 50
"F"	Forced Flow	Jammed or grid-lock type operating conditions. Generally considered to be unacceptable for most drivers. Zero or very poor progression, with over-saturation or high volume-to-capacity ratios. Several individual cycle failures occur. Queue spillovers from other locations restrict or prevent movement.	> 80	> 50

Source: HCM-2010, Exhibits 18-4 and 19-1

Table 4. Speed-based Level-of-Service Criteria for Roadway/Highway Segments

Travel Speed as a Percentage of Base Free-Flow Speed (%)	LOS by Volume to Capacity Ratio*	
	≤1.0	>1.0
>85	A	F
>67-85	B	F
>50-67	C	F
>40-50	D	F
>30-40	E	F
≤30	F	F

Source: HCM-2010, Exhibit 17-2
* Volume to Capacity ratio of through movement at downstream boundary intersection

The Caltrans' *Guide for the Preparation of Traffic Impact Studies* (dated December 2002) states:

> "Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS."

The *Transportation Concept Reports* for both SR 89 and SR 28 through the study area state that LOS "E" is the 20-year target level of service for these Caltrans facilities. Therefore, the target level of service for this environmental analysis is LOS "E" for roadway segments. For study intersections that fall under local agency jurisdiction, TRPA-defined LOS "D" operations is still used as the minimum acceptable threshold; however, peak hour LOS "E" is regarded as acceptable if the duration of such operations (based on statistical probability) does not exceed four hours per day. These are the intersection target levels of service for this environmental analysis. TRPA vehicle LOS standards may be exceeded when provisions for multi-modal amenities and/or services (such as transit, bicycling, and walking facilities) are adequate to provide mobility for users at a level that is proportional to the project-generated traffic in relation to overall traffic conditions on affected roadways.

For this analysis, a general suburban peak hour factor of 0.92 (as recommended by HCM 2010) has been used in the study intersection analyses under all analysis scenarios. Based on a review of Caltrans AADT and truck counts for the year 2012, a heavy-vehicle percentage of 7 percent in the peak hour periods was applied to the SR 89 north-south approaches, a 5 percent heavy-vehicle percentage was applied to the SR 28 east-west approaches and a 3 percent peak-hour heavy-vehicle percentage was applied to the local street approaches at the study intersections. The heavy-vehicle percentages mentioned are based on truck AADTs and are representative of the average annual traffic conditions. The spike in volumes in the summer peak hour can be primarily attributed to tourist traffic, therefore a downward adjustment of the heavy-vehicle percentage is necessary to accurately represent the vehicular mix in the summer peak conditions. For the purposes of arterial and intersection operational analyses, the above-mentioned average annual heavy-vehicle percentages were conservatively applied to the summer peak analysis scenarios. Because truck operating characteristics differ from those of passenger vehicles in that they accelerate/decelerate more slowly, a higher number of trucks that results from a conservative percentage could project lower levels of service and higher delay at intersections and along roadway segments in the study area.

Project Description

As stated in the current draft environmental documentation, the overall purposes of the proposed project are to reduce congestion and improve the safety and operations of the SR 89/28 wye intersection in Tahoe City for present and future automobile travel demand, improve pedestrian and bicycle mobility, support public transit needs, resolve the poor structural integrity of Fanny Bridge, expand emergency access to the Lake Tahoe West Shore communities in the Fanny Bridge vicinity, and contribute to economic revitalization of the local Tahoe City community. The primary needs for the project relate to the currently excessive traffic congestion and unacceptable levels of traffic volume, especially during peak summer travel periods; pedestrian and traffic safety risks from inadequate infrastructure; and the structural deficiency of Fanny Bridge. Other needs arising from traffic congestion and inadequate infrastructure are excessive mobile-source air pollutant emissions and unmanaged stormwater runoff from roadways.

The project would achieve the following objectives:

- Relieve existing congestion on SR 89 and improve vehicle mobility for commerce needs and a better resident and visitor experience;
- Improve traffic safety, traffic operations, and emergency access on SR 89 and SR 28, which includes the river crossing (Fanny Bridge) and associated intersections;
- Improve connectivity, reliability, travel times and operations of public transportation modes, including increased mobility and safety for bicycles and pedestrians and more multi-use trail options for crossing Truckee River;
- Improve highway freight mobility to meet commerce needs;
- Improve the structural integrity of Fanny Bridge, resolve bridge safety issues, and address community concerns about protecting the cultural values of the historic Fanny Bridge;
- Make public transportation more effective with better connectivity, reliability, and travel times;
- Provide two viable emergency evacuation routes to the north from the Lake Tahoe West Shore communities; and
- Reduce mobile-source air pollutant emissions by decreasing congestion and improve stormwater treatment facilities for project area roadways.

Appendix D includes graphics of each alternative (which are presented in the EIR/EIS/EA). Note that there is a difference between the graphic for Alternative 2 and the configuration analyzed in this traffic operations analysis. For Alternative 2, the graphic shows a south leg at the existing wye intersection in Option 1. This leg would provide access to businesses north of the bridge and for emergency vehicles to travel to the bridge. This south leg of the existing wye intersection is not included in the operations analysis because the analysis models are not able to accurately represent the vehicle arrivals based on these travel patterns. Therefore, the existing wye is modeled as a stop-controlled intersection for the business access on the north side of SR 28; the through movements on SR 28 are free-flow. Although a signal is shown in Option 1 on the Alternative 2 graphic, signal control is not necessary when the intersection is modeled without a south leg. For similar reasons, a roundabout as shown in Option 2 on the Alternative 2 graphic was not modeled for the operations analysis.

The proposed alternatives are:

- **ALTERNATIVE 1: NEW ALIGNMENT – EXISTING SR 89 OPEN AS A LOCAL ROADWAY**

  Alternative 1 would realign SR 89 as a new two-lane segment of roadway that would cross through USFS's 64-Acre Tract. The western end of the new segment would be constructed as a hybrid, single-lane circulating roundabout that would serve as the new SR 89/SR 28 intersection. This roundabout configuration is considered a hybrid because the southwest leg (coming into Tahoe City from Truckee) would have two lanes – one for entering the roundabout and one exclusive right-turn lane from which vehicles would be required to yield to circulating traffic. The other two approaches would have single lane entries into the roundabout.

  A new bridge over the Truckee River would be constructed immediately to the southeast of the roundabout on the new roadway segment. The new alignment would continue east and reconnect to existing SR 89 at a second roundabout near the existing changeable message sign and sled hill. The realigned portion of SR 89 would be elevated from 3 feet near the roundabout, up to 9 feet near the bridge. Slopes would be vegetated to blend in with the surrounding forested areas, and pathways would be installed along both sides of the roadway.

  Fanny Bridge would be rehabilitated or replaced to address the existing structural deficiencies and resolve safety and community concerns related to the project objectives. The existing section of SR 89 between Fanny Bridge and the eastern roundabout would be relinquished to Placer County and become a local street. Traffic calming and aesthetic features would be installed within this section of roadway (e.g., reduced speed limit, bulb-outs, landscaped areas, raised landscaped median, on-street parking, sidewalks, street lighting, benches, etc.).

  Alternative 1 has two possible options for the existing wye intersection. Option 1 removes the free-flowing right-turn lanes so the turning movements occur within the intersection. New parking or landscaping may replace the existing free-right turn lanes. Option 2 is a one-lane roundabout to replace the signal and turn lanes.

  Alternative 1 would include signage to indicate to drivers the direction to Truckee, Tahoe City, and South Lake Tahoe. Signs would be placed near all entry points to the roundabouts. Signs for gas, food, lodging, public transportation, hiking trails, and other tourist amenities would direct travelers toward Tahoe City attractions and businesses. In addition, the entrance into the Transit Center would be realigned to allow for bus and vehicle access approximately 240 feet north of the eastern roundabout.

- **ALTERNATIVE 2: NEW ALIGNMENT – CLOSE EXISTING SR 89 TO VEHICLE TRAFFIC ACROSS FANNY BRIDGE**

  With Alternative 2, the SR 89 realignment and signage would be the same as described above under Alternative 1. In order to improve the operation to LOS E that is less than 4 hours for opening day traffic on the northbound approach to the New SR 89/28 intersection, the western end of the new segment would be constructed as a hybrid, single-lane circulating roundabout. This roundabout configuration is considered a hybrid because the southwest leg (coming into Tahoe City from Truckee) would have two lanes – one for entering the roundabout and one exclusive right-turn lane from which vehicles would be required to yield to circulating traffic. The southern leg (coming from the west shore of Lake Tahoe and the eastern roundabout) of this hybrid roundabout would also have two lanes – one for entering the roundabout and one exclusive right-turn lane from which vehicles would be required to yield to circulating traffic. The other approach would have a single lane entry into the roundabout.
  In order to improve the operation to a LOS E that is less than 4 hours for the northbound and westbound approaches in 2038, the western end of the new segment would be constructed as a

new roundabout that would serve as the new SR 89/SR 28 intersection. The proposed roundabout configuration consists of a two-lane circulating roundabout on all approaches. This two-lane roundabout could be constructed for opening day, or constructed in a phased approach where only the additional lane for the northbound approach would be constructed initially.

A new bridge, which would serve as the primary river crossing, would be constructed over the Truckee River near the east end of the Caltrans maintenance yard. Fanny Bridge would be rehabilitated or replaced to address the existing structural deficiencies and resolve safety and community concerns related to the project objectives. Bollards would be placed to the north and south of Fanny Bridge to prohibit vehicular traffic. Access on this portion of the former SR 89 would be provided only for pedestrians, bicyclists, and emergency vehicles. The existing section of SR 89 between Fanny Bridge and the eastern roundabout would be relinquished to Placer County and become a local street.

Although modeled as a stop-controlled intersection, there are two possible options for the wye intersection. Option 1 removes the free-flowing right-turn lanes so the turning movements occur within the intersection. New parking or landscaping may replace the existing free-right turn lanes. Option 2 is a one-lane roundabout to replace the signal and turn lanes. The SR 89/SR 28 intersection modifications and signage would be the same under Alternative 3 as described above under Alternative 1.

Entry into the Transit Center would be allowed from the south only, at a point access approximately 240 feet north of the eastern roundabout. Traffic calming improvements similar to those described for Alternative 1 would be constructed on the street south of Fanny Bridge. The realigned portion of SR 89 would be elevated from 3 feet near the roundabout, up to 9 feet near the bridge. Slopes would be vegetated to blend in with the surrounding forested areas, and pathways would be installed along both sides of the roadway.

- **ALTERNATIVE 3: NEW ALIGNMENT –EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE**

  With Alternative 3, the SR 89 realignment and signage would be the same as described above under Alternative 1. In order to improve the operation to LOS E that is less than 4 hours for opening day traffic on the northbound approach to the New SR 89/28 intersection, the western end of the new segment would be constructed as a hybrid, single-lane circulating roundabout. This roundabout configuration is considered a hybrid because the southwest leg (coming into Tahoe City from Truckee) would have two lanes – one for entering the roundabout and one exclusive right-turn lane from which vehicles would be required to yield to circulating traffic. The southern leg (coming from the west shore of Lake Tahoe and the eastern roundabout) of this hybrid roundabout would have two lanes – one for entering the roundabout and one exclusive right-turn lane from which vehicles would be required to yield to circulating traffic. The other approach would have a single lane entry into the roundabout.

  In order to improve the operation to a LOS E that is less than 4 hours for the northbound and westbound approaches in 2038, the western end of the new segment would be constructed as a new roundabout that would serve as the new SR 89/SR 28 intersection. The proposed roundabout configuration consists of a two-lane circulating roundabout on all approaches. This two-lane roundabout could be constructed for opening day, or constructed in a phased

approach where only the additional lane for the northbound approach would be constructed initially.

A new bridge, which would serve as the primary river crossing, would be constructed over the Truckee River near the east end of the Caltrans maintenance yard. Fanny Bridge would be rehabilitated or replaced to address the existing structural integrity and resolve safety and community concerns related to the project objectives. The existing section of SR 89 between Fanny Bridge and the eastern roundabout would be relinquished to Placer County and become a local street. Access to Fanny Bridge would only be available from the north, via SR 28. A cul-de-sac would be constructed on the southern side of Fanny Bridge. The existing SR 89 would no longer allow access to Fanny Bridge for through traffic from the south. It would only provide access to the Transit Center and provide a secondary Truckee River crossing for emergency vehicles, if necessary.

Buses would be allowed to enter the Transit Center either from the cul-de-sac or the eastern roundabout; car entry to the Transit Center would be limited to the eastern roundabout. The realigned portion of SR 89 would be elevated from 3 feet near the roundabout, up to 9 feet near the bridge. Slopes would be vegetated to blend in with the surrounding forested areas, and pathways would be installed along both sides of the roadway.

Alternative 3 has two possible options for the existing wye intersection. Option 1 removes the free-flowing right-turn lanes so the turning movements occur within the intersection. New parking or landscaping may replace the existing free-right turn lanes. Option 2 is a one-lane roundabout to replace the signal and turn lanes. The SR 89/SR 28 intersection modifications and signage would be the same under Alternative 3 as described above under Alternative 1.

- **ALTERNATIVE 4: NEW ALIGNMENT – NO ROUNDABOUTS, EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE**

  With Alternative 4, the SR 89 realignment would follow a similar alignment as described above under Alternative 1. The new SR 89/SR 28 intersection would be a traditional signalized intersection, and a sweeping curve would connect the realigned and existing segments of SR 89. A new bridge, which would serve as the primary river crossing, would be constructed over the Truckee River near the east end of the Caltrans maintenance yard. Fanny Bridge would be rehabilitated or replaced to improve the existing structural integrity and resolve safety and community concerns related to the project objectives. The realigned portion of SR 89 would be elevated from 3 feet near the roundabout, up to 9 feet near the bridge. Slopes would be vegetated to blend in with the surrounding forested areas, and pathways would be installed along both sides of the roadway.

  The SR 89/SR 28 intersection modifications and signage would be the same under Alternative 4 as described above under Alternatives 1, 2, and 3. Buses would be allowed to enter the Transit Center from the cul-de-sac; car entry to the Transit Center would be limited to the relocated stop-controlled intersection with the 64-Acres Access Road. The existing wye remains a signalized intersection.

- **ALTERNATIVE 5: NO ACTION**

  Alternative 5 is the No Action Alternative. Under this alternative, there would be no improvements to SR 89, the SR 89/SR 28 intersection, or to Fanny Bridge. Any actions required to address the bridge's structural deficiencies would not be completed by TTD. Another agency (such as Caltrans or Placer County) could pursue a separate bridge rehabilitation or replacement project, or gradual upgrades may be implemented through routine maintenance by Caltrans. Alternatively, Caltrans could declare a more stringent vehicle weight restriction. At this time, no specific improvements to the bridge are planned by Caltrans or another agency.

- **ALTERNATIVE 6: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, MODIFY LANE GEOMETRICS AT EXISTING WYE INTERSECTION**

  Alternative 6 would rehabilitate or replace the existing Fanny Bridge with a wider structure with three northbound and two southbound travel lanes. The widened portion of the bridge would be constructed downstream of the existing structure, to comply with Board of Reclamation distance restrictions related to the dam. As a result, the new bridge would be 60 feet wider, and the centerline would be 28 feet downstream, as compared to the existing structure. The new Fanny Bridge would have 12-foot travel lanes, 8-foot shoulders, and 10-foot sidewalks on both sides. Under this alternative, the wye would remain in its existing location and configuration; however, the free right-turn lanes at the wye would be removed and replaced with right-turn lanes that would direct vehicles through the signalized intersection.

- **ALTERNATIVE 6A: REHABILITATE OR REPLACE AND WIDEN EXISTING BRIDGE, INSTALL ROUNDABOUT AT EXISTING WYE INTERSECTION**

  Under Alternative 6A, the existing Fanny Bridge would be rehabilitated or replaced at its current location with a new, wider four-lane structure built to current Caltrans design and safety standards. Similar to Alternative 6, the additional 49 feet of width would be downstream of the existing structure. The centerline of the new bridge would be 22 feet downstream from the centerline of the existing bridge. The new Fanny Bridge would have 12-foot travel lanes, 8-foot shoulders, and 10-foot sidewalks on both sides. The existing signalized wye intersection would be replaced with a two-lane roundabout. A single-lane roundabout was initially modeled, but all approaches provided failing levels of service, so the configuration was increased to two circulating lanes.

Roadway Segment and Intersection Operational Analysis

This section presents the roadway segment and intersection operational analysis results for the existing, opening, and design years as projected through application of the HCM-2010, *Synchro/SimTraffic 8*, and *SIDRA/GDOT* roundabout methodologies previously described. The LOS results presented in this section represent the best available information based upon modeling efforts. Actual, opening day and design year conditions may differ from those projected because the required model calibration effort to accurately simulate random, mid-block pedestrian crossings and queues that do not discharge within the peak hour was not undertaken as part of this traffic analysis. For example, the models cannot adequately account for pedestrian/bicyclist crossing activity at the at-grade crosswalk on the south end of the bridge. The pedestrian signal at this location has been observed to cause delay for motorists on this existing segment of SR 89, particularly during the peak summer hour, as they stop when the pedestrian signal is actuated. More delay is experienced in the summer peak periods on the northbound SR 89 approach to the existing wye intersection than predicted, due to turbulence in the traffic stream associated with uncontrolled movements and unexpected situations likely to be encountered with multiple access points and high volumes of pedestrians/bicyclists.

In the following tables for Alternatives 1 through 4, the relocated segment of SR 89 is referenced with a northbound/southbound direction. The northbound direction is toward the western roundabout and the southbound direction is toward the eastern roundabout. This nomenclature allows for a direct comparison to the existing SR 89 segment which is referenced as northbound/southbound. The No Action Alternative is used as a baseline point of comparison to describe impacts under the action alternatives. For Alternatives 1 through 4, the SR 89 segment between the existing wye intersection and Granlibakken Road is compared to the new segment of SR 89 between the new SR 89/28 intersection and the new intersection between existing SR 89 and this new segment. The SR 89 segment between Twin Crags Way and the existing wye intersection is compared to two segments: one is between Twin Crags Way and the new SR 89/28 intersection and the other is between the new SR 89/28 intersection and the existing wye intersection (referred to as New SR 28). Because SR 89 would not be realigned under Alternatives 6 and 6a, this analysis directly compares SR 89 segments between the wye intersection and Granlibakken Road between Twin Crags Way and the existing wye intersection.

At the new SR 89/28 intersection (termed the western roundabout for Alternatives 1, 2, and 3), the northbound approach refers to the segment with vehicles traveling on relocated SR 89 toward the new SR 89/28 intersection. The eastbound approach refers to the segment with vehicles traveling eastbound on SR 28 toward the new SR 89/28 intersection. Likewise, the westbound approach refers to the segment with vehicles traveling westbound on SR 28 toward the new SR 89/28 intersection. At the intersection with relocated SR 89/existing SR 89 (termed the eastern roundabout for Alternatives 1, 2, and 3), the eastbound approach refers to the segment of relocated SR 89 with vehicles traveling away from the new SR 89/28 intersection and toward the relocated SR 89/existing SR 89 intersection. The northbound approach refers to the segment of existing SR 89 with vehicles traveling toward the relocated SR 89/existing SR 89 intersection. The southbound approach refers to the segment of existing SR 89 with vehicles traveling away from Fanny Bridge and toward the relocated SR 89/existing SR 89 intersection. The table entries that are diagonal slashes indicate that the particular movement does not exist with the intersection configuration for the alternative. All delay is represented by average seconds per vehicle. The source for all the data in the tables is CH2M HILL, 2014.

Existing Conditions (Year 2013)

Figure 3 shows the existing volumes. Table 5a shows estimated peak hour arterial/highway directional segment operations under 2013 traffic volume conditions for the segments that will be analyzed for the various alternatives. These levels of service are the baseline condition for the roadway segment analysis. As shown in Table 5a, the study arterial segments are estimated to operate at an acceptable LOS "C" or better during both annual average and summer peak hour volume conditions. As noted in the Field Conditions section, Fanny Bridge has a lower capacity than the segment of SR 89 between the existing wye intersection and Granlibakken Road. The effects of this pinch point are a lower average travel speed and LOS experienced by motorists, particularly during the summer peak hour.

Table 5a. Existing Conditions Arterial Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 - between Twin Crags Way and existing wye intersection	EB	24.6	B	19.3	C
	WB	20.9	C	20.3	C
Existing SR 89 – between existing wye intersection and Granlibakken Rd	NB	21.7	C	20.9	C
	SB	21.7	C	19.9	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-37 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

Tables 5b and 5c show the signalized and unsignalized intersection operations under 2013 volume conditions. These levels of service are the baseline condition for the intersection analysis. As shown in Table 5b, the wye overall and each individual approach operates at an acceptable LOS "D" or better under both annual average and summer peak hour volume conditions. At the unsignalized intersections, the uncontrolled movements on SR 89 and SR 28 operate at high levels of service. However, the stop-controlled side street approaches generally experience significant delay and low levels of service due to a lack of adequate gaps in the through traffic streams on the state routes. The delays are greater during the summer peak than the average annual peak hour. The previous discussion about the field conditions explains the low throughput capacity of SR 89 due to pedestrian/bicyclist activity at/near Fanny Bridge.

Table 5b. Existing Conditions Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	25.7	C	22.7	C	26.5	C	27.7	C	25.1
	Summer			C	33.2	C	32.0	D	50.8	D	35.8	D	37.5

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 5c. Existing Conditions Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	15.6	A	0.0			A	8.8
	Summer			C	20.8	A	0.0			A	9.5
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	39.7	A	9.5	C	24.2	A	9.0
	Summer			F	144.2	B	10.3	E	42.8	A	9.7
SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	8.8	C	16.2	A	0.0		
	Summer			A	9.5	C	22.9	A	0.0		
SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	8.9	D	30.3
	Summer			A	0.0			A	9.7	F	97.7
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.3	C	16.2	A	8.7	F	57.8
	Summer			A	8.7	C	23.0	A	9.4	F	415.0

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Opening Day Conditions (Year 2018)

This subsection presents the projected peak hour arterial/highway directional segment and intersection operations under 2018 traffic volume conditions for all of the alternatives. The project would not generate additional vehicle trips that could affect intersection or roadway segment operations; rather, it would implement improvements to existing transportation infrastructure. For Alternatives 1 through 4, SR 89 would be realigned through the 64-Acre Tract; and under Alternatives 6 and 6A the existing SR 89 roadway alignment would remain the same as under the existing conditions. The wye would be modified for all action alternatives. Thus, impacts are assessed by comparing the action alternatives to the No Action Alternative. Figure 5 shows the projected opening day peak hour and daily traffic volumes in the study area for the No Build condition in year 2018. The subsequent figures show the 2018 volumes associated with each alternative. Appendixes E and F contain the model output for the segment and intersection analyses. As noted in the discussion about the modeling tools used for this analysis, the capacity limitations imposed by Fanny Bridge and the random mid-block pedestrian crossings known to occur in the study area likely would result in lower average travel speeds and LOS than presented in the following tables.

ALTERNATIVE 1: NEW ALIGNMENT – EXISTING SR 89 OPEN AS A LOCAL ROADWAY

Table 6a shows the peak hour arterial/highway directional segment operations for Alternative 1 traffic and geometric conditions. Figure 6 shows the study area volumes associated with Alternative 1 in the year 2018. As shown in Table 6a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations (i.e., as shown for Alternative 5, the No Action Alternative). Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative. The relocated SR 89 segment (between the western and eastern roundabouts) is projected to operate at the same LOS in the northbound direction toward SR 28 during both peak hours as compared to the existing alignment under the No Action Alternative (between the existing wye and Granlibakken Road). Along this same segment between the western and eastern roundabouts, the southbound projected travel speed and associated LOS is lower during the summer peak hour than the No Action Alternative. The operations at the eastern roundabout could contribute to the projected average speed reduction. The projected LOS for the existing segment of SR 89 between the wye and Granlibakken Road is the same for Alternative 1 as under the No Action Alternative. The projected average travel speeds are higher with Alternative 1, which is likely due to the removal of SR 89 through traffic to the new SR 89 segment between the roundabouts.

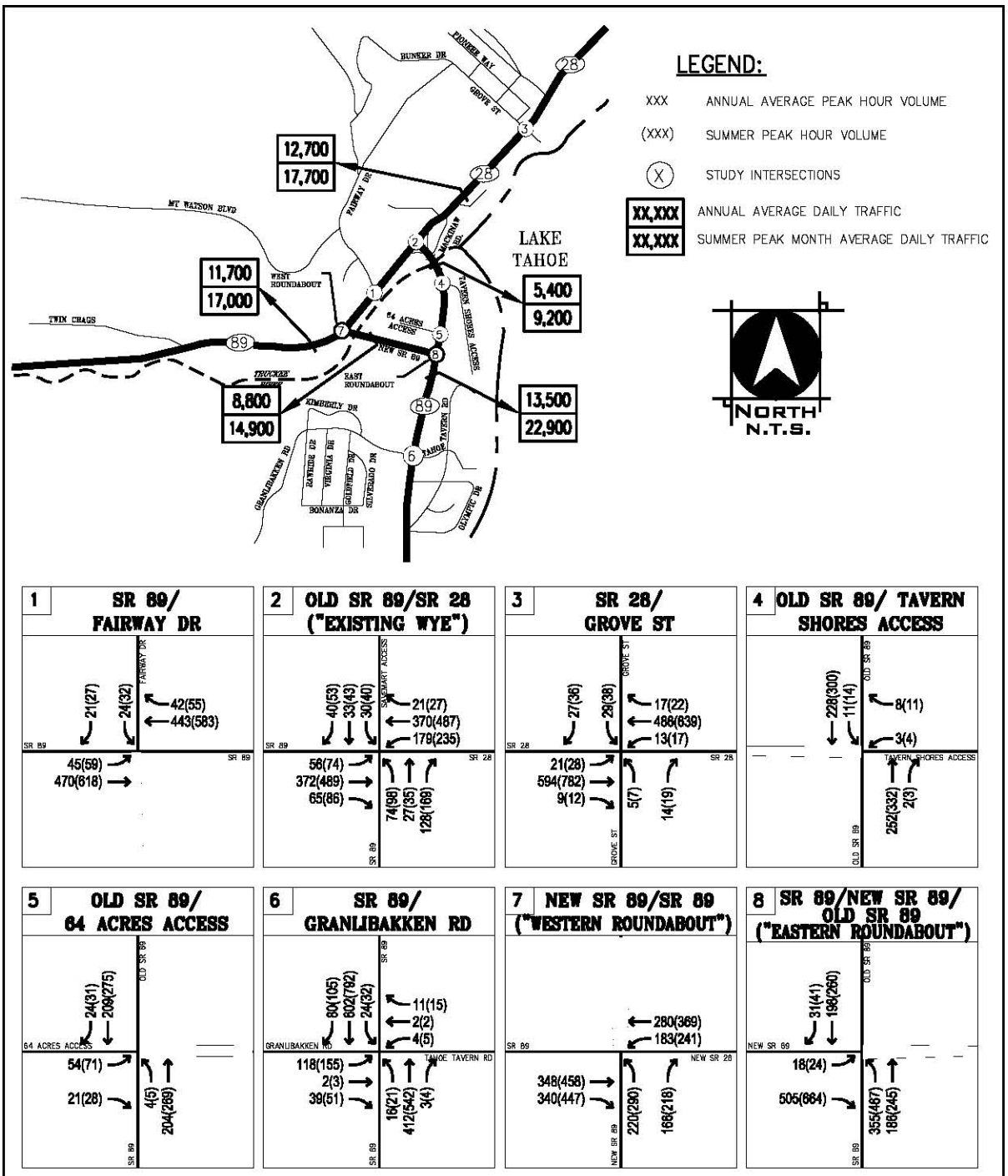

FIGURE 6

YEAR 2018 ALTERNATIVE 1 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

Table 6a. Year 2018 Alternative 1 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	21.8	C	21.8	C
	WB	19.0	C	19.3	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	23.7	C	22.0	C
	SB	22.0	C	16.0	C
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	19.3	C	19.0	C
	WB	21.0	C	18.8	C
Existing SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout)	NB	23.5	C	23.5	C
	SB	23.5	C	23.8	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 6b, the signalized existing wye intersection is projected to operate at LOS "C" or better conditions during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to the existing wye in the No Action Alternative.

As shown in Table 6c, the three unsignalized intersections in the project area (Fairway Drive, Tavern Shores Access Road, and 64-Acres Recreational Access Road) are projected to operate with minimal delays for the stop-controlled side street movements during both the annual average and summer peak hour conditions. These are the three intersections at which the through traffic volumes are reduced on portions of existing SR 89 and SR 28 due to the relocation of the SR 89 through movement. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

As shown in Table 6d, a single-lane, hybrid roundabout at the new SR 89 / 28 intersection (shown as the western roundabout in the figures and tables) is projected to operate at LOS "C" or better for all the movements, and with less average delay than projected for any of the movements at the existing wye intersection. The exclusive right-turn lane for the eastbound to southbound right turn movement removes the highest volume movement from circulatory roadway within the roundabout. Likewise, the eastern roundabout at the intersection between the relocated segment of SR 89 and existing SR 89 is projected to operate at LOS "C" or better during both peak hours. The eastbound approach would experience the highest delay of the three approaches, with an average delay of 24.1 seconds per vehicle; this is the continuation of the eastbound to southbound through movement for SR 89 that travels through the new SR 89 / 28 intersection in the exclusive right-turn lane. At the existing wye intersection, a two-lane roundabout is projected to provide a better level of service for all the approaches than the existing signalized intersection configuration.

Table 6b. Year 2018 Alternative 1 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	22.0	B	19.0	C	20.8	C	22.8	C	20.8
	Summer			C	26.5	C	21.1	C	24.9	C	26.1	C	23.7

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 6c. Year 2018 Alternative 1 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	B	14.5	A	0.0			A	8.7
	Summer			C	18.6	A	0.0			A	9.4
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
Old SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	7.9	B	10.5	A	0.0		
	Summer			A	8.1	B	11.5	A	0.0		
Old SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	7.7	B	12.4
	Summer			A	0.0			A	7.9	B	14.7
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.4	A	9.0	F	109.4
	Summer			A	8.9	D	29.3	A	9.9	F	716.6

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 6d. Year 2018 Alternative 1 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound Exclusive Right Turn Lane (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			B	13.7	C	15.3	A	9.6
	Summer					D	30.8	E	39.8	B	14.4
	Average Annual		Calibrated*			A	10.0	B	11.4	A	8.4
	Summer					C	18.1	C	24.2	B	12.3
	Average Annual	SIDRA	EF = 1.2			A	5.4	A	8.5	A	3.7
	Summer					B	14.9	C	23.6	A	4.4
	Average Annual		EF = 1.1			A	4.3	A	6.7	A	3.4
	Summer					A	9.3	B	14.4	A	4.0
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	A	9.5			B	10.8	C	16.0
	Summer			B	14.5			C	17.1	E	44.3
	Average Annual		Calibrated*	A	7.5			A	8.1	B	11.5
	Summer			B	11.0			B	11.6	C	24.1
	Average Annual	SIDRA	EF = 1.2	A	6.5			A	7.9	A	7.7
	Summer			A	9.0			A	8.2	C	22.4
	Average Annual		EF = 1.1	A	5.9			A	7.9	A	6.2
	Summer			A	7.3			A	8.1	B	12.9
New SR 28 / Old SR 89 / SR 28 (existing wye)	Average Annual	GDOT Analysis Tool	HCM 2010	A	9.6	C	15.9	B	11.3	C	15.8
	Summer			B	14.4	E	43.8	C	19.8	E	43.9
	Average Annual		Calibrated*	A	7.7	B	11.0	A	8.9	B	11.2
	Summer			B	11.4	C	21.9	B	14.5	C	23.1
	Average Annual	SIDRA	EF = 1.2	B	10.3	A	7.4	A	9.4	A	7.6
	Summer			B	14.0	B	14.0	B	14.5	C	18.9
	Average Annual		EF = 1.1	A	9.5	A	7.0	A	8.8	A	6.3
	Summer			B	12.6	A	9.9	B	11.9	B	11.9

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

ALTERNATIVE 2: NEW ALIGNMENT – CLOSE EXISTING SR 89 TO VEHICLE TRAFFIC ACROSS FANNY BRIDGE

Table 7a shows the peak hour arterial/highway directional segment operations for Alternative 2 traffic and geometric conditions. Figure 7 shows the study area volumes associated with Alternative 2 in the year 2018. As shown in Table7a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during the annual average peak hour. In the summer peak hour, the projected average travel speed on new SR 28 in the westbound direction (toward the new SR 89/28 intersection) is projected to be lower than the speed projected under the No Action Alternative. This result could be attributed to the western roundabout operations under Alternative 2. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate at the same LOS as compared to the existing alignment between the wye and Granlibakken Road under the No Action Alternative.

Table 7a. Year 2018 Alternative 2 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	22.0	C	21.2	C
	WB	19.5	C	19.3	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	21.3	C	20.0	C
	SB	22.3	C	19.7	C
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	22.7	C	22.3	C
	WB	21.3	C	13.3	E

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

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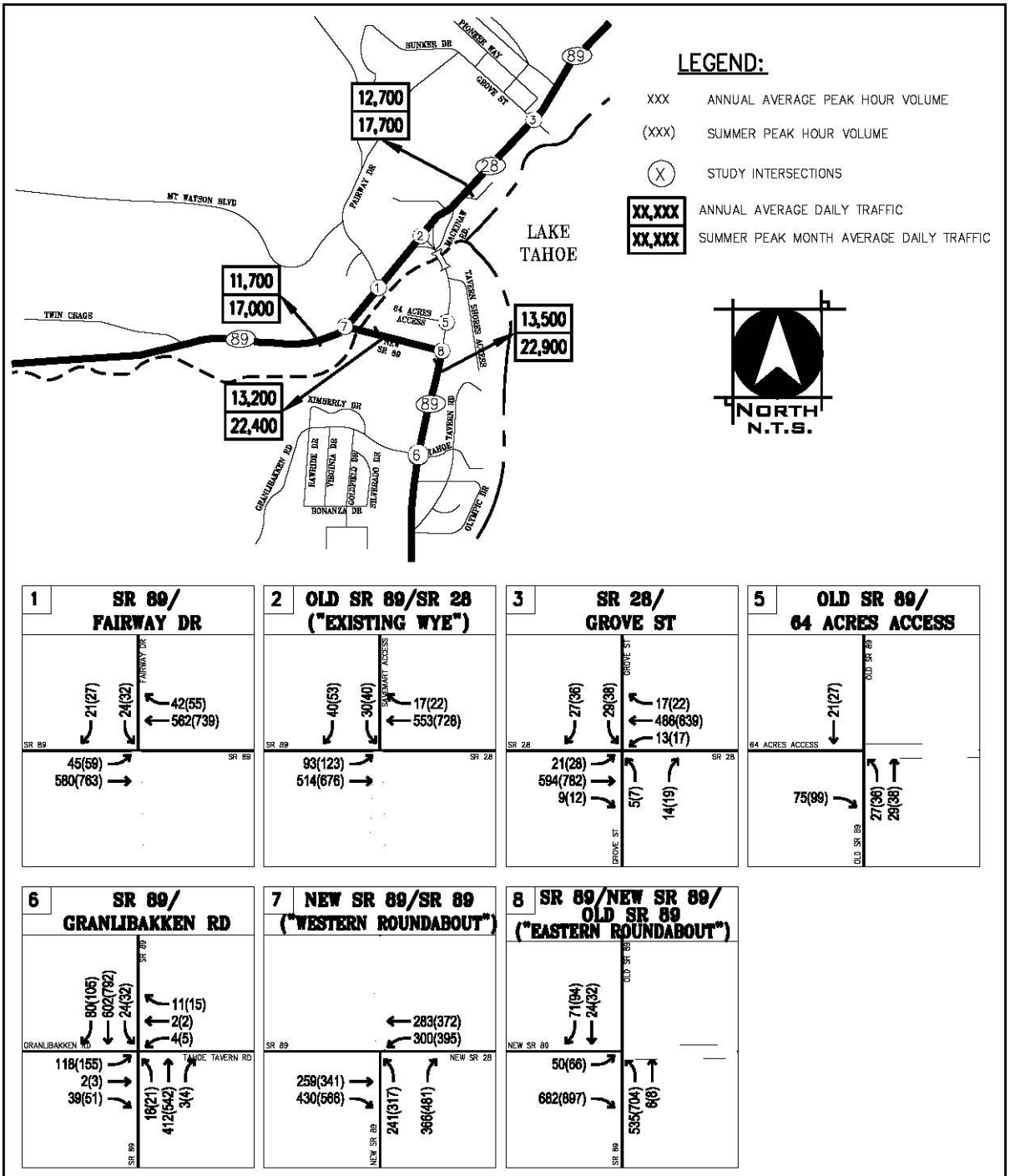


FIGURE 7

YEAR 2018 ALTERNATIVE 2 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

With this alternative, the turning movement volumes through the existing wye intersection become through movements for the SR 89 traffic. When modeled as a stop-controlled intersection as shown in Table 7b, the through movements at the existing wye would operate in a free-flow condition and experience less delay and a higher level of service as compared to the existing wye in Alternative 5. The southbound approach is projected to operate at LOS "C" during the peak hours. Also shown in Table 7b, the two unsignalized intersections in the project area (Fairway Drive and 64-Acres Recreational Access Road) are projected to operate with minimal delays for the stop-controlled side street movements during both the annual average and summer peak hour conditions. These are the two intersections at which the through traffic volumes are reduced on portions of existing SR 89 and SR 28 due to the relocation of the SR 89 through movement. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

As shown in Table 7c, the westbound approach to the single-lane, hybrid roundabout at the new SR 89/28 intersection is projected to operate at LOS "E" for the summer peak hour, which is a lower level of service than projected for any of the movements at the existing wye intersection. The additional volume through this single-lane hybrid roundabout due to the closure of SR 89 to through traffic with this alternative would increase the average delay over that projected for Alternative 1. All the approaches at the eastern roundabout are projected to operate at acceptable levels of service during both peak hours. Since the northbound volume that is a through movement with Alternative 1 would be a turning movement through the roundabout with Alternative 2, the delay is projected to be greater with this alternative. Likewise, more delay is projected for the eastbound to southbound movement because this volume is higher than with Alternative 1 due to the closure of Fanny Bridge to vehicular traffic.

4 Hour LOS Analysis. The LOS "E" projected for the westbound approach at the western roundabout necessitates further analysis to determine if the TRPA criterion can be met: *peak hour LOS "E" is regarded as acceptable if the duration of such operations does not exceed four hours per day*. Table 7d shows the fifth hour level of service is projected to be LOS "D" for the westbound approach. Thus, the criterion is met and mitigation would not be required.

Table 7b. Year 2018 Alternative 2 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Savemart Access / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	15.9	A	0.0			A	9.5
	Summer			C	21.7	A	0.0			B	10.7
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	16.7	A	0.0			A	9.2
	Summer			C	23.3	A	0.0			B	10.1
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
Old SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	7.3	A	9.0
	Summer			A	0.0			A	7.4	A	9.1
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.4	A	9.0	F	109.4
	Summer			A	8.9	D	29.3	A	9.9	F	716.6

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 7c. Year 2018 Alternative 2 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			C	22.1	B	11.1	B	13.3
	Summer					F	93.1	C	20.0	D	31.3
	Average Annual		Calibrated*			B	14.2	A	8.9	B	10.2
	Summer					E	44.4	B	13.8	C	18.2
	Average Annual	SIDRA	EF = 1.2			A	9.5	A	4.1	A	4.2
	Summer					F	61.2	A	5.7	A	7.2
	Average Annual		EF = 1.1			A	6.8	A	3.8	A	3.7
	Summer					C	24.9	A	4.6	A	6.0
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	A	8.5			B	11.6	C	18.2
	Summer			B	12.1			C	20.0	F	55.8
	Average Annual		Calibrated*	A	6.9			A	8.7	B	12.1
	Summer			A	9.7			B	13.0	D	26.0
	Average Annual	SIDRA	EF = 1.2	A	8.1			B	10.7	A	4.7
	Summer			B	10.7			B	11.5	A	6.5
	Average Annual		EF = 1.1	A	7.4			B	10.5	A	4.5
	Summer			A	9.7			B	11.1	A	5.3

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 7d. Year 2018 Alternative 2 Fifth Peak Hour Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive-Right Turn Lanes (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			D	27.2	B	11.7	B	14.5

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

ALTERNATIVE 3: NEW ALIGNMENT – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE

Table 8a shows the peak hour arterial/highway directional segment operations for Alternative 3 traffic and geometric conditions. Figure 8 shows the study area volumes associated with Alternative 3 in the year 2018. As shown in Table 8a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during the annual average peak hour. In the summer peak hour, the projected average travel speed on new SR 28 in the westbound direction (toward the new SR 89/28 intersection) is projected to be lower than the speed projected under the No Action Alternative. This result could be attributed to the western roundabout operations under Alternative 3. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate at the same LOS as compared to the existing alignment between the wye and Granlibakken Road during the annual average peak hour as under the No Action Alternative. Like the new SR 28 westbound segment, the average speed in the northbound direction of the relocated SR 89 segment (toward the new SR 89/28 intersection) is projected to be lower than the speed projected under the No Action Alternative. This result could be attributed to the western roundabout operations under Alternative 3.

Table 8a. Year 2018 Alternative 3 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	22.0	C	21.2	C
	WB	19.5	C	19.5	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	20.7	C	17.0	D
	SB	22.3	C	21.3	C
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	20.3	C	20.0	C
	WB	20.0	C	16.3	D

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

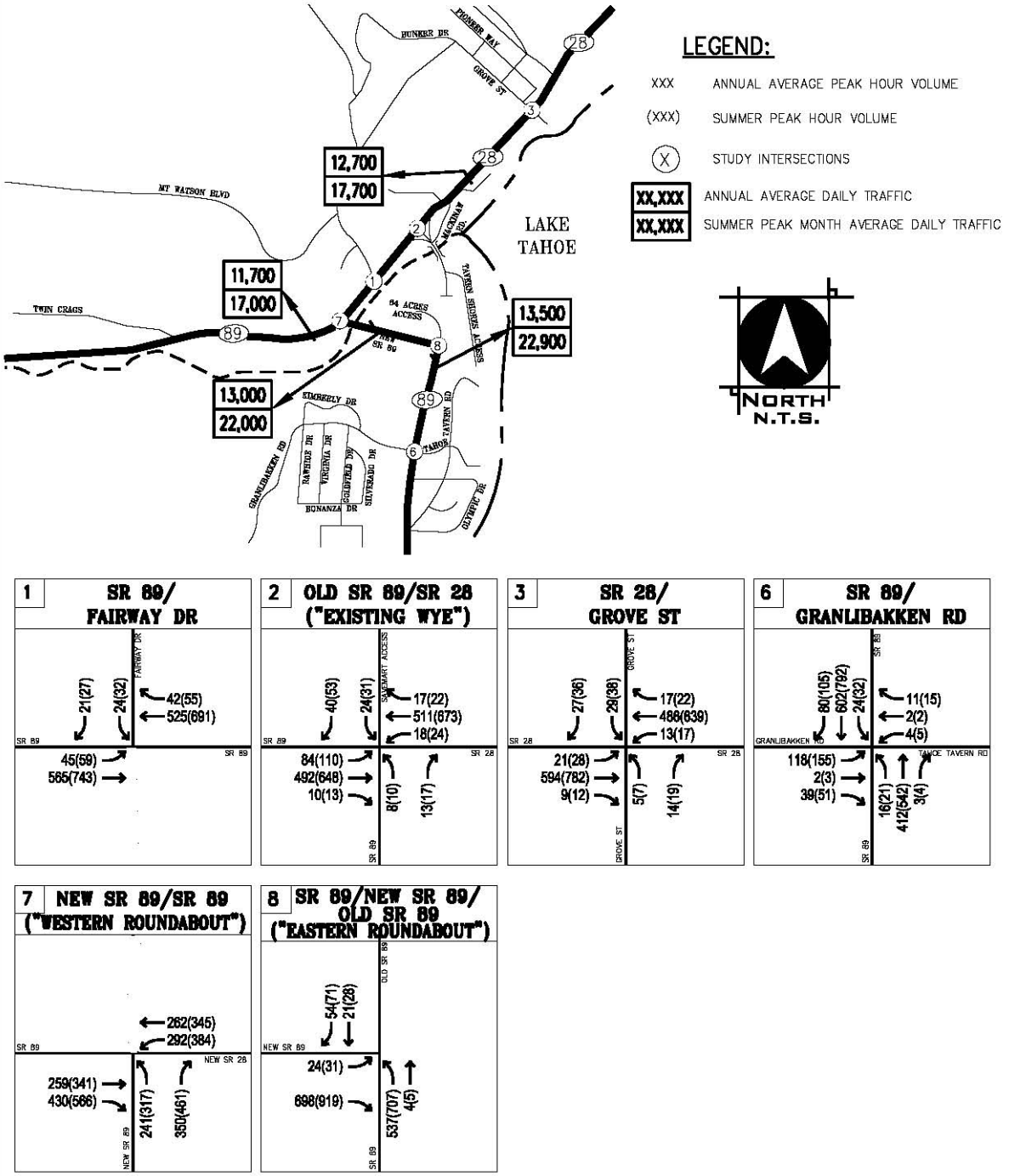


FIGURE 8

YEAR 2018 ALTERNATIVE 3 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

As shown in Table 8b, the signalized existing wye intersection is projected to operate at LOS “B” for all approaches during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to the No Action Alternative at the existing wye.

As shown in Table 8c, the unsignalized Fairway Drive intersection with SR 28 is projected to operate with LOS “C” conditions for the stop-controlled side street movement during both the annual average and summer peak hour conditions. The through traffic volume is reduced on portions of existing SR 89 and this portion of existing SR 89/new SR 28 due to the relocation of the SR 89 through movement. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

As shown in Table 8d, the westbound approach to the single-lane, hybrid roundabout at the new SR 89/28 intersection is projected to operate at LOS “E” for the summer peak hour, which is a lower level of service than projected for any of the movements at the existing wye intersection. The additional volume through this single-lane, hybrid roundabout due to the closure of SR 89 to through traffic south of Fanny Bridge with this alternative would increase the average delay over that projected for Alternative 1. All the approaches at the eastern roundabout are projected to operate at acceptable levels of service during both peak hours. The roundabout configuration at this location is projected to reduce the delay and improve the level of service projected for the eastbound side street movements at the 64-Acre Access with the No Action Alternative. At the existing wye intersection, a roundabout is projected to provide a better level of service for all the approaches than the existing signalized intersection configuration.

4 Hour LOS Analysis. The LOS “E” projected for the westbound approach at the western roundabout necessitates further analysis to determine if the TRPA criterion can be met: *peak hour LOS “E” is regarded as acceptable if the duration of such operations does not exceed four hours per day*. Table 8e shows the fifth hour level of service is projected to be LOS “C” for the westbound approach. Thus, the criterion is met and mitigation would not be required.

Table 8b. Year 2018 Alternative 3 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	B	10.4	B	10.7	A	9.9	B	11.6	B	11.1
	Summer			B	11.9	B	11.8	B	11.3	B	11.5	B	11.7

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 8c. Year 2018 Alternative 3 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	16.1	A	0.0			A	9.0
	Summer			C	22.0	A	0.0			A	9.9
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.4	A	9.0	F	109.4
	Summer			A	8.9	D	29.3	A	9.9	F	716.6

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 8d. Year 2018 Alternative 3 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			C	19.6	B	10.7	B	13.0
	Summer					F	74.6	C	18.4	D	29.8
	Average Annual		Calibrated*			B	13.1	A	8.7	B	10.1
	Summer					E	35.4	B	13.2	C	17.6
	Average Annual	SIDRA	EF = 1.2			A	8.6	A	4.1	A	4.1
	Summer					E	43.9	A	5.5	A	7.4
	Average Annual		EF = 1.1			A	6.4	A	3.8	A	3.7
	Summer					C	18.8	A	4.6	A	5.8
64 Acres Access / Old SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	A	8.0			B	11.0	C	17.5
	Summer			B	11.0			C	17.5	F	50.7
	Average Annual		Calibrated*	A	6.5			A	8.2	B	11.7
	Summer			A	8.9			B	11.8	C	24.1
	Average Annual	SIDRA	EF = 1.2	A	8			B	10.3	A	4.4
	Summer			B	10.6			B	10.7	A	5.8
	Average Annual		EF = 1.1	A	7.4			B	10.2	A	4.2
	Summer			A	9.6			B	10.5	A	4.8
New SR 28 / Old SR 89 / SR 28 (existing wye)	Average Annual	GDOT Analysis Tool	HCM 2010	A	7.5	B	12.5	A	7.2	B	12.3
	Summer			B	10.1	C	24.0	A	9.2	C	22.5
	Average Annual		Calibrated*	A	6.1	A	9.1	A	6.0	A	8.8
	Summer			A	8.2	B	14.4	A	7.6	B	13.5
	Average Annual	SIDRA	EF = 1.2	A	9.8	A	4.6	B	10.2	A	4.7
	Summer			B	12.0	A	5.5	B	12.7	A	5.3
	Average Annual		EF = 1.1	A	9.3	A	4.3	A	9.6	A	4.5
	Summer			B	11.2	A	5.0	B	11.8	A	4.9

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 8e. Year 2018 Alternative 3 Fifth Peak Hour Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			C	23.1	B	11.4	B	14.2

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

ALTERNATIVE 4: NEW ALIGNMENT, NO ROUNDABOUTS – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE

Table 9a shows the peak hour arterial/highway directional segment operations for Alternative 4 traffic and geometric conditions. Figure 9 shows the study area volumes associated with Alternative 4 in the year 2018. As shown in Table 9a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during both peak hours. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate with slower average travel speeds as compared to the existing location under the No Action Alternative during both peak hours. This could be attributed the roundabout operations at either end of this segment.

Table 9a. Year 2018 Alternative 4 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89/28 intersection	EB	21.6	C	20.2	C
	WB	23.3	C	23.3	C
New SR 89 between SR 89 /28 intersection and Granlibakken Road	NB	18.3	D	18.0	D
	SB	19.3	C	18.3	D
New SR 28 between New SR 89/28 intersection and existing wye intersection	EB	20.8	C	20.5	C
	WB	20.5	C	19.5	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

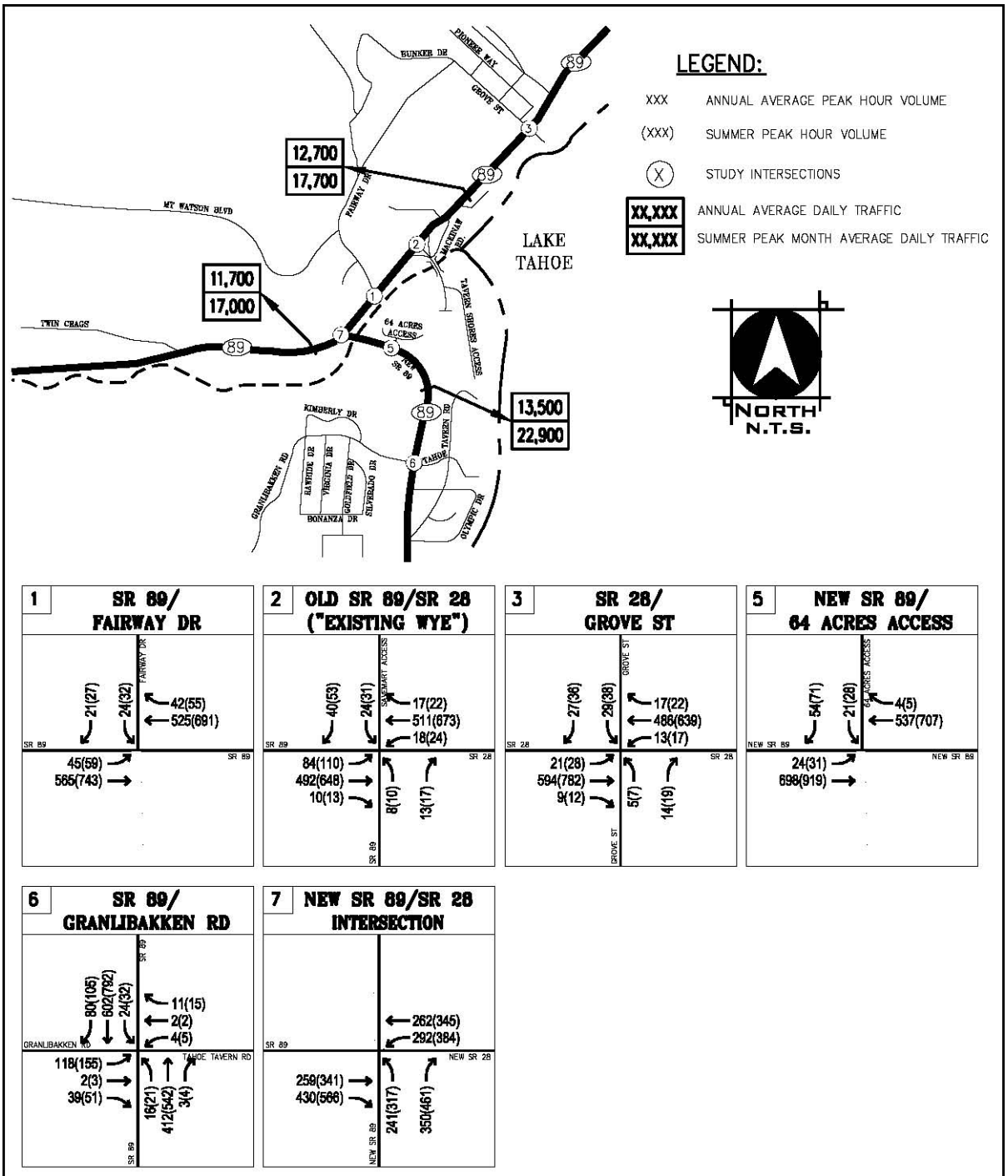


FIGURE 9

YEAR 2018 ALTERNATIVE 4 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

As shown in Table 9b, the signalized existing wye intersection is projected to operate at an overall LOS "B" during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to the No Action Alternative at the existing wye. The new SR 89 / 28 intersection is projected to provide LOS "C" or better operations as a signalized intersection. With regard to the northbound approach, less delay is projected with this configuration than for the other alternatives.

As shown in Table 9c, the unsignalized Fairway Drive intersection with SR 28 is projected to operate at similar levels of service as the No Action Alternative during both the annual average and summer peak hour conditions. At the 64-Acres Access intersection, the southbound approach is representative of the eastbound approach in the No Build condition. The delay for this movement to access SR 89 is projected to be less with Alternative 4 than with the No Action Alternative. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Action Alternative.

Table 9b. Year 2018 Alternative 4 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 89 / 28	Average Annual	Synchro	HCM 2010			B	11.0	B	17.7	B	14.7	B	13.5
	Summer					C	20.5	C	30.4	C	25.8	C	24.1
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	B	11.2	A	9.5	B	10.7	B	10.5	B	10.1
	Summer			B	12.6	B	10.4	B	11.8	B	10.6	B	10.6

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 9c. Year 2018 Alternative 4 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	16.1	A	0.0			A	9.0
	Summer			C	22.0	A	0.0			A	9.9
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
New SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	C	17.0	A	0.0			A	8.8
	Summer			D	25.4	A	0.0			A	9.6
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.4	A	9.0	F	109.4
	Summer			A	8.9	D	29.3	A	9.9	F	716.6

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

ALTERNATIVE 5: NO ACTION

Table 10a shows year 2018 peak hour arterial/highway directional segment operations for No Action traffic and geometric conditions. Figure 5 shows the study area volumes associated with the No Action Alternative in the year 2018. As shown in Table 10a, the roadway segments are projected to operate at LOS "C" with average travel speeds around 20 miles per hour during both peak hours with existing capacity configurations.

Table 10a. Year 2018 Alternative 5 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 - between Twin Crags Way and existing wye intersection	EB	19.0	C	18.1	C
	WB	20.8	C	20.6	C
Existing SR 89 – between existing wye intersection and Granlibakken Rd	NB	21.6	C	20.9	C
	SB	20.0	C	19.1	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-37 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 10b, the signalized existing wye intersection is projected to operate at LOS "C" during the annual average peak hour and LOS "D" during the summer peak hour conditions in 2018. The additional volume traveling through the intersection during the summer tourist season would increase the average delay at this intersection.

As shown in Table 10c, the through movements on the state routes at the five unsignalized intersections in the study area are all projected to operate with high levels of service; the only delay is experienced by the turning movements. The side street approaches at the Fairway Drive and Tavern Shores Access Road intersections are projected to operate at acceptable levels of service. The eastbound approach at the 64-Acres Access Road intersection is projected to operate at LOS "D" during the annual average peak hour and then at an unacceptable LOS "F" during the summer peak hour. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements currently experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. Lengthy delays are also projected for 2018 volume conditions.

Table 10b. Year 2018 Alternative 5 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	27.0	C	26.7	C	28.2	C	29.0	C	27.7
	Summer			C	34.9	D	40.8	D	50.6	D	38.7	D	42.2

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 10c. Year 2018 Alternative 5 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	16.2	A	0.0			A	8.9
	Summer			C	22.3	A	0.0			A	9.7
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	8.9	C	17.4	A	0.0		
	Summer			A	9.6	D	26.0	A	0.0		
SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	9.0	D	34.2
	Summer			A	0.0			A	9.8	F	126.7
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.7	A	9.0	F	107.3
	Summer			A	8.8	D	27.8	A	9.8	F	640.2

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

ALTERNATIVE 6: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, MODIFY LANE GEOMETRICS AT EXISTING WYE INTERSECTION

Table 11a shows the peak hour arterial/highway directional segment operations for Alternatives 6 and 6A traffic and geometric conditions. Figure 10 shows the study area volumes associated with Alternatives 6 and 6A in the year 2018. As shown in Table 11a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. The projected LOS for this alternative during both peak hours is the same as projected under the No Action Alternative.

Table 11a. Year 2018 Alternatives 6 and 6A Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 - between Twin Crags Way and existing wye intersection	EB	17.9	C	17.2	D
	WB	20.7	C	20.1	C
Existing SR 89 – between existing wye intersection and Granlibakken Rd	NB	21.4	C	20.6	C
	SB	20.0	C	19.9	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-37 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 11b, the improved intersection configuration at the existing wye is projected to provide less average delay per vehicle during the summer peak season as compared to the No Action Alternative. The projected operations are similar to the No Build condition during the annual average peak hour because the demand is lower. As shown in Table 11c, the unsignalized intersections are projected to operate at similar levels of service as Alternative 5 because no improvements are proposed for them with Alternative 6.

ALTERNATIVE 6A: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, INSTALL ROUNDABOUT AT EXISTING WYE INTERSECTION

Projected roadway segment operations for Alternative 6A are the same as described above for Alternative 6. As shown in Table 11d, reconfiguring the existing wye as a roundabout is projected to provide a higher level of service and less average delay per vehicle as compared to Alternative 5. The projected delay reduction is significant for all the approaches because a roundabout provides more free-flow operation and less stop-related delay than signal control. A single-lane roundabout at this location was modeled initially, but this configuration projected failing operations for each approach.

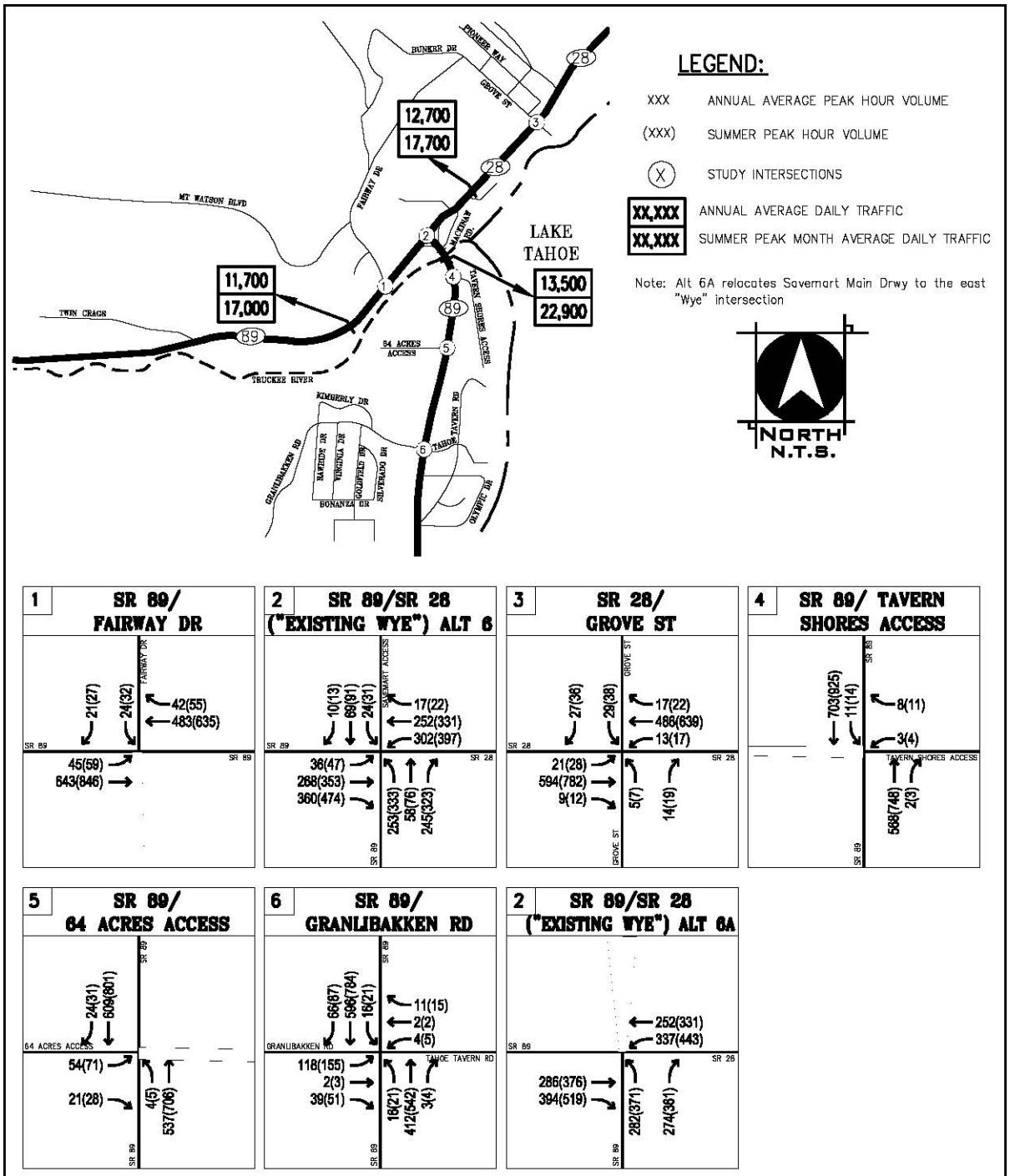


FIGURE 10

YEAR 2018 ALTERNATIVE 6 & 6A TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

Table 11b. Year 2018 Alternative 6 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	29.6	C	33.7	C	27.3	C	23.6	C	28.0
	Summer			D	36.4	D	46.1	D	37.6	D	33.6	D	38.7

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 11c. Year 2018 Alternative 6 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	16.2	A	0.0			A	8.9
	Summer			C	22.3	A	0.0			A	9.7
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	E	45.8	A	9.5	D	25.9	A	9.2
	Summer			F	210.4	B	10.5	E	48.7	A	9.9
SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	8.9	C	17.4	A	0.0		
	Summer			A	9.6	D	26.0	A	0.0		
SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	9.0	D	34.2
	Summer			A	0.0			A	9.8	F	126.7
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.4	C	18.7	A	9.0	F	107.3
	Summer			A	8.8	D	27.8	A	9.8	F	640.2

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 11d. Year 2018 Alternative 6A Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye) Two-lane Roundabout	Average Annual	GDOT Analysis Tool	HCM 2010			A	9.1	A	9.5	B	11.3
	Summer					B	13.3	B	13.5	C	19.7
	Average Annual		Calibrated*			A	7.4	A	7.7	A	8.8
	Summer					B	10.6	B	10.7	B	14.1
	Average Annual	SIDRA	EF = 1.2			A	9.2	A	8.9	A	9.2
	Summer					B	11.0	B	10.4	B	11.1
	Average Annual		EF = 1.1			A	8.9	A	8.7	A	5.8
	Summer					A	9.9	A	9.6	A	8.8

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Two-lane Roundabout*

Design Year Conditions (Year 2038)

This subsection presents the projected peak hour arterial/highway directional segment and intersection operations under 2038 traffic volume conditions for all of the alternatives. The annual growth rate was applied to the year 2018 volumes to forecast the 2038 volumes used in this analysis. The project would not generate additional vehicle trips that could affect intersection or roadway segment operations; rather, it would implement improvements to existing transportation infrastructure. Thus, impacts are assessed by comparing the action alternatives to the No Action Alternative. Figure 11 shows the projected peak hour and daily traffic volumes in the study area for the No Action Alternative in year 2038. The subsequent figures show the 2038 volumes associated with each alternative. Appendixes E and F contain the model output for the segment and intersection analyses. As noted in the discussion about the modeling tools used for this analysis, the capacity limitations imposed by Fanny Bridge and the random mid-block pedestrian crossings known to occur in the study area likely would result in lower average travel speeds and LOS than presented in the following tables.

ALTERNATIVE 1: NEW ALIGNMENT – EXISTING SR 89 OPEN AS A LOCAL ROADWAY

Table 12a shows the peak hour arterial/highway directional segment operations for Alternative 1 traffic and geometric conditions. Figure 12 shows the study area volumes associated with Alternative 1 in the year 2038. As shown in Table 12a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations (i.e., as shown for Alternative 5, the No Action Alternative). Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative. The relocated SR 89 segment (between the western and eastern roundabouts) is projected to operate at the same LOS in the northbound direction toward SR 28 during both peak hours as compared to the existing alignment under the No Action Alternative (between the existing wye and Granlibakken Road). Along this same segment between the western and eastern roundabouts, the southbound projected travel speed and associated LOS is lower during the summer peak hour than the No Action Alternative. The operations at the eastern roundabout could contribute to the projected average speed reduction. The projected LOS for the existing segment of SR 89 between the wye and Granlibakken Road is the same for Alternative 1 as under the No Action Alternative. The projected average travel speeds are higher with Alternative 1, which is likely due to the removal of SR 89 through traffic to the new SR 89 segment between the roundabouts.

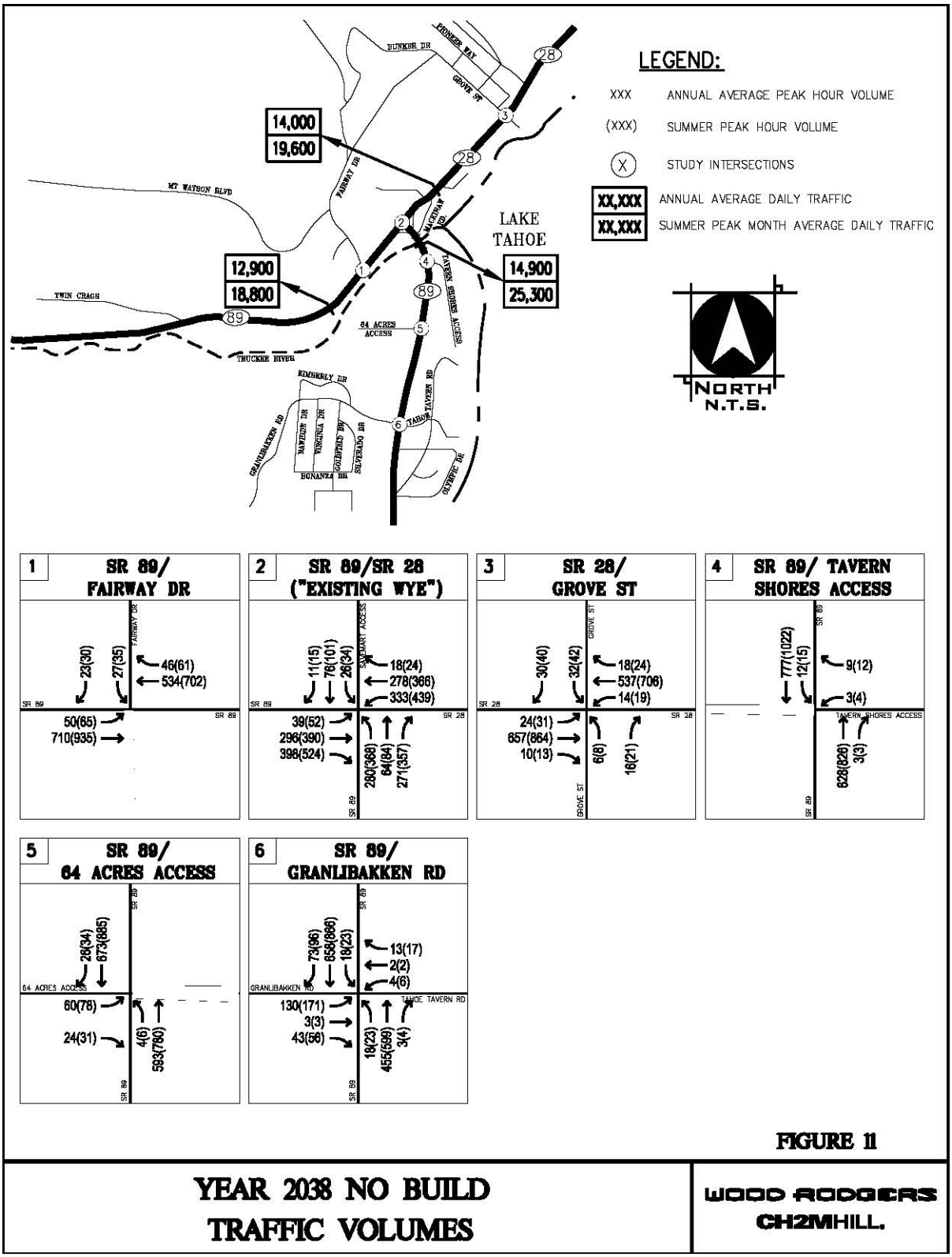


FIGURE 11

YEAR 2038 NO BUILD TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

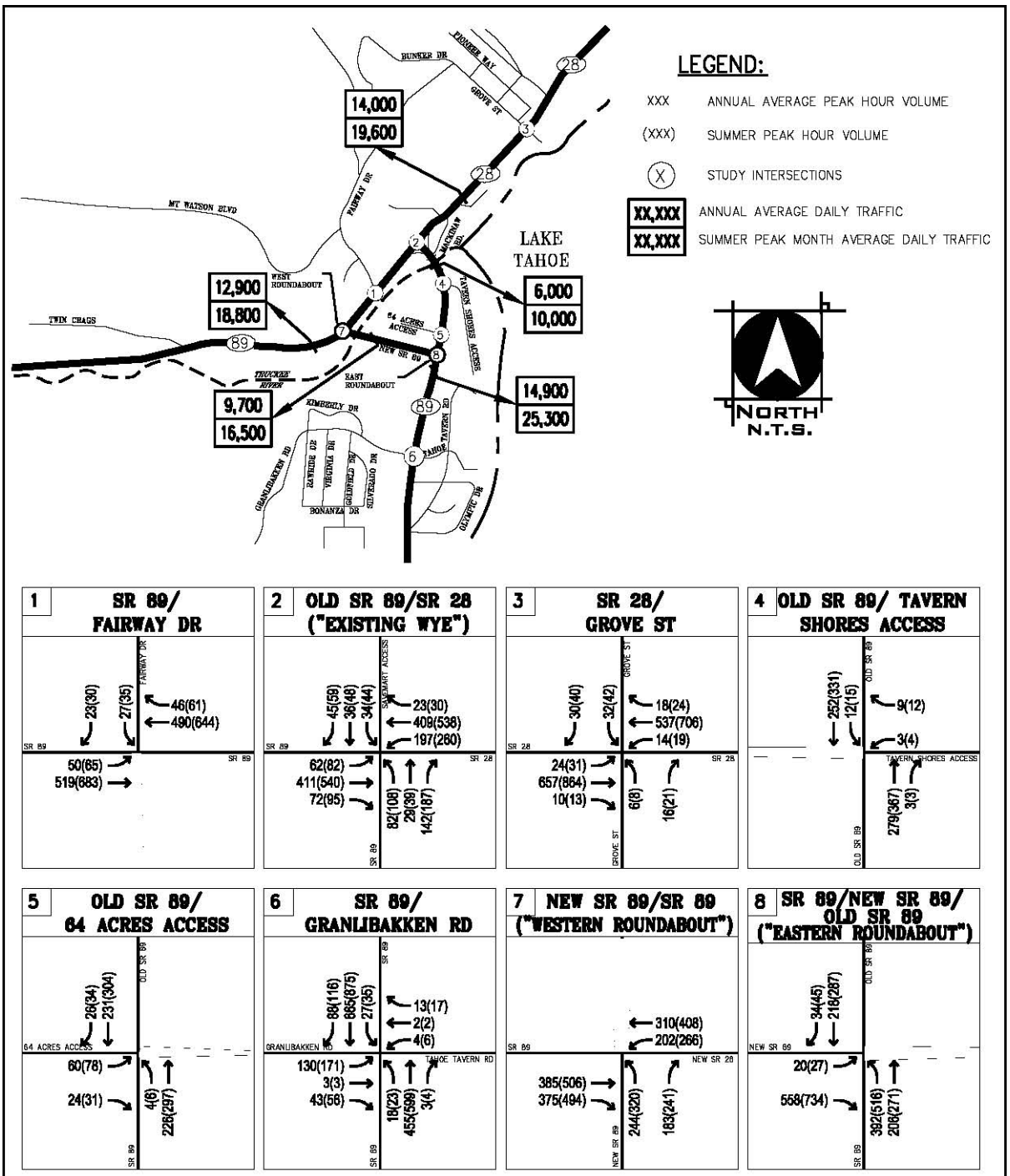


FIGURE 12

YEAR 2038 ALTERNATIVE 1 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

Table 12a. Year 2038 Alternative 1 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	21.8	C	21.0	C
	WB	19.5	C	18.5	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	22.3	C	22.3	C
	SB	21.0	C	13.7	E
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	19.0	C	19.0	C
	WB	19.8	C	17.8	C
Existing SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout)	NB	23.5	C	23.0	C
	SB	23.8	C	23.8	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 12b, the signalized existing wye intersection is projected to operate at LOS "C" or better conditions during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to the existing wye in the No Action Alternative.

As shown in Table 12c, the three unsignalized intersections in the project area (Fairway Drive, Tavern Shores Access Road, and 64-Acres Recreational Access Road) are projected to operate at LOS "C" or better for the stop-controlled side street movements during both the annual average and summer peak hour conditions. These are the three intersections at which the through traffic volumes are reduced on portions of existing SR 89 and SR 28 due to the relocation of the SR 89 through movement. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

As shown in Table 12d, each of the three roundabouts is projected to operate at LOS "E" for at least one of the approaches in the summer peak hour. The existing wye is projected to provide less delay as a roundabout than the existing signalized intersection configuration, although the corresponding level of service is lower per the HCM-2010 roundabout methodology.

4 Hour LOS Analysis. The LOS "E" projected for the northbound approach at the western roundabout, the eastbound approach to the eastern roundabout, and the westbound/eastbound approaches at the existing wye necessitates further analysis to determine if the TRPA criterion can be met: *peak hour LOS "E" is regarded as acceptable if the duration of such operations does not exceed four hours per day*. Table 12e shows the fifth hour level of service is projected to be LOS "D" for these approaches at the western and eastern roundabouts, and LOS "C" at the existing wye. Thus, the criterion is met and mitigation would not be required.

Table 12b. Year 2038 Alternative 1 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	22.6	C	21.8	C	21.4	C	23.6	C	22.5
	Summer			C	25.2	C	32.0	C	23.6	C	29.1	C	29.7

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 12c. Year 2038 Alternative 1 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	15.7	A	0.0			A	8.9
	Summer			C	21.0	A	0.0			A	9.7
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
Old SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	7.9	B	10.8	A	0.0		
	Summer			A	8.2	B	12.0	A	0.0		
Old SR 89 / 64-Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	7.8	B	13.1
	Summer			A	0.0			A	8.0	C	16.1
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.6	C	20.3	A	9.3	F	238.8
	Summer			A	9.1	E	40.9	B	10.3	F	1257.1

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 12d. Year 2038 Alternative 1 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound Exclusive Right Turn Lane (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			C	17.0	C	19.7	B	10.9
	Summer					F	53.5	F	74.5	C	18.0
	Average Annual		Calibrated*			B	11.8	B	14.0	A	9.4
	Summer					D	26.7	E	41.3	C	15.0
	Average Annual	SIDRA	EF = 1.2			A	7.2	B	11.1	A	3.9
	Summer					D	28.1	F	59.1	A	5.2
	Average Annual		EF = 1.1			A	5.3	A	8.4	A	3.6
	Summer					C	15.2	D	26.1	A	4.3
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	B	10.8			B	12.4	C	20.8
	Summer			C	18.3			C	22.6	F	81.2
	Average Annual		Calibrated*	A	8.4			A	9.1	B	14.0
	Summer			B	13.3			B	14.0	E	41.4
	Average Annual	SIDRA	EF = 1.2	A	7.0			A	8.0	B	10.0
	Summer			B	11.4			A	8.4	F	55.7
	Average Annual		EF = 1.1	A	6.4			A	7.9	A	7.5
	Summer			A	9.0			A	8.2	C	23.3
New SR 28 / Old SR 89 / SR 28 (existing wye)	Average Annual	GDOT Analysis Tool	HCM 2010	B	10.9	C	20.5	B	13.4	C	20.5
	Summer			C	17.9	F	79.5	D	27.8	F	81.7
	Average Annual		Calibrated*	A	8.8	B	13.2	B	10.3	B	13.6
	Summer			B	13.8	E	36.1	C	19.1	E	39.1
	Average Annual	SIDRA	EF = 1.2	B	11.3	A	8.5	B	10.1	A	9.7
	Summer			C	19.6	D	26.0	C	19.9	E	40.9
	Average Annual		EF = 1.1	B	10.5	A	7.3	A	9.4	A	7.5
	Summer			C	15.8	B	14.0	C	15.5	C	19.3

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 12e. Year 2038 Alternative 1 Fifth Peak Hour Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound Exclusive Right Turn Lane (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			C	19.1	D	26.1	B	12.6
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Summer	GDOT Analysis Tool	Calibrated*	B	11.3			B	11.9	D	25.9
New SR 28 / Old SR 89 / SR 28 (existing wye)	Summer	GDOT Analysis Tool	Calibrated*	B	11.7	C	23.5	C	15.1	C	24.8

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

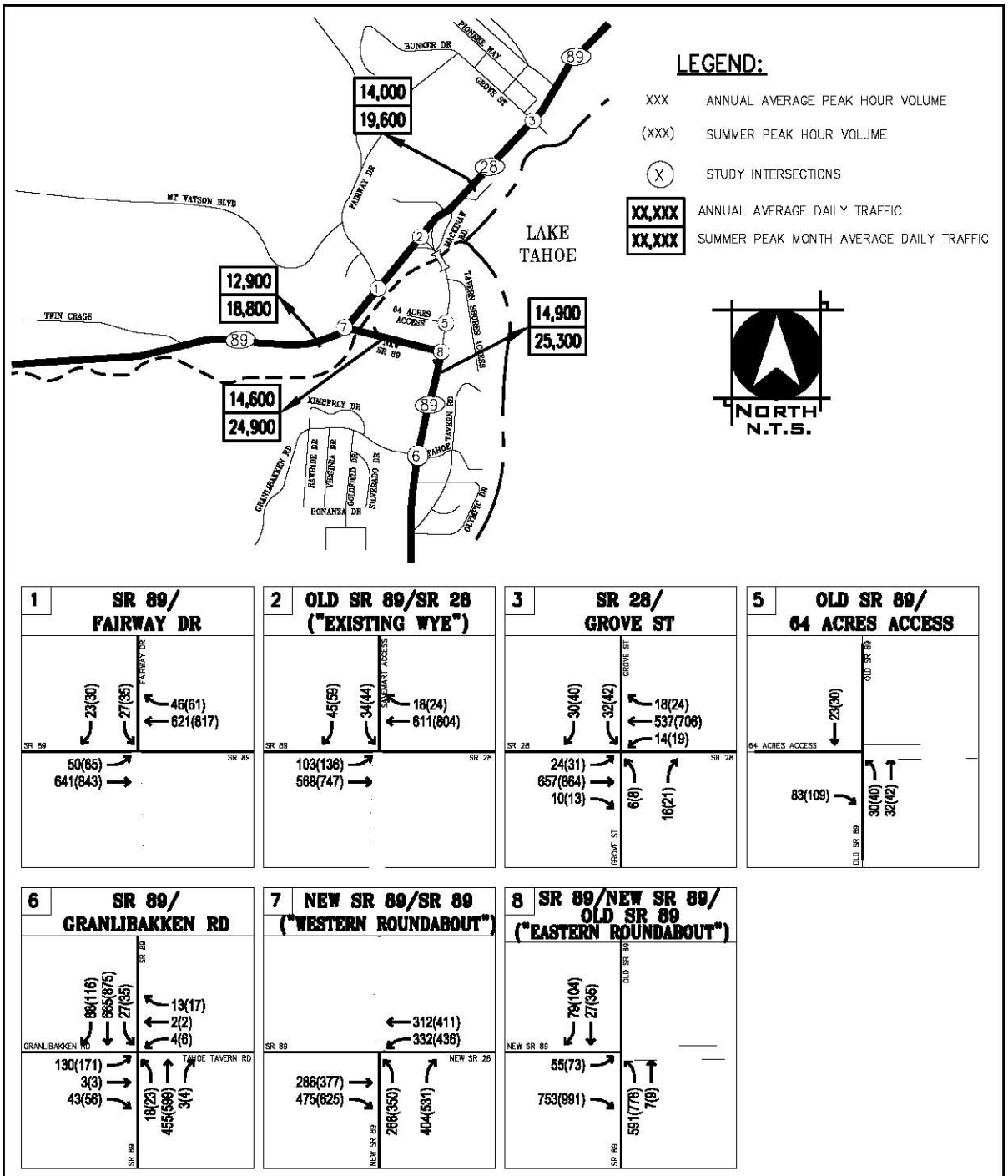
ALTERNATIVE 2: NEW ALIGNMENT – CLOSE EXISTING SR 89 TO VEHICLE TRAFFIC ACROSS FANNY BRIDGE

Table 13a shows the peak hour arterial/highway directional segment operations for Alternative 2 traffic and geometric conditions. Figure 13 shows the study area volumes associated with Alternative 2 in the year 2038. As shown in Table 13a, most of the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during the annual average peak hour. In the summer peak hour, the LOS for both directions on new SR 28 (west of the new SR 89/28 intersection) is projected to be lower than under the No Action Alternative. The westbound approach to the roundabout is projected to operate at an unacceptable LOS "F" during the summer peak hour. Likewise, the departure from the SR 89/28 intersection in the eastbound direction is projected to operate at a slower speed during the summer peak hour. This result could be attributed to the western roundabout operations under Alternative 2. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate at a lower LOS with slower average travel speeds as compared to the existing alignment between the wye and Granlibakken Road under the No Action Alternative. Again, this result could be attributed to roundabout operations at the intersections.

Table 13a. Year 2038 Alternative 2 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	21.6	C	14.8	D
	WB	19.5	C	19.3	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	20.7	C	15.7	D
	SB	21.0	C	16.3	D
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	22.3	C	14.7	D
	WB	21.0	C	4.7	F

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments



FIGIURE 13

YEAR 2038 ALTERNATIVE 2 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

Based on the assumption that the LOS "F" operations projected for the westbound segment of new SR 28 result from the projected western roundabout operations, a two-lane configuration that provides additional capacity for this roundabout during the summer peak hour was analyzed. Table 13b shows the projected roadway segment operations for the new SR 28 westbound approach to the new SR 89/28 intersection would improve to acceptable LOS based on a two-lane roundabout configuration.

Table 13b. Year 2038 Alternative 2 Roadway Segment Operational Analysis with Additional Capacity for Western Roundabout

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	22.2	C	21.0	C
	WB	21.3	C	21.3	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	21.7	C	21.5	C
	SB	20.7	C	17.8	D
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	22.5	C	22.3	C
	WB	21.8	C	20.8	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.

Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.

LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 13c, the Fairway Drive and 64-Acres Recreational Access Road unsignalized intersections are projected to operate with acceptable levels of service for the stop-controlled side street movements during both the annual average and summer peak hour conditions. These are the two intersections at which the through traffic volumes are reduced on portions of existing SR 89 and SR 28 due to the relocation of the SR 89 through movement. The existing wye intersection in Alternative 2 is modeled as an unsignalized intersection with stop-control for the southbound approach; this approach is projected to operate at LOS "C" during the annual average and LOS "D" during the summer peak hours. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in Alternative 5.

As shown in Table 13d, the westbound approach to the single-lane, hybrid roundabout at the new SR 89/28 intersection is projected to operate at LOS "F" for the summer peak hour, which is a lower level of service than projected for any of the movements at the existing wye intersection. This is the only approach without an exclusive right-turn lane in this configuration. The additional volume through this single-lane, hybrid roundabout due to the closure of SR 89 to through traffic with this alternative would increase the average delay over that projected for Alternative 1 for the eastbound and westbound approaches. The eastbound approach to the eastern roundabout is projected to operate at LOS "E" during the summer peak hour. With the removal of through traffic on SR 89 approaching the eastern roundabout from the north, the eastbound to southbound movement is projected to operate with less delay and better levels of service than are projected than for Alternative 1. Since the northbound volume that is a through movement with Alternative 1 is a turning movement through the roundabout with Alternative 2, the delay is projected to be slightly more with this alternative. Likewise, slightly more

Table 13c. Year 2038 Alternative 2 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Savemart Access / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	17.5	A	0.0			A	9.8
	Summer			D	25.9	A	0.0			B	11.4
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	18.5	A	0.0			A	9.4
	Summer			D	27.7	A	0.0			B	10.6
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
Old SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	7.3	A	9.0
	Summer			A	0.0			A	7.4	A	9.2
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.6	C	20.3	A	9.3	F	238.8
	Summer			A	9.1	E	40.9	B	10.3	F	1257.1

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 13d. Year 2038 Alternative 2 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			D	33.1	B	13.0	C	16.5
	Summer					F	158.0	D	29.8	F	54.8
	Average Annual		Calibrated*			C	18.7	B	10.1	B	12.0
	Summer					F	87.2	C	17.8	D	26.9
	Average Annual	SIDRA	EF = 1.2			B	14.3	A	4.4	A	5.1
	Summer					F	129.8	A	7.0	A	7.9
	Average Annual		EF = 1.1			A	9.2	A	4.0	A	4.1
	Summer					F	67.3	A	5.6	A	6.9
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	A	9.5			B	13.6	C	24.6
	Summer			B	14.3			D	28.2	F	93.0
	Average Annual		Calibrated*	A	7.7			A	9.8	B	14.8
	Summer			B	11.4			C	16.4	E	43.9
	Average Annual	SIDRA	EF = 1.2	A	8.9			B	10.9	A	4.9
	Summer			B	13.5			B	12.0	E	36.4
	Average Annual		EF = 1.1	A	8.1			B	10.7	A	4.7
	Summer			B	11.1			B	11.4	A	7.1

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

delay is projected for the eastbound to southbound movement because this volume is higher than with Alternative 1 due to the closure of Fanny Bridge to vehicular traffic.

4 Hour LOS Analysis. The LOS "F" projected for the westbound approach at the western roundabout and the LOS "E" for the eastbound approach to the eastern roundabout necessitate further analysis to determine if the TRPA criterion can be met: *peak hour LOS "E" is regarded as acceptable if the duration of such operations does not exceed four hours per day*. Table 13e shows the fifth hour level of service is projected to be LOS "D" for the eastbound approach to the eastern roundabout. Thus, the criterion is met and mitigation would not be required for the eastern roundabout.

Table 13e shows the fifth hour level of service is projected to be LOS "E" for the westbound approach. Hence, this result does not meet the TRPA criterion and mitigation would be required. Therefore, the western roundabout was modeled as a two-lane circulating roundabout. Table 13f shows that all approaches would operate at acceptable levels of service with this configuration at the western roundabout.

Table 13e. Year 2038 Alternative 2 Fifth Peak Hour Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound Exclusive Right Turn Lane (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			E	49.6	B	14.3	C	19.2
Old SR 89 / SR 89 / New SR 89 (Eastern Roundabout)	Summer	GDOT Analysis Tool	Calibrated*	A	10.0			B	13.5	D	28.2

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 13f. Year 2038 Alternative 2 Two-lane Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 (Two-lane Roundabout) (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			B	10.6	B	13.6	C	18.4

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Two-lane Roundabout*

ALTERNATIVE 3: NEW ALIGNMENT – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE

Table 14a shows the peak hour arterial/highway directional segment operations for Alternative 3 traffic and geometric conditions. Figure 14 shows the study area volumes associated with Alternative 3 in the year 2038. As shown in Table 14a, most of the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during the annual average peak hour. In the summer peak hour, the westbound direction on new SR 28 (toward the new SR 89/28 intersection) is projected to operate at an unacceptable LOS "F", which is lower than under the No Action Alternative. This result could be attributed to the western roundabout operations under Alternative 3. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate at a lower LOS with slower average travel speeds in the northbound direction (toward the new SR 89/28 intersection) as compared to the existing alignment between the wye and Granlibakken Road under the No Action Alternative. Again, this result could be attributed to the western roundabout operations.

Table 14a. Year 2038 Alternative 3 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	22.0	C	20.2	C
	WB	19.5	C	19.5	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	20.0	C	15.7	D
	SB	22.3	C	19.7	C
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	20.0	C	20.0	C
	WB	19.3	C	7.3	F

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

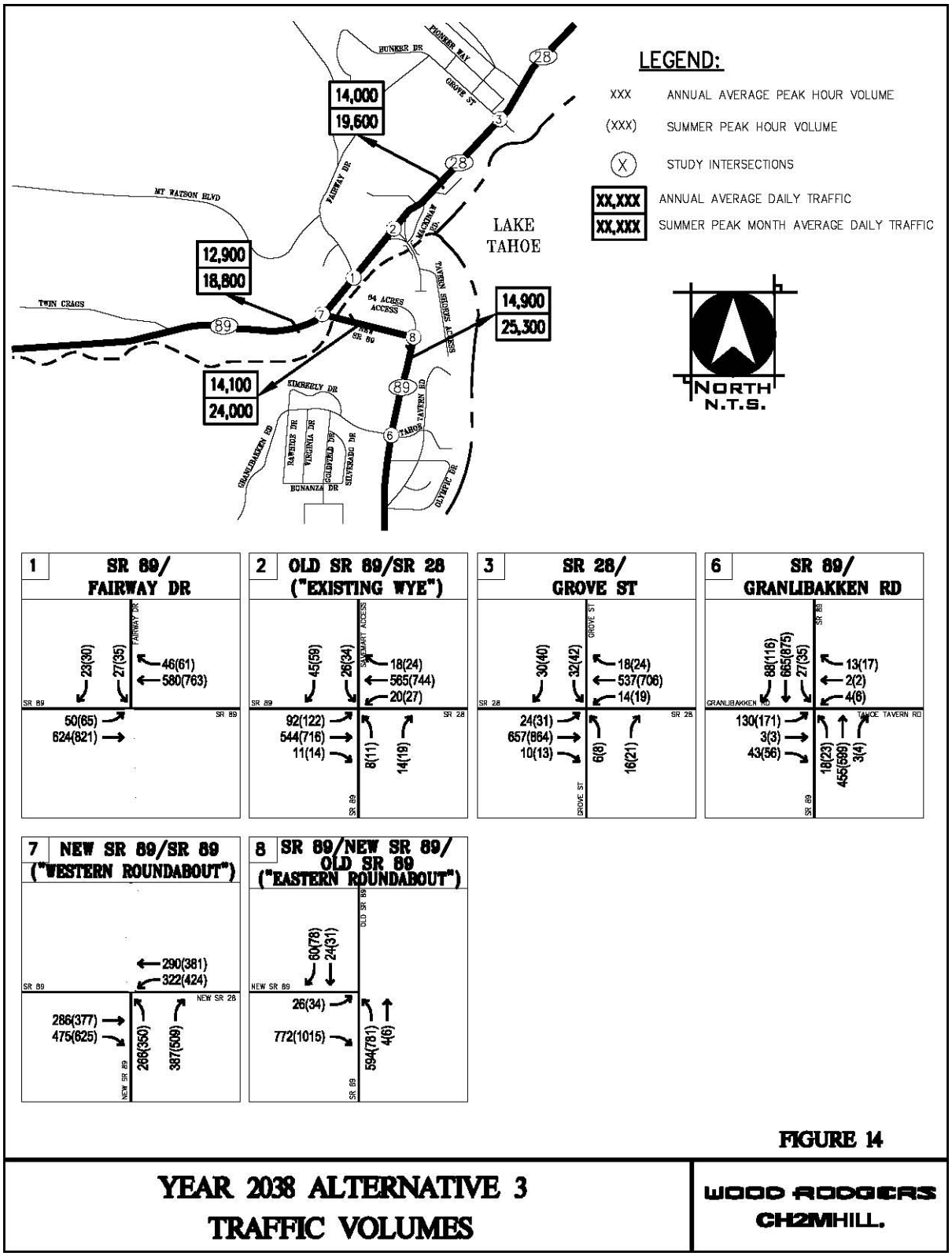


FIGURE 14

YEAR 2038 ALTERNATIVE 3 TRAFFIC VOLUMES

WOOD RODGERS
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Based on the assumption that the LOS "F" operations projected for the westbound segment of new SR 28 result from the projected western roundabout operations, a two-lane configuration that provides additional capacity for this roundabout during the summer peak hour was analyzed. Table 14b shows the projected roadway segment operations for the new SR 28 westbound approach to the new SR 89/28 intersection would improve to acceptable LOS based on a two-lane roundabout configuration.

Table 14b. Year 2038 Alternative 3 Roadway Segment Operational Analysis with Additional Capacity for Western Roundabout

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89 (Western Roundabout)	EB	22.2	C	21.0	C
	WB	21.3	C	21.3	C
New SR 89 between SR 89 (Western Roundabout) and Old SR 89 (Eastern Roundabout)	NB	21.8	C	21.5	C
	SB	20.8	C	17.8	D
New SR 28 between New SR 89 (Western Roundabout) and existing wye intersection	EB	20.8	C	20.5	C
	WB	20.5	C	19.0	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.

Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.

LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 14c, the signalized existing wye intersection is projected to operate at LOS "B" for all approaches during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to the No Action Alternative at the existing wye.

As shown in Table 14d, the unsignalized Fairway Drive intersection with SR 28 is projected to operate at LOS "C" and "D" for the stop-controlled side street movement during the annual average and summer peak hour conditions. This projected delay is similar to that for the No Action Alternative at this location. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

Table 14c. Year 2038 Alternative 3 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	B	10.9	B	11.0	B	10.4	B	11.5	B	11.2
	Summer			B	12.6	B	12.8	B	11.8	B	11.9	B	12.3

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 14d. Year 2038 Alternative 3 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	17.8	A	0.0			A	9.3
	Summer			D	25.8	A	0.0			B	10.3
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.6	C	20.3	A	9.3	F	238.8
	Summer			A	9.1	E	40.9	B	10.3	F	1257.1

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

As shown in Table 14e, the westbound approach to the single-lane, hybrid roundabout at the new SR 89/28 intersection is projected to operate at LOS “F” for the summer peak hour, which is a lower level of service than projected for any of the movements at the existing wye intersection. This is the only approach without an exclusive right-turn lane in this configuration. The additional volume through this single-lane, hybrid roundabout due to the closure of SR 89 to through traffic with this alternative would increase the average delay over that projected for Alternative 1 for the eastbound and westbound approaches. Like Alternatives 1 and 2, the eastbound approach to the eastern roundabout is projected to operate at LOS “E” during the summer peak hour. With the removal of through traffic on SR 89 approaching the eastern roundabout from the north, less delay and better levels of service are projected than for the Alternative 1 roundabout at this location. The roundabout configuration at this location is projected to reduce the delay and improve the level of service projected for the eastbound side street movements at the 64-Acre Access with Alternative 5. At the existing wye intersection, a roundabout is projected to provide a better level of service for all the approaches than the existing signalized intersection configuration.

4 Hour LOS Analysis. The LOS “F” projected for the westbound approach at the western roundabout and the LOS “E” for the eastbound approach to the eastern roundabout necessitate further analysis to determine if the TRPA criterion can be met: *peak hour LOS “E” is regarded as acceptable if the duration of such operations does not exceed four hours per day*. Table 14f shows the fifth hour level of service is projected to be LOS “D” for the eastbound approach to the eastern roundabout. Thus, the criterion is met and mitigation would not be required for the eastern roundabout.

Table 14f shows the fifth hour level of service is projected to be LOS “E” for the westbound approach. Hence, this result does not meet the TRPA criterion and mitigation would be required. Therefore, the western roundabout was modeled as a two-lane circulating roundabout. Table 14g shows that all approaches would operate at acceptable levels of service with this configuration.

Table 14e. Year 2038 Alternative 3 Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010			D	27.9	B	12.5	C	16.1
	Summer					F	132.3	D	26.3	F	51.7
	Average Annual		Calibrated*			C	16.8	A	9.9	B	11.8
	Summer					F	68.8	C	16.7	D	25.5
	Average Annual	SIDRA	EF = 1.2			B	12.2	A	4.4	A	4.9
	Summer					F	104.0	A	6.7	A	8.2
	Average Annual		EF = 1.1			A	8.4	A	4.1	A	4.0
	Summer					E	48.4	A	5.4	A	7.2
64 Acres Access / Old SR 89 / New SR 89 (Eastern Roundabout)	Average Annual	GDOT Analysis Tool	HCM 2010	A	8.9			B	12.6	C	23.3
	Summer			B	12.7			C	23.3	F	85.1
	Average Annual		Calibrated*	A	7.2			A	9.2	B	14.2
	Summer			B	10.3			B	14.3	E	39.5
	Average Annual	SIDRA	EF = 1.2	A	8.8			B	10.4	A	4.6
	Summer			B	12.0			B	11.0	D	27.1
	Average Annual		EF = 1.1	A	8.0			B	10.3	A	4.4
	Summer			B	10.9			B	10.7	A	5.8
New SR 28 / Old SR 89 / SR 28 (existing wye)	Average Annual	GDOT Analysis Tool	HCM 2010	A	8.3	B	14.9	A	7.8	B	14.5
	Summer			B	11.4	E	37.3	B	10.3	D	33.6
	Average Annual		Calibrated*	A	6.7	B	10.4	A	6.4	B	10.0
	Summer			A	9.2	C	19.1	A	8.5	C	17.3
	Average Annual	SIDRA	EF = 1.2	B	10.4	A	4.8	B	10.8	A	4.8
	Summer			B	13.2	A	8.4	B	14.3	A	5.9
	Average Annual		EF = 1.1	A	9.8	A	4.5	B	10.5	A	4.6
	Summer			B	12.3	A	5.6	B	13.3	A	5.3

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 14f. Year 2038 Alternative 3 Fifth Peak Hour Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 with Eastbound and Northbound Exclusive Right Turn Lanes (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			E	39.1	B	13.7	C	18.5
64 Acres Access / Old SR 89 / New SR 89 (Eastern Roundabout)	Summer	GDOT Analysis Tool	Calibrated*	A	9.1			B	12.2	D	25.8

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Single Lane Roundabout*

Table 14g. Year 2038 Alternative 3 Two-lane Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / New SR 89 / New SR 28 (Two-lane Roundabout) (Western Roundabout)	Summer	GDOT Analysis Tool	Calibrated*			B	10.1	B	13.0	C	17.8

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Two-lane Roundabout*

ALTERNATIVE 4: NEW ALIGNMENT, NO ROUNDABOUTS – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF FANNY BRIDGE

Table 15a shows the peak hour arterial/highway directional segment operations for Alternative 4 traffic and geometric conditions. Figure 15 shows the study area volumes associated with Alternative 4 in the year 2038. As shown in Table 15a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. Both the SR 89 segment between Twin Crags Way and the new SR 89/28 intersection and the new SR 28 segment between this intersection and the existing wye are projected to operate at the same LOS in both directions as under the No Action Alternative during both peak hours. The relocated SR 89 segment between the western and eastern roundabouts is projected to operate with slower average travel speeds in both directions as compared to the existing location under the No Action Alternative during both peak hours. This could be attributed the roundabout operations at either end of this segment.

Table 15a. Year 2038 Alternative 4 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 between Twin Crags Way and New SR 89/28 intersection	EB	20.4	C	19.6	C
	WB	23.3	C	23.0	C
New SR 89 between SR 89 /28 intersection and Granlibakken Road	NB	18.3	D	17.3	D
	SB	19.0	C	18.0	D
New SR 28 between New SR 89/28 intersection and existing wye intersection	EB	21.0	C	20.0	C
	WB	19.8	C	19.0	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-38 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

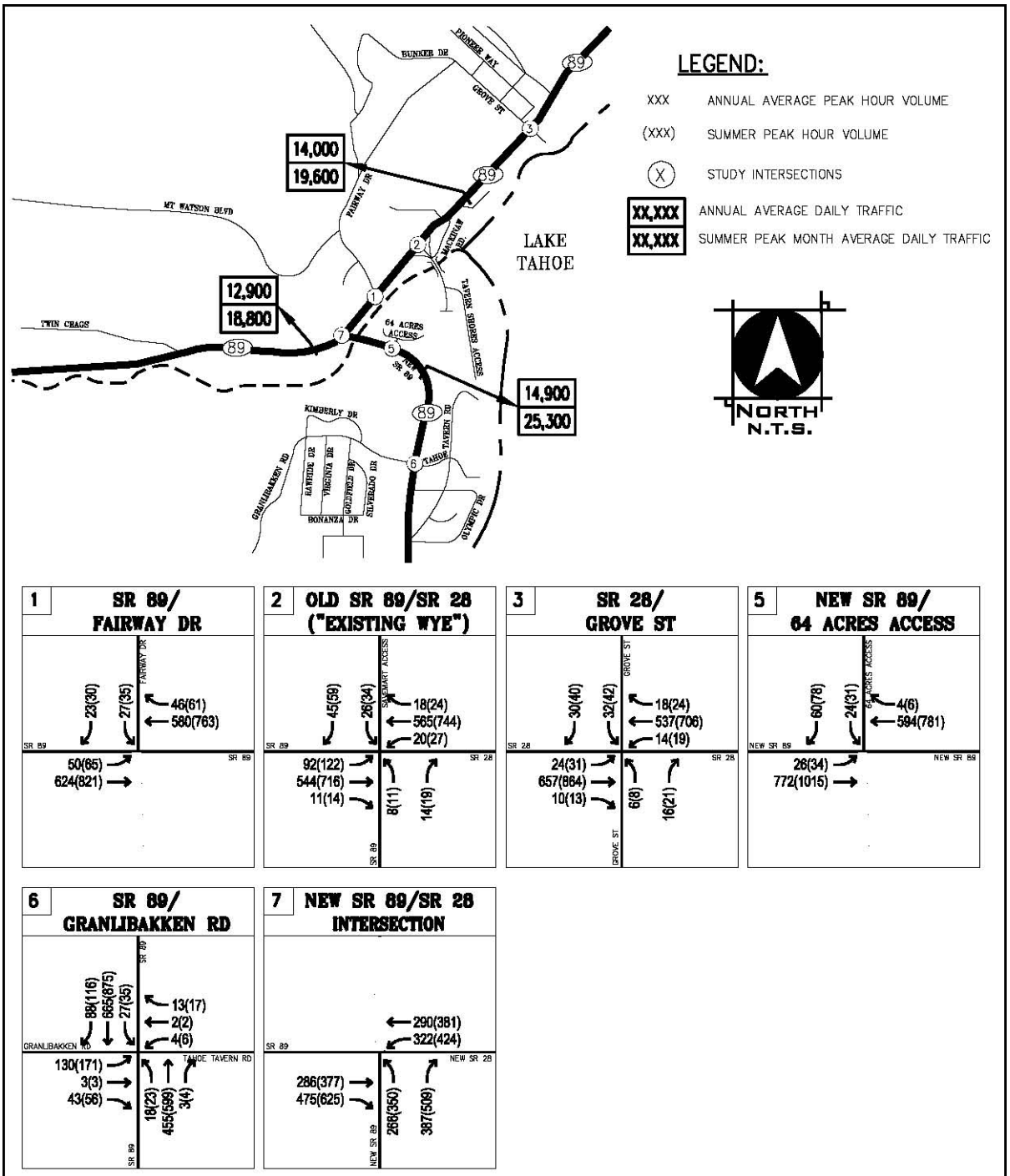

FIGURE 15

YEAR 2038 ALTERNATIVE 4 TRAFFIC VOLUMES

WOOD RODGERS
CH2MHILL.

As shown in Table 15b, the signalized existing wye intersection is projected to operate at an overall LOS "B" or better during summer and annual average peak hour conditions. With this alternative, some of the turning movement volumes through this intersection become through movements for the SR 89 traffic. Thus, a smaller proportion of the signal cycle is required for the turns and the result would be less average delay for each approach and the intersection overall. This alternative reduces delay and improves level of service as compared to Alternative 5 at the existing wye. The new SR 89 / 28 intersection is projected to provide LOS "C" or better operations overall as a signalized intersection. With regard to the northbound approach, less delay is projected with this configuration than for the Alternatives 2 and 3, and a similar amount of delay is projected as compared to Alternative 1.

As shown in Table 15c, the unsignalized Fairway Drive intersection with SR 28 is projected to operate at similar levels of service as the No Action Alternative during both the annual average and summer peak hour conditions. At the 64-Acres Access intersection, the southbound approach is representative of the eastbound approach in the No Build condition. The delay for this movement to access SR 89 is projected to be less with Alternative 4 than with the No Action Alternative. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity. The projected operations for these two intersections are similar to the No Build projections in the No Action Alternative.

Table 15b. Year 2038 Alternative 4 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 89 / 28	Average Annual	Synchro	HCM 2010			B	12.9	B	19.7	B	16.5	B	15.3
	Summer					C	23.4	D	37.0	C	34.0	C	29.1
Old SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	B	11.6	A	9.7	B	11.0	B	10.6	B	10.3
	Summer			B	13.2	B	11.2	B	12.3	B	10.7	B	11.1

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 15c. Year 2038 Alternative 4 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
New SR 28 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	17.8	A	0.0			A	9.3
	Summer			D	25.9	A	0.0			B	10.4
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
New SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	C	19.1	A	0.0			A	9.1
	Summer			D	32.5	A	0.0			A	10.0
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.6	C	20.3	A	9.3	F	238.8
	Summer			A	9.1	E	40.9	B	10.3	F	1257.1

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

ALTERNATIVE 5: NO ACTION

Table 16a shows year 2038 peak hour arterial/highway directional segment operations for No Action traffic and geometric conditions. Figure 11 shows the study area volumes associated with the No Action Alternative in the year 2038. As shown in Table 16a, the roadway segments are projected to operate at LOS "C" with average travel speeds around 20 miles per hour during both peak hours with existing capacity configurations.

Table 16a. Year 2038 Alternative 5 Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 - between Twin Crags Way and existing wye intersection	EB	19.0	C	18.4	C
	WB	20.8	C	20.2	C
Existing SR 89 – between existing wye intersection and Granlibakken Rd	NB	21.4	C	20.6	C
	SB	19.6	C	18.9	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-37 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 16b, the signalized existing wye intersection is projected to operate overall at LOS "C" during the annual average peak hour and LOS "D" during the summer peak hour conditions in 2018. The westbound and northbound approaches are projected to operate at LOS "E" during the summer peak hour. The additional volume traveling through the intersection during the summer tourist season would increase the average delay at this intersection.

As shown in Table 16c, the through movements on the state routes at the five unsignalized intersections in the study area are all projected to operate with high levels of service; the only delay is experienced by the turning movements. The side street approaches at the Fairway Drive and Tavern Shores Access Road intersections are projected to operate at acceptable levels of service. The eastbound approach at the 64-Acres Access Road intersection is projected to operate at LOS "E" during the annual average peak hour and then at an unacceptable LOS "F" during the summer peak hour. The two stop-controlled intersections at Granlibakken Road and Grove Street are in the study area, but would not be modified with this or any of the alternatives. The side street movements currently experience long delays due to the through movement volumes. This delay is more noticeable in the summer due to the reduced throughput capacity of the state routes due to pedestrian/bicyclist activity.

Table 16b. Year 2038 Alternative 5 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	28.2	D	36.2	D	37.1	C	30.5	C	34.4
	Summer			D	35.7	E	58.0	E	68.7	D	41.1	D	54.8

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 16c. Year 2038 Alternative 5 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	17.9	A	0.0			A	9.1
	Summer			D	26.1	A	0.0			B	10.1
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	9.1	C	19.1	A	0.0		
	Summer			B	10.0	D	30.6	A	0.0		
SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	9.3	E	47.9
	Summer			A	0.0			B	10.2	F	272.8
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.5	C	19.7	A	9.3	F	209.5
	Summer			A	9.1	E	37.4	B	10.3	F	1126.4

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

ALTERNATIVE 6: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, MODIFY LANE GEOMETRICS AT EXISTING WYE INTERSECTION

Table 17a shows the peak hour arterial/highway directional segment operations for Alternatives 6 and 6A traffic and geometric conditions. Figure 16 shows the study area volumes associated with Alternatives 6 and 6A in the year 2038. As shown in Table 17a, the roadway segments are projected to operate at acceptable LOS during both peak hours with existing capacity configurations. The projected LOS for this alternative between Twin Crags Way and the existing wye intersection during the annual average peak hour is the same as projected under the No Action Alternative. In the summer peak hour, the eastbound direction is projected to operate at a lower LOS than under the Action Alternative. With the same volume and intersection configurations, the existing segment of SR 89 between the wye and Granlibakken Road is projected to operate at the same LOS as under the No Action Alternative.

Table 17a. Year 2038 Alternatives 6 and 6A Roadway Segment Operational Analysis Summary

Arterial Segment	Direction	Average Annual Peak Hour		Summer Peak Hour	
		Speed	LOS	Speed	LOS
SR 89 - between Twin Crags Way and existing wye intersection	EB	18.1	C	16.6	D
	WB	20.7	C	20.1	C
Existing SR 89 – between existing wye intersection and Granlibakken Rd	NB	21.3	C	20.3	C
	SB	20.0	C	19.7	C

Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
Free flow speeds of 35-37 mph were calculated based on HCM 2010 methodology.
LOS Source: 2010 Highway Capacity Manual, Urban Street Segments

As shown in Table 17b, the improved intersection configuration at the existing wye is projected to provide slightly less average delay per vehicle during the summer peak season as compared to the No Action Alternative. The northbound approach level of service improves to LOS "D" with the improvements. The projected operations are similar to the No Action Alternative during the annual average peak hour because the demand is lower. As shown in Table 17c, the unsignalized intersections are projected to operate at similar levels of service as the No Action Alternative because no improvements are proposed for them with Alternative 6.

ALTERNATIVE 6A: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, INSTALL ROUNDABOUT AT EXISTING WYE INTERSECTION

Projected roadway operations for Alternative 6A are the same as described for Alternative 6. As shown in Table 17d, reconfiguring the existing wye as a roundabout is projected to provide a higher level of service and less average delay per vehicle as compared to the No Action Alternative. The projected delay reduction is significant for all the approaches because a roundabout provides more free-flow operation and less stop-related delay than signal control. A single-lane roundabout at this location was modeled initially, but this configuration projected failing operations for each approach.

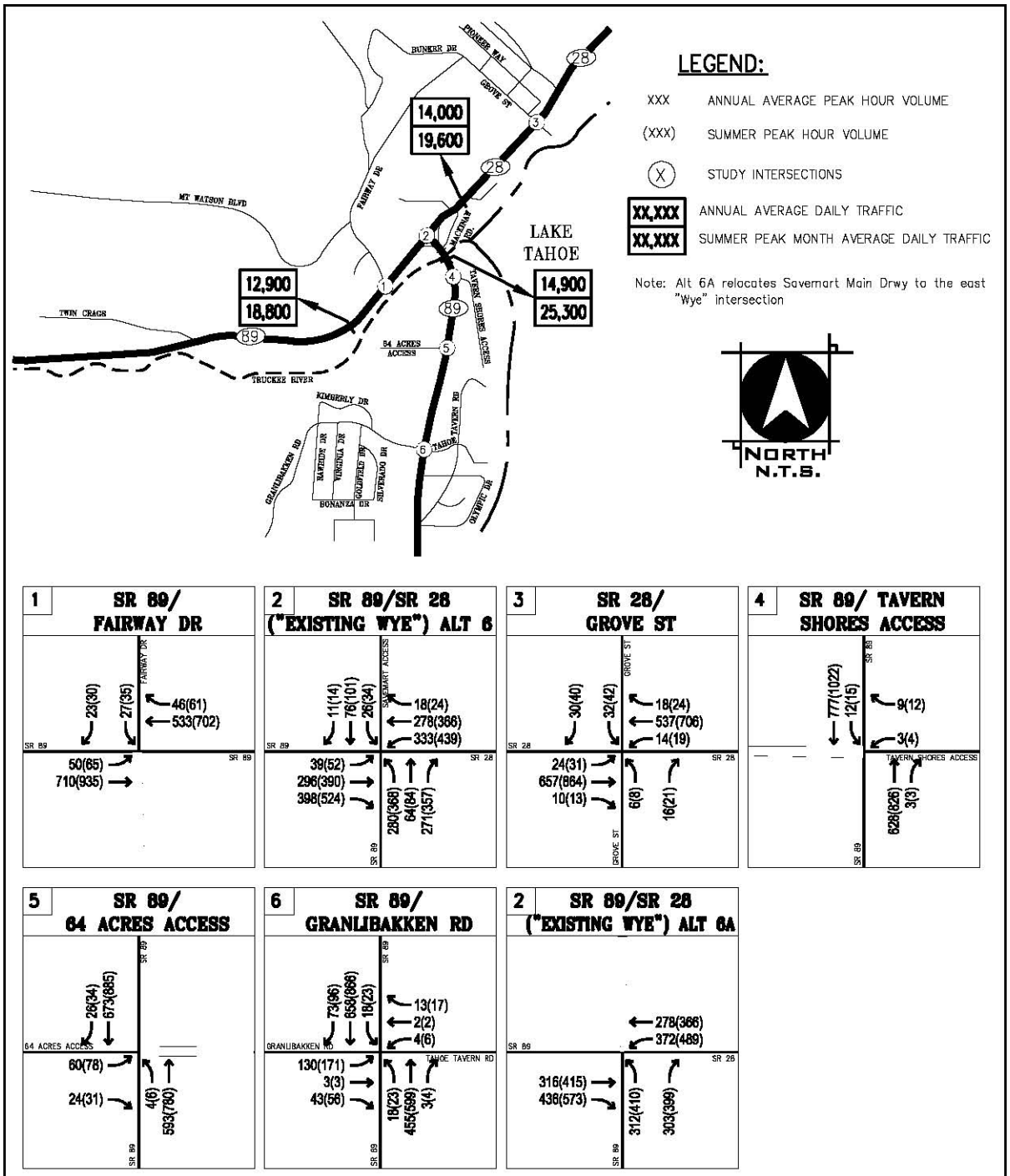

FIGURE 16

YEAR 2038 ALTERNATIVE 6 & 6A TRAFFIC VOLUMES

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Table 17b. Year 2038 Alternative 6 Signalized Intersection Operational Analysis Summary

Intersection	Peak Hour	Analysis Method	Calibration	By Approach								Intersection	
				Southbound		Westbound		Northbound		Eastbound			
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye)	Average Annual	Synchro	HCM 2010	C	30.3	D	45.1	C	31.2	C	24.9	C	33.1
	Summer			D	36.9	E	63.4	D	50.1	D	41.1	D	50.2

LOS Source: 2010 Highway Capacity Manual - Signalized Intersections *Delay in seconds per vehicle*

Table 17c. Year 2038 Alternative 6 Unsignalized Intersection Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / Fairway Dr	Average Annual	Synchro	HCM 2010	C	17.9	A	0.0			A	9.1
	Summer			D	26.1	A	0.0			B	10.1
SR 28 / Grove St	Average Annual	Synchro	HCM 2010	F	68.9	A	9.8	D	31.8	A	9.4
	Summer			F	427.6	B	11.0	F	72.8	B	10.3
SR 89 / Tavern Shores Access Rd	Average Annual	Synchro	HCM 2010	A	9.1	C	19.1	A	0.0		
	Summer			B	10.0	D	30.6	A	0.0		
SR 89 / 64 Acres Access Rd	Average Annual	Synchro	HCM 2010	A	0.0			A	9.3	E	47.9
	Summer			A	0.0			B	10.2	F	272.8
SR 89 / Granlibakken Rd	Average Annual	Synchro	HCM 2010	A	8.5	C	19.7	A	9.3	F	209.5
	Summer			A	9.1	E	37.4	B	10.3	F	1126.4

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

Table 17d. Year 2038 Alternative 6A Roundabout Operational Analysis Summary

Intersection	Peak Period	Analysis Method	Calibration	By Approach							
				Southbound		Westbound		Northbound		Eastbound	
				Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay	Level of Service	Average Delay
SR 89 / SR 28 (existing wye) Two-lane Roundabout	Average Annual	GDOT Analysis Tool	HCM 2010			B	10.2	B	10.6	B	13.3
	Summer					C	16.4	C	16.2	D	28.2
	Average Annual		Calibrated*			A	8.2	A	8.5	B	10.2
	Summer					B	12.8	B	12.6	C	18.5
	Average Annual	SIDRA	EF = 1.2			A	9.5	A	9.3	A	7.4
	Summer					B	12.6	B	11.9	C	16.8
	Average Annual		EF = 1.1			A	9.2	A	9.0	A	6.3
	Summer					B	11.2	B	10.7	B	11.8

LOS Source: 2010 Highway Capacity Manual - Unsignalized Intersections *Delay in seconds per vehicle*

** 2014 FHWA Capacity Adjustment for Two-ane Roundabout*

Roadway Segment Operations Analysis Summaries for 2018 and 2038

Table S1 provides a summary of the roadway segment operations analysis under all of the project alternatives for the opening year conditions and Table S2 provides a summary for the design year conditions. These summaries do not represent the two-lane configuration for the western roundabout that would be required for acceptable LOS on all approaches for Alternatives 2 and 3 in the 2038 summer peak hour. For the segments in each alternative, the projected average travel speed in miles per hour and the associated level of service for existing capacity configurations are shown in the tables. As previously noted, the projected speeds and LOS shown in these tables may be higher than the conditions that would be encountered by motorists due to the influencing factors of mid-block pedestrian crossings.

Table S1. 2018 Roadway Segment Traffic Operations for all Alternatives

Arterial Segment	Direction	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
		Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS
		Annual Average Peak Hour													
SR 89 – between Twin Crags Way and existing wye intersection	EB	19.0	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17.9	C	17.9	C
	WB	20.8	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.7	C	20.7	C
SR 89 – between Twin Crags Way and New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4)	EB	N/A	N/A	21.8	C	22.0	C	22.0	C	21.6	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	19.0	C	19.5	C	19.5	C	23.3	C	N/A	N/A	N/A	N/A
New SR 28 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & existing wye intersection	EB	N/A	N/A	19.3	C	22.7	C	20.3	C	20.8	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	21.0	C	21.3	C	20.0	C	20.5	C	N/A	N/A	N/A	N/A
SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout) for Alt 1 or between existing wye intersection and Granlibakken Rd for Alts 5, 6, 6A	NB	21.6	C	23.5	C	N/A	N/A	N/A	N/A	N/A	N/A	21.4	C	21.4	C
	SB	20.0	C	23.5	C	N/A	N/A	N/A	N/A	N/A	N/A	20.0	C	20.0	C
New SR 89 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & New SR 89/existing SR 89 intersection (Eastern Roundabout for Alts 1,2,3 or Granlibakken Rd for Alts 4)	NB	N/A	N/A	23.7	C	21.3	C	20.7	C	18.3	D	N/A	N/A	N/A	N/A
	SB	N/A	N/A	22.0	C	22.3	C	22.3	C	19.3	C	N/A	N/A	N/A	N/A
		Summer Peak Hour													
SR 89 – between Twin Crags Way and existing wye intersection	EB	18.1	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17.2	D	17.2	D
	WB	20.6	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.1	C	20.1	C
SR 89 – between Twin Crags Way and New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4)	EB	N/A	N/A	21.8	C	21.2	C	21.2	C	20.2	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	19.3	C	19.3	C	19.5	C	23.3	C	N/A	N/A	N/A	N/A

Table S1. 2018 Roadway Segment Traffic Operations for all Alternatives

Arterial Segment	Direction	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
		Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS
New SR 28 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & existing wye intersection	EB	N/A	N/A	19.0	C	22.3	C	20.0	C	20.5	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	18.8	C	13.3	E	16.3	D	19.5	C	N/A	N/A	N/A	N/A
SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout) for Alt 1 or between existing wye intersection and Granlibakken Rd for Alts 5, 6, 6A	NB	20.9	C	23.5	C	N/A	N/A	N/A	N/A	N/A	N/A	20.6	C	20.6	C
	SB	19.1	C	23.8	C	N/A	N/A	N/A	N/A	N/A	N/A	19.9	C	19.9	C
New SR 89 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & New SR 89/existing SR 89 intersection (Eastern Roundabout for Alts 1,2,3 or Granlibakken Rd for Alt 4)	NB	N/A	N/A	22.0	C	20.0	C	17.0	D	18.0	D	N/A	N/A	N/A	N/A
	SB	N/A	N/A	16.0	D	19.7	C	21.3	C	18.3	D	N/A	N/A	N/A	N/A

Notes: 1. Speed = Average Travel Speed in miles per hour, EB = Eastbound, WB = Westbound, NB = Northbound, LOS = Level of Service
2. Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
3. Free flow speeds of 35-37 mph were calculated based on HCM 2010.
4. LOS Source: 2010 Highway Capacity Manual, Urban Street Segments.
5. Speed is represented in miles per hour.
6. LOS is likely worse for the SR 89 segment between the existing wye intersection and Granlibakken Road than shown in this table.

Table S2. 2038 Roadway Segment Traffic Operations for all Alternatives

Arterial Segment	Direction	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
		Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS
		Annual Average Peak Hour													
SR 89 – between Twin Crags Way and existing wye intersection	EB	19.0	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18.1	C	18.1	C
	WB	20.8	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.7	C	20.7	C
SR 89 – between Twin Crags Way and New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4)	EB	N/A	N/A	21.8	C	21.6	C	22.0	C	20.4	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	19.5	C	19.5	C	19.5	C	23.3	C	N/A	N/A	N/A	N/A
New SR 28 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & existing wye intersection	EB	N/A	N/A	19.0	C	22.3	C	20.0	C	21.0	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	19.8	C	21.0	C	19.3	C	19.8	C	N/A	N/A	N/A	N/A
SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout) for Alt 1 or between existing wye intersection and Granlibakken Rd for Alts 5, 6, 6A	NB	21.4	C	23.5	C	N/A	N/A	N/A	N/A	N/A	N/A	21.3	C	21.3	C
	SB	19.6	C	23.8	C	N/A	N/A	N/A	N/A	N/A	N/A	20.0	C	20.0	C
New SR 89 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & New SR 89/existing SR 89 intersection (Eastern Roundabout for Alts 1,2,3 or Granlibakken Rd for Alts 4)	NB	N/A	N/A	22.3	C	20.7	C	20.0	C	18.3	D	N/A	N/A	N/A	N/A
	SB	N/A	N/A	21.0	C	21.0	C	22.3	C	19.0	C	N/A	N/A	N/A	N/A
		Summer Peak Hour													
SR 89 – between Twin Crags Way and existing wye intersection	EB	18.4	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16.6	D	16.6	D
	WB	20.2	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20.1	C	20.1	C
SR 89 – between Twin Crags Way and New SR	EB	N/A	N/A	21.0	C	14.8	D	20.2	C	19.6	C	N/A	N/A	N/A	N/A

Table S2. 2038 Roadway Segment Traffic Operations for all Alternatives

Arterial Segment	Direction	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
		Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS	Speed	LOS
89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4)	WB	N/A	N/A	18.5	C	19.3	C	19.5	C	23.0	C	N/A	N/A	N/A	N/A
New SR 28 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & existing wye intersection	EB	N/A	N/A	19.0	C	14.7	D	20.0	C	20.0	C	N/A	N/A	N/A	N/A
	WB	N/A	N/A	17.8	C	4.7	F	7.3	F	19.0	C	N/A	N/A	N/A	N/A
Existing SR 89 – between existing wye intersection and New SR 89/existing SR 89 intersection (Eastern Roundabout) for Alt 1 or between existing wye intersection and Granlibakken Rd for Alts 5, 6, 6A	NB	20.6	C	23.0	C	N/A	N/A	N/A	N/A	N/A	N/A	20.3	C	20.3	C
	SB	18.9	C	23.8	C	N/A	N/A	N/A	N/A	N/A	N/A	19.7	C	19.7	C
New SR 89 – between New SR 89/28 intersection (Western Roundabout for Alts 1,2,3 or signal for Alt 4) & New SR 89/existing SR 89 intersection (Eastern Roundabout for Alts 1,2,3 or Granlibakken Rd for Alts 4)	NB	N/A	N/A	22.3	C	15.7	D	15.7	D	17.3	D	N/A	N/A	N/A	N/A
	SB	N/A	N/A	13.7	E	16.3	D	19.7	C	18.0	D	N/A	N/A	N/A	N/A

Notes: 1. Speed = Average Travel Speed in miles per hour, EB = Eastbound, WB = Westbound, NB = Northbound, LOS = Level of Service
2. Study arterial segments are Class III Arterials based on 2010 Highway Capacity Manual, Two-Lane Highways.
3. Free flow speeds of 35-37 mph were calculated based on HCM 2010.
4. LOS Source: 2010 Highway Capacity Manual, Urban Street Segments.
5. Speed is represented in miles per hour.
6. LOS is likely worse for the SR 89 segment between the existing wye intersection and Granlibakken Road than shown in this table.

Intersection Operations Analysis Summaries for 2018 and 2038

Table S3 provides a summary of the intersection operations analysis for the opening year conditions and Table S4 provides a summary for the design year conditions under all of the project alternatives. For the signalized intersections in each alternative, the overall projected delay and level of service are shown in the tables. For the unsignalized intersections and roundabouts in each alternative, the results for the approach at each intersection with the highest projected delay / lowest LOS are shown in the tables. These summaries do not represent the two-lane configuration for the western roundabout that would be required for acceptable LOS on all approaches for Alternatives 2 and 3 in the 2038 summer peak hour.

Table S3. 2018 Intersection Traffic Operations for all Alternatives

#	Intersection	Control Type	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Annual Average Peak Hour																
1	SR 89 / Fairway Dr	TWSC	16.2	C	14.5	B	16.7	C	16.1	C	16.1	C	16.2	C	16.2	C
2	SR 89 / SR 28 Existing wye	Signal (1,3,4,5,6) TWSC (2) Roundabout (6A)	27.7	C	20.8	C	15.9	C	11.1	B	11.2	B	28.0	C	8.8	A
		Roundabout (1,3)			11.2	B			8.8	A						
3	SR 28 / Grove St	TWSC	45.8	E	45.8	E	45.8	E	45.8	E	45.8	E	45.8	E	45.8	E
4	SR 89 / Tavern Shores Access Rd	TWSC	17.4	C	10.5	B	N/A	N/A	N/A	N/A	N/A	N/A	17.4	C	17.4	C
5	SR 89 / 64 Acres Recreational Access Rd	TWSC	34.2	D	12.4	B	9.0	A	N/A	N/A	17.0	C	34.2	D	34.2	D
6	SR 89 / Granlibakken Rd	TWSC	107.3	F	109.4	F	109.4	F	109.4	F	109.4	F	107.3	F	107.3	F
7	New SR 89/28	Western Roundabout (1,2,3) Signal (4)	N/A	N/A	11.4	B	14.2	B	13.1	B	13.5	B	N/A	N/A	N/A	N/A
8	New SR 89 / Old SR 89	Eastern Roundabout (1,2,3)	N/A	N/A	11.5	B	12.1	B	11.7	B	N/A	N/A	N/A	N/A	N/A	N/A

Table S3. 2018 Intersection Traffic Operations for all Alternatives

#	Intersection	Control Type	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Summer Peak Hour																
1	SR 89 / Fairway Dr	TWSC	22.3	C	18.6	C	23.3	C	22.0	C	22.0	C	22.3	C	22.3	C
2	SR 89 / SR 28 Existing wye	Signal (1,3,4,5,6) TWSC (2) Roundabout (6A)	42.2	D	23.7	C	21.7	C	11.7	B	12.6	B	38.7	D	14.1	B
		Roundabout (1,3)			23.1	C			13.5	B						
3	SR 28 / Grove St	TWSC	210.4	F	210.4	F	210.4	F	210.4	F	210.4	F	210.4	F	210.4	F
4	SR 89 / Tavern Shores Access Rd	TWSC	26.0	D	11.5	B	N/A	N/A	N/A	N/A	N/A	N/A	26.0	D	26.0	D
5	SR 89 / 64 Acres Recreational Access Rd	TWSC	126.7	F	14.7	B	9.1	A	N/A	N/A	25.4	D	126.7	F	126.7	F
6	SR 89 / Granlibakken Rd	TWSC	640.2	F	716.6	F	716.6	F	716.6	F	716.6	F	640.2	F	640.2	F
7	New SR 89/28	Western Roundabout (1,2,3) Signal (4)	N/A	N/A	24.2	C	27.2	D	23.1	C	24.1	C	N/A	N/A	N/A	N/A
8	New SR 89 / Old SR 89	Eastern Roundabout (1,2,3)	N/A	N/A	24.1	C	26.0	D	24.1	C	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
1. "Average" delay (in seconds/vehicle) for the overall intersection are indicated for signal-controlled intersections.
2." Worse" case delay (in seconds/vehicle) are indicated for Two-way-stop (TWSC) controlled intersections.
3. Roundabout analysis was completed using GDOT / SIDRA software.
4. Shaded cells highlight the intersections which are projected to operate with lower LOS than the No Action Alternative.
Source: CH2M HILL 2014

Table S4. 2038 Intersection Traffic Operations for all Alternatives

#	Intersection	Control Type	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Annual Average Peak Hour																
1	SR 89 / Fairway Dr	TWSC	17.9	C	15.7	B	18.5	C	17.8	C	17.8	C	17.9	D	17.9	D
2	SR 89 / SR 28 Existing wye	Signal (1,3,4,5,6) TWSC (2) Roundabout (6A)	34.4	C	22.5	C	9.8	A	11.2	B	10.3	B	33.1	C	10.2	B
		Roundabout (1,3)			13.6	B			10.4	B						
3	SR 28 / Grove St	TWSC	68.9	F	68.9	F	68.9	F	68.9	F	68.9	F	68.9	F	68.9	F
4	SR 89 / Tavern Shores Access Rd	TWSC	19.1	C	10.8	B	N/A	N/A	N/A	N/A	N/A	N/A	17.4	C	17.4	C
5	SR 89 / 64 Acres Recreational Access Rd	TWSC	47.9	E	13.1	B	9.0	A	14.2	B	19.1	C	47.9	E	47.9	E
6	SR 89 / Granlibakken Rd	TWSC	209.5	F	238.8	F	238.8	F	238.8	F	238.8	F	209.5	F	209.5	F
7	New SR 89/28	Western Roundabout (1,2,3) Signal (4)	N/A	N/A	14.0	B	18.7	C	16.8	C	15.3	B	N/A	N/A	N/A	N/A
8	New SR 89 / Old SR 89	Eastern Roundabout (1,2,3)	N/A	N/A	14.0	B	14.8	B	14.2	B	N/A	N/A	N/A	N/A	N/A	N/A

Table S4. 2038 Intersection Traffic Operations for all Alternatives

#	Intersection	Control Type	Alternative 5 (No Action)		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 6		Alternative 6A	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Summer Peak Hour																
1	SR 89 / Fairway Dr	TWSC	D	26.1	21.0	C	27.7	D	25.8	D	25.9	D	26.1	D	26.1	D
2	SR 89 / SR 28 Existing wye	Signal (1,3,4,5,6) TWSC (2) Roundabout (6A)	D	50.2	29.7	C	11.4	B	12.3	B	11.1	B	50.2	D	18.5	C
		Roundabout (1,3)			24.8	C			19.1	C						
3	SR 28 / Grove St	TWSC	427.6	F	427.6	F	427.6	F	427.6	F	427.6	F	427.6	F	427.6	F
4	SR 89 / Tavern Shores Access Rd	TWSC	30.6	D	12.0	B	N/A	N/A	N/A	N/A	N/A	N/A	30.6	D	30.6	D
5	SR 89 / 64 Acres Recreational Access Rd	TWSC	272.8	F	16.1	B	9.2	A	39.5	E	32.5	D	272.8	F	272.8	F
6	SR 89 / Granlibakken Rd	TWSC	1126.4	F	1257.1	F	1257.1	F	1257.1	F	1257.1	F	1126.4	F	1126.4	F
7	New SR 89/28	Western Roundabout (1,2,3) Signal (4)	N/A	N/A	26.1	D	49.6	E	39.1	E	29.1	C	N/A	N/A	N/A	N/A
8	New SR 89 / Old SR 89	Eastern Roundabout (1,2,3)	N/A	N/A	25.9	D	28.2	D	25.8	D	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
1. "Average" delay (in seconds/vehicle) for the overall intersection are indicated for signal-controlled intersections.
2." Worse" case delay (in seconds/vehicle) are indicated for Two-way-stop (TWSC) controlled intersections.
3. Roundabout analysis was completed using GDOT / SIDRA software.
4. Shaded cells highlight the intersections which are projected to operate with lower LOS than the No Action Alternative.
Source: CH2M HILL 2014

Safety Assessment

The geometry of the existing wye intersection provides the potential for conflict at multiple locations; this potential is exacerbated during the summer peak season when volumes increase and motorists unfamiliar with the area drive through the intersection. These conflicts occur when drivers with varying purposes are required to complete conflicting maneuvers within a relatively short distance. For example, the eastbound to southbound free-flowing right turn lane in the southwest quadrant also serves as the access lane for adjacent parking spaces. In the southeast quadrant, the location at which northbound SR 89 widens from one to two lanes is also the location where Macinaw Street intersects SR 89, the northbound to eastbound free-flowing right turn lane diverges, and motorists must choose which of the two lanes at the intersection to maneuver into. On southbound SR 89, the two lanes departing the intersection merge to one lane within 300 feet of the intersection. On the westbound and eastbound departures, two lanes merge into one lane within 200 feet of the intersection. Another conflict point for vehicles occurs where the northbound to eastbound free-flowing right turn lane merges into eastbound SR 28 at the point at which the second through lane ends. The pedestrians and bicyclists traveling through this intersection to access Fanny Bridge and bike paths south of the intersection also introduce potential for conflict as they cross the various travel lanes without using the marked crosswalks. Drivers that are not familiar with summer peak hour field conditions may not expect vehicles to be stopped in the roadway or other drivers to be slowing down for mid-block pedestrian crossings; this can increase the potential for rear-end collisions. The various build alternatives would likely improve safety for all modes of travel. The following discusses these improvements.

ALTERNATIVE 1: NEW ALIGNMENT – EXISTING SR 89 OPEN AS A LOCAL ROADWAY

Alternative 1 would substantially reduce vehicular traffic through the existing wye intersection (annual average and peak hour volumes are projected to decrease approximately 60 percent along this segment of SR 89), and extend the pedestrian/bike path from south of Fanny Bridge to further south of proposed New SR 89 to connect with the existing bike path. Fewer vehicles reduces exposure along this roadway segment and reduces the potential for vehicular crashes to occur. Pedestrian and bicyclist exposure to vehicular traffic would also be reduced because project features associated with Alternative 1 would provide a grade-separated crossing for the pedestrian/bike path on proposed New SR 89 at the west leg of proposed New SR 89/Old SR 89 intersection, connecting it to the existing path in the southwest quadrant of the proposed intersection. The exposure due to crossing the roadway is eliminated, which reduces the potential for pedestrian/bicyclist collisions with motor vehicles.

The new SR 89/28 intersection would be constructed as a single-lane, hybrid roundabout rather than a signalized intersection. Roundabouts tend to reduce the severity of traffic crashes because the geometric design of the entry points eliminates right angle crashes and high entry speeds as well as reduces conflict points. The low-speed, sideswipe collisions that can occur in roundabouts generally result in a less severe outcome. Furthermore, the existing wye with Alternative 1 improvements is projected to operate at a higher level of service in 2018 than the existing signalized wye intersection, which should reduce queues on the SR 89 approaches. Shorter queue lengths would likely lead to a reduction in rear-end crashes, which is the most predominate crash type in the study area. Likewise, elimination of the at-grade pedestrian/bike path crossing that necessitates motorists to stop reduces the potential for rear-end vehicular crashes to occur at this location.

ALTERNATIVE 2: NEW ALIGNMENT – CLOSE EXISTING SR 89 TO VEHICLE TRAFFIC

Alternative 2 would eliminate through traffic (with the exception of emergency vehicles) on the segment of SR 89 south of the bridge. Lower traffic volumes reduces the potential for collisions to occur between motorists and pedestrians / bicyclists traveling along SR 89. Also, pedestrian and bicyclist exposure to

vehicular traffic would be reduced because project features associated with Alternative 2 would provide a grade-separated crossing for the pedestrian/bike paths under the bridge.

The new SR 89/28 intersection would be constructed as a single-lane, hybrid roundabout or a signalized intersection. Roundabouts tend to reduce the severity of traffic crashes because the geometric design of the entry points eliminates right angle crashes and high entry speeds as well as reduces conflict points. The low-speed, sideswipe collisions that can occur in roundabouts generally result in a less severe outcome. Revisions at the existing wye intersection (either a roundabout or pavement markings on the northbound and eastbound approaches, the elimination of through traffic to/from the south side of the bridge, and the elimination of free-flowing right turn lanes) will eliminate conflicting maneuvers and reduce the potential for rear-end collisions to occur (the most common crash type in the study area). Furthermore, the existing wye with Alternative 2 improvements is projected to operate at a higher level of service during summer peak hours in 2018 than the existing signalized wye intersection, which should reduce queues on the SR 89 approaches. Shorter queue lengths would likely lead to a reduction in rear-end crashes during the summer peak, which is the most predominate crash type in the study area.

ALTERNATIVE 3: NEW ALIGNMENT – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF THE BRIDGE

Alternative 3 would reduce vehicular traffic on the segment of SR 89 south of the bridge. The new SR 89/28 intersection new SR 89/28 would be constructed as a single-lane, hybrid roundabout or a signalized intersection. Roundabouts tend to reduce the severity of traffic crashes because the geometric design of the entry points eliminates right angle crashes and high entry speeds as well as reduces conflict points. The low-speed, sideswipe collisions that can occur in roundabouts generally result in a less severe outcome. Revised pavement markings on the northbound and eastbound approaches and the elimination of free-flowing right turn lanes at the existing wye intersection will eliminate conflicting maneuvers and reduce the potential for rear-end collisions to occur (the most common crash type in the study area). Furthermore, the existing wye with Alternative 3 improvements is projected to operate at a higher level of service during summer peak hours in 2018 than the existing signalized wye intersection, which should reduce queues on the SR 89 approaches. Shorter queue lengths would likely lead to a reduction in rear-end crashes. Also, pedestrian and bicyclist exposure to vehicular traffic would be reduced because project features associated with Alternative 3 would provide a grade-separated crossing for the pedestrian/bike paths under the bridge. Reduced exposure due to crossing the roadway lowers the potential for pedestrian/bicyclist collisions with motor vehicles. The potential for rear-end crashes to occur on SR 89 as motorists stop for the pedestrian signal is eliminated with a grade-separated crossing.

ALTERNATIVE 4: NEW ALIGNMENT, NO ROUNDABOUTS – EXISTING SR 89 BECOMES A CUL-DE-SAC ON THE SOUTH SIDE OF THE BRIDGE

Alternative 4 would reduce vehicular traffic on the segment of SR 89 south of the bridge. Revised pavement markings on the northbound and eastbound approaches and the elimination of free-flowing right turn lanes at the existing wye intersection will eliminate conflicting maneuvers and reduce the potential for rear-end collisions to occur (the most common crash type in the study area). Furthermore, the existing wye with Alternative 4 improvements is projected to operate at a higher level of service in 2018 than the existing signalized wye intersection, which should reduce queues on the SR 89 approaches. Shorter queue lengths would likely lead to a reduction in rear-end crashes. Also, pedestrian and bicyclist exposure to vehicular traffic would be reduced because project features associated with Alternative 4 would provide a grade-separated crossing for the pedestrian/bike paths under the bridge. The exposure due to crossing the roadway is eliminated, which reduces the potential for

pedestrian/bicyclist collisions with motor vehicles. The potential for rear-end crashes to occur on SR 89 as motorists stop for the pedestrian signal is eliminated with a grade-separated crossing.

ALTERNATIVE 5: NO ACTION

With no geometric improvements and increasing traffic volumes, crashes would likely continue to occur at the study area intersections and along the roadway segments.

ALTERNATIVE 6: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, MODIFY LANE GEOMETRICS AT EXISTING WYE INTERSECTION

Alternative 6 would include major modifications to the existing wye intersection and would provide for a five-lane section on Fanny Bridge at the existing location. Elimination of the required merge from two lanes to one lane prior to the bridge on the southbound intersection departure would reduce the potential for conflict between vehicles. Also, the conversion of the free-flowing right turn lanes to traditional right turn lanes will reduce some of the existing conflicts and the potential for rear-end collisions to occur (the most common crash type in the study area). The barrier-separation between the sidewalks and vehicle lanes would reduce the pedestrian/bicyclist exposure to vehicles.

ALTERNATIVE 6A: REPAIR OR REPLACE AND WIDEN EXISTING BRIDGE, INSTALL ROUNDABOUT AT EXISTING WYE INTERSECTION

Alternative 6A replaces the existing signalized intersection with a roundabout. Roundabouts tend to reduce the severity of traffic crashes because the geometric design of the entry points eliminates right angle crashes and high entry speeds as well as reduces conflict points. The low-speed, sideswipe collisions that can occur in roundabouts generally result in a less severe outcome. The roundabout also reduces delay as compared to the existing wye intersection in 2018, which will reduce the potential for queuing and rear-end collisions to occur.

APPENDIXES

Appendix A – Historical AADT Volume Trends from 1974 to 2009

Appendix B – August 2013 Peak Hour Intersection Count Data

Appendix C - Hourly Counts for SR 89 and SR 28 from Caltrans Database

Appendix D – Graphical Illustrations of All Build Alternatives

Appendix E – Roadway Segment Operations Analysis Results

Appendix F – Intersection Operations Analysis Results

Appendix A: Historic Traffic Volume Trends from 1974 through 2009

Appendix B: August 2013 Intersection Peak Hour Count Data

Appendix C: Hourly Counts for SR 89 and SR 28 from Caltrans Database

Appendix D: Graphics of Alternatives

Appendix E: Arterial Analysis Results

Appendix F: Intersection Analysis Results

SR 89/Fanny Bridge Community Revitalization Project Traffic Forecasts and Operations Analysis Appendixes

PREPARED FOR:	Caltrans District 3 Tahoe Transportation District Tahoe Regional Planning Agency Federal Highway Administration Central Federal Lands Division
PREPARED BY:	CH2M HILL / Wood Rogers
DATE:	December 17, 2014

APPENDIXES

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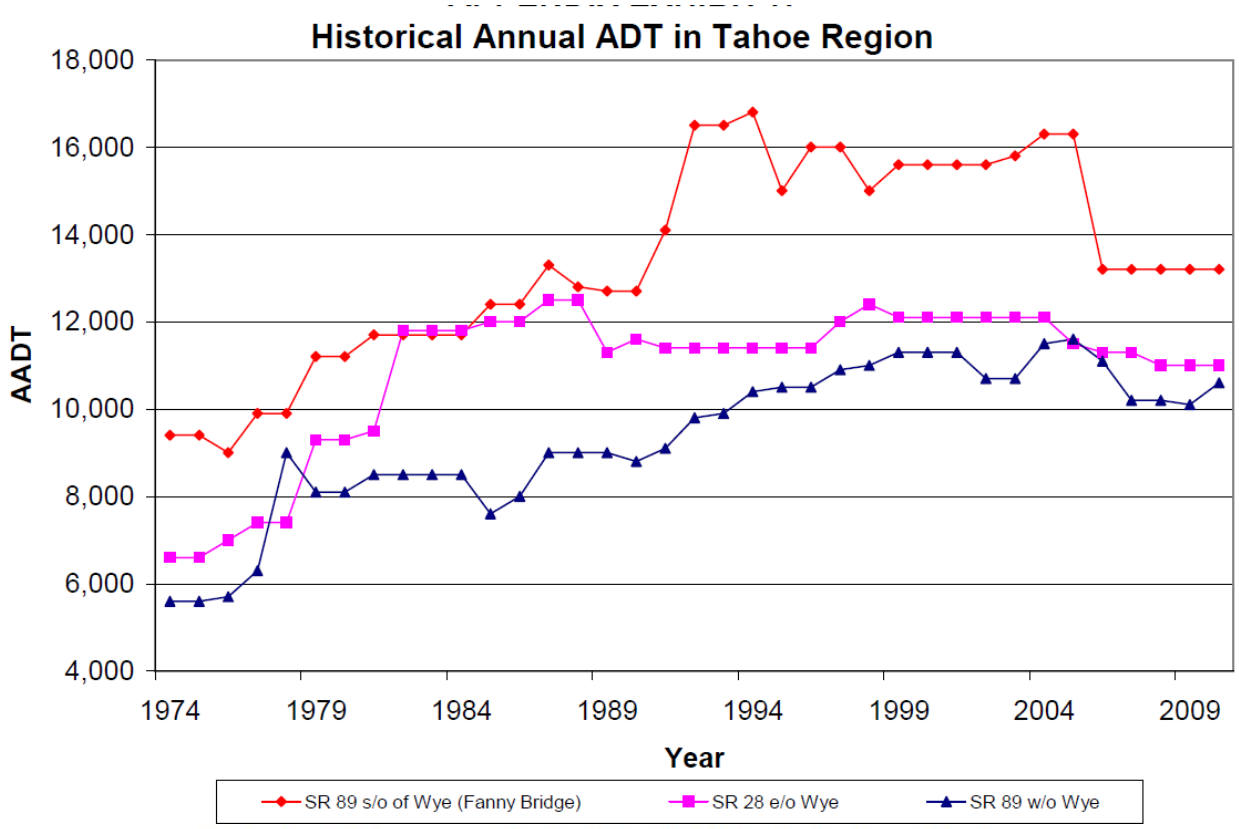
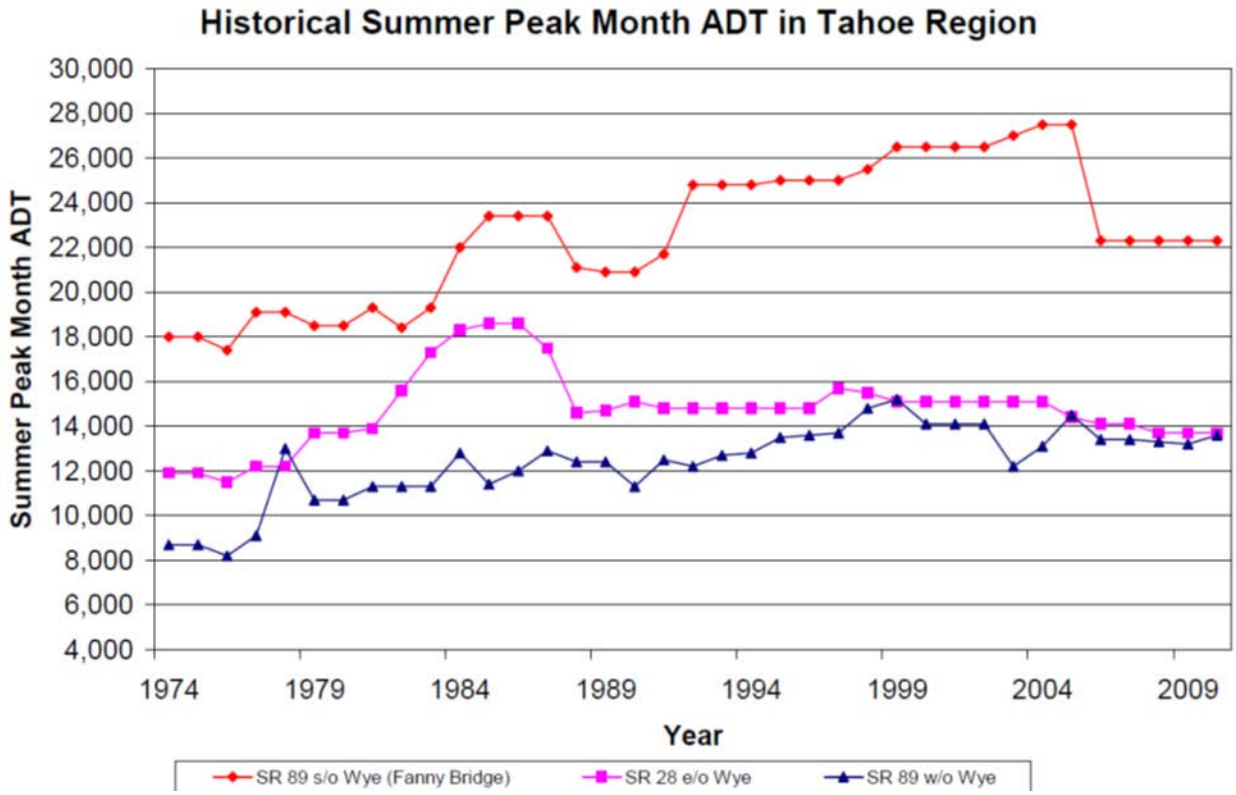
Appendix A: Historic Traffic Volume Trends from 1974 through 2009


Historical Annual ADT in Tahoe Region
AADT
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
1974
1979
1984
1989
1994
1999
2004
2009
Year
SR 89 s/o of Wye (Fanny Bridge)
SR 28 e/o Wye
SR 89 w/o Wye


Historical Summer Peak Month ADT in Tahoe Region
Summer Peak Month ADT
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
1974
1979
1984
1989
1994
1999
2004
2009
Year
SR 89 s/o Wye (Fanny Bridge)
SR 28 e/o Wye
SR 89 w/o Wye

Appendix B: August 2013 Peak Hour Intersection Count Data

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-006 SR 89-Granlibakken Road.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	SR 89 Southbound					Tahoe Tavern Road Westbound					SR 89 Northbound					Granlibakken Road Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	0	58	2	0	60	2	0	0	0	2	3	74	0	0	77	1	0	0	0	1	140	0
07:15	1	81	5	0	87	3	0	3	0	6	1	79	3	0	83	6	1	3	0	10	186	0
07:30	2	91	5	0	98	2	0	5	0	7	1	109	3	0	113	4	0	2	0	6	224	0
07:45	3	94	14	0	111	4	0	2	0	6	4	101	3	0	108	6	0	0	0	6	231	0
Total	6	324	26	0	356	11	0	10	0	21	9	363	9	0	381	17	1	5	0	23	781	0
08:00	2	94	11	0	107	2	1	2	0	5	1	76	2	0	79	14	0	2	0	16	207	0
08:15	0	69	14	0	83	4	0	2	0	6	1	106	7	0	114	14	0	7	0	21	224	0
08:30	3	113	12	0	128	4	0	5	0	9	1	155	3	0	159	12	1	4	0	17	313	0
08:45	8	107	17	0	132	3	2	4	0	9	4	127	3	0	134	18	0	2	0	20	295	0
Total	13	383	54	0	450	13	3	13	0	29	7	464	15	0	486	58	1	15	0	74	1039	0
16:00	5	142	22	0	169	1	0	8	0	9	8	94	1	0	103	32	0	9	0	41	322	0
16:15	4	168	21	0	193	0	0	4	0	4	3	127	1	0	131	34	1	18	0	53	381	0
16:30	9	186	22	0	217	0	0	2	0	2	4	130	2	0	136	41	1	6	0	48	403	0
16:45	3	163	18	0	184	3	2	5	0	10	5	124	1	0	130	36	1	12	0	49	373	0
Total	21	659	83	0	763	4	2	19	0	25	20	475	5	0	500	143	3	45	0	191	1479	0
17:00	4	177	24	0	205	2	0	4	0	6	6	130	0	0	136	40	0	11	0	51	398	0
17:15	7	181	25	0	213	0	0	12	0	12	5	89	0	0	94	19	0	10	0	29	348	0
17:30	3	169	13	0	185	0	1	5	0	6	4	120	1	0	125	44	1	6	0	51	367	0
17:45	4	136	12	0	152	0	1	6	0	7	1	139	0	0	140	45	0	11	0	56	355	0
Total	18	663	74	0	755	2	2	27	0	31	16	478	1	0	495	148	1	38	0	187	1468	0
Grand Total	58	2029	237	0	2324	30	7	69	0	106	52	1780	30	0	1862	366	6	103	0	475	4767	0
Apprch %	2.5%	87.3%	10.2%	0.0%		28.3%	6.6%	65.1%	0.0%		2.8%	95.6%	1.6%	0.0%		77.1%	1.3%	21.7%	0.0%			
Total %	1.2%	42.6%	5.0%	0.0%	48.8%	0.6%	0.1%	1.4%	0.0%	2.2%	1.1%	37.3%	0.6%	0.0%	39.1%	7.7%	0.1%	2.2%	0.0%	10.0%	100.0%	

AM PEAK HOUR	SR 89 Southbound					Tahoe Tavern Road Westbound					SR 89 Northbound					Granlibakken Road Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	2	94	11	0	107	2	1	2	0	5	1	76	2	0	79	14	0	2	0	16	207
08:15	0	69	14	0	83	4	0	2	0	6	1	106	7	0	114	14	0	7	0	21	224
08:30	3	113	12	0	128	4	0	5	0	9	1	155	3	0	159	12	1	4	0	17	313
08:45	8	107	17	0	132	3	2	4	0	9	4	127	3	0	134	18	0	2	0	20	295
Total Volume	13	383	54	0	450	13	3	13	0	29	7	464	15	0	486	58	1	15	0	74	1039
% App Total	2.9%	85.1%	12.0%	0.0%		44.8%	10.3%	44.8%	0.0%		1.4%	95.5%	3.1%	0.0%		78.4%	1.4%	20.3%	0.0%		
PHF	.406	.847	.794	.000	.852	.813	.375	.650	.000	.806	.438	.748	.536	.000	.764	.806	.250	.536	.000	.881	.830

PM PEAK HOUR	SR 89 Southbound					Tahoe Tavern Road Westbound					SR 89 Northbound					Granlibakken Road Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:15 to 17:15																					
Peak Hour For Entire Intersection Begins at 16:15																					
16:15	4	168	21	0	193	0	0	4	0	4	3	127	1	0	131	34	1	18	0	53	381
16:30	9	186	22	0	217	0	0	2	0	2	4	130	2	0	136	41	1	6	0	48	403
16:45	3	163	18	0	184	3	2	5	0	10	5	124	1	0	130	36	1	12	0	49	373
17:00	4	177	24	0	205	2	0	4	0	6	6	130	0	0	136	40	0	11	0	51	398
Total Volume	20	694	85	0	799	5	2	15	0	22	18	511	4	0	533	151	3	47	0	201	1555
% App Total	2.5%	86.9%	10.6%	0.0%		22.7%	9.1%	68.2%	0.0%		3.4%	95.9%	0.8%	0.0%		75.1%	1.5%	23.4%	0.0%		
PHF	.556	.933	.885	.000	.921	.417	.250	.750	.000	.550	.750	.983	.500	.000	.980	.921	.750	.653	.000	.948	.965

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-005 SR 89-64-Acres Recreational Access Road.pp
Date : 8/2/2013

Unshifted Count = All Vehicles

	SR 89 Southbound					Westbound					SR 89 Northbound					64-Acres Recreational Access Road Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	0	55	4	0	59	0	0	0	0	0	2	71	0	0	73	0	0	0	0	0	132	0
07:15	0	85	4	0	89	0	0	0	0	0	0	86	0	0	86	2	0	1	0	3	178	0
07:30	0	98	8	0	106	0	0	0	0	0	4	107	0	0	111	3	0	3	0	6	223	0
07:45	0	109	6	0	115	0	0	0	0	0	1	118	0	0	119	1	0	1	0	2	236	0
Total	0	347	22	0	369	0	0	0	0	0	7	382	0	0	389	6	0	5	0	11	769	0
08:00	0	106	8	0	114	0	0	0	0	0	2	92	0	0	94	3	0	1	0	4	212	0
08:15	0	85	5	0	90	0	0	0	0	0	1	119	0	0	120	0	0	2	0	2	212	0
08:30	0	119	4	0	123	0	0	0	0	0	3	165	0	0	168	4	0	3	0	7	298	0
08:45	0	135	5	0	140	0	0	0	0	0	2	139	0	0	141	1	0	1	0	2	283	0
Total	0	445	22	0	467	0	0	0	0	0	8	515	0	0	523	8	0	7	0	15	1005	0
16:00	0	166	12	0	178	0	0	0	0	0	3	130	0	0	133	15	0	7	0	22	333	0
16:15	0	182	7	0	189	0	0	0	0	0	2	167	0	0	169	20	0	7	0	27	385	0
16:30	0	210	9	0	219	0	0	0	0	0	2	177	0	0	179	14	0	10	0	24	422	0
16:45	0	177	5	0	182	0	0	0	0	0	1	164	0	0	165	16	0	9	0	25	372	0
Total	0	735	33	0	768	0	0	0	0	0	8	638	0	0	646	65	0	33	0	98	1512	0
17:00	0	202	9	0	211	0	0	0	0	0	0	163	0	0	163	19	0	1	0	20	394	0
17:15	0	215	7	0	222	0	0	0	0	0	0	128	0	0	128	26	0	2	0	28	378	0
17:30	0	175	12	0	187	0	0	0	0	0	3	176	0	0	179	29	0	4	0	33	399	0
17:45	0	152	9	0	161	0	0	0	0	0	4	166	0	0	170	16	0	3	0	19	350	0
Total	0	744	37	0	781	0	0	0	0	0	7	633	0	0	640	90	0	10	0	100	1521	0
Grand Total	0	2271	114	0	2385	0	0	0	0	0	30	2168	0	0	2198	169	0	55	0	224	4807	0
Apprch %	0.0%	95.2%	4.8%	0.0%		0.0%	0.0%	0.0%	0.0%		1.4%	98.6%	0.0%	0.0%		75.4%	0.0%	24.6%	0.0%			
Total %	0.0%	47.2%	2.4%	0.0%	49.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	45.1%	0.0%	0.0%	45.7%	3.5%	0.0%	1.1%	0.0%	4.7%	100.0%	

AM PEAK HOUR	SR 89 Southbound					Westbound					SR 89 Northbound					64-Acres Recreational Access Road Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	106	8	0	114	0	0	0	0	0	2	92	0	0	94	3	0	1	0	4	212
08:15	0	85	5	0	90	0	0	0	0	0	1	119	0	0	120	0	0	2	0	2	212
08:30	0	119	4	0	123	0	0	0	0	0	3	165	0	0	168	4	0	3	0	7	298
08:45	0	135	5	0	140	0	0	0	0	0	2	139	0	0	141	1	0	1	0	2	283
Total Volume	0	445	22	0	467	0	0	0	0	0	8	515	0	0	523	8	0	7	0	15	1005
% App Total	0.0%	95.3%	4.7%	0.0%		0.0%	0.0%	0.0%	0.0%		1.5%	98.5%	0.0%	0.0%		53.3%	0.0%	46.7%	0.0%		
PHF	.000	.824	.688	.000	.834	.000	.000	.000	.000	.000	.667	.780	.000	.000	.778	.500	.000	.583	.000	.536	.843

PM PEAK HOUR	SR 89 Southbound					Westbound					SR 89 Northbound					64-Acres Recreational Access Road Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:15 to 17:15																					
Peak Hour For Entire Intersection Begins at 16:15																					
16:15	0	182	7	0	189	0	0	0	0	0	2	167	0	0	169	20	0	7	0	27	385
16:30	0	210	9	0	219	0	0	0	0	0	2	177	0	0	179	14	0	10	0	24	422
16:45	0	177	5	0	182	0	0	0	0	0	1	164	0	0	165	16	0	9	0	25	372
17:00	0	202	9	0	211	0	0	0	0	0	0	163	0	0	163	19	0	1	0	20	394
Total Volume	0	771	30	0	801	0	0	0	0	0	5	671	0	0	676	69	0	27	0	96	1573
% App Total	0.0%	96.3%	3.7%	0.0%		0.0%	0.0%	0.0%	0.0%		0.7%	99.3%	0.0%	0.0%		71.9%	0.0%	28.1%	0.0%		
PHF	.000	.918	.833	.000	.914	.000	.000	.000	.000	.000	.625	.948	.000	.000	.944	.863	.000	.675	.000	.889	.932

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-004 SR 89-Tavern Shores Access Road.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	SR 89 Southbound					Tavern Shores Access Road Westbound					SR 89 Northbound					Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	0	61	0	0	61	2	0	0	0	2	0	71	1	0	72	0	0	0	0	0	135	0
07:15	0	90	0	0	90	2	0	0	0	2	0	87	0	0	87	0	0	0	0	0	179	0
07:30	4	103	0	0	107	1	0	1	0	2	0	111	1	0	112	0	0	0	0	0	221	0
07:45	0	120	0	0	120	2	0	1	0	3	0	117	1	0	118	0	0	0	0	0	241	0
Total	4	374	0	0	378	7	0	2	0	9	0	386	3	0	389	0	0	0	0	0	776	0
08:00	0	112	0	0	112	2	0	1	0	3	0	96	0	0	96	0	0	0	0	0	211	0
08:15	0	87	0	0	87	0	0	1	0	1	0	119	1	0	120	0	0	0	0	0	208	0
08:30	2	130	0	0	132	0	0	6	0	6	0	168	0	0	168	0	0	0	0	0	306	0
08:45	2	138	0	0	140	0	0	1	0	1	0	142	3	0	145	0	0	0	0	0	286	0
Total	4	467	0	0	471	2	0	9	0	11	0	525	4	0	529	0	0	0	0	0	1011	0
16:00	2	170	0	0	172	0	0	2	0	2	0	148	2	0	150	0	0	0	0	0	324	0
16:15	6	190	0	0	196	2	0	3	0	5	0	192	0	0	192	0	0	0	0	0	393	0
16:30	2	210	0	0	212	1	0	3	0	4	0	190	0	0	190	0	0	0	0	0	406	0
16:45	5	187	0	0	192	1	0	4	0	5	0	184	2	0	186	0	0	0	0	0	383	0
Total	15	757	0	0	772	4	0	12	0	16	0	714	4	0	718	0	0	0	0	0	1506	0
17:00	3	217	0	0	220	1	0	1	0	2	0	171	0	0	171	0	0	0	0	0	393	0
17:15	4	218	0	0	222	1	0	3	0	4	0	167	1	0	168	0	0	0	0	0	394	0
17:30	6	180	0	0	186	1	0	2	0	3	0	193	0	0	193	0	0	0	0	0	382	0
17:45	5	153	0	0	158	1	0	3	0	4	0	193	0	0	193	0	0	0	0	0	355	0
Total	18	768	0	0	786	4	0	9	0	13	0	724	1	0	725	0	0	0	0	0	1524	0
Grand Total	41	2366	0	0	2407	17	0	32	0	49	0	2349	12	0	2361	0	0	0	0	0	4817	0
Apprch %	1.7%	98.3%	0.0%	0.0%		34.7%	0.0%	65.3%	0.0%		0.0%	99.5%	0.5%	0.0%		0.0%	0.0%	0.0%	0.0%			
Total %	0.9%	49.1%	0.0%	0.0%	50.0%	0.4%	0.0%	0.7%	0.0%	1.0%	0.0%	48.8%	0.2%	0.0%	49.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	

AM PEAK HOUR	SR 89 Southbound					Tavern Shores Access Road Westbound					SR 89 Northbound					Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	112	0	0	112	2	0	1	0	3	0	96	0	0	96	0	0	0	0	0	211
08:15	0	87	0	0	87	0	0	1	0	1	0	119	1	0	120	0	0	0	0	0	208
08:30	2	130	0	0	132	0	0	6	0	6	0	168	0	0	168	0	0	0	0	0	306
08:45	2	138	0	0	140	0	0	1	0	1	0	142	3	0	145	0	0	0	0	0	286
Total Volume	4	467	0	0	471	2	0	9	0	11	0	525	4	0	529	0	0	0	0	0	1011
% App Total	0.8%	99.2%	0.0%	0.0%		18.2%	0.0%	81.8%	0.0%		0.0%	99.2%	0.8%	0.0%		0.0%	0.0%	0.0%	0.0%		
PHF	.500	.846	.000	.000	.841	.250	.000	.375	.000	.458	.000	.781	.333	.000	.787	.000	.000	.000	.000	.000	.826

PM PEAK HOUR	SR 89 Southbound					Tavern Shores Access Road Westbound					SR 89 Northbound					Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:30 to 17:30																					
Peak Hour For Entire Intersection Begins at 16:30																					
16:30	2	210	0	0	212	1	0	3	0	4	0	190	0	0	190	0	0	0	0	0	406
16:45	5	187	0	0	192	1	0	4	0	5	0	184	2	0	186	0	0	0	0	0	383
17:00	3	217	0	0	220	1	0	1	0	2	0	171	0	0	171	0	0	0	0	0	393
17:15	4	218	0	0	222	1	0	3	0	4	0	167	1	0	168	0	0	0	0	0	394
Total Volume	14	832	0	0	846	4	0	11	0	15	0	712	3	0	715	0	0	0	0	0	1576
% App Total	1.7%	98.3%	0.0%	0.0%		26.7%	0.0%	73.3%	0.0%		0.0%	99.6%	0.4%	0.0%		0.0%	0.0%	0.0%	0.0%		
PHF	.700	.954	.000	.000	.953	1.000	.000	.688	.000	.750	.000	.937	.375	.000	.941	.000	.000	.000	.000	.000	.970

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-003 Grove Street-SR 28.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	Grove Street Southbound					SR 28 Westbound					Grove Street Northbound					SR 28 Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	0	0	3	0	3	1	81	2	0	84	0	0	0	0	0	1	48	0	0	49	136	0
07:15	1	0	5	0	6	1	95	4	0	100	0	0	1	0	1	7	64	0	0	71	178	0
07:30	1	0	7	0	8	4	108	9	0	121	2	0	1	0	3	6	64	1	0	71	203	0
07:45	6	0	5	0	11	4	139	9	0	152	0	0	1	0	1	7	98	2	0	107	271	0
Total	8	0	20	0	28	10	423	24	0	457	2	0	3	0	5	21	274	3	0	298	788	0
08:00	10	1	13	0	24	3	103	8	0	114	1	2	3	0	6	5	99	2	0	106	250	0
08:15	6	0	10	0	16	6	107	7	0	120	2	0	2	0	4	4	97	2	0	103	243	0
08:30	3	0	2	0	5	1	140	6	0	147	3	1	3	0	7	10	135	7	0	152	311	0
08:45	3	0	3	0	6	3	155	3	0	161	1	1	3	0	5	9	129	0	0	138	310	0
Total	22	1	28	0	51	13	505	24	0	542	7	4	11	0	22	28	460	11	0	499	1114	0
16:00	9	1	7	0	17	3	157	12	0	172	1	0	5	0	6	6	179	3	0	188	383	0
16:15	7	2	13	0	22	3	151	9	0	163	1	0	6	0	7	6	170	1	0	177	369	0
16:30	13	0	10	0	23	1	133	12	0	146	1	0	4	0	5	6	187	3	0	196	370	0
16:45	12	0	13	0	25	3	151	5	0	159	0	0	7	0	7	7	182	2	0	191	382	0
Total	41	3	43	0	87	10	592	38	0	640	3	0	22	0	25	25	718	9	0	752	1504	0
17:00	9	0	8	0	17	7	166	5	0	178	3	0	4	0	7	9	179	2	0	190	392	0
17:15	8	0	7	0	15	1	151	6	0	158	2	0	3	0	5	6	192	3	0	201	379	0
17:30	8	0	7	0	15	6	130	5	0	141	2	0	5	0	7	5	199	5	0	209	372	0
17:45	10	1	7	0	18	4	131	9	0	144	1	0	5	0	6	4	171	6	0	181	349	0
Total	35	1	29	0	65	18	578	25	0	621	8	0	17	0	25	24	741	16	0	781	1492	0
Grand Total	106	5	120	0	231	51	2098	111	0	2260	20	4	53	0	77	98	2193	39	0	2330	4898	0
Apprch %	45.9%	2.2%	51.9%	0.0%		2.3%	92.8%	4.9%	0.0%		26.0%	5.2%	68.8%	0.0%		4.2%	94.1%	1.7%	0.0%			
Total %	2.2%	0.1%	2.4%	0.0%	4.7%	1.0%	42.8%	2.3%	0.0%	46.1%	0.4%	0.1%	1.1%	0.0%	1.6%	2.0%	44.8%	0.8%	0.0%	47.6%	100.0%	

AM PEAK HOUR	Grove Street Southbound					SR 28 Westbound					Grove Street Northbound					SR 28 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	10	1	13	0	24	3	103	8	0	114	1	2	3	0	6	5	99	2	0	106	250
08:15	6	0	10	0	16	6	107	7	0	120	2	0	2	0	4	4	97	2	0	103	243
08:30	3	0	2	0	5	1	140	6	0	147	3	1	3	0	7	10	135	7	0	152	311
08:45	3	0	3	0	6	3	155	3	0	161	1	1	3	0	5	9	129	0	0	138	310
Total Volume	22	1	28	0	51	13	505	24	0	542	7	4	11	0	22	28	460	11	0	499	1114
% App Total	43.1%	2.0%	54.9%	0.0%		2.4%	93.2%	4.4%	0.0%		31.8%	18.2%	50.0%	0.0%		5.6%	92.2%	2.2%	0.0%		
PHF	.550	.250	.538	.000	.531	.542	.815	.750	.000	.842	.583	.500	.917	.000	.786	.700	.852	.393	.000	.821	.895

PM PEAK HOUR	Grove Street Southbound					SR 28 Westbound					Grove Street Northbound					SR 28 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:45 to 17:45																					
Peak Hour For Entire Intersection Begins at 16:45																					
16:45	12	0	13	0	25	3	151	5	0	159	0	0	7	0	7	7	182	2	0	191	382
17:00	9	0	8	0	17	7	166	5	0	178	3	0	4	0	7	9	179	2	0	190	392
17:15	8	0	7	0	15	1	151	6	0	158	2	0	3	0	5	6	192	3	0	201	379
17:30	8	0	7	0	15	6	130	5	0	141	2	0	5	0	7	5	199	5	0	209	372
Total Volume	37	0	35	0	72	17	598	21	0	636	7	0	19	0	26	27	752	12	0	791	1525
% App Total	51.4%	0.0%	48.6%	0.0%		2.7%	94.0%	3.3%	0.0%		26.9%	0.0%	73.1%	0.0%		3.4%	95.1%	1.5%	0.0%		
PHF	.771	.000	.673	.000	.720	.607	.901	.875	.000	.893	.583	.000	.679	.000	.929	.750	.945	.600	.000	.946	.973

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-002 SR 89-SR 28.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	Driveway Southbound					SR 28 Westbound					SR 89 Northbound					SR 28 Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	2	5	1	0	8	39	32	2	0	73	33	10	27	0	70	0	27	20	0	47	198	0
07:15	2	7	0	0	9	52	35	4	0	91	35	7	46	0	88	3	40	39	0	82	270	0
07:30	1	5	1	0	7	59	51	0	0	110	53	11	40	0	104	2	30	40	0	72	293	0
07:45	0	7	1	0	8	60	77	3	0	140	43	15	66	0	124	0	47	65	0	112	384	0
Total	5	24	3	0	32	210	195	9	0	414	164	43	179	0	386	5	144	164	0	313	1145	0
08:00	1	4	2	0	7	58	40	0	0	98	38	5	53	0	96	1	48	54	0	103	304	0
08:15	3	10	1	0	14	50	55	2	0	107	48	7	64	0	119	2	49	40	0	91	331	0
08:30	2	12	1	0	15	77	55	1	0	133	65	15	96	0	176	2	62	55	0	119	443	0
08:45	2	9	3	0	14	71	62	2	0	135	46	12	76	0	134	2	70	58	0	130	413	0
Total	8	35	7	0	50	256	212	5	0	473	197	39	289	0	525	7	229	207	0	443	1491	0
16:00	9	19	5	0	33	88	73	3	0	164	70	19	74	0	163	13	80	80	0	173	533	0
16:15	8	19	3	0	30	90	90	8	0	188	86	17	81	0	184	11	75	100	0	186	588	0
16:30	5	25	4	0	34	72	62	6	0	140	84	22	76	0	182	10	104	111	0	225	581	0
16:45	9	25	2	0	36	96	85	4	0	185	79	16	76	0	171	11	77	96	0	184	576	0
Total	31	88	14	0	133	346	310	21	0	677	319	74	307	0	700	45	336	387	0	768	2278	0
17:00	8	20	4	0	32	104	86	3	0	193	69	19	71	0	159	14	88	110	0	212	596	0
17:15	7	27	4	0	38	103	76	6	0	185	69	19	65	0	153	3	93	99	0	195	571	0
17:30	10	22	6	0	38	74	69	4	0	147	90	15	92	0	197	10	90	99	0	199	581	0
17:45	13	25	4	0	42	60	69	2	0	131	92	20	84	0	196	14	90	84	0	188	557	0
Total	38	94	18	0	150	341	300	15	0	656	320	73	312	0	705	41	361	392	0	794	2305	0
Grand Total	82	241	42	0	365	1153	1017	50	0	2220	1000	229	1087	0	2316	98	1070	1150	0	2318	7219	0
Apprch %	22.5%	66.0%	11.5%	0.0%		51.9%	45.8%	2.3%	0.0%		43.2%	9.9%	46.9%	0.0%		4.2%	46.2%	49.6%	0.0%			
Total %	1.1%	3.3%	0.6%	0.0%	5.1%	16.0%	14.1%	0.7%	0.0%	30.8%	13.9%	3.2%	15.1%	0.0%	32.1%	1.4%	14.8%	15.9%	0.0%	32.1%	100.0%	

AM PEAK HOUR	Driveway Southbound					SR 28 Westbound					SR 89 Northbound					SR 28 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	1	4	2	0	7	58	40	0	0	98	38	5	53	0	96	1	48	54	0	103	304
08:15	3	10	1	0	14	50	55	2	0	107	48	7	64	0	119	2	49	40	0	91	331
08:30	2	12	1	0	15	77	55	1	0	133	65	15	96	0	176	2	62	55	0	119	443
08:45	2	9	3	0	14	71	62	2	0	135	46	12	76	0	134	2	70	58	0	130	413
Total Volume	8	35	7	0	50	256	212	5	0	473	197	39	289	0	525	7	229	207	0	443	1491
% App Total	16.0%	70.0%	14.0%	0.0%		54.1%	44.8%	1.1%	0.0%		37.5%	7.4%	55.0%	0.0%		1.6%	51.7%	46.7%	0.0%		
PHF	.667	.729	.583	.000	.833	.831	.855	.625	.000	.876	.758	.650	.753	.000	.746	.875	.818	.892	.000	.852	.841

PM PEAK HOUR	Driveway Southbound					SR 28 Westbound					SR 89 Northbound					SR 28 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:15 to 17:15																					
Peak Hour For Entire Intersection Begins at 16:15																					
16:15	8	19	3	0	30	90	90	8	0	188	86	17	81	0	184	11	75	100	0	186	588
16:30	5	25	4	0	34	72	62	6	0	140	84	22	76	0	182	10	104	111	0	225	581
16:45	9	25	2	0	36	96	85	4	0	185	79	16	76	0	171	11	77	96	0	184	576
17:00	8	20	4	0	32	104	86	3	0	193	69	19	71	0	159	14	88	110	0	212	596
Total Volume	30	89	13	0	132	362	323	21	0	706	318	74	304	0	696	46	344	417	0	807	2341
% App Total	22.7%	67.4%	9.8%	0.0%		51.3%	45.8%	3.0%	0.0%		45.7%	10.6%	43.7%	0.0%		5.7%	42.6%	51.7%	0.0%		
PHF	.833	.890	.813	.000	.917	.870	.897	.656	.000	.915	.924	.841	.938	.000	.946	.821	.827	.939	.000	.897	.982

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-002B SR 89-Mackinaw Road.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	SR 89 Southbound					Mackinaw Road Westbound					SR 89 Northbound					Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
07:15	2	0	0	0	2	2	0	7	0	9	0	0	1	0	1	0	0	0	0	0	12	0
07:30	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	3	0
07:45	2	0	0	0	2	4	0	5	0	9	0	0	4	0	4	0	0	0	0	0	15	0
Total	5	0	0	0	5	7	0	14	0	21	0	0	5	0	5	0	0	0	0	0	31	0
08:00	0	0	0	0	0	1	0	1	0	2	0	0	1	0	1	0	0	0	0	0	3	0
08:15	1	0	0	0	1	2	0	3	0	5	0	0	2	0	2	0	0	0	0	0	8	0
08:30	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0
08:45	0	0	0	0	0	1	0	3	0	4	0	0	3	0	3	0	0	0	0	0	7	0
Total	1	0	0	0	1	4	0	8	0	12	0	0	6	0	6	0	0	0	0	0	19	0
16:00	2	0	0	0	2	2	0	6	0	8	0	0	11	0	11	0	0	0	0	0	21	0
16:15	1	0	0	0	1	4	0	7	0	11	0	0	17	0	17	0	0	0	0	0	29	0
16:30	0	0	0	0	0	4	0	1	0	5	0	0	12	0	12	0	0	0	0	0	17	0
16:45	0	0	0	0	0	2	0	4	0	6	0	0	28	0	28	0	0	0	0	0	34	0
Total	3	0	0	0	3	12	0	18	0	30	0	0	68	0	68	0	0	0	0	0	101	0
17:00	1	0	0	0	1	0	0	3	0	3	0	0	23	0	23	0	0	0	0	0	27	0
17:15	2	0	0	0	2	0	0	3	0	3	0	0	25	0	25	0	0	0	0	0	30	0
17:30	2	0	0	0	2	0	0	8	0	8	0	0	6	0	6	0	0	0	0	0	16	0
17:45	2	0	0	0	2	1	0	2	0	3	0	0	5	0	5	0	0	0	0	0	10	0
Total	7	0	0	0	7	1	0	16	0	17	0	0	59	0	59	0	0	0	0	0	83	0
Grand Total	16	0	0	0	16	24	0	56	0	80	0	0	138	0	138	0	0	0	0	0	234	0
Apprch %	100.0%	0.0%	0.0%	0.0%		30.0%	0.0%	70.0%	0.0%		0.0%	0.0%	100.0%	0.0%		0.0%	0.0%	0.0%	0.0%			
Total %	6.8%	0.0%	0.0%	0.0%	6.8%	10.3%	0.0%	23.9%	0.0%	34.2%	0.0%	0.0%	59.0%	0.0%	59.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	

AM PEAK HOUR	SR 89 Southbound					Mackinaw Road Westbound					SR 89 Northbound					Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 07:15 to 08:15																					
Peak Hour For Entire Intersection Begins at 07:15																					
07:15	2	0	0	0	2	2	0	7	0	9	0	0	1	0	1	0	0	0	0	0	12
07:30	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	3
07:45	2	0	0	0	2	4	0	5	0	9	0	0	4	0	4	0	0	0	0	0	15
08:00	0	0	0	0	0	1	0	1	0	2	0	0	1	0	1	0	0	0	0	0	3
Total Volume	4	0	0	0	4	8	0	15	0	23	0	0	6	0	6	0	0	0	0	0	33
% App Total	100.0%	0.0%	0.0%	0.0%		34.8%	0.0%	65.2%	0.0%		0.0%	0.0%	100.0%	0.0%		0.0%	0.0%	0.0%	0.0%		
PHF	.500	.000	.000	.000	.500	.500	.000	.536	.000	.639	.000	.000	.375	.000	.375	.000	.000	.000	.000	.000	.550

PM PEAK HOUR	SR 89 Southbound					Mackinaw Road Westbound					SR 89 Northbound					Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:30 to 17:30																					
Peak Hour For Entire Intersection Begins at 16:30																					
16:30	0	0	0	0	0	4	0	1	0	5	0	0	12	0	12	0	0	0	0	0	17
16:45	0	0	0	0	0	2	0	4	0	6	0	0	28	0	28	0	0	0	0	0	34
17:00	1	0	0	0	1	0	0	3	0	3	0	0	23	0	23	0	0	0	0	0	27
17:15	2	0	0	0	2	0	0	3	0	3	0	0	25	0	25	0	0	0	0	0	30
Total Volume	3	0	0	0	3	6	0	11	0	17	0	0	88	0	88	0	0	0	0	0	108
% App Total	100.0%	0.0%	0.0%	0.0%		35.3%	0.0%	64.7%	0.0%		0.0%	0.0%	100.0%	0.0%		0.0%	0.0%	0.0%	0.0%		
PHF	.375	.000	.000	.000	.375	.375	.000	.688	.000	.708	.000	.000	.786	.000	.786	.000	.000	.000	.000	.000	.794

ALL TRAFFIC DATA

City of Tahoe City
All Vehicles on Unshifted
Nothing on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 13-7385-001 Fairway Drive-SR 89.ppd
Date : 8/2/2013

Unshifted Count = All Vehicles

	Fairway Drive Southbound					SR 89 Westbound					Northbound					SR 89 Eastbound						
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total	Uturn Total
07:00	5	0	0	0	5	0	52	7	0	59	0	0	0	0	0	2	42	0	0	44	108	0
07:15	14	0	4	0	18	0	66	5	0	71	0	0	0	0	0	2	60	0	0	62	151	0
07:30	5	0	3	0	8	0	103	5	0	108	0	0	0	0	0	3	63	0	0	66	182	0
07:45	8	0	2	0	10	0	104	19	0	123	0	0	0	0	0	5	113	0	0	118	251	0
Total	32	0	9	0	41	0	325	36	0	361	0	0	0	0	0	12	278	0	0	290	692	0
08:00	9	0	1	0	10	0	68	5	0	73	0	0	0	0	0	1	84	0	0	85	168	0
08:15	8	0	4	0	12	0	89	7	0	96	0	0	0	0	0	1	99	0	0	100	208	0
08:30	7	0	6	0	13	0	99	5	0	104	0	0	0	0	0	1	100	0	0	101	218	0
08:45	3	0	1	0	4	0	94	6	0	100	0	0	0	0	0	2	120	0	0	122	226	0
Total	27	0	12	0	39	0	350	23	0	373	0	0	0	0	0	5	403	0	0	408	820	0
16:00	5	0	2	0	7	0	141	12	0	153	0	0	0	0	0	11	176	0	0	187	347	0
16:15	6	0	5	0	11	0	163	15	0	178	0	0	0	0	0	11	189	0	0	200	389	0
16:30	7	0	2	0	9	0	145	12	0	157	0	0	0	0	0	15	207	0	0	222	388	0
16:45	6	0	9	0	15	0	157	11	0	168	0	0	0	0	0	20	182	0	0	202	385	0
Total	24	0	18	0	42	0	606	50	0	656	0	0	0	0	0	57	754	0	0	811	1509	0
17:00	12	0	10	0	22	0	148	16	0	164	0	0	0	0	0	12	202	0	0	214	400	0
17:15	9	0	4	0	13	0	155	6	0	161	0	0	0	0	0	14	185	0	0	199	373	0
17:30	8	0	6	0	14	0	155	14	0	169	0	0	0	0	0	9	190	0	0	199	382	0
17:45	6	0	6	0	12	0	154	9	0	163	0	0	0	0	0	4	170	0	0	174	349	0
Total	35	0	26	0	61	0	612	45	0	657	0	0	0	0	0	39	747	0	0	786	1504	0
Grand Total	118	0	65	0	183	0	1893	154	0	2047	0	0	0	0	0	113	2182	0	0	2295	4525	0
Apprch %	64.5%	0.0%	35.5%	0.0%		0.0%	92.5%	7.5%	0.0%		0.0%	0.0%	0.0%	0.0%		4.9%	95.1%	0.0%	0.0%			
Total %	2.6%	0.0%	1.4%	0.0%	4.0%	0.0%	41.8%	3.4%	0.0%	45.2%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	48.2%	0.0%	0.0%	50.7%	100.0%	

AM PEAK HOUR	Fairway Drive Southbound					SR 89 Westbound					Northbound					SR 89 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 07:45 to 08:45																					
Peak Hour For Entire Intersection Begins at 07:45																					
07:45	8	0	2	0	10	0	104	19	0	123	0	0	0	0	0	5	113	0	0	118	251
08:00	9	0	1	0	10	0	68	5	0	73	0	0	0	0	0	1	84	0	0	85	168
08:15	8	0	4	0	12	0	89	7	0	96	0	0	0	0	0	1	99	0	0	100	208
08:30	7	0	6	0	13	0	99	5	0	104	0	0	0	0	0	1	100	0	0	101	218
Total Volume	32	0	13	0	45	0	360	36	0	396	0	0	0	0	0	8	396	0	0	404	845
% App Total	71.1%	0.0%	28.9%	0.0%		0.0%	90.9%	9.1%	0.0%		0.0%	0.0%	0.0%	0.0%		2.0%	98.0%	0.0%	0.0%		
PHF	.889	.000	.542	.000	.865	.000	.865	.474	.000	.805	.000	.000	.000	.000	.000	.400	.876	.000	.000	.856	.842

PM PEAK HOUR	Fairway Drive Southbound					SR 89 Westbound					Northbound					SR 89 Eastbound					
START TIME	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	LEFT	THRU	RIGHT	UTURNS	APP.TOTAL	Total
Peak Hour Analysis From 16:15 to 17:15																					
Peak Hour For Entire Intersection Begins at 16:15																					
16:15	6	0	5	0	11	0	163	15	0	178	0	0	0	0	0	11	189	0	0	200	389
16:30	7	0	2	0	9	0	145	12	0	157	0	0	0	0	0	15	207	0	0	222	388
16:45	6	0	9	0	15	0	157	11	0	168	0	0	0	0	0	20	182	0	0	202	385
17:00	12	0	10	0	22	0	148	16	0	164	0	0	0	0	0	12	202	0	0	214	400
Total Volume	31	0	26	0	57	0	613	54	0	667	0	0	0	0	0	58	780	0	0	838	1562
% App Total	54.4%	0.0%	45.6%	0.0%		0.0%	91.9%	8.1%	0.0%		0.0%	0.0%	0.0%	0.0%		6.9%	93.1%	0.0%	0.0%		
PHF	.646	.000	.650	.000	.648	.000	.940	.844	.000	.937	.000	.000	.000	.000	.000	.725	.942	.000	.000	.944	.976

Appendix C: Hourly Counts for SR 89 and SR 28 from Caltrans Database

SR89 NB 0.3 miles South of Existing Wye							Percentage
Friday, August 05, 2011							of
					Data Quality		Peak
Time	Postmile (Abs)	Postmile (CA)	VDS	Flow	# Lane Points	% Observed	
0:00	67.022	8.22	317728	28	12	100	3.50%
1:00	67.022	8.22	317728	22	12	100	2.75%
2:00	67.022	8.22	317728	11	12	100	1.37%
3:00	67.022	8.22	317728	6	12	100	0.75%
4:00	67.022	8.22	317728	17	12	100	2.12%
5:00	67.022	8.22	317728	47	12	100	5.87%
6:00	67.022	8.22	317728	180	12	100	22.47%
7:00	67.022	8.22	317728	333	12	100	41.57%
8:00	67.022	8.22	317728	504	12	100	62.92%
9:00	67.022	8.22	317728	694	12	100	86.64%
10:00	67.022	8.22	317728	801	12	100	100.00%
11:00	67.022	8.22	317728	746	12	100	93.13%
12:00	67.022	8.22	317728	760	12	100	94.88%
13:00	67.022	8.22	317728	718	12	100	89.64%
14:00	67.022	8.22	317728	623	12	100	77.78%
15:00	67.022	8.22	317728	556	12	100	69.41%
16:00	67.022	8.22	317728	609	12	100	76.03%
17:00	67.022	8.22	317728	631	12	91.7	78.78%
18:00	67.022	8.22	317728	654	12	100	81.65%
19:00	67.022	8.22	317728	418	12	100	52.18%
20:00	67.022	8.22	317728	272	12	100	33.96%
21:00	67.022	8.22	317728	209	12	100	26.09%
22:00	67.022	8.22	317728	175	12	100	21.85%
23:00	67.022	8.22	317728	113	12	100	14.11%
Total					288	99.7	
				9,127			

SR89 SB 0.3 miles South of Existing Wye							Percentage	Both	Percentage
Friday, August 05, 2011							of	Directions	of
					Data Quality		Peak		Peak
Time	Postmile (Abs)	Postmile (CA)	VDS	Flow	# Lane Points	% Observed			
0:00	67.022	8.22	317729	87	12	0	8.37%	115	6.79%
1:00	67.022	8.22	317729	56	12	0	5.38%	78	4.60%
2:00	67.022	8.22	317729	41	12	0	3.94%	52	3.07%
3:00	67.022	8.22	317729	50	12	0	4.81%	56	3.31%
4:00	67.022	8.22	317729	114	12	0	10.96%	131	7.73%
5:00	67.022	8.22	317729	292	12	0	28.08%	339	20.01%
6:00	67.022	8.22	317729	369	12	0	35.48%	549	32.41%
7:00	67.022	8.22	317729	534	12	0	51.35%	867	51.18%
8:00	67.022	8.22	317729	529	12	0	50.87%	1,033	60.98%
9:00	67.022	8.22	317729	534	12	0	51.35%	1,228	72.49%
10:00	67.022	8.22	317729	743	12	0	71.44%	1,544	91.15%
11:00	67.022	8.22	317729	832	12	0	80.00%	1,578	93.15%
12:00	67.022	8.22	317729	916	12	0	88.08%	1,676	98.94%
13:00	67.022	8.22	317729	976	12	0	93.85%	1,694	100.00%
14:00	67.022	8.22	317729	1,040	12	0	100.00%	1,663	98.17%
15:00	67.022	8.22	317729	915	12	0	87.98%	1,471	86.84%
16:00	67.022	8.22	317729	907	12	0	87.21%	1,516	89.49%
17:00	67.022	8.22	317729	874	12	0	84.04%	1,505	88.84%
18:00	67.022	8.22	317729	778	12	0	74.81%	1,432	84.53%
19:00	67.022	8.22	317729	680	12	0	65.38%	1,098	64.82%
20:00	67.022	8.22	317729	577	12	0	55.48%	849	50.12%
21:00	67.022	8.22	317729	519	12	0	49.90%	728	42.98%
22:00	67.022	8.22	317729	402	12	0	38.65%	577	34.06%
23:00	67.022	8.22	317729	247	12	0	23.75%	360	21.25%
Total					288	0			
				13,012				22,139	

SR89

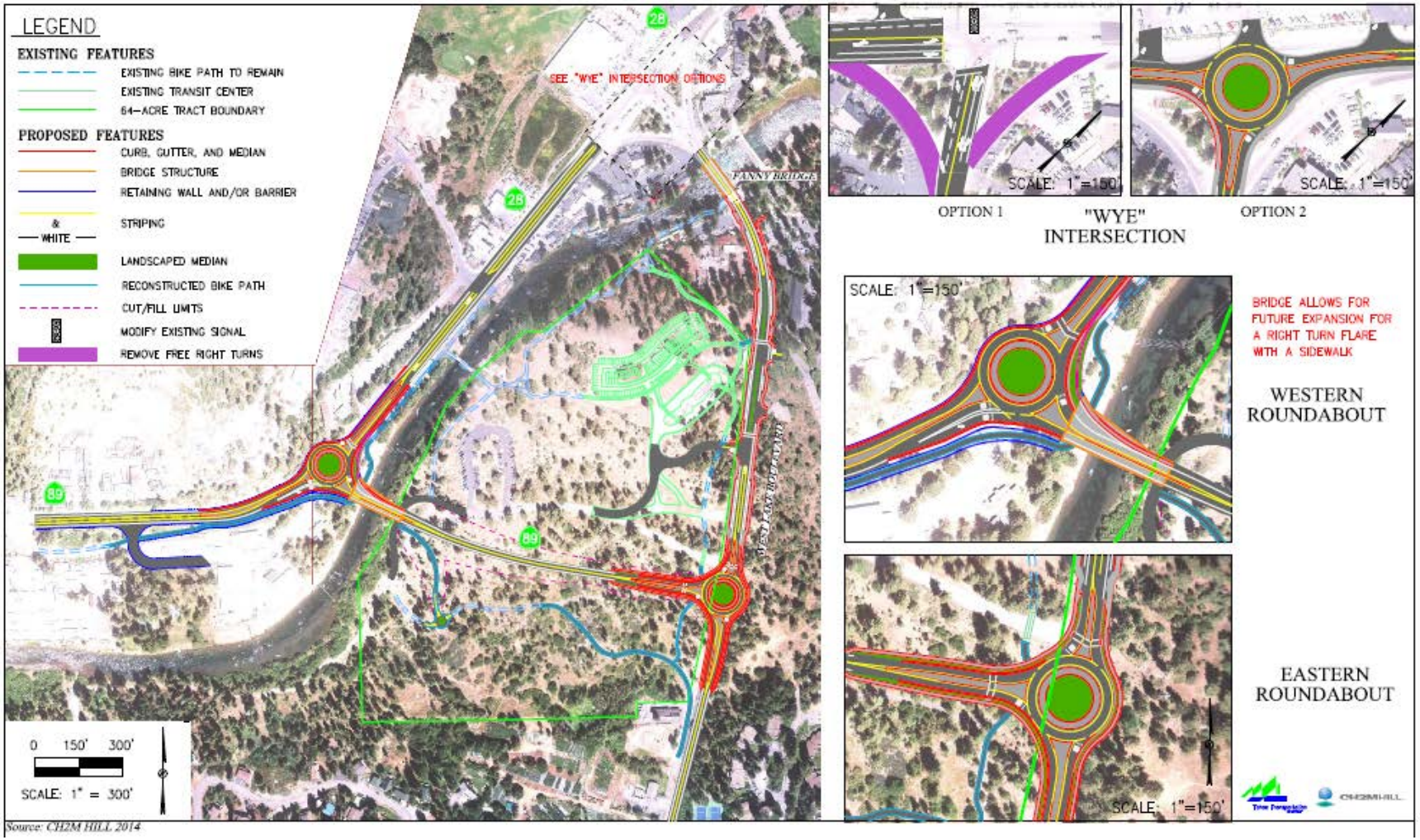
Abs PM	CA PM	Description
66.55	7.75	OLYMPIC DR-SOUTH - RT
66.68	7.88	OLYMPIC DR-NORTH - RT
66.75	7.95	TAN TAVERN-L;GRNLIBKN-R
67.25	8.45	TAHOE TAVERN RD S - LT
67.32	T8.52	MACKINAW RD - RT
67.37	T8.569	**RTE028 SEQ 0000101**
67.58	8.72	FAIRWAY DRIVE - RT
68.12	9.26	TWIN CRAGS DR - RT
71.2	12.34	ALPINE MEADOWS RD - LT
72.58	13.72	SQUAW VALLEY RD - LT
74.89	16.03	POLE CREEK RD - LT
77.75	18.888	MONTREAL RD - LT
77.83	18.971	CABIN CREEK RD - LT

SR28

Abs PM	CA PM	Description
0.12	0.2	MACKINAW RD-RT
0.43	0.51	GROVE ST
0.54	0.626	CO RD W6028 & JACKPINE
0.75	0.83	TAHOE STATE PARK DR -RT

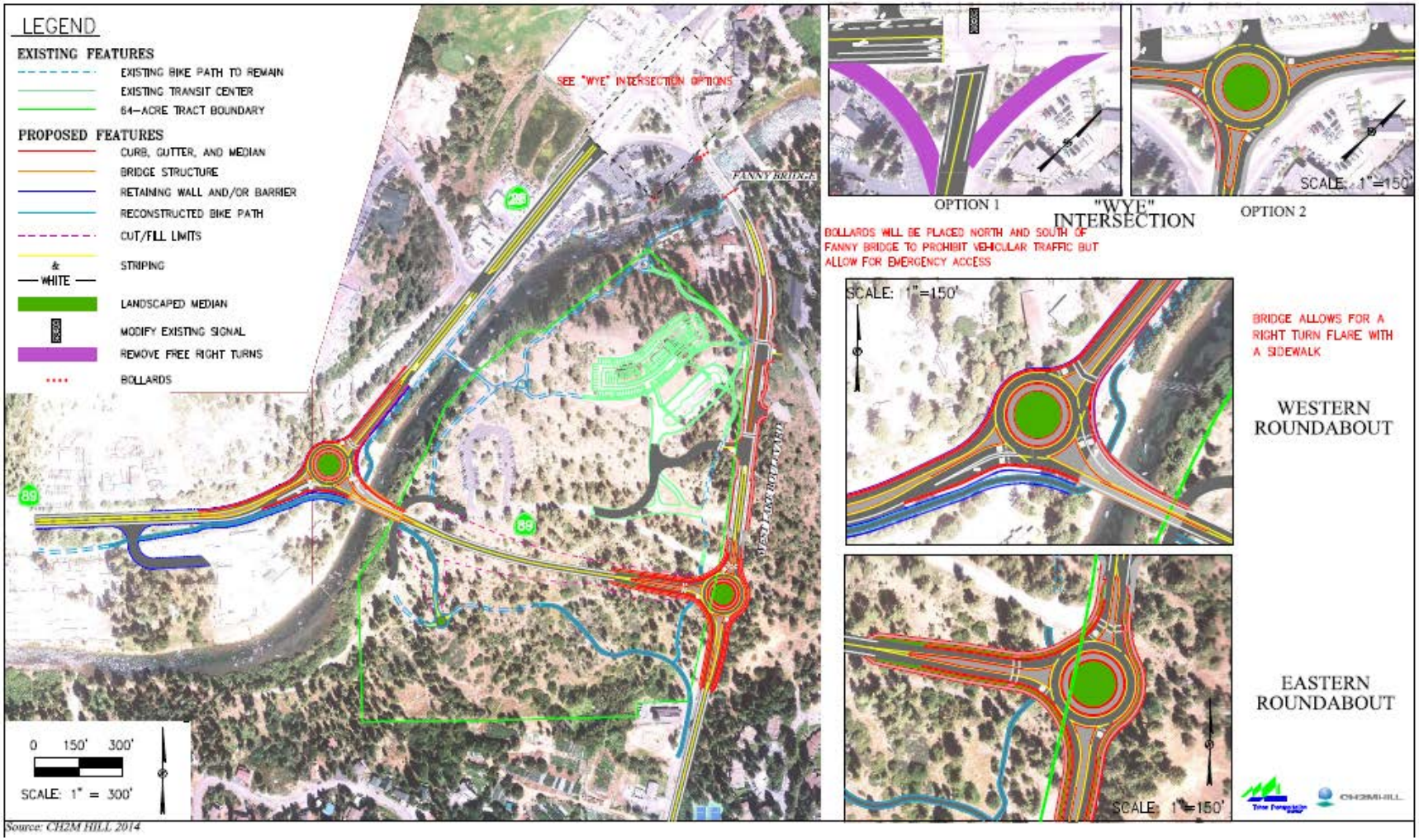
Appendix D: Graphical Illustrations of All Build Alternatives

ALTERNATIVE 1



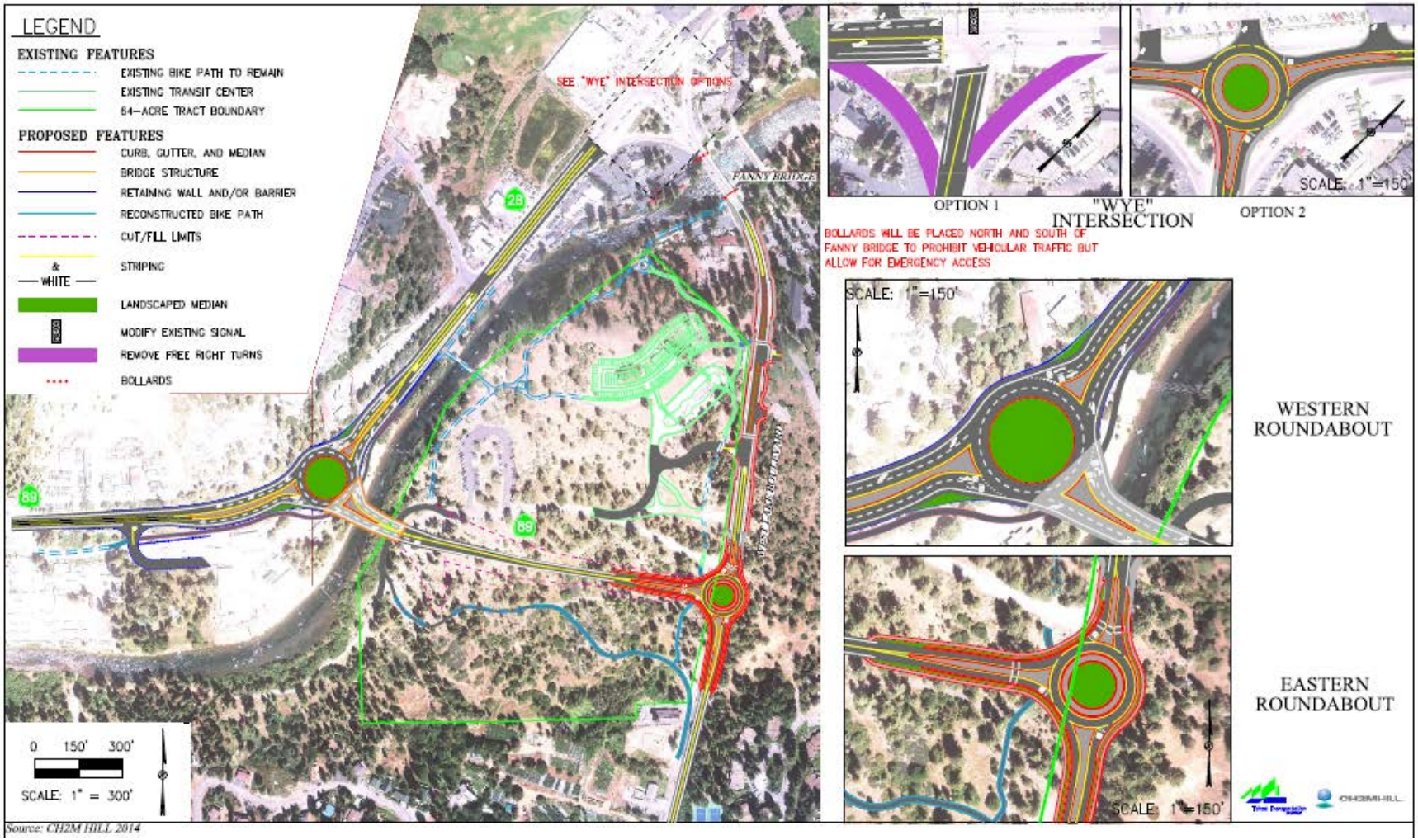
Source: CH2M HILL 2014

ALTERNATIVE 2 2018



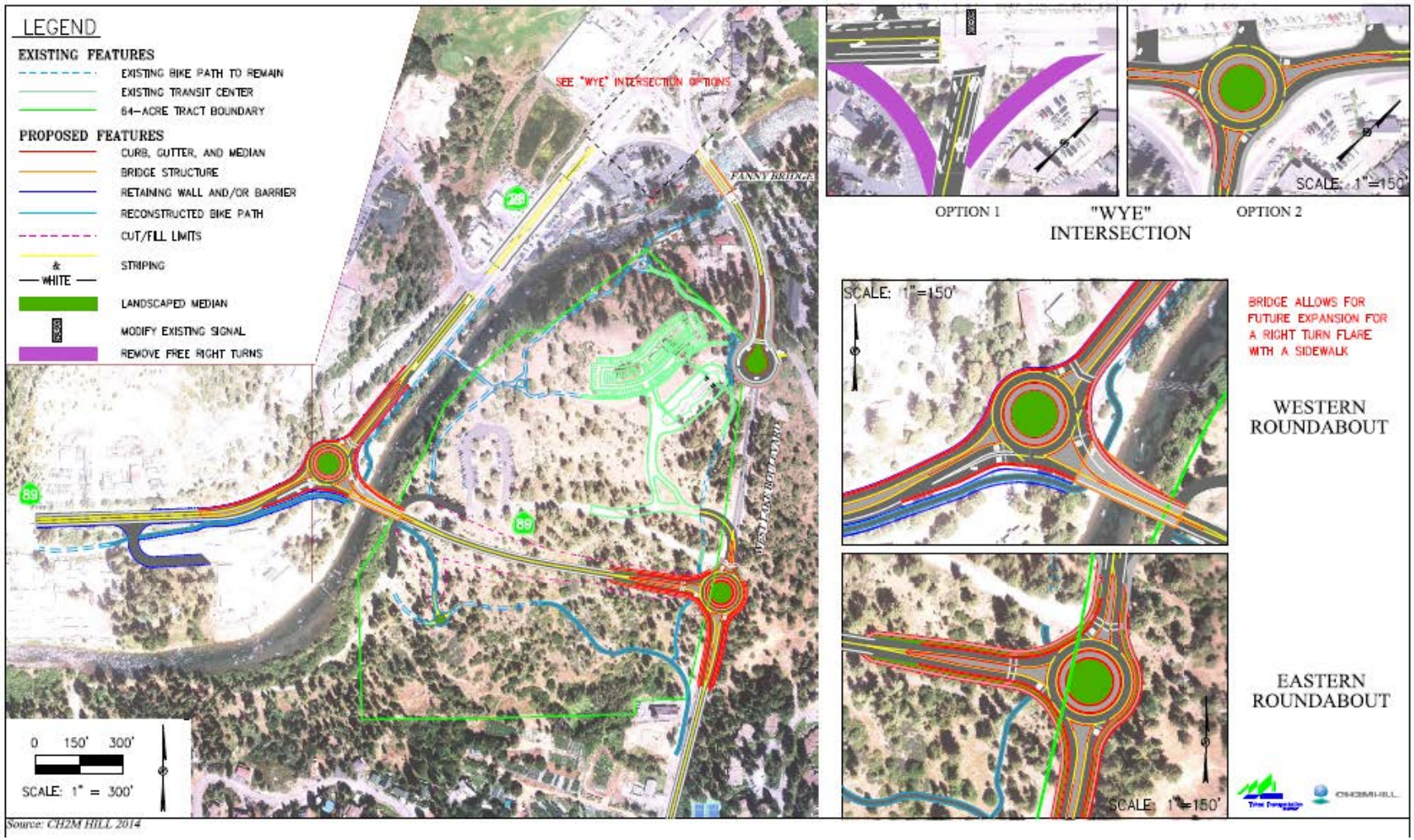
Source: CH2M HILL 2014

ALTERNATIVE 2 2038



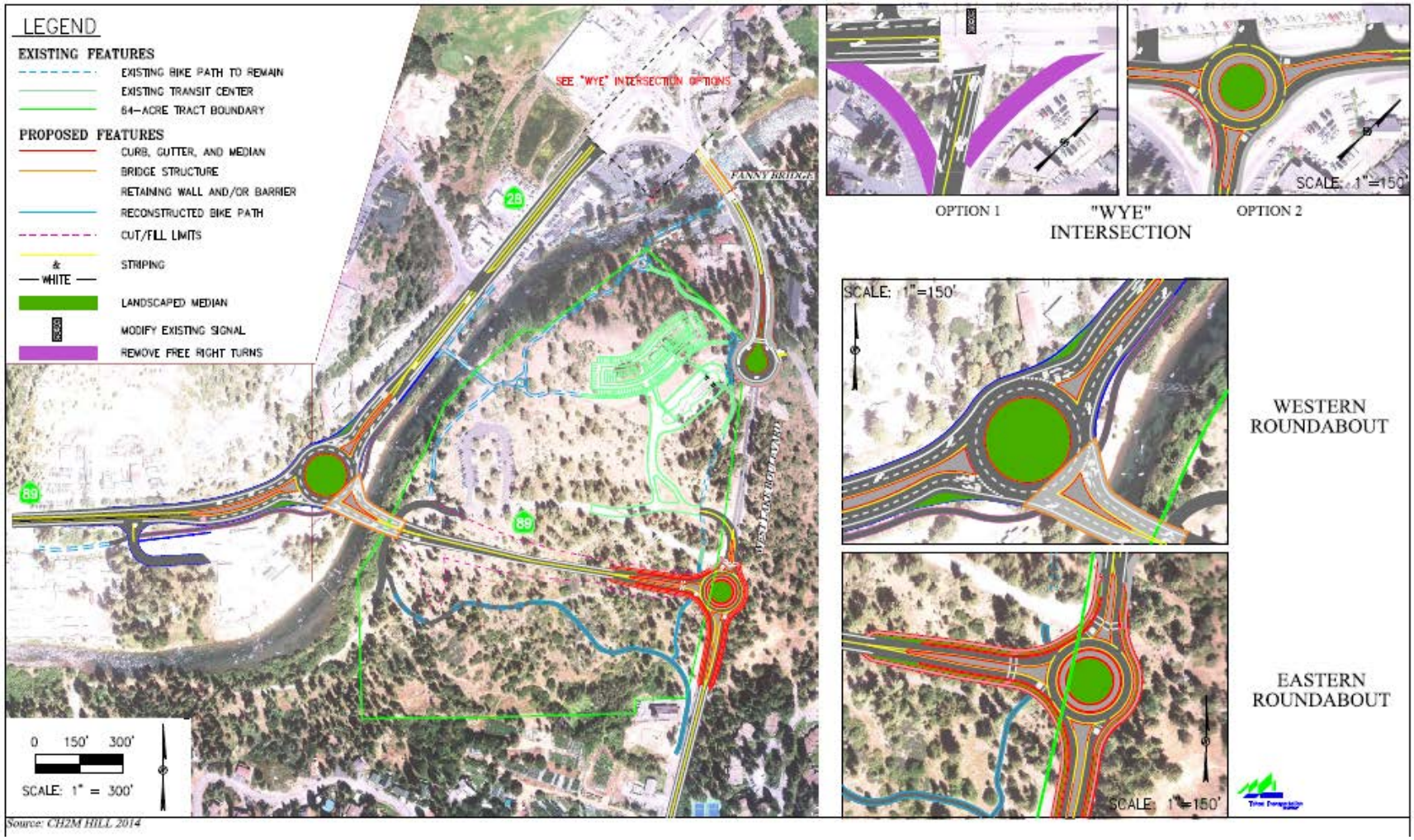
Source: CH2M HILL 2014

ALTERNATIVE 3 2018



Source: CH2M HILL 2014

ALTERNATIVE 3 2038



Source: CH2M HILL 2014

ALTERNATIVE 4

Source: CH2M HILL 2014

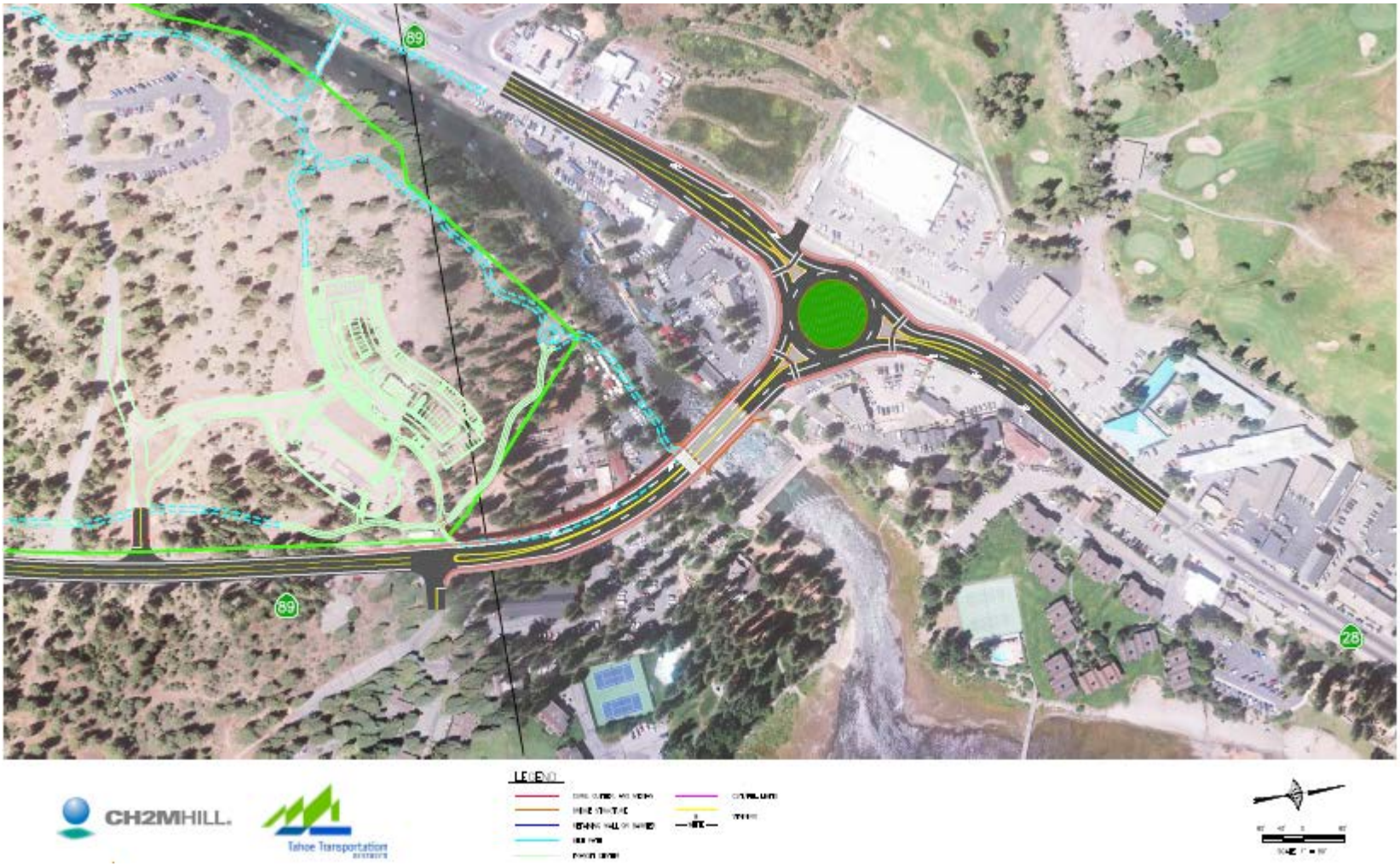
ALTERNATIVE 6

CH2MHILL.

Tahoe Transportation

LEGEND

ALTERNATIVE 6A



Appendix E: Roadway Segment Operations Analysis Results

Existing Conditions

Average Annual Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	5.5	13.3	0.1	14	14	5.7
	9	1.8	17.4	0.1	22	22	1.9
Grove St	2	2.9	24.8	0.3	41	40	3.7
	17	0.8	8.4	0.1	22	22	1.0
	18	0.6	9.8	0.1	23	23	0.6
Total		11.6	73.7	0.6	27	27	13.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.8	14	5.6	14	5.1	14
	22	1.8	23	1.8	22	1.7	22
Grove St	41	2.6	41	3.0	42	2.8	42
	23	0.8	22	0.8	23	0.8	23
	23	0.6	23	0.6	23	0.6	23
Total	27	11.7	27	11.9	28	10.9	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	5.2	14	5.4
	1.8	22	1.9
Grove St	2.6	41	2.6
	0.8	23	0.8
	0.6	23	0.7
Total	11.0	27	11.4

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.4
	17	0.3	9.5	0.1	24	24	0.4
Grove St	2	2.0	9.5	0.1	20	20	2.1
	9	2.7	42.8	0.3	23	23	2.7
	8	1.3	16.9	0.1	23	23	1.2
Savemart Access	6	14.9	21.9	0.1	9	8	15.8
Total		21.5	111.1	0.6	20	20	22.6

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.3	24	0.4	24	0.3	24
Grove St	20	1.8	20	2.1	20	2.1	20
	24	2.4	23	3.0	23	2.7	24
	23	1.3	23	1.4	23	1.3	23
Savemart Access	9	13.0	9	13.7	9	14.1	8
Total	21	19.0	21	20.9	21	20.8	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.3	26	0.3
	0.4	24	0.3
Grove St	2.1	20	1.8
	2.5	24	2.6
	1.3	23	1.2
Savemart Access	15.5	8	17.4
Total	22.0	20	23.7

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.2	8.6	0.1	26	26	0.2
Granlibakken Rd	26	0.9	11.2	0.1	23	22	1.4
	12	0.5	12.9	0.1	24	24	0.6
	19	0.9	20.3	0.1	24	24	1.0
	3	0.4	6.7	0.0	23	23	0.4
64 Acres Access	20	0.6	7.9	0.0	23	23	0.6
	45	0.5	8.1	0.1	24	24	0.6
	11	0.7	11.0	0.1	23	23	0.8
Tavern Shores Access	22	0.6	8.0	0.1	25	25	0.6
	10	0.5	7.1	0.0	21	20	0.6
SR 28	6	25.9	39.6	0.1	9	8	27.4
	16	1.3	13.0	0.1	18	18	1.3
Fairway Dr	42	1.4	16.4	0.1	24	24	1.4
	13	0.8	11.9	0.1	22	22	0.8
	1	0.7	12.6	0.1	23	23	0.8
	4	0.5	8.4	0.1	24	24	0.6
	5	1.3	18.7	0.1	23	23	1.4
	14	0.6	7.6	0.0	23	23	0.6
	34	0.8	10.1	0.1	23	23	0.9
	35	0.6	7.1	0.0	23	23	0.6
	36	1.1	9.2	0.1	22	22	1.2
Twin Crag	37	1.1	5.4	0.0	27	26	1.2
	38	1.5	13.0	0.1	22	22	1.6
	39	1.0	10.8	0.1	23	23	1.0
Total		44.3	286.0	1.7	21	21	47.5

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.2	26	0.2	26	0.2	26
Granlibakken Rd	23	0.9	23	0.9	24	0.7	23
	24	0.5	24	0.5	24	0.5	24
	24	1.0	24	0.9	24	0.9	24
	23	0.4	23	0.4	23	0.4	23
64 Acres Access	23	0.6	23	0.5	23	0.6	23
	23	0.6	24	0.5	24	0.6	24
	23	0.8	23	0.7	23	0.7	23
Tavern Shores Access	25	0.6	25	0.6	25	0.6	25
	20	0.5	20	0.5	21	0.5	21
SR 28	8	27.5	9	23.8	9	24.3	8
	18	1.4	18	1.2	18	1.2	18
Fairway Dr	24	1.4	24	1.3	24	1.4	24
	22	0.8	22	0.7	22	0.7	22
	23	0.8	24	0.7	23	0.7	23
	24	0.6	24	0.5	24	0.5	23
	23	1.4	23	1.2	23	1.2	23
	23	0.6	23	0.6	23	0.5	23
	23	0.8	23	0.8	23	0.7	23
	23	0.6	23	0.6	23	0.5	23
	22	1.1	22	1.0	22	1.0	22
Twin Crag	26	1.2	28	1.1	28	1.1	26
	22	1.5	22	1.5	22	1.4	22
	23	1.0	23	0.9	23	0.9	23
Total	21	46.8	21	41.8	21	41.9	21

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.2	26	0.2
Granlibakken Rd	0.8	24	0.6
	0.5	24	0.4
	0.8	24	0.8
	0.4	24	0.4
64 Acres Access	0.5	23	0.5
	0.5	24	0.5
	0.7	23	0.7
Tavern Shores Access	0.5	25	0.6
	0.5	21	0.5
SR 28	26.8	9	25.2
	1.2	18	1.3
Fairway Dr	1.3	23	1.7
	0.8	22	0.8
	0.8	24	0.6
	0.6	24	0.5
	1.3	23	1.1
	0.6	23	0.5
	0.8	23	0.7
	0.6	23	0.5
	1.1	22	0.9
Twin Crag	1.2	28	1.1
	1.4	22	1.5
	1.0	22	1.0
Total	44.8	21	42.6

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.2	7.1	0.1	27	27	0.2
	38	0.3	10.2	0.1	24	24	0.3
Twin Crag	37	0.4	11.0	0.1	26	26	0.4
	36	0.2	5.0	0.0	19	19	0.2
	35	0.4	8.5	0.1	24	24	0.4
	34	0.4	6.9	0.0	24	24	0.3
	14	0.6	9.9	0.1	23	24	0.6
	5	0.5	7.6	0.0	23	23	0.4
	4	1.3	18.7	0.1	23	23	1.2
	1	0.7	8.9	0.1	22	23	0.6
	13	1.0	12.7	0.1	23	23	1.0
Fairway Dr	42	1.4	10.1	0.1	30	30	1.3
	16	3.7	19.1	0.1	20	21	3.0
SR 89	6	5.4	7.9	0.1	30	27	6.3
	10	29.9	49.9	0.1	7	7	31.9
Tavern Shores Access	22	0.4	6.4	0.0	23	23	0.4
	11	0.5	8.2	0.1	25	24	0.5
	45	0.8	11.1	0.1	23	23	0.9
64 Acres Access	20	0.7	8.2	0.1	24	23	0.8
	3	0.7	8.0	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.1	21.5	0.1	23	22	2.1
Granlibakken Rd	26	3.0	15.3	0.1	20	19	3.3
	27	1.3	11.9	0.1	22	22	1.4
Total		56.5	291.0	1.6	20	20	58.9

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	27	0.2	27	0.2	27	0.2	27
	24	0.3	24	0.3	24	0.3	24
Twin Crag	26	0.4	26	0.4	26	0.4	26
	19	0.2	19	0.2	19	0.2	19
	24	0.4	24	0.4	24	0.4	24
	24	0.4	24	0.4	23	0.4	24
	24	0.6	23	0.6	23	0.6	24
	23	0.5	23	0.5	23	0.5	23
	23	1.3	23	1.3	23	1.3	24
	22	0.7	22	0.7	22	0.7	23
	23	1.0	23	1.0	23	1.0	23
Fairway Dr	30	1.3	30	1.5	29	1.7	30
	20	4.0	21	3.7	19	4.6	20
SR 89	32	4.8	34	4.5	28	6.0	29
	7	30.4	7	29.1	7	30.5	7
Tavern Shores Access	23	0.4	23	0.4	23	0.4	23
	25	0.5	25	0.5	25	0.5	25
	23	0.9	23	0.8	23	0.8	23
64 Acres Access	24	0.7	24	0.7	24	0.7	24
	22	0.7	22	0.7	22	0.6	22
	23	0.6	23	0.6	23	0.6	23
	23	2.0	22	2.1	23	1.9	23
Granlibakken Rd	20	3.2	20	3.2	20	2.6	20
	22	1.3	22	1.3	22	1.2	22
Total	20	56.7	21	54.9	20	58.0	21

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.2	27	0.2
	0.3	24	0.3
Twin Crag	0.4	26	0.5
	0.2	19	0.2
	0.4	24	0.5
	0.3	23	0.4
	0.5	23	0.7
	0.4	23	0.5
	1.2	23	1.5
	0.6	22	0.8
	0.9	23	1.2
Fairway Dr	1.4	29	1.5
	4.1	21	3.0
SR 89	5.7	33	4.8
	29.0	7	28.4
Tavern Shores Access	0.4	23	0.3
	0.5	25	0.5
	0.9	23	0.8
64 Acres Access	0.7	24	0.7
	0.7	22	0.7
	0.6	23	0.6
	2.1	23	2.0
Granlibakken Rd	2.8	20	2.9
	1.3	22	1.3
Total	55.7	21	54.3

Summer Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.9	14.6	0.1	13	13	6.5
	9	2.1	17.7	0.1	22	22	2.1
Grove St	2	4.4	26.2	0.3	40	39	4.3
	17	1.1	8.7	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		15.2	77.1	0.6	26	26	14.6

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	13	7.0	12	7.2	12	7.2	13
	22	2.1	22	2.2	22	2.2	22
Grove St	40	4.2	40	4.2	40	4.3	39
	22	1.1	22	1.1	22	1.1	22
	23	0.7	23	0.7	23	0.7	23
Total	26	15.1	26	15.4	26	15.5	26

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	7.0	13	6.3
	2.1	22	2.1
Grove St	4.4	39	5.0
	1.2	22	1.2
	0.8	23	0.7
Total	15.4	26	15.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.7	0.1	26	26	0.4
	17	0.5	9.6	0.1	24	24	0.5
Grove St	2	2.9	10.3	0.1	18	19	2.7
	9	3.3	43.1	0.3	23	23	3.4
	8	1.8	17.4	0.1	22	23	1.6
Savemart Access	6	16.7	24.0	0.1	8	8	15.3
Total		25.5	115.0	0.6	20	20	23.9

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	25	0.4	26
	24	0.5	24	0.4	23	0.5	24
Grove St	18	3.1	19	2.4	17	3.4	18
	24	3.1	23	3.1	23	3.3	23
	23	1.7	23	1.6	22	1.9	22
Savemart Access	8	15.8	8	17.0	8	17.2	7
Total	20	24.6	20	24.9	19	26.8	19

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.4	26	0.4
	0.5	24	0.4
Grove St	2.9	18	2.7
	3.3	23	3.3
	2.3	22	1.8
Savemart Access	19.2	8	15.9
Total	28.7	20	24.5

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.3	8.8	0.1	26	26	0.3
Granlibakken Rd	26	1.4	11.8	0.1	22	23	1.1
	12	0.7	13.1	0.1	23	23	0.7
	19	1.2	20.6	0.1	23	24	1.2
	3	0.5	6.8	0.0	23	23	0.5
64 Acres Access	20	0.6	8.0	0.0	22	22	0.7
	45	0.6	8.2	0.1	23	23	0.7
	11	0.8	11.2	0.1	23	23	0.9
Tavern Shores Access	22	0.7	8.1	0.1	25	25	0.7
	10	0.6	7.2	0.0	20	20	0.6
SR 28	6	33.0	46.8	0.1	7	7	34.1
	16	1.4	13.2	0.1	18	18	1.2
Fairway Dr	42	1.7	16.8	0.1	23	24	1.6
	13	0.9	12.1	0.1	22	22	0.9
	1	0.9	12.8	0.1	23	23	0.8
	4	0.6	8.5	0.1	23	24	0.6
	5	1.5	18.9	0.1	23	23	1.5
	14	0.6	7.7	0.0	23	23	0.6
	34	0.9	10.2	0.1	23	23	0.9
	35	0.6	7.2	0.0	23	23	0.6
	36	1.3	9.4	0.1	21	22	1.3
Twin Crag	37	1.3	6.6	0.0	25	25	1.3
	38	1.7	13.2	0.1	22	22	1.7
	39	1.1	10.9	0.1	22	22	1.1
Total		54.7	297.9	1.7	20	20	55.7

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.2	26	0.3	26
Granlibakken Rd	22	1.6	23	0.9	23	1.0	22
	23	0.7	24	0.6	24	0.7	24
	23	1.2	24	1.2	23	1.2	24
	23	0.5	23	0.5	23	0.5	23
64 Acres Access	22	0.6	22	0.6	22	0.7	23
	23	0.6	23	0.6	23	0.7	23
	23	0.8	23	0.9	23	0.9	23
Tavern Shores Access	25	0.7	25	0.7	25	0.7	25
	20	0.6	20	0.6	20	0.6	20
SR 28	7	37.6	7	34.4	8	27.8	7
	18	1.4	18	1.5	18	1.3	18
Fairway Dr	24	1.6	23	1.8	23	1.9	23
	22	0.9	22	1.0	22	0.9	22
	23	0.9	23	0.9	23	0.8	23
	24	0.6	23	0.6	23	0.6	24
	23	1.5	23	1.5	23	1.4	23
	23	0.7	23	0.7	23	0.6	23
	23	0.9	23	0.9	23	0.9	23
	23	0.6	22	0.7	23	0.6	23
	22	1.2	21	1.3	21	1.2	22
Twin Crag	25	1.3	24	1.4	25	1.2	25
	22	1.6	22	1.8	22	1.7	22
	23	1.0	22	1.1	22	1.1	22
Total	20	59.4	20	56.3	21	49.5	20

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.2	26	0.3
Granlibakken Rd	1.5	21	2.2
	0.6	23	0.7
	1.0	23	1.1
	0.4	23	0.4
64 Acres Access	0.6	22	0.6
	0.6	23	0.6
	0.8	23	0.8
Tavern Shores Access	0.6	25	0.7
	0.6	20	0.6
SR 28	31.7	7	31.3
	1.3	18	1.3
Fairway Dr	1.9	23	1.7
	0.9	22	0.9
	0.8	23	0.9
	0.6	23	0.6
	1.4	23	1.5
	0.6	23	0.7
	0.8	23	0.9
	0.6	23	0.6
	1.2	21	1.2
Twin Crag	1.2	25	1.3
	1.6	22	1.6
	1.1	22	1.1
Total	52.5	20	53.8

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	7.7	0.1	26	26	0.4
	38	0.5	10.4	0.1	24	24	0.5
Twin Crag	37	0.7	11.3	0.1	25	25	0.7
	36	0.4	5.1	0.0	19	19	0.3
	35	0.7	8.8	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	22	22	0.7
	4	1.9	19.3	0.1	22	22	2.0
	1	1.2	9.4	0.1	21	22	1.0
	13	4.1	15.8	0.1	19	19	3.4
Fairway Dr	42	17.3	607.9	0.1	10	10	18.1
	16	27.7	43.0	0.1	9	9	29.1
SR 89	6	8.7	10.9	0.1	22	21	9.0
	10	44.0	64.2	0.1	5	5	44.2
Tavern Shores Access	22	0.4	6.5	0.0	23	23	0.5
	11	0.6	8.2	0.1	25	24	0.6
	45	0.9	11.2	0.1	23	23	1.0
64 Acres Access	20	0.8	8.2	0.1	23	23	0.8
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	22	0.6
	12	2.2	21.6	0.1	22	22	2.2
Granlibakken Rd	26	3.5	15.7	0.1	19	20	3.3
	27	1.4	11.9	0.1	22	22	1.4
Total		121.2	937.3	1.6	17	17	122.8

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.4	26
	23	0.6	24	0.5	24	0.5	24
Twin Crag	25	0.8	25	0.7	25	0.7	25
	19	0.4	19	0.4	19	0.4	19
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	23	1.0	23	0.9	23	0.9	23
	22	0.8	22	0.7	22	0.7	23
	22	2.0	23	1.9	22	1.9	23
	22	1.0	21	1.2	22	0.9	22
	20	3.1	18	4.6	20	3.1	21
Fairway Dr	10	16.2	10	18.2	11	15.6	11
	9	26.7	9	28.2	10	25.7	9
SR 89	25	7.3	22	8.5	22	8.8	20
	5	43.4	5	45.4	6	40.3	5
Tavern Shores Access	23	0.4	23	0.4	23	0.5	23
	25	0.6	25	0.6	24	0.6	25
	23	0.9	23	0.9	23	1.0	23
64 Acres Access	24	0.8	24	0.8	23	0.9	23
	22	0.7	22	0.7	22	0.8	22
	23	0.6	23	0.6	22	0.7	23
	22	2.2	23	2.1	22	2.3	22
Granlibakken Rd	20	3.4	20	3.3	20	3.4	19
	22	1.4	22	1.3	22	1.5	22
Total	17	116.1	17	123.6	17	112.7	17

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Delay	Run optimized Speed	Run optimized Delay
	0.3	26	0.4
	0.5	24	0.5
Twin Crag	0.7	25	0.8
	0.3	19	0.4
	0.6	23	0.7
	0.5	23	0.6
	0.8	23	1.0
	0.7	22	0.8
	1.7	22	2.1
	0.9	20	1.9
	2.5	15	7.8
Fairway Dr	15.3	9	21.1
	26.0	8	31.1
SR 89	9.6	21	9.3
	43.9	5	47.4
Tavern Shores Access	0.4	23	0.4
	0.6	25	0.6
	0.9	23	0.9
64 Acres Access	0.8	23	0.8
	0.7	22	0.7
	0.6	23	0.6
	2.2	22	2.2
Granlibakken Rd	4.0	19	3.7
	1.5	22	1.5
Total	116.1	16	137.3

Opening Day (2018) Operations

Opening Day (2018) Operations: Alternative 5 (No Build)

Average Annual Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.1	13.8	0.1	14	13	6.5
	9	2.1	17.7	0.1	22	22	2.0
Grove St	2	3.2	25.5	0.3	40	40	3.2
	17	0.9	8.5	0.1	22	22	0.9
	18	0.7	9.9	0.1	23	23	0.7
Total		12.9	75.3	0.6	27	26	13.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	4.5	14	5.7	14	5.8	13
	22	1.9	22	2.1	22	2.1	22
Grove St	40	3.4	38	4.3	40	3.1	42
	22	1.0	22	1.0	22	0.9	23
	23	0.7	23	0.7	23	0.6	23
Total	27	11.5	26	13.8	27	12.5	27

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 5 11122014 Speed	Alt 5 11122014 Delay
	6.5	13	7.0
	2.1	22	2.1
Grove St	2.6	40	2.8
	0.7	23	0.8
	0.6	23	0.7
Total	12.6	26	13.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.3
Grove St	2	1.8	9.3	0.1	20	21	1.3
	9	2.6	42.6	0.3	24	23	2.5
	8	1.6	17.1	0.1	23	22	2.0
Savemart Access	6	15.5	22.4	0.1	8	8	16.9
Total		22.1	111.4	0.6	20	20	23.3

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.4	26	0.3	26
	24	0.4	24	0.4	24	0.3	24
Grove St	21	1.5	19	2.4	22	1.2	20
	23	2.8	24	2.5	24	2.3	24
	23	1.6	23	1.2	23	1.2	23
Savemart Access	10	12.6	8	16.7	8	16.7	8
Total	21	19.1	20	23.5	20	22.0	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 5 11122014 Speed	Alt 5 11122014 Delay
	0.3	26	0.4
	0.4	24	0.4
Grove St	1.8	19	2.4
	2.6	23	3.0
	1.3	22	2.2
Savemart Access	16.7	9	13.7
Total	23.2	20	22.1

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.2	8.7	0.1	26	26	0.2
Granlibakken Rd	26	0.9	11.3	0.1	23	23	0.8
	12	0.5	12.9	0.1	24	24	0.5
	19	0.9	20.4	0.1	24	24	0.9
	3	0.4	6.7	0.0	23	24	0.4
64 Acres Access	20	0.5	7.9	0.0	23	23	0.5
	45	0.6	8.2	0.1	24	24	0.6
	11	0.8	11.1	0.1	23	23	0.8
Tavern Shores Access	22	0.6	8.0	0.1	25	25	0.6
	10	0.5	7.2	0.0	20	20	0.5
SR 28	6	31.0	44.8	0.1	8	8	30.7
	16	1.2	13.1	0.1	18	18	1.3
Fairway Dr	42	1.5	16.5	0.1	24	24	1.5
	13	0.8	12.0	0.1	22	22	0.8
	1	0.7	12.6	0.1	23	23	0.7
	4	0.5	8.4	0.1	24	24	0.5
	5	1.3	18.7	0.1	23	23	1.2
	14	0.6	7.6	0.0	23	23	0.5
	34	0.8	10.1	0.1	23	23	0.7
	35	0.6	7.1	0.0	23	23	0.5
	36	1.1	9.2	0.1	22	22	1.0
Twin Crag	37	1.2	5.5	0.0	27	27	1.1
	38	1.5	13.1	0.1	22	22	1.5
	39	1.0	10.8	0.1	23	23	0.9
Total		49.5	291.7	1.7	21	21	48.8

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	27	0.2	26	0.2	26	0.2	26
Granlibakken Rd	24	0.6	23	0.9	22	1.3	23
	24	0.5	24	0.5	23	0.6	23
	24	0.9	24	0.8	23	1.0	24
	24	0.4	24	0.3	23	0.4	23
64 Acres Access	23	0.5	23	0.5	22	0.6	23
	24	0.5	24	0.5	23	0.6	24
	23	0.7	23	0.7	23	0.8	23
Tavern Shores Access	25	0.5	25	0.6	25	0.7	25
	21	0.5	21	0.5	20	0.6	20
SR 28	8	29.9	7	32.2	7	32.8	8
	18	1.2	18	1.3	18	1.3	18
Fairway Dr	24	1.4	23	1.6	23	1.6	24
	22	0.8	22	0.8	22	0.8	22
	23	0.8	23	0.7	23	0.8	23
	24	0.6	24	0.5	24	0.5	24
	23	1.4	23	1.3	23	1.3	23
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.8	23	0.8	23
	23	0.6	23	0.6	23	0.6	23
	22	1.1	22	1.1	22	1.0	22
Twin Crag	26	1.2	26	1.2	27	1.1	26
	22	1.6	22	1.6	22	1.5	22
	23	1.0	23	1.0	23	1.0	23
Total	21	48.0	20	50.7	20	52.7	21

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Alt 5 11122014 Delay	Run 5 Alt 5 11122014 Speed	Run 5 Alt 5 11122014 Delay
	0.2	26	0.2
Granlibakken Rd	0.9	22	1.1
	0.5	23	0.6
	0.9	24	1.0
	0.4	23	0.4
64 Acres Access	0.5	23	0.5
	0.6	24	0.6
	0.8	23	0.8
Tavern Shores Access	0.6	25	0.6
	0.5	20	0.6
SR 28	27.5	7	32.1
	1.1	18	1.2
Fairway Dr	1.4	24	1.3
	0.7	22	0.8
	0.7	23	0.7
	0.5	24	0.5
	1.1	23	1.3
	0.5	23	0.5
	0.7	23	0.8
	0.5	23	0.6
	1.0	22	1.0
Twin Crag	1.2	27	1.2
	1.5	22	1.5
	1.0	23	1.0
Total	45.4	20	50.8

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.8	0.1	23	23	0.8
	34	0.7	7.2	0.0	23	23	0.7
	14	1.0	10.3	0.1	22	22	1.0
	5	0.8	7.9	0.0	22	22	0.8
	4	2.1	19.5	0.1	22	22	2.2
	1	1.3	9.5	0.1	21	21	1.3
	13	4.5	16.2	0.1	18	18	5.0
Fairway Dr	42	14.9	329.4	0.1	11	12	13.9
	16	23.5	38.8	0.1	10	11	21.1
SR 89	6	10.3	12.5	0.1	19	22	8.4
	10	39.7	60.0	0.1	6	6	37.2
Tavern Shores Access	22	0.4	6.5	0.0	23	23	0.4
	11	0.6	8.2	0.1	25	25	0.6
	45	0.9	11.2	0.1	23	23	0.9
64 Acres Access	20	0.7	7.9	0.1	24	25	0.6
	3	0.6	8.0	0.0	22	22	0.6
	19	0.6	6.9	0.0	23	23	0.6
	12	2.1	21.5	0.1	23	23	2.0
Granlibakken Rd	26	3.2	15.3	0.1	20	21	2.7
	27	1.4	11.9	0.1	22	22	1.3
Total		112.3	652.6	1.6	17	18	104.4

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.5	26	0.5	26
	23	0.6	23	0.6	23	0.7	23
Twin Crag	25	0.8	25	0.8	25	0.9	25
	19	0.4	18	0.4	18	0.4	18
	23	0.7	23	0.8	23	0.8	23
	23	0.6	23	0.7	23	0.7	23
	23	1.0	22	1.0	22	1.0	22
	22	0.8	22	0.8	22	0.8	22
	22	2.0	22	2.1	22	2.2	22
	21	1.2	21	1.1	21	1.2	20
	18	4.3	18	4.3	19	4.0	17
Fairway Dr	10	17.1	11	15.5	11	15.3	12
	9	27.0	10	23.6	10	24.7	11
SR 89	14	15.0	17	11.8	19	10.1	21
	5	43.3	6	37.8	5	41.3	6
Tavern Shores Access	23	0.4	23	0.4	23	0.4	23
	25	0.5	25	0.6	24	0.6	25
	23	0.9	23	0.9	23	1.0	23
64 Acres Access	24	0.7	24	0.7	24	0.7	24
	22	0.7	22	0.6	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.1	23	2.0	22	2.2	22
Granlibakken Rd	20	3.1	21	2.9	20	3.5	20
	22	1.4	22	1.4	22	1.5	22
Total	16	125.5	17	111.6	17	115.8	17

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Alt 5 11122014 Delay	Run 5 Alt 5 11122014 Speed	Run 5 Alt 5 11122014 Delay
	0.5	26	0.4
	0.7	23	0.6
Twin Crag	0.9	25	0.8
	0.4	19	0.4
	0.8	23	0.7
	0.7	23	0.6
	1.0	23	1.0
	0.8	22	0.8
	2.2	22	2.0
	1.6	22	1.0
	5.6	19	3.6
Fairway Dr	13.9	12	13.9
	21.4	10	23.4
SR 89	9.2	25	7.4
	37.7	5	41.2
Tavern Shores Access	0.4	23	0.4
	0.6	25	0.6
	0.9	23	0.9
64 Acres Access	0.7	24	0.7
	0.7	22	0.6
	0.6	23	0.6
	2.1	23	2.1
Granlibakken Rd	3.2	19	3.9
	1.4	22	1.5
Total	108.1	17	109.1

Summer Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.1	13.8	0.1	14	13	6.4
	9	2.1	17.7	0.1	22	22	2.2
Grove St	2	4.2	25.5	0.3	41	42	3.2
	17	1.1	8.6	0.1	22	22	0.9
	18	0.7	9.9	0.1	23	23	0.7
Total		14.1	75.5	0.6	27	27	13.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	13	6.2	14	5.8	14	5.2	13
	22	2.1	22	2.0	22	2.1	22
Grove St	43	3.4	40	4.4	42	3.8	40
	22	1.0	22	0.9	22	1.1	22
	23	0.7	23	0.6	23	0.7	23
Total	27	13.5	27	13.8	27	12.8	26

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	6.2	13	6.4
	2.2	22	2.1
Grove St	4.1	38	6.0
	1.1	21	1.3
	0.7	23	0.7
Total	14.3	26	16.5

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.7	0.1	26	26	0.4
	17	0.5	9.7	0.1	23	23	0.5
Grove St	2	3.2	10.7	0.1	18	19	2.4
	9	4.0	44.0	0.3	23	22	6.6
	8	10.9	26.5	0.1	15	12	18.0
Savemart Access	6	16.0	28.8	0.1	8	8	16.1
Total		35.1	130.4	0.6	18	17	44.0

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.4	26
	24	0.5	24	0.4	24	0.5	24
Grove St	17	3.5	18	2.7	18	3.0	18
	23	3.1	23	3.3	23	4.3	23
	13	14.6	16	8.7	11	19.0	20
Savemart Access	9	13.9	7	18.4	8	17.6	8
Total	18	36.0	18	33.9	17	44.8	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	0.4	26	0.4
	0.5	23	0.7
Grove St	3.1	16	4.5
	3.3	23	3.5
	3.5	22	2.1
Savemart Access	15.0	8	15.0
Total	25.7	20	26.2

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.3	8.9	0.1	26	26	0.3
Granlibakken Rd	26	1.6	12.0	0.1	22	21	1.8
	12	0.8	13.2	0.1	23	23	0.7
	19	1.2	20.7	0.1	23	23	1.3
	3	0.5	6.8	0.0	23	23	0.5
64 Acres Access	20	0.7	8.0	0.0	22	22	0.7
	45	0.7	8.2	0.1	23	23	0.6
	11	0.9	11.2	0.1	23	23	0.8
Tavern Shores Access	22	0.7	8.1	0.1	25	25	0.7
	10	0.6	7.2	0.0	20	20	0.6
SR 28	6	35.1	48.8	0.1	7	7	36.4
	16	1.4	13.2	0.1	18	18	1.4
Fairway Dr	42	1.6	16.6	0.1	24	23	1.7
	13	0.9	12.0	0.1	22	22	0.9
	1	0.8	12.7	0.1	23	23	0.9
	4	0.6	8.5	0.1	24	23	0.6
	5	1.5	18.8	0.1	23	23	1.5
	14	0.6	7.7	0.0	23	23	0.6
	34	0.9	10.2	0.1	23	23	0.9
	35	0.6	7.1	0.0	23	23	0.7
	36	1.3	9.4	0.1	21	21	1.3
Twin Crag	37	1.3	6.2	0.0	25	25	1.3
	38	1.7	13.2	0.1	22	22	1.7
	39	1.0	10.9	0.1	22	22	1.1
Total		57.1	299.6	1.7	20	20	58.9

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.2	26
Granlibakken Rd	22	1.6	21	2.0	24	0.5	23
	23	0.8	23	0.9	24	0.6	23
	23	1.2	23	1.2	24	1.2	23
	23	0.5	23	0.5	23	0.5	23
64 Acres Access	22	0.6	22	0.6	22	0.7	22
	23	0.6	23	0.6	23	0.7	24
	23	0.8	23	0.8	23	0.9	23
Tavern Shores Access	25	0.6	25	0.6	25	0.7	25
	20	0.6	20	0.6	20	0.6	20
SR 28	6	38.6	7	31.9	7	33.7	7
	18	1.3	18	1.3	18	1.3	18
Fairway Dr	24	1.3	23	1.7	24	1.5	24
	22	0.7	22	0.9	22	0.8	22
	23	0.7	23	0.8	23	0.8	23
	24	0.5	23	0.6	24	0.6	23
	23	1.3	23	1.5	23	1.5	23
	23	0.6	23	0.7	23	0.6	23
	23	0.8	23	0.9	23	0.8	23
	23	0.6	22	0.6	23	0.6	23
	22	1.3	21	1.3	21	1.3	22
Twin Crag	25	1.3	25	1.2	25	1.3	25
	22	1.6	22	1.6	22	1.7	22
	23	1.0	22	1.1	22	1.0	22
Total	20	59.3	20	54.2	20	54.3	20

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Alt 5 12132014 Delay	Run 5 Alt 5 12132014 Speed	Run 5 Alt 5 12132014 Delay
	0.3	26	0.3
Granlibakken Rd	1.1	20	2.5
	0.8	23	0.9
	1.2	23	1.3
	0.5	23	0.5
64 Acres Access	0.6	22	0.7
	0.6	23	0.7
	0.9	23	1.0
Tavern Shores Access	0.7	25	0.8
	0.6	20	0.7
SR 28	37.1	7	32.6
	1.5	18	1.4
Fairway Dr	1.5	24	1.6
	0.9	22	0.9
	0.9	23	0.8
	0.6	24	0.6
	1.5	23	1.5
	0.7	23	0.7
	0.9	23	0.9
	0.7	23	0.7
	1.2	21	1.4
Twin Crag	1.2	24	1.4
	1.6	22	1.8
	1.0	22	1.1
Total	58.6	20	56.8

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	25	0.5
	38	0.6	10.5	0.1	23	23	0.7
Twin Crag	37	0.8	11.4	0.1	25	25	0.9
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.8	0.1	23	23	0.8
	34	0.7	7.2	0.0	23	22	0.7
	14	1.0	10.3	0.1	23	22	1.1
	5	0.8	7.9	0.0	22	22	0.8
	4	2.1	19.5	0.1	22	22	2.3
	1	1.3	9.5	0.1	21	20	1.6
	13	5.5	17.2	0.1	17	16	6.2
Fairway Dr	42	21.0	1099.0	0.1	9	9	20.9
	16	31.2	46.5	0.1	8	9	30.4
SR 89	6	13.8	16.0	0.1	15	15	14.1
	10	49.4	69.6	0.1	5	5	48.3
Tavern Shores Access	22	0.4	6.5	0.0	23	23	0.4
	11	0.6	8.2	0.1	24	24	0.6
	45	1.0	11.2	0.1	23	23	1.0
64 Acres Access	20	0.7	8.0	0.1	24	24	0.8
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.1	21.6	0.1	22	22	2.2
Granlibakken Rd	26	3.6	15.7	0.1	20	19	3.8
	27	1.5	12.0	0.1	22	22	1.5
Total		141.0	1444.8	1.6	16	16	141.3

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.5	26
	23	0.6	23	0.6	23	0.7	23
Twin Crag	25	0.8	25	0.7	25	0.9	25
	19	0.4	19	0.4	18	0.4	18
	23	0.8	23	0.7	23	0.8	23
	23	0.6	23	0.6	23	0.7	23
	23	1.0	23	0.9	23	1.0	22
	22	0.8	22	0.7	22	0.8	22
	22	2.1	22	2.0	22	2.1	22
	21	1.1	21	1.0	21	1.2	20
	18	4.5	19	4.2	16	6.4	16
Fairway Dr	9	20.2	9	20.8	8	23.6	9
	8	31.3	8	31.9	8	34.3	9
SR 89	15	13.2	16	13.0	17	12.0	12
	5	50.1	5	49.3	5	52.4	5
Tavern Shores Access	23	0.4	23	0.4	22	0.5	23
	24	0.6	24	0.6	24	0.6	24
	23	1.0	23	0.9	23	1.0	23
64 Acres Access	24	0.7	24	0.7	24	0.8	24
	22	0.7	22	0.6	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.2	23	2.0	22	2.2	22
Granlibakken Rd	20	3.6	20	3.6	20	3.5	20
	22	1.5	22	1.4	22	1.4	22
Total	16	139.2	16	138.0	15	149.1	16

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Alt 5 12132014 Delay	Run 5 Alt 5 12132014 Speed	Run 5 Alt 5 12132014 Delay
	0.5	26	0.4
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	19	0.4
	0.8	23	0.7
	0.7	23	0.6
	1.0	23	1.0
	0.8	22	0.8
	2.2	22	2.0
	1.7	21	1.1
	6.7	18	4.9
Fairway Dr	18.7	8	22.0
	27.3	8	32.5
SR 89	17.2	15	13.1
	45.7	5	50.5
Tavern Shores Access	0.4	23	0.4
	0.6	25	0.6
	1.0	23	0.9
64 Acres Access	0.7	24	0.7
	0.7	22	0.7
	0.6	23	0.6
	2.1	22	2.1
Granlibakken Rd	3.3	19	3.9
	1.4	22	1.5
Total	135.9	16	142.7

Opening Day (2018) Operations: Alternative 1

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	27	0.3
	38	0.5	10.3	0.1	24	24	0.4
Twin Crag	37	0.6	11.2	0.1	25	26	0.6
	36	0.3	5.1	0.0	19	19	0.3
	35	0.6	8.7	0.1	23	23	0.6
	34	0.5	7.0	0.0	23	23	0.5
	14	0.8	10.2	0.1	23	23	0.8
	5	0.7	7.8	0.0	23	23	0.7
SR 89	4	3.4	21.5	0.1	20	20	3.4
New SR 28	1	2.8	10.9	0.1	18	18	2.9
Total		10.6	100.2	0.6	22	22	10.5

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.4	26
	24	0.5	23	0.5	23	0.5	24
Twin Crag	26	0.6	25	0.7	25	0.7	26
	19	0.3	19	0.4	19	0.4	19
	23	0.6	23	0.7	23	0.7	23
	23	0.5	23	0.6	23	0.6	23
	23	0.8	23	0.9	23	0.9	23
	23	0.7	23	0.7	23	0.7	23
SR 89	20	3.4	20	3.3	20	3.5	20
New SR 28	19	2.5	19	2.5	17	3.6	19
Total	22	10.3	22	10.5	22	12.0	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
	0.3	26	0.3
	0.5	24	0.5
Twin Crag	0.6	25	0.7
	0.3	19	0.3
	0.6	23	0.7
	0.5	23	0.6
	0.8	23	0.9
	0.6	22	0.7
SR 89	3.3	20	3.4
New SR 28	2.6	19	2.5
Total	10.2	22	10.5

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.7	20.0	0.1	10	10	1.9
	5	0.6	23.2	0.1	19	19	0.6
	14	0.3	7.4	0.0	24	24	0.3
	34	0.5	9.8	0.1	24	24	0.5
	35	0.4	6.9	0.0	23	24	0.4
	36	0.5	8.7	0.1	23	23	0.5
Twin Crag	37	0.3	4.1	0.0	24	24	0.4
	38	0.9	12.4	0.1	23	23	0.8
	39	0.8	10.7	0.1	23	23	0.7
Total		6.0	103.2	0.6	20	20	6.0

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	10	1.6	10	1.7	10	1.7	10
	19	0.6	19	0.6	19	0.6	19
	24	0.3	24	0.3	24	0.3	24
	24	0.5	24	0.5	24	0.5	24
	23	0.4	23	0.4	23	0.4	24
	23	0.5	23	0.6	23	0.6	23
Twin Crag	24	0.3	24	0.3	23	0.3	24
	23	0.8	23	0.9	23	0.9	23
	23	0.8	23	0.8	23	0.9	23
Total	20	5.7	20	6.0	20	6.3	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
SR 89	1.5	10	1.6
	0.6	19	0.6
	0.3	24	0.3
	0.5	24	0.5
	0.4	24	0.4
	0.6	23	0.5
Twin Crag	0.3	24	0.3
	0.9	23	0.9
	0.8	23	0.8
Total	6.0	20	5.9

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	8	0.6
	47	0.1	5.7	0.0	18	18	0.1
	31	1.0	21.8	0.1	24	24	1.0
SR 89	3	4.9	11.7	0.1	18	18	5.0
Total		5.9	39.2	0.3	25	17	6.6

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	8	0.8	-	-	-	-	-
	18	0.1	18	0.1	18	0.1	18
	24	0.9	24	1.0	24	1.1	24
SR 89	17	6.0	17	5.4	19	4.5	18
Total	17	7.7	25	6.6	25	5.6	25

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
EB to SB RT	-	8	0.8
	0.1	18	0.1
	1.1	24	0.9
SR 89	4.7	21	3.4
Total	5.9	17	5.2

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	0.7	9.3	0.1	23	21	0.9
	47	0.9	21.7	0.1	24	24	1.0
New SR 89	24	1.5	7.5	0.0	14	13	1.7
New SR 28	1	3.6	10.8	0.0	14	13	3.8
Total		6.7	49.2	0.3	20	19	7.4

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	24	0.6	21	0.6	23	0.6	23
	24	0.9	24	0.9	24	0.9	24
New SR 89	13	1.9	14	1.3	14	1.3	14
New SR 28	14	3.4	13	3.8	13	3.8	14
Total	20	6.8	20	6.6	20	6.7	20

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
	0.7	24	0.6
	0.9	24	1.0
New SR 89	1.4	14	1.4
New SR 28	3.3	14	3.4
Total	6.2	20	6.4

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.8	13.8	0.1	21	21	0.9
Fairway Dr	42	0.3	11.0	0.1	24	24	0.3
	16	0.8	16.2	0.1	24	24	0.8
Old SR 89	6	19.0	28.2	0.1	8	8	19.4
Total		20.9	69.1	0.3	17	17	21.4

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	0.7	21	0.8	21	0.8	21
Fairway Dr	24	0.3	24	0.4	24	0.3	24
	24	0.7	24	0.8	24	0.6	24
Old SR 89	8	18.9	8	18.9	8	19.0	9
Total	17	20.6	17	20.9	17	20.8	17

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
	0.8	21	0.8
Fairway Dr	0.3	24	0.3
	0.8	24	0.8
Old SR 89	18.4	8	19.4
Total	20.3	17	21.3

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	3.4	13.3	0.1	18	18	3.6
Fairway Dr	42	1.4	16.6	0.1	24	24	1.3
	13	0.7	12.0	0.1	22	22	0.7
SR 89	1	5.0	15.1	0.1	20	21	4.2
Total		10.6	56.9	0.3	21	21	9.7

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	3.4	19	2.7	17	3.8	17
Fairway Dr	24	1.5	24	1.2	23	1.5	24
	22	0.8	22	0.7	22	0.8	22
SR 89	19	5.5	19	5.1	19	5.1	20
Total	21	11.2	21	9.7	21	11.3	21

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	4.0	19	3.0
Fairway Dr	1.6	24	1.5
	0.9	22	0.7
SR 89	4.8	19	5.2
Total	11.2	21	10.4

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	4.0	11.8	0.1	16	16	3.9
	9	1.3	16.5	0.1	24	24	1.5
Grove St	2	2.5	22.6	0.3	45	43	3.0
	17	0.8	8.4	0.1	23	22	0.8
	18	0.5	9.7	0.1	23	23	0.5
Total		9.1	69.1	0.6	29	29	9.7

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	4.2	17	3.4	16	3.9	15
	24	1.3	24	1.2	24	1.3	23
Grove St	46	2.7	46	2.2	46	2.3	46
	23	0.8	22	0.8	22	0.8	22
	23	0.6	23	0.6	23	0.6	23
Total	29	9.4	30	8.2	29	8.8	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	4.2	16	4.1
	1.4	24	1.3
Grove St	2.6	45	2.1
	0.8	23	0.7
	0.6	24	0.4
Total	9.6	29	8.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.4	0.1	26	26	0.3
	17	0.3	9.5	0.1	24	24	0.3
Grove St	2	2.1	9.6	0.1	20	20	2.1
	9	2.5	40.6	0.3	25	25	2.6
	8	1.2	16.7	0.1	23	23	1.2
Savemart Access	6	13.9	21.2	0.1	9	8	15.3
Total		20.3	107.9	0.6	21	21	21.8

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.4	24	0.3	24	0.3	24
Grove St	20	1.7	18	2.9	21	1.6	19
	25	2.4	24	2.5	25	2.7	25
	23	1.2	23	1.2	23	1.3	24
Savemart Access	9	13.4	10	11.8	9	14.1	8
Total	21	19.4	21	19.0	21	20.3	21

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.3	26	0.2
	0.3	24	0.3
Grove St	2.3	20	1.9
	2.5	25	2.4
	1.2	23	1.1
Savemart Access	15.2	9	13.8
Total	21.8	21	19.7

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	12.7	0.0	14	14	0.2
	45	0.1	7.7	0.1	25	25	0.1
	11	0.2	10.5	0.1	24	24	0.2
Tavern Shores Access	22	0.2	7.5	0.1	27	27	0.2
	10	0.2	6.8	0.0	22	21	0.2
SR 28	6	8.9	18.8	0.1	18	19	8.1
Total		9.8	64.0	0.4	21	21	8.8

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	14	0.1	14	0.2	14	0.2	14
	25	0.1	25	0.1	25	0.1	25
	24	0.2	25	0.1	24	0.2	24
Tavern Shores Access	27	0.3	27	0.2	27	0.2	27
	21	0.2	22	0.2	21	0.2	21
SR 28	18	8.5	19	7.6	18	9.2	16
Total	21	9.5	21	8.3	20	10.1	20

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
64 Acres Access	0.2	14	0.2
	0.1	25	0.1
	0.2	25	0.2
Tavern Shores Access	0.2	27	0.2
	0.2	22	0.2
SR 28	10.6	17	9.8
Total	11.6	20	10.6

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	10	1.7	15.9	0.1	21	21	1.8
Tavern Shores Access	22	0.2	6.0	0.0	24	24	0.2
	11	0.3	7.9	0.1	25	25	0.3
	45	0.4	10.7	0.1	24	24	0.5
64 Acres Access	20	0.4	7.9	0.1	24	24	0.4
New SR 89	3	4.5	10.1	0.0	18	17	4.9
Total		7.5	58.6	0.4	22	22	8.1

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.6	20	1.7	21	1.7	22
Tavern Shores Access	24	0.2	24	0.2	24	0.2	24
	25	0.2	25	0.3	25	0.3	25
	24	0.4	23	0.5	24	0.4	24
64 Acres Access	24	0.4	24	0.5	24	0.4	25
New SR 89	17	4.6	17	4.9	18	4.2	19
Total	22	7.5	22	8.2	22	7.1	23

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
	1.8	23	1.4
Tavern Shores Access	0.2	25	0.2
	0.3	26	0.2
	0.4	24	0.3
64 Acres Access	0.3	24	0.3
New SR 89	4.0	18	4.5
Total	7.0	23	7.0

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	4.3	16.6	0.1	19	19	4.4
Total		4.3	16.6	0.1	19	19	4.4

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	18	4.4	19	4.2	18	4.6	19
Total	18	4.4	19	4.2	18	4.6	19

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Alt 1 11202014 Speed	Alt 1 11202014 Delay
New SR 89	4.3	19	4.3
Total	4.3	19	4.3

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	-	-
	47	0.1	5.9	0.0	18	18	0.1
	31	5.2	26.0	0.1	20	21	3.4
SR 89	3	19.9	43.3	0.1	8	9	16.8
Total		25.2	75.2	0.3	17	18	20.3

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	8	1.2	-	-	7
	18	0.1	18	0.1	18	0.1	18
	16	11.2	22	2.6	21	3.5	20
SR 89	7	23.8	9	15.6	10	15.4	8
Total	14	35.0	14	19.6	19	18.9	12

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
EB to SB RT	1.4	7	1.3
	0.1	18	0.1
	5.1	20	4.8
SR 89	21.2	6	27.3
Total	27.9	12	33.6

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	1.0	10.4	0.1	20	20	1.1
	47	1.3	22.2	0.1	23	23	1.4
New SR 89	24	3.6	9.8	0.0	11	10	4.3
New SR 28	1	5.5	12.7	0.0	12	12	5.3
Total		11.4	55.1	0.3	18	18	12.0

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	1.0	20	1.0	20	0.9	21
	23	1.3	24	1.3	24	1.1	24
New SR 89	11	3.9	12	3.1	12	2.9	12
New SR 28	11	5.8	11	5.6	11	5.6	12
Total	18	12.0	18	10.9	18	10.6	19

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	1.0	20	1.2
	1.1	23	1.5
New SR 89	2.5	10	5.0
New SR 28	5.2	11	5.5
Total	9.8	17	13.2

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	19	0.4
	35	0.8	8.8	0.1	23	23	0.7
	34	0.7	7.2	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	0.9
	5	0.8	7.9	0.0	22	22	0.7
SR 89	4	4.3	22.4	0.1	19	20	3.9
New SR 89	1	3.8	11.8	0.1	17	17	3.7
Total		13.7	103.5	0.6	22	22	12.9

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	26	0.5	26
	23	0.7	23	0.7	23	0.7	23
Twin Crag	25	0.9	25	0.8	25	0.9	25
	18	0.4	19	0.4	18	0.4	19
	23	0.8	23	0.8	23	0.8	23
	22	0.7	23	0.6	23	0.7	23
	22	1.0	23	1.0	22	1.0	23
	22	0.8	22	0.8	22	0.8	22
SR 89	19	4.3	19	4.6	19	4.4	19
New SR 89	17	3.7	17	3.7	17	3.8	17
Total	22	13.6	22	13.9	22	14.0	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	0.4	26	0.4
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	18	0.4
	0.8	23	0.8
	0.7	23	0.7
	1.0	23	1.0
	0.8	22	0.8
SR 89	4.3	19	4.2
New SR 89	4.0	17	3.8
Total	13.8	22	13.7

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.9	16.5	0.1	12	12	2.1
	5	0.7	23.0	0.1	19	19	0.7
	14	0.4	7.4	0.0	24	24	0.4
	34	0.6	9.9	0.1	23	23	0.6
	35	0.5	7.0	0.0	23	23	0.5
	36	0.7	8.8	0.1	23	23	0.7
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.6	0.1	23	23	1.0
	39	1.0	10.8	0.1	23	23	1.0
Total		7.0	100.3	0.6	20	20	7.3

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	1.9	12	1.7	12	1.8	12
	19	0.6	19	0.7	19	0.7	19
	24	0.3	24	0.3	24	0.4	24
	23	0.6	23	0.6	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.6	23	0.6	23	0.7	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	1.0	23	1.0	23	1.0	23
	23	0.9	23	0.9	23	0.9	23
Total	20	6.8	20	6.7	20	7.0	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
SR 89	1.9	12	1.9
	0.7	19	0.8
	0.4	24	0.4
	0.6	23	0.6
	0.5	23	0.5
	0.7	23	0.7
Twin Crag	0.3	23	0.4
	1.0	23	1.1
	0.9	23	1.0
Total	7.1	20	7.3

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	1.2	14.6	0.1	20	20	1.1
Fairway Dr	42	0.4	11.1	0.1	24	24	0.5
	16	1.0	16.4	0.1	24	24	1.0
Old SR 89	6	22.3	31.4	0.1	8	8	21.1
Total		24.9	73.5	0.3	16	16	23.7

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	1.2	20	1.1	20	1.1	20
Fairway Dr	23	0.5	24	0.5	24	0.4	24
	24	1.0	24	1.0	24	1.0	24
Old SR 89	7	23.1	7	24.3	8	20.9	8
Total	16	25.8	16	26.9	16	23.4	16

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	1.2	20	1.2
Fairway Dr	0.4	24	0.5
	0.9	24	1.0
Old SR 89	21.2	7	22.9
Total	23.7	16	25.6

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	4.9	14.7	0.1	16	16	5.1
Fairway Dr	42	2.1	17.2	0.1	23	23	2.2
	13	1.1	12.3	0.1	21	21	1.2
SR 89	1	10.2	20.3	0.1	15	14	11.7
Total		18.3	64.4	0.3	18	18	20.2

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	4.7	16	5.4	17	4.3	16
Fairway Dr	23	2.0	23	2.1	23	2.2	23
	21	1.1	21	1.1	22	1.1	21
SR 89	14	10.4	16	8.9	15	9.2	13
Total	18	18.2	19	17.4	19	16.8	18

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	4.9	16	4.7
Fairway Dr	2.0	23	2.0
	1.3	22	1.1
SR 89	11.8	16	9.0
Total	19.9	19	16.8

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	5.2	13.1	0.1	14	15	4.8
	9	1.6	16.9	0.1	23	23	1.7
Grove St	2	3.1	23.6	0.3	44	44	3.0
	17	1.0	8.5	0.1	22	22	0.9
	18	0.6	9.8	0.1	23	23	0.6
Total		11.6	71.9	0.6	28	28	11.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.6	14	5.2	14	5.2	14
	23	1.7	23	1.6	23	1.5	23
Grove St	43	3.3	44	2.9	44	3.5	44
	22	1.0	22	0.9	22	1.1	22
	23	0.7	23	0.6	23	0.6	23
Total	28	12.3	28	11.2	28	11.9	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	5.1	14	5.5
	1.5	23	1.6
Grove St	3.0	45	2.9
	0.9	22	0.9
	0.6	23	0.7
Total	11.2	28	11.6

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.7	0.1	26	26	0.4
	17	0.5	9.6	0.1	24	24	0.5
Grove St	2	2.6	10.1	0.1	19	18	2.9
	9	3.2	42.5	0.3	24	24	3.1
	8	1.6	17.2	0.1	23	23	1.5
Savemart Access	6	16.0	23.0	0.1	8	8	16.3
Total		24.4	113.2	0.6	20	20	24.7

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	25	0.4	26	0.4	25
	24	0.5	23	0.6	24	0.4	23
Grove St	18	2.8	20	2.0	19	2.4	19
	24	3.2	23	3.3	24	2.6	23
	22	2.5	23	1.5	23	1.2	23
Savemart Access	8	15.2	8	17.8	8	15.2	8
Total	20	24.6	20	25.6	21	22.2	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	0.5	25	0.5
	0.6	23	0.5
Grove St	2.5	18	3.0
	3.4	23	3.4
	1.5	23	1.5
Savemart Access	16.5	9	15.0
Total	25.0	20	24.0

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.3	13.3	0.0	13	13	0.4
	45	0.2	7.7	0.1	25	25	0.2
	11	0.2	10.5	0.1	24	24	0.2
Tavern Shores Access	22	0.3	7.5	0.1	27	27	0.2
	10	0.2	6.8	0.0	21	22	0.2
SR 28	6	8.7	18.5	0.1	18	21	6.5
Total		9.9	64.4	0.4	20	21	7.8

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	14	0.3	13	0.3	13	0.3	13
	25	0.1	25	0.2	25	0.2	25
	24	0.2	24	0.3	24	0.3	25
Tavern Shores Access	27	0.2	26	0.3	26	0.3	27
	21	0.2	21	0.3	21	0.3	22
SR 28	16	10.7	20	7.8	18	8.2	16
Total	20	11.7	21	9.1	20	9.6	20

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
64 Acres Access	0.3	13	0.4
	0.1	25	0.1
	0.2	25	0.2
Tavern Shores Access	0.2	27	0.2
	0.2	21	0.2
SR 28	11.3	19	8.0
Total	12.3	21	9.1

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	10	1.7	15.6	0.1	22	22	1.7
Tavern Shores Access	22	0.2	6.1	0.0	24	24	0.2
	11	0.3	8.0	0.1	25	25	0.3
	45	0.5	10.8	0.1	24	24	0.5
64 Acres Access	20	0.6	8.2	0.1	24	23	0.9
New SR 89	3	7.7	13.1	0.0	14	12	9.1
Total		11.1	61.8	0.4	21	21	12.8

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	1.7	21	1.9	21	1.6	22
Tavern Shores Access	24	0.2	24	0.2	24	0.2	24
	25	0.3	25	0.3	25	0.3	25
	24	0.5	24	0.5	24	0.5	23
64 Acres Access	24	0.6	24	0.5	24	0.5	24
New SR 89	14	7.6	15	6.6	15	6.5	14
Total	21	10.9	21	10.1	22	9.6	21

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
	1.7	21	1.6
Tavern Shores Access	0.3	24	0.2
	0.3	25	0.3
	0.5	24	0.5
64 Acres Access	0.6	24	0.6
New SR 89	7.6	13	8.4
Total	11.0	21	11.6

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	5.6	17.7	0.1	17	17	5.7
Total		5.6	17.7	0.1	17	17	5.7

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	17	5.6	18	5.3	17	5.7	17
Total	17	5.6	18	5.3	17	5.7	17

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run Copy Speed	Run Copy Delay
New SR 89	5.8	17	5.4
Total	5.8	17	5.4

Opening Day (2018) Operations: Alternative 2

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	5.5	0.0	20	19	0.1
	31	1.4	23.2	0.1	23	23	1.3
SR 89	3	3.2	9.7	0.1	21	22	3.0
Total		4.6	38.4	0.3	26	26	4.4

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	8	1.2	-	-	8
WB to NB RT	-	-	20	0.1	20	0.1	20
	-	-	22	1.5	23	1.4	23
SR 89	-	-	22	3.0	21	3.3	22
Total	-	-	17	5.8	26	4.8	17

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
EB to SB RT	0.9	8	0.9
WB to NB RT	0.1	20	0.1
	1.3	23	1.3
SR 89	2.8	20	3.8
Total	5.0	17	6.1

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	0.7	10.2	0.1	20	20	0.7
WB to NB RT	25	3.2	24.2	0.1	22	22	3.0
New SR 89	24	1.4	7.5	0.0	14	14	1.4
New SR 28	1	1.6	9.2	0.0	16	15	1.7
Total		6.9	51.1	0.3	19	19	6.9

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	21	0.8	20	0.6	20
WB to NB RT	-	-	22	2.8	22	3.4	22
New SR 89	-	-	14	1.3	14	1.4	14
New SR 28	-	-	15	1.6	15	1.6	16
Total	-	-	19	6.4	19	7.0	19

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.9	20	0.7
WB to NB RT	3.4	21	3.3
New SR 89	1.3	14	1.4
New SR 28	1.5	16	1.4
Total	7.2	19	6.9

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.3
	38	0.4	10.3	0.1	24	24	0.5
Twin Crag	37	0.6	11.2	0.1	26	25	0.6
	36	0.3	5.1	0.0	19	19	0.3
	35	0.6	8.7	0.1	23	23	0.6
	34	0.5	7.0	0.0	23	23	0.5
	14	0.8	10.1	0.1	23	23	0.8
	5	0.6	7.7	0.0	23	23	0.6
SR 89	4	3.4	21.4	0.1	20	20	3.6
New SR 89	1	3.2	11.3	0.1	18	17	3.6
Total		10.8	100.4	0.6	22	22	11.5

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	26	0.3	26	0.3	26
	-	-	24	0.5	24	0.5	24
Twin Crag	-	-	26	0.6	25	0.6	26
	-	-	19	0.3	19	0.3	19
	-	-	23	0.6	23	0.6	23
	-	-	23	0.5	23	0.5	23
	-	-	23	0.8	23	0.8	23
	-	-	23	0.7	23	0.7	23
SR 89	-	-	20	3.4	20	3.3	20
New SR 89	-	-	18	3.4	17	3.6	19
Total	-	-	22	11.2	22	11.2	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 1 Speed	Run 1 Delay
	0.3	26	0.3
	0.4	24	0.4
Twin Crag	0.6	26	0.6
	0.3	19	0.3
	0.6	23	0.6
	0.5	23	0.5
	0.8	23	0.8
	0.6	23	0.6
SR 89	3.4	20	3.2
New SR 89	2.8	18	2.9
Total	10.1	22	10.2

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.4	16.0	0.1	12	13	1.4
	5	0.6	22.7	0.1	19	19	0.6
	14	0.3	7.4	0.0	24	24	0.3
	34	0.5	9.8	0.1	24	24	0.5
	35	0.4	6.9	0.0	23	23	0.4
	36	0.6	8.7	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.5	0.1	23	23	0.9
	39	0.9	10.7	0.1	23	23	0.9
Total		6.0	99.0	0.6	21	21	5.9

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	-	-	12	1.5	12	1.5	13
	-	-	19	0.6	19	0.6	19
	-	-	24	0.3	24	0.3	24
	-	-	24	0.5	24	0.5	24
	-	-	23	0.4	23	0.4	23
	-	-	23	0.6	23	0.6	23
Twin Crag	-	-	23	0.3	23	0.3	23
	-	-	23	0.9	23	1.0	23
	-	-	23	0.8	23	0.9	23
Total	-	-	21	5.7	20	6.3	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	1.4	12	1.4
	0.6	19	0.6
	0.3	24	0.3
	0.5	24	0.6
	0.4	23	0.5
	0.6	23	0.6
Twin Crag	0.3	23	0.3
	0.9	23	1.0
	0.8	23	0.9
Total	5.8	20	6.3

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	-	-	0.0	-	-	-
Fairway Dr	42	1.8	17.7	0.1	22	22	1.8
	16	0.8	16.2	0.1	24	24	0.8
Savemart Access	6	0.9	10.7	0.1	22	22	0.9
Total		3.5	44.5	0.3	27	27	3.5

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	-	-	-	-	11	1.3	-
Fairway Dr	-	-	22	1.7	22	1.7	22
	-	-	25	0.7	24	0.8	24
Savemart Access	-	-	23	0.7	22	0.9	22
Total	-	-	27	3.1	20	4.7	26

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	-	-	-
Fairway Dr	2.0	22	2.0
	0.9	24	0.8
Savemart Access	0.9	22	0.9
Total	3.8	27	3.6

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	1.3	11.2	0.1	21	21	1.2
Fairway Dr	42	1.4	16.5	0.1	24	24	1.4
WB to NB RT	13	4.3	20.0	0.1	19	19	4.3
SR 89	1	5.4	10.6	0.0	16	18	4.4
Total		12.5	58.4	0.3	20	21	11.3

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	21	1.2	21	1.3	21
Fairway Dr	-	-	24	1.4	24	1.5	24
WB to NB RT	-	-	18	5.6	19	4.6	21
SR 89	-	-	15	6.1	15	6.6	17
Total	-	-	20	14.4	20	14.0	21

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.3	21	1.4
Fairway Dr	1.4	24	1.5
WB to NB RT	2.9	19	4.2
SR 89	4.8	17	5.2
Total	10.4	20	12.3

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	0.7	7.9	0.1	24	24	0.7
	9	0.9	16.4	0.1	24	24	0.9
Grove St	2	2.1	21.9	0.3	47	46	2.4
	17	0.7	8.3	0.1	23	23	0.8
	18	0.5	9.7	0.1	23	23	0.6
Total		5.0	64.2	0.6	31	31	5.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	24	0.6	24	0.7	24
	-	-	24	0.9	24	0.9	23
Grove St	-	-	46	2.0	47	2.1	46
	-	-	23	0.7	23	0.7	23
	-	-	23	0.5	23	0.5	23
Total	-	-	31	4.7	31	4.9	31

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.8	24	0.8
	1.0	24	0.9
Grove St	2.2	49	1.9
	0.7	23	0.6
	0.6	24	0.5
Total	5.2	32	4.8

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.3	9.5	0.1	24	24	0.3
Grove St	2	1.9	9.5	0.1	20	19	2.3
	9	2.7	42.4	0.3	24	24	2.6
	8	1.2	16.9	0.1	23	23	1.1
Savemart Access	6	1.0	7.8	0.1	24	23	1.1
Total		7.5	96.5	0.6	23	23	7.7

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	26	0.3	26	0.3	26
	-	-	24	0.3	24	0.4	24
Grove St	-	-	21	1.5	20	1.9	19
	-	-	24	2.6	24	2.7	23
	-	-	23	1.2	23	1.2	23
Savemart Access	-	-	24	1.0	24	0.9	25
Total	-	-	24	6.9	23	7.5	23

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.3	26	0.4
	0.3	24	0.4
Grove St	2.2	20	1.8
	2.6	24	2.9
	1.2	23	1.4
Savemart Access	0.8	24	1.1
Total	7.4	23	7.9

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	8.9	0.0	20	32	0.4
	45	0.0	7.6	0.1	26	26	0.0
	11	0.0	10.3	0.1	25	25	0.0
	22	0.0	7.9	0.1	25	27	0.0
Total		0.3	34.7	0.2	24	27	0.4

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	-	-	13	0.0	22	0.2	42
	-	-	26	0.0	26	0.0	25
	-	-	26	0.0	26	0.0	25
	-	-	25	0.0	26	0.0	25
Total	-	-	21	0.0	25	0.2	27

Arterial Level of Service: NB Old SR 89

Cross Street	Run Alt 2 Delay	Run Alt 2 Speed	Run Alt 2 Delay
64 Acres Access	0.3	17	0.2
	0.0	25	0.1
	0.0	25	0.1
	0.0	25	0.1
Total	0.3	23	0.5

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	7.9	0.1	25	25	0.0
	45	0.0	10.3	0.1	25	25	0.0
64 Acres Access	20	0.1	7.7	0.1	25	25	0.0
New SR 89	3	4.3	8.7	0.0	21	20	4.5
Total		4.4	34.6	0.2	24	24	4.6

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	-	-	25	0.0	25	0.0	26
	-	-	25	0.0	25	0.0	25
64 Acres Access	-	-	25	0.0	25	0.1	26
New SR 89	-	-	30	1.9	22	4.5	17
Total	-	-	26	1.9	24	4.6	23

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.0	25	0.0
	0.0	25	0.0
64 Acres Access	0.1	25	0.0
New SR 89	5.5	18	5.5
Total	5.5	23	5.5

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	7.5	19.3	0.1	16	15	7.9
Total		7.5	19.3	0.1	16	15	7.9

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	-	-	14	9.5	16	7.3	17
Total	-	-	14	9.5	16	7.3	17

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	6.2	16	6.6
Total	6.2	16	6.6

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	4.8	22.6	0.1	13	14	4.2
Total		4.8	22.6	0.1	13	14	4.2

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	-	-	13	5.4	13	4.2	13
Total	-	-	13	5.4	13	4.2	13

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Delay	Run 2 Speed	Run 5 Delay
New SR 28	5.5	13	4.3
Total	5.5	13	4.3

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	8	1.5
WB to NB RT	25	0.1	5.5	0.0	19	19	0.1
	31	3.7	25.5	0.1	21	21	3.2
SR 89	3	5.9	12.4	0.1	17	16	6.1
Total		9.7	43.4	0.3	23	16	11.1

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	-	-	-	-	-
WB to NB RT	20	0.1	20	0.1	20	0.1	19
	19	5.4	22	1.8	20	4.6	20
SR 89	16	6.5	20	3.8	15	7.3	15
Total	21	12.0	25	5.7	21	12.0	22

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
EB to SB RT	-	-	-
WB to NB RT	0.1	19	0.1
	4.1	21	3.2
SR 89	7.3	19	4.5
Total	11.5	24	7.9

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	1.0	10.5	0.1	20	20	1.1
WB to NB RT	25	5.0	26.0	0.1	20	19	6.1
New SR 89	24	2.0	8.1	0.0	13	13	2.2
New SR 28	1	2.3	10.0	0.0	14	14	2.6
Total		10.2	54.6	0.3	18	17	11.9

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	0.9	20	1.0	19	1.0	20
WB to NB RT	20	4.9	20	4.9	21	3.8	19
New SR 89	13	2.2	13	2.0	14	1.6	13
New SR 28	14	2.3	14	2.3	15	1.9	14
Total	18	10.3	18	10.3	18	8.4	18

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.0	20	1.0
WB to NB RT	6.2	21	4.1
New SR 89	2.0	14	1.7
New SR 28	2.5	15	2.2
Total	11.7	19	8.9

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.7
Twin Crag	37	0.8	11.4	0.1	25	25	0.9
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.8	0.1	23	23	0.8
	34	0.6	7.1	0.0	23	22	0.7
	14	1.0	10.3	0.1	23	22	1.0
	5	0.8	7.9	0.0	22	22	0.8
SR 89	4	4.4	22.5	0.1	19	20	4.2
New SR 89	1	4.3	12.4	0.1	16	15	5.0
Total		14.2	104.0	0.6	21	21	15.1

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.5	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	18	0.4	19	0.4	19	0.4	19
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	23	1.0	23	1.0	23	1.0	23
	22	0.8	22	0.8	22	0.8	22
SR 89	20	3.9	20	3.8	20	4.2	18
New SR 89	16	4.1	16	4.5	16	4.2	16
Total	22	13.3	22	13.6	22	13.7	21

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.4	26	0.5
	0.6	23	0.7
Twin Crag	0.8	25	0.9
	0.4	18	0.4
	0.7	23	0.8
	0.6	23	0.7
	0.9	23	1.0
	0.8	22	0.8
SR 89	5.7	19	4.6
New SR 89	4.3	17	3.9
Total	15.2	21	14.2

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	2.1	16.7	0.1	12	12	2.0
	5	0.7	22.9	0.1	19	19	0.7
	14	0.4	7.4	0.0	24	23	0.4
	34	0.6	9.9	0.1	23	23	0.6
	35	0.5	7.0	0.0	23	23	0.5
	36	0.7	8.8	0.1	23	23	0.7
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.1	12.6	0.1	23	23	1.1
	39	1.0	10.8	0.1	23	23	1.0
Total		7.3	100.4	0.6	20	20	7.3

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	2.2	12	2.1	12	2.2	12
	19	0.6	19	0.7	19	0.7	19
	24	0.3	24	0.4	23	0.4	24
	23	0.6	23	0.6	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.6	23	0.6	23	0.6	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	1.0	23	1.0	23	1.0	23
	23	0.9	23	0.9	23	0.9	23
Total	20	7.1	20	7.0	20	7.2	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	2.2	12	2.0
	0.7	19	0.7
	0.4	24	0.4
	0.6	23	0.6
	0.5	23	0.5
	0.7	23	0.7
Twin Crag	0.4	23	0.4
	1.1	23	1.1
	1.0	23	1.0
Total	7.7	20	7.3

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	-	-	0.0	-	-	-
Fairway Dr	42	2.2	18.1	0.1	21	21	2.4
	16	0.9	16.3	0.1	24	24	1.0
Savemart Access	6	1.0	10.8	0.1	22	22	1.0
Total		4.1	45.2	0.3	26	26	4.3

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	-	-	11	1.9	-	-	11
Fairway Dr	21	2.3	22	2.2	21	2.3	21
	24	0.9	24	0.9	24	1.0	24
Savemart Access	22	1.0	22	0.9	22	0.9	22
Total	26	4.2	19	5.9	26	4.2	19

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	1.9	-	-
Fairway Dr	2.2	21	1.9
	0.9	24	0.8
Savemart Access	1.1	22	0.9
Total	6.1	26	3.6

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	2.6	12.5	0.1	19	20	1.7
Fairway Dr	42	13.0	28.2	0.1	14	23	2.1
WB to NB RT	13	42.5	60.5	0.1	7	13	15.3
SR 89	1	9.2	19.9	0.0	12	14	7.7
Total		67.2	121.2	0.3	11	17	26.8

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	1.8	20	2.1	16	4.9	19
Fairway Dr	17	8.3	17	8.1	12	18.7	8
WB to NB RT	8	33.9	6	50.0	5	56.5	5
SR 89	12	9.3	12	9.9	12	10.1	12
Total	12	53.3	10	70.2	9	90.2	7

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	2.9	20	1.8
Fairway Dr	37.0	22	3.1
WB to NB RT	67.9	9	29.5
SR 89	10.1	13	8.1
Total	117.9	14	42.4

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	0.9	8.0	0.1	23	23	0.9
	9	1.1	16.6	0.1	23	23	1.0
Grove St	2	3.9	24.3	0.3	42	41	4.6
	17	1.0	8.6	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		7.5	67.5	0.6	30	29	8.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	1.0	23	0.9	23	0.9	23
	23	1.2	23	1.1	23	1.1	23
Grove St	42	4.0	43	3.5	43	3.5	43
	22	1.1	22	1.0	22	1.1	22
	23	0.7	23	0.7	23	0.6	23
Total	30	7.9	30	7.2	30	7.2	30

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.9	23	0.9
	1.1	24	1.0
Grove St	3.2	42	4.2
	0.9	22	1.0
	0.7	23	0.6
Total	6.8	30	7.6

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.8	0.1	26	26	0.4
	17	0.6	9.7	0.1	23	24	0.4
Grove St	2	3.2	10.7	0.1	18	18	3.1
	9	3.3	43.2	0.3	23	23	3.1
	8	1.4	17.0	0.1	23	23	1.3
Savemart Access	6	1.2	8.0	0.1	23	23	1.2
Total		10.0	99.3	0.6	23	23	9.6

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.4	26	0.4	25	0.5	26
	24	0.5	23	0.7	23	0.8	24
Grove St	19	2.3	18	3.0	16	4.3	17
	23	3.1	23	3.1	23	3.9	23
	23	1.4	23	1.4	23	1.6	23
Savemart Access	24	1.1	24	1.2	24	1.1	23
Total	23	8.8	23	9.7	22	12.2	23

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 1 Speed	Run 1 Delay
	0.4	26	0.4
	0.5	24	0.5
Grove St	3.8	19	2.3
	3.4	23	3.2
	1.4	23	1.4
Savemart Access	1.3	24	1.1
Total	10.8	23	8.9

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	11.2	0.0	16	18	0.2
	45	0.0	7.6	0.1	25	26	0.0
	11	0.0	10.3	0.1	25	25	0.0
	22	0.0	7.9	0.1	25	26	0.0
Total		0.2	37.0	0.2	22	23	0.3

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	15	0.1	14	0.1	15	0.4	12
	25	0.0	25	0.0	26	0.0	25
	25	0.0	24	0.0	25	0.0	25
	25	0.0	25	0.0	26	0.0	25
Total	22	0.1	21	0.1	22	0.5	21

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
64 Acres Access	0.2	19	0.2
	0.0	25	0.0
	0.0	25	0.0
	0.0	25	0.0
Total	0.2	23	0.3

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	7.8	0.1	26	26	0.0
	45	0.0	10.2	0.1	25	25	0.0
64 Acres Access	20	0.1	7.6	0.1	25	25	0.2
New SR 89	3	4.6	8.3	0.0	22	25	3.3
Total		4.7	33.9	0.2	25	25	3.5

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.0	25	0.1	25	0.0	26
	25	0.0	25	0.2	25	0.0	25
64 Acres Access	25	0.1	25	0.2	25	0.1	25
New SR 89	19	5.6	20	5.7	19	4.8	25
Total	23	5.7	24	6.1	24	4.9	25

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.0	25	0.0
	0.0	24	0.0
64 Acres Access	0.1	24	0.1
New SR 89	3.5	22	5.1
Total	3.7	24	5.2

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	15.4	27.1	0.1	11	11	14.4
Total		15.4	27.1	0.1	11	11	14.4

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	14	10.2	10	17.1	10	18.4	10
Total	14	10.2	10	17.1	10	18.4	10

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	18.3	12	13.8
Total	18.3	12	13.8

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	12.7	30.5	0.1	10	8	17.2
Total		12.7	30.5	0.1	10	8	17.2

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	10	11.7	10	12.3	10	12.0	10
Total	10	11.7	10	12.3	10	12.0	10

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Delay	Run 2 Speed	Run 5 Delay
New SR 28	12.5	10	10.8
Total	12.5	10	10.8

Opening Day (2018) Operations: Alternative 3

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
NB to EB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	4.7	0.0	18	18	0.1
	44	1.4	23.9	0.2	23	24	1.2
SR 89	3	3.1	9.3	0.1	21	22	2.7
Total		4.6	37.9	0.3	26	27	4.0

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
NB to EB RT	8	1.0	-	-	8	1.1	-
WB to NB RT	18	0.1	18	0.1	18	0.1	18
	23	1.4	23	1.6	23	1.5	23
SR 89	22	2.7	22	3.3	18	4.6	22
Total	17	5.2	26	5.0	17	7.3	26

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
NB to EB RT	-	-	-
WB to NB RT	0.1	18	0.1
	1.5	23	1.3
SR 89	2.7	23	2.5
Total	4.4	27	3.9

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	44	0.8	9.7	0.1	20	20	0.6
WB to NB RT	25	3.4	25.9	0.2	21	22	3.3
New SR 89	24	1.0	5.9	0.0	14	15	0.8
New SR 28	1	4.2	11.6	0.0	13	14	3.5
Total		9.5	53.1	0.3	19	19	8.1

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.9	20	0.8	20	0.8	20
WB to NB RT	21	3.7	22	3.3	22	3.2	21
New SR 89	14	1.2	14	1.1	14	1.0	14
New SR 28	13	4.4	12	4.7	12	4.7	13
Total	18	10.3	18	9.9	18	9.7	19

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.8	20	0.8
WB to NB RT	3.6	21	3.5
New SR 89	1.1	14	1.0
New SR 28	3.9	13	4.4
Total	9.4	18	9.7

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.3
	38	0.4	10.3	0.1	24	24	0.4
Twin Crag	37	0.6	11.2	0.1	26	26	0.6
	36	0.3	5.1	0.0	19	19	0.3
	35	0.6	8.7	0.1	23	23	0.6
	34	0.5	7.0	0.0	23	23	0.5
	14	0.8	10.1	0.1	23	23	0.8
	5	0.6	7.7	0.0	23	23	0.6
SR 89	4	3.2	21.4	0.1	20	20	3.1
New SR 89	1	3.1	11.0	0.1	18	18	3.0
Total		10.5	100.0	0.6	22	22	10.4

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.4	24	0.4	24	0.4	24
Twin Crag	26	0.6	26	0.6	26	0.6	25
	19	0.3	19	0.3	19	0.3	19
	23	0.6	23	0.6	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.8	23	0.8	23	0.8	23
	23	0.6	23	0.7	23	0.6	23
SR 89	20	3.2	20	3.3	20	3.2	20
New SR 89	18	3.2	18	2.9	18	3.3	18
Total	22	10.6	22	10.4	22	10.4	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.3	27	0.3
	0.5	24	0.4
Twin Crag	0.6	26	0.6
	0.3	19	0.3
	0.6	23	0.6
	0.5	23	0.5
	0.8	23	0.8
	0.6	23	0.7
SR 89	3.2	20	3.4
New SR 89	3.1	18	2.9
Total	10.5	22	10.6

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.4	16.0	0.1	12	12	1.5
	5	0.5	22.6	0.1	19	19	0.5
	14	0.3	7.3	0.0	24	24	0.3
	34	0.4	9.8	0.1	24	24	0.5
	35	0.4	6.9	0.0	23	23	0.4
	36	0.5	8.7	0.1	23	23	0.5
Twin Crag	37	0.3	4.1	0.0	23	23	0.3
	38	0.8	12.4	0.1	23	23	0.9
	39	0.8	10.6	0.1	23	23	0.8
Total		5.4	98.4	0.6	21	21	5.6

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	13	1.3	12	1.5	12	1.4	13
	19	0.5	19	0.6	19	0.5	19
	24	0.3	24	0.3	24	0.3	24
	24	0.5	24	0.5	24	0.5	24
	24	0.4	23	0.4	23	0.4	24
	23	0.5	23	0.5	23	0.5	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	0.8	23	0.8	23	0.9	23
	23	0.8	23	0.8	23	0.8	23
Total	21	5.3	21	5.6	21	5.5	21

Arterial Level of Service: WB SR 89

Cross Street	Run 3 Delay	Run 3 Speed	Run 3 Delay
SR 89	1.3	12	1.4
	0.5	19	0.5
	0.3	24	0.3
	0.4	24	0.4
	0.3	23	0.4
	0.5	23	0.5
Twin Crag	0.3	23	0.3
	0.8	23	0.8
	0.8	23	0.8
Total	5.2	21	5.3

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	1.1	8.6	0.0	20	20	1.1
Fairway Dr	42	1.6	17.3	0.1	22	22	1.5
	16	0.7	16.2	0.1	24	24	0.7
Old SR 89	6	6.4	15.7	0.1	15	15	6.9
Total		9.8	57.8	0.3	21	20	10.2

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	20	1.1	20	1.0	20	1.0	20
Fairway Dr	22	1.6	22	1.6	23	1.5	22
	24	0.7	24	0.8	24	0.8	24
Old SR 89	15	6.2	15	7.1	15	6.2	16
Total	21	9.7	20	10.5	21	9.5	21

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	1.1	20	1.1
Fairway Dr	1.7	22	1.7
	0.7	24	0.7
Old SR 89	5.5	15	6.4
Total	8.9	20	10.0

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	3.9	13.7	0.1	17	17	4.3
Fairway Dr	42	1.8	16.8	0.1	23	23	1.9
WB to NB RT	13	3.7	19.6	0.1	20	20	3.6
SR 89	1	5.1	10.3	0.0	17	16	5.7
Total		14.5	60.3	0.3	20	19	15.6

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	3.7	18	3.7	17	4.0	17
Fairway Dr	23	1.9	23	1.7	23	1.8	23
WB to NB RT	19	4.4	20	3.7	18	5.6	21
SR 89	17	5.2	17	5.0	16	5.3	18
Total	19	15.2	20	14.2	19	16.7	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	3.8	18	3.5
Fairway Dr	1.9	23	1.7
WB to NB RT	2.4	21	2.5
SR 89	4.1	17	4.9
Total	12.2	20	12.6

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	2.4	10.0	0.1	19	18	2.4
	9	1.1	16.7	0.1	23	24	1.0
Grove St	2	2.4	23.0	0.3	45	45	2.3
	17	0.8	8.4	0.1	23	23	0.7
	18	0.6	9.8	0.1	23	23	0.6
Total		7.2	67.8	0.6	30	30	7.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	19	2.4	18	2.5	19	2.4	19
	24	1.0	23	1.1	23	1.1	23
Grove St	45	2.7	45	2.4	44	2.6	46
	22	0.8	23	0.7	23	0.8	22
	23	0.5	23	0.6	23	0.6	23
Total	30	7.4	30	7.3	29	7.4	30

Arterial Level of Service: NE SR 28

Cross Street	Run 3 Delay	Run 3 Speed	Run 4 Delay
	2.2	19	2.4
	1.0	23	1.1
Grove St	2.3	43	2.5
	0.7	23	0.8
	0.5	23	0.6
Total	6.8	29	7.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.3	9.5	0.1	24	24	0.3
Grove St	2	1.9	9.4	0.1	20	19	2.7
	9	2.6	42.5	0.3	24	24	2.7
	8	1.2	16.8	0.1	23	23	1.3
Old SR 89	6	9.4	16.5	0.1	11	11	10.5
Total		15.8	105.2	0.6	22	21	17.8

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.4	26
	24	0.3	24	0.3	24	0.4	24
Grove St	20	2.1	20	1.9	20	1.8	21
	23	2.7	24	2.7	24	2.7	24
	23	1.2	23	1.3	23	1.2	23
Old SR 89	11	9.4	12	8.9	11	9.5	12
Total	21	16.1	22	15.3	21	16.0	22

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.3	26	0.3
	0.3	24	0.3
Grove St	1.5	21	1.4
	2.4	24	2.3
	1.2	23	1.1
Old SR 89	8.9	11	9.3
Total	14.6	22	14.6

Arterial Level of Service: EB NB to EB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	8.2	20.2	0.1	15	16	7.4
Total		8.2	20.2	0.1	15	16	7.4

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	14	8.8	15	8.5	15	7.7	14
Total	14	8.8	15	8.5	15	7.7	14

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 6 Delay	Run 6 Speed	Run 7 Delay
New SR 89	8.9	15	8.1
Total	8.9	15	8.1

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	4.3	20.0	0.1	14	14	3.5
Total		4.3	20.0	0.1	14	14	3.5

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	13	5.3	14	3.5	14	3.6	13
Total	13	5.3	14	3.5	14	3.6	13

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 6 Delay	Run 6 Speed	Run 7 Delay
New SR 28	5.0	14	4.6
Total	5.0	14	4.6

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
NB to EB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	4.7	0.0	18	18	0.1
	44	2.1	24.6	0.2	23	23	1.7
SR 89	3	4.8	10.8	0.1	18	20	3.8
Total		7.0	40.1	0.3	25	26	5.7

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
NB to EB RT	-	-	-	-	-	-	-
WB to NB RT	18	0.1	18	0.1	18	0.1	18
	22	2.3	23	2.1	23	1.6	22
SR 89	15	7.3	20	3.8	20	3.5	16
Total	23	9.7	25	6.0	26	5.2	23

Arterial Level of Service: EB New SR 89

Cross Street	Run 3 Delay	Run 3 Speed	Run 3 Delay
NB to EB RT	-	-	-
WB to NB RT	0.1	18	0.1
	3.0	23	2.1
SR 89	6.3	19	4.5
Total	9.4	25	6.7

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	44	1.2	10.2	0.1	19	20	0.9
WB to NB RT	25	13.2	35.6	0.2	16	18	9.0
New SR 89	24	3.3	8.2	0.0	10	10	3.2
New SR 28	1	9.6	16.8	0.0	9	9	10.1
Total		27.2	70.8	0.3	14	15	23.1

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	19	1.4	20	0.9	19	1.1	20
WB to NB RT	15	14.7	16	12.0	18	7.9	20
New SR 89	11	2.8	10	3.6	10	3.2	11
New SR 28	9	9.2	9	9.5	9	8.7	9
Total	14	28.3	14	26.0	15	20.9	16

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.0	18	2.0
WB to NB RT	5.2	10	32.5
New SR 89	2.6	9	4.6
New SR 28	9.9	9	10.0
Total	18.6	11	49.0

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	8.0	0.1	26	26	0.4
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.7
	36	0.4	5.2	0.0	18	19	0.4
	35	0.7	8.8	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	0.9
	5	0.8	7.9	0.0	22	22	0.7
SR 89	4	4.3	22.5	0.1	19	20	3.8
New SR 89	1	4.3	12.3	0.1	16	16	4.2
Total		14.1	104.0	0.6	21	22	13.1

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	26	0.4	26
	23	0.7	23	0.6	23	0.6	23
Twin Crag	25	0.9	25	0.8	25	0.8	25
	18	0.4	18	0.4	19	0.4	18
	23	0.8	23	0.8	23	0.7	23
	22	0.7	23	0.7	23	0.6	23
	22	1.0	22	1.0	23	0.9	23
	22	0.8	22	0.8	22	0.7	22
SR 89	20	4.0	19	4.4	20	3.7	20
New SR 89	17	4.1	17	3.5	16	4.8	16
Total	22	13.9	22	13.5	22	13.7	21

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 6 Speed	Run 6 Delay
	0.4	26	0.5
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	19	0.4
	0.7	23	0.7
	0.6	23	0.6
	0.9	23	1.0
	0.8	22	0.9
SR 89	3.8	18	6.0
New SR 89	4.7	16	4.8
Total	13.8	21	16.3

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.9	16.5	0.1	12	12	1.9
	5	0.6	22.5	0.1	19	19	0.5
	14	0.3	7.3	0.0	24	24	0.3
	34	0.5	9.8	0.1	24	24	0.5
	35	0.4	6.9	0.0	23	24	0.4
	36	0.6	8.7	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.5	0.1	23	23	0.9
	39	0.9	10.7	0.1	23	23	0.9
Total		6.4	99.2	0.6	20	21	6.3

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	1.9	12	1.6	12	2.2	12
	19	0.6	19	0.5	19	0.6	19
	24	0.3	24	0.3	24	0.3	24
	24	0.5	24	0.5	24	0.6	24
	23	0.4	23	0.4	23	0.4	23
	23	0.6	23	0.6	23	0.6	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	0.9	23	0.9	23	1.0	23
	23	0.9	23	0.9	23	0.9	23
Total	20	6.5	20	6.0	20	7.0	21

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	1.7	12	1.9
	0.6	19	0.6
	0.3	24	0.3
	0.5	24	0.5
	0.4	23	0.4
	0.6	23	0.6
Twin Crag	0.3	23	0.3
	1.0	23	0.9
	0.9	23	0.9
Total	6.3	20	6.4

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	1.8	9.4	0.0	18	19	1.8
Fairway Dr	42	2.0	17.8	0.1	22	21	2.0
	16	0.9	16.4	0.1	24	24	1.0
Old SR 89	6	7.3	16.6	0.1	14	14	7.4
Total		12.0	60.2	0.3	20	20	12.1

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	18	1.9	18	1.8	18	1.9	18
Fairway Dr	22	2.0	22	1.9	22	1.9	21
	24	0.9	24	0.9	24	0.9	24
Old SR 89	14	7.1	14	7.7	14	7.7	14
Total	20	11.9	20	12.4	20	12.3	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	1.8	18	1.9
Fairway Dr	1.9	22	2.1
	0.9	24	1.0
Old SR 89	7.2	15	6.7
Total	11.8	20	11.7

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	5.0	14.8	0.1	16	16	5.0
Fairway Dr	42	3.1	18.2	0.1	22	22	2.7
WB to NB RT	13	19.8	36.3	0.1	11	11	19.0
SR 89	1	8.2	13.3	0.0	13	13	8.4
Total		36.0	82.5	0.3	15	15	35.2

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	4.6	16	4.9	16	5.1	16
Fairway Dr	23	2.2	23	2.3	22	2.8	23
WB to NB RT	11	20.9	15	10.0	7	36.1	15
SR 89	12	9.0	14	6.9	11	10.1	14
Total	14	36.8	17	24.1	12	54.1	17

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	4.9	16	5.2
Fairway Dr	2.2	18	6.4
WB to NB RT	9.5	10	21.9
SR 89	6.7	13	7.7
Total	23.3	14	41.3

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	3.1	10.8	0.1	17	17	3.0
	9	1.3	16.9	0.1	23	23	1.3
Grove St	2	4.1	24.7	0.3	42	43	3.7
	17	1.0	8.6	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		10.3	70.9	0.6	28	29	9.9

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.3	17	3.4	17	3.2	17
	23	1.3	23	1.3	23	1.2	23
Grove St	40	5.5	42	4.4	42	3.8	42
	22	1.0	22	1.1	22	1.0	22
	23	0.7	23	0.7	23	0.6	23
Total	28	11.8	28	10.8	29	9.8	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	3.0	18	2.9
	1.2	23	1.2
Grove St	3.9	44	3.6
	1.1	22	0.9
	0.7	23	0.6
Total	9.9	29	9.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.8	0.1	26	26	0.4
	17	0.5	9.6	0.1	24	24	0.5
Grove St	2	3.0	10.5	0.1	18	17	3.9
	9	3.2	43.2	0.3	23	23	3.3
	8	1.5	17.0	0.1	23	23	1.4
Old SR 89	6	11.0	18.1	0.1	10	10	11.4
Total		19.7	109.3	0.6	21	20	20.9

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.4	26
	24	0.5	24	0.5	24	0.5	24
Grove St	19	2.6	19	2.5	19	2.7	19
	23	3.2	23	3.3	23	3.2	23
	23	1.5	23	1.5	23	1.5	23
Old SR 89	11	10.2	10	11.8	10	11.1	11
Total	21	18.4	21	20.1	21	19.5	21

Arterial Level of Service: SW SR 28

Cross Street	Run 3 Delay	Run 3 Speed	Run 3 Delay
	0.4	25	0.5
	0.5	23	0.6
Grove St	2.7	17	3.8
	3.1	23	3.3
	1.4	23	1.4
Old SR 89	10.5	10	11.1
Total	18.5	21	20.7

Arterial Level of Service: EB NB to EB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	15.4	27.4	0.1	11	11	15.9
Total		15.4	27.4	0.1	11	11	15.9

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	10	17.5	10	17.4	13	12.0	12
Total	10	17.5	10	17.4	13	12.0	12

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 6 Delay	Run 6 Speed	Run 7 Delay
New SR 89	12.7	11	16.7
Total	12.7	11	16.7

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	9.5	25.2	0.1	11	12	7.6
Total		9.5	25.2	0.1	11	12	7.6

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	12	8.1	12	7.8	10	12.4	11
Total	12	8.1	12	7.8	10	12.4	11

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 6 Delay	Run 6 Speed	Run 7 Delay
New SR 28	8.3	10	12.8
Total	8.3	10	12.8

Opening Day (2018) Operations: Alternative 4

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.4
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	19	0.4
	35	0.7	8.8	0.1	23	23	0.7
	34	0.6	7.2	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	1.0
	5	0.8	7.9	0.0	22	22	0.8
	4	2.1	20.1	0.1	22	22	2.1
New SR 89	1	8.4	16.3	0.1	15	17	7.0
Total		15.9	105.7	0.6	22	22	14.3

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	26	0.5	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	19	0.4	19	0.4	18	0.4	18
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	22	1.0	23	0.9	23	1.0	23
	22	0.8	22	0.8	22	0.8	22
	22	2.1	22	2.1	22	2.1	22
New SR 89	15	8.5	15	8.5	15	8.6	15
Total	22	16.0	22	15.9	22	16.1	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	0.5	26	0.5
	0.6	23	0.7
Twin Crag	0.8	25	0.8
	0.4	18	0.4
	0.8	23	0.8
	0.6	22	0.7
	1.0	22	1.0
	0.8	22	0.8
	2.2	22	2.1
New SR 89	9.1	15	8.6
Total	16.9	22	16.3

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	1.0	11.0	0.1	23	23	1.0
	5	1.0	18.6	0.1	24	24	0.9
	14	0.5	7.5	0.0	23	23	0.4
	34	0.7	10.0	0.1	23	23	0.6
	35	0.5	7.0	0.0	23	23	0.5
	36	0.7	8.9	0.1	23	23	0.7
Twin Crag	37	0.6	4.0	0.0	25	24	0.6
	38	1.0	12.5	0.1	23	23	1.0
	39	0.8	10.7	0.1	23	23	0.8
Total		6.8	90.2	0.6	23	23	6.6

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	1.0	23	1.1	23	1.0	23
	24	1.0	24	1.0	24	0.9	24
	23	0.5	23	0.5	23	0.4	23
	23	0.7	23	0.7	23	0.6	24
	23	0.5	23	0.5	23	0.5	23
	23	0.8	23	0.7	23	0.7	23
Twin Crag	24	0.6	25	0.6	25	0.6	25
	23	1.0	23	1.0	23	1.0	23
	23	0.8	23	0.8	23	0.8	23
Total	23	7.0	23	6.9	23	6.7	23

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	1.1	23	1.0
	0.9	24	1.1
	0.4	23	0.5
	0.6	23	0.7
	0.5	23	0.5
	0.6	23	0.8
Twin Crag	0.5	24	0.6
	0.9	23	1.1
	0.8	23	0.9
Total	6.3	23	7.2

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	12.9	30.8	0.1	9	9	12.8
64 Acres Access	46	1.5	18.8	0.1	23	23	1.6
	20	0.8	10.6	0.1	23	24	0.8
Total		15.2	60.2	0.3	16	16	15.2

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	9	13.0	9	13.0	9	13.0	9
64 Acres Access	23	1.5	23	1.4	23	1.5	23
	23	0.9	24	0.8	23	0.9	23
Total	16	15.4	16	15.3	16	15.4	16

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	12.5	9	12.9
64 Acres Access	1.3	23	1.5
	0.8	24	0.8
Total	14.6	16	15.2

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	46	0.8	10.3	0.1	24	24	0.8
	24	1.5	19.1	0.1	23	23	1.5
New SR 28	1	14.3	26.1	0.1	11	11	14.5
Total		16.6	55.5	0.3	17	17	16.9

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	24	0.8	24	0.8	24	0.8	24
	23	1.5	23	1.4	22	1.5	22
New SR 28	11	13.5	10	16.3	11	13.9	11
Total	18	15.8	17	18.5	17	16.2	18

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
64 Acres Access	0.8	24	0.8
	1.5	23	1.4
New SR 28	13.4	11	14.0
Total	15.8	18	16.3

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	1.9	12.8	0.1	21	22	1.7
Fairway Dr	42	0.6	11.6	0.1	23	23	0.6
	16	1.1	16.6	0.1	24	24	1.1
Old SR 89	6	6.4	15.5	0.1	15	17	5.3
Total		9.9	56.4	0.3	21	21	8.8

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.7	21	1.7	21	2.0	21
Fairway Dr	23	0.6	23	0.6	23	0.6	22
	24	1.0	24	1.0	24	1.1	23
Old SR 89	15	7.0	15	6.4	16	6.1	15
Total	20	10.3	21	9.8	21	9.8	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	1.9	21	2.0
Fairway Dr	0.7	23	0.6
	1.2	24	1.1
Old SR 89	6.3	15	7.1
Total	10.1	20	10.9

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	3.6	13.4	0.1	18	18	3.6
Fairway Dr	42	1.7	16.5	0.1	24	24	1.6
	13	0.8	12.0	0.1	22	22	0.8
New SR 89	1	4.3	15.0	0.1	18	18	4.5
Total		10.5	56.9	0.3	20	20	10.5

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.9	18	3.6	18	3.4	17
Fairway Dr	24	1.8	24	1.7	24	1.5	23
	22	0.8	22	0.9	22	0.8	22
New SR 89	19	3.8	19	3.9	18	4.7	17
Total	20	10.4	21	10.1	21	10.5	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	3.7	18	3.6
Fairway Dr	1.9	24	1.5
	0.8	22	0.8
New SR 89	4.8	18	4.3
Total	11.3	20	10.2

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	2.5	10.3	0.1	18	18	2.4
	9	1.1	16.7	0.1	23	23	1.2
Grove St	2	2.2	22.2	0.3	46	45	2.1
	17	0.7	8.3	0.1	23	23	0.7
	18	0.6	9.8	0.1	23	23	0.6
Total		7.1	67.3	0.6	30	30	7.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	2.7	18	2.4	18	2.3	18
	23	1.1	23	1.0	23	1.1	23
Grove St	46	2.3	47	2.1	46	2.3	46
	23	0.8	23	0.7	23	0.8	23
	23	0.6	23	0.5	23	0.5	23
Total	30	7.4	30	6.7	30	7.1	30

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	2.5	18	2.5
	1.1	23	1.1
Grove St	2.4	47	2.0
	0.8	23	0.6
	0.6	23	0.5
Total	7.3	30	6.8

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.2
	17	0.4	9.5	0.1	24	24	0.3
Grove St	2	1.9	9.3	0.1	20	21	1.4
	9	2.6	42.5	0.3	24	24	2.2
	8	1.2	16.7	0.1	23	24	1.1
Savemart Access	6	9.6	16.7	0.1	11	11	9.5
Total		15.9	105.2	0.6	22	22	14.7

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.4	24	0.4	24	0.4	24
Grove St	19	2.4	20	2.0	20	2.0	21
	23	2.7	24	2.6	24	2.6	24
	23	1.2	23	1.2	23	1.3	23
Savemart Access	11	10.3	12	9.0	12	8.9	11
Total	21	17.4	22	15.5	22	15.4	21

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	0.3	26	0.3
	0.3	24	0.4
Grove St	1.6	21	1.7
	2.6	24	2.9
	1.2	23	1.2
Savemart Access	9.9	11	10.1
Total	15.8	21	16.6

Summer Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	7.9	0.1	26	26	0.4
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	19	18	0.4
	35	0.7	8.8	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	0.9
	5	0.8	7.8	0.0	22	22	0.7
	4	2.4	20.3	0.1	22	22	2.1
New SR 89	1	20.8	30.6	0.1	8	8	21.8
Total		28.6	120.0	0.6	19	19	29.1

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.4	26	0.4	26
	23	0.7	23	0.6	23	0.6	23
Twin Crag	25	0.9	25	0.8	25	0.7	25
	18	0.4	19	0.4	19	0.4	18
	23	0.8	23	0.7	23	0.7	23
	23	0.7	23	0.6	23	0.6	23
	23	1.0	23	0.9	23	0.9	23
	22	0.8	22	0.8	22	0.7	22
	21	3.5	22	2.2	22	2.1	22
New SR 89	7	25.5	8	21.9	9	18.7	9
Total	18	34.7	19	29.3	20	25.7	20

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	0.5	26	0.4
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	18	0.4
	0.8	23	0.7
	0.6	23	0.6
	1.0	23	1.0
	0.8	22	0.8
	2.2	22	2.1
New SR 89	17.5	9	19.1
Total	25.3	19	26.7

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	1.2	11.1	0.1	23	22	1.3
	5	1.2	18.8	0.1	24	23	1.4
	14	0.6	7.6	0.0	23	23	0.6
	34	0.8	10.1	0.1	23	23	0.9
	35	0.6	7.1	0.0	23	23	0.7
	36	0.8	8.9	0.1	23	22	0.9
Twin Crag	37	0.4	4.3	0.0	22	22	0.5
	38	1.2	12.7	0.1	23	22	1.2
	39	1.0	10.9	0.1	22	22	1.1
Total		7.9	91.5	0.6	23	23	8.6

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	1.2	23	1.2	23	1.1	23
	23	1.3	24	1.1	24	1.1	24
	23	0.6	23	0.6	23	0.6	23
	23	0.9	23	0.8	23	0.8	23
	22	0.6	23	0.6	23	0.6	23
	22	0.8	23	0.8	23	0.7	23
Twin Crag	22	0.4	23	0.4	23	0.4	23
	23	1.2	23	1.1	23	1.1	23
	22	1.1	23	1.0	23	1.0	23
Total	23	8.1	23	7.6	23	7.3	23

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	1.0	23	1.2
	1.1	24	1.2
	0.5	23	0.6
	0.7	23	0.9
	0.6	23	0.6
	0.8	23	0.8
Twin Crag	0.4	23	0.4
	1.1	23	1.2
	1.0	23	1.1
Total	7.2	23	8.1

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	15.8	33.6	0.1	9	8	15.8
64 Acres Access	46	2.3	19.7	0.1	22	22	1.8
	20	1.0	10.8	0.1	23	23	1.0
Total		19.2	64.1	0.3	15	15	18.6

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	9	15.8	9	15.3	8	17.1	9
64 Acres Access	22	2.3	21	2.9	22	2.3	22
	23	1.1	23	1.0	23	1.0	23
Total	15	19.2	15	19.2	15	20.4	15

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	14.8	9	15.7
64 Acres Access	2.0	21	2.7
	1.0	23	1.0
Total	17.7	15	19.4

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	46	1.0	10.5	0.1	24	24	1.0
	24	1.7	19.2	0.1	22	22	1.7
New SR 28	1	19.5	31.4	0.1	9	9	18.5
Total		22.2	61.0	0.3	16	16	21.1

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	24	1.0	24	0.9	24	0.9	24
	22	1.8	22	1.7	23	1.6	22
New SR 28	8	22.2	9	19.9	9	19.0	10
Total	15	24.9	16	22.5	16	21.5	16

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
64 Acres Access	1.0	24	0.9
	1.8	22	1.7
New SR 28	17.4	9	20.0
Total	20.2	16	22.6

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	2.0	12.9	0.1	21	21	1.9
Fairway Dr	42	0.7	11.7	0.1	23	23	0.7
	16	1.2	16.7	0.1	23	23	1.2
	6	7.1	16.3	0.1	15	15	6.8
Total		11.0	57.5	0.3	20	20	10.5

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	2.1	21	1.9	21	2.0	21
Fairway Dr	23	0.8	23	0.7	23	0.7	22
	24	1.3	24	1.2	23	1.3	23
	15	7.0	16	6.1	14	7.4	14
Total	20	11.1	21	10.0	20	11.4	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	1.9	21	2.1
Fairway Dr	0.7	22	0.8
	1.2	23	1.3
	7.8	14	7.4
Total	11.6	20	11.5

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	4.8	14.6	0.1	16	16	4.7
Fairway Dr	42	2.1	17.1	0.1	23	23	2.0
	13	1.0	12.2	0.1	22	22	1.0
New SR 89	1	5.4	16.1	0.1	17	17	5.6
Total		13.3	60.1	0.3	19	19	13.3

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	4.9	17	4.5	16	4.9	16
Fairway Dr	23	1.9	23	1.9	23	2.1	23
	22	1.0	22	0.9	22	1.0	22
New SR 89	17	5.0	17	5.6	17	5.4	18
Total	19	12.8	20	13.0	19	13.4	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	4.9	16	4.8
Fairway Dr	2.1	23	2.5
	1.0	21	1.2
New SR 89	4.6	16	6.2
Total	12.7	19	14.7

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	3.3	11.1	0.1	17	17	3.3
	9	1.3	17.0	0.1	23	23	1.3
Grove St	2	3.3	24.0	0.3	43	43	3.5
	17	1.0	8.6	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		9.6	70.5	0.6	29	29	9.9

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.3	17	3.2	17	2.9	17
	23	1.3	23	1.3	23	1.3	23
Grove St	44	3.2	43	3.0	43	3.5	44
	22	1.0	22	1.0	22	0.9	22
	23	0.7	23	0.6	23	0.7	23
Total	29	9.4	29	9.1	29	9.3	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	3.3	16	3.6
	1.3	23	1.4
Grove St	3.2	42	3.5
	1.0	22	1.0
	0.7	23	0.6
Total	9.5	28	10.1

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.7	0.1	26	26	0.4
	17	0.5	9.6	0.1	24	23	0.5
Grove St	2	2.7	10.2	0.1	18	18	3.1
	9	3.2	43.2	0.3	23	23	3.3
	8	1.4	17.0	0.1	23	23	1.5
	6	10.4	17.5	0.1	11	11	9.9
Total		18.6	108.4	0.6	21	21	18.7

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.4	26	0.4	26	0.4	25
	24	0.5	24	0.4	24	0.4	23
Grove St	18	2.8	19	2.5	19	2.4	19
	23	3.0	23	2.9	23	3.3	23
	23	1.4	23	1.4	23	1.5	23
	11	10.1	10	10.9	11	10.5	11
Total	21	18.1	21	18.5	21	18.5	21

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 4 11122014 Speed	Alt 4 11122014 Delay
	0.4	26	0.4
	0.5	24	0.5
Grove St	2.5	18	3.2
	3.3	23	3.2
	1.5	23	1.4
	10.3	11	10.6
Total	18.6	21	19.2

Opening Day (2018) Operations: Alternative 6

Average Annual Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.3	14.3	0.1	13	13	6.6
	9	1.5	17.1	0.1	23	23	1.5
Grove St	2	3.7	26.3	0.3	39	39	3.3
	17	0.9	8.5	0.1	22	22	0.9
	18	0.6	9.8	0.1	23	23	0.7
Total		13.0	76.0	0.6	26	26	13.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.7	13	6.2	13	6.6	13
	23	1.3	23	1.5	23	1.5	23
Grove St	39	3.3	40	3.9	39	3.8	39
	22	0.9	22	0.9	22	1.0	22
	23	0.7	23	0.6	23	0.7	23
Total	27	11.9	27	13.2	26	13.5	26

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 11192014 Speed	Run 11192014 Delay
	6.4	13	6.3
	1.5	23	1.4
Grove St	3.3	37	4.4
	0.9	22	1.0
	0.6	23	0.6
Total	12.8	26	13.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.4
	17	0.4	9.6	0.1	24	23	0.5
Grove St	2	2.6	10.1	0.1	19	18	2.9
	9	2.7	42.6	0.3	24	23	2.7
	8	2.6	18.3	0.1	21	20	4.0
Savemart Access	6	15.3	22.5	0.1	8	8	16.5
Total		24.0	113.6	0.6	20	19	26.8

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.3	24	0.4	24	0.4	24
Grove St	20	1.9	18	3.1	19	2.3	18
	24	2.5	24	2.8	24	2.6	23
	23	1.4	20	4.2	23	1.4	21
Savemart Access	9	13.3	8	16.6	9	15.1	9
Total	21	19.7	19	27.5	20	22.1	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 11192014 Speed	Run 11192014 Delay
	0.3	26	0.4
	0.4	24	0.4
Grove St	2.9	19	2.6
	2.8	23	2.8
	2.6	22	2.0
Savemart Access	14.7	8	15.8
Total	23.8	20	23.8

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.2	8.6	0.1	26	26	0.2
Granlibakken Rd	26	1.3	11.6	0.1	22	23	1.0
	12	0.5	12.9	0.1	24	24	0.5
	19	0.9	20.4	0.1	24	24	0.9
	3	0.4	6.7	0.0	23	23	0.4
64 Acres	20	0.6	7.9	0.0	23	23	0.5
	45	0.6	8.2	0.1	24	24	0.6
	11	0.8	11.1	0.1	23	23	0.8
Tavern shores	22	0.6	8.0	0.1	25	25	0.6
	10	0.4	5.8	0.0	20	20	0.5
SR 28	6	33.6	48.2	0.1	8	8	33.0
	16	1.3	13.7	0.1	17	17	1.4
Fariway Dr	42	1.3	16.3	0.1	24	24	1.4
	13	0.8	12.0	0.1	22	22	0.8
	1	0.8	12.6	0.1	23	23	0.7
	4	0.6	8.4	0.1	24	24	0.5
	5	1.3	18.7	0.1	23	23	1.3
	14	0.6	7.6	0.0	23	23	0.6
	34	0.8	10.1	0.1	23	23	0.8
	35	0.6	7.1	0.0	23	23	0.6
	36	1.1	9.2	0.1	22	22	1.0
Twin Crag	37	1.2	5.4	0.0	27	27	1.2
	38	1.5	13.1	0.1	22	22	1.5
	39	1.0	10.9	0.1	23	23	1.0
Total		52.7	294.4	1.7	20	20	51.6

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.2	26	0.2	27	0.2	26
Granlibakken Rd	22	1.5	22	1.2	21	2.0	23
	23	0.6	23	0.5	24	0.6	24
	24	1.0	24	0.9	24	1.0	24
	23	0.4	23	0.4	23	0.4	24
64 Acres	23	0.6	23	0.6	23	0.6	23
	24	0.6	24	0.6	24	0.6	24
	23	0.8	23	0.7	23	0.8	23
Tavern shores	25	0.6	25	0.6	25	0.7	25
	20	0.4	20	0.4	20	0.5	20
SR 28	9	24.4	8	33.8	9	25.8	9
	17	1.3	17	1.3	17	1.4	17
Fariway Dr	24	1.3	24	1.4	24	1.4	24
	22	0.8	22	0.8	22	0.8	22
	23	0.8	23	0.8	23	0.8	23
	24	0.6	24	0.6	24	0.6	24
	23	1.3	23	1.3	23	1.5	23
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.8	23	0.9	23
	23	0.6	23	0.6	23	0.6	23
	22	1.1	22	1.0	22	1.1	22
Twin Crag	27	1.2	27	1.1	27	1.1	27
	22	1.5	22	1.4	22	1.5	22
	23	1.0	23	0.9	23	1.0	23
Total	21	43.9	20	52.5	21	46.7	21

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run 11192014 Speed	Run 11192014 Delay
	0.2	27	0.2
Granlibakken Rd	1.0	23	0.8
	0.5	24	0.6
	0.8	24	1.0
	0.3	23	0.4
64 Acres	0.5	23	0.6
	0.5	24	0.6
	0.6	23	0.8
Tavern shores	0.5	25	0.7
	0.4	20	0.5
SR 28	28.7	5	53.8
	1.3	17	1.3
Fariway Dr	1.1	24	1.4
	0.7	22	0.8
	0.7	23	0.8
	0.5	24	0.6
	1.2	23	1.4
	0.5	23	0.6
	0.7	23	0.8
	0.5	23	0.6
	1.0	22	1.1
Twin Crag	1.2	26	1.2
	1.5	22	1.6
	0.9	22	1.1
Total	45.9	19	73.4

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.1	0.0	19	19	0.4
	35	0.7	8.8	0.1	23	23	0.8
	34	0.6	7.1	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	1.0
	5	0.8	7.8	0.0	22	22	0.8
	4	2.0	19.4	0.1	22	22	2.1
	1	1.2	9.4	0.1	21	20	1.6
	13	3.9	15.5	0.1	19	18	4.5
Fariway Dr	42	13.0	199.4	0.1	12	13	12.4
	16	19.8	35.2	0.1	11	11	18.8
SR 89	6	38.6	49.5	0.1	5	5	37.2
	10	1.0	17.0	0.1	22	22	1.0
Tavern shores	22	0.4	5.2	0.0	22	22	0.4
	11	0.6	8.3	0.1	24	24	0.6
	45	1.0	11.3	0.1	23	23	1.0
64 Acres	20	0.8	8.0	0.1	24	24	0.7
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.2	21.6	0.1	22	22	2.1
Granlibakken Rd	26	3.5	15.6	0.1	20	20	3.3
	27	1.5	12.0	0.1	22	22	1.5
Total		96.2	511.4	1.6	18	18	94.2

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	26	0.4	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	19	0.4	19	0.4	19	0.4	19
	23	0.7	23	0.8	23	0.7	23
	23	0.6	23	0.7	23	0.6	23
	23	1.0	23	1.0	23	1.0	23
	22	0.8	22	0.8	22	0.8	22
	22	2.0	22	2.1	22	2.0	22
	21	1.1	21	1.3	22	1.0	22
	19	3.5	17	5.4	19	3.6	20
Fariway Dr	12	13.2	11	14.2	12	13.5	13
	11	21.1	11	21.3	11	18.9	11
SR 89	5	38.9	5	39.8	5	37.6	5
	22	1.0	22	1.0	22	1.0	22
Tavern shores	22	0.4	22	0.4	22	0.4	22
	24	0.6	24	0.6	24	0.6	24
	23	1.0	23	1.0	23	1.0	23
64 Acres	24	0.8	24	0.8	24	0.7	24
	22	0.7	22	0.7	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.2	22	2.2	22	2.1	22
Granlibakken Rd	19	3.9	19	3.8	20	3.2	20
	22	1.5	22	1.5	22	1.5	22
Total	18	98.1	18	102.1	18	93.7	18

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Delay	Run 11192014 Speed	Run 11192014 Delay
	0.5	26	0.5
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	19	0.4
	0.7	23	0.7
	0.6	23	0.6
	1.0	23	0.9
	0.8	22	0.7
	2.0	22	1.9
	1.0	21	1.0
	2.7	20	3.4
Fariway Dr	12.3	13	12.4
	19.7	11	19.2
SR 89	39.9	5	38.4
	1.0	22	0.9
Tavern shores	0.4	22	0.4
	0.6	24	0.6
	1.0	23	1.0
64 Acres	0.8	24	0.8
	0.7	22	0.7
	0.6	23	0.6
	2.3	22	2.2
Granlibakken Rd	3.6	20	3.2
	1.5	22	1.4
Total	95.7	18	93.5

Summer Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.9	14.8	0.1	13	13	6.5
	9	1.4	17.0	0.1	23	23	1.4
Grove St	2	3.5	24.8	0.3	42	41	3.7
	17	1.0	8.6	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		13.5	75.0	0.6	27	27	13.3

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	13	6.6	13	7.0	13	6.8	12
	23	1.4	23	1.4	23	1.4	23
Grove St	43	2.9	43	3.0	42	3.5	41
	22	0.9	22	0.9	22	1.0	22
	23	0.7	23	0.7	23	0.7	23
Total	27	12.4	27	13.0	27	13.3	27

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 11142014 Speed	Run 11142014 Delay
	7.1	12	7.2
	1.4	23	1.6
Grove St	3.7	40	4.1
	1.0	22	1.1
	0.7	23	0.7
Total	14.0	26	14.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.7	0.1	26	26	0.4
	17	0.5	9.7	0.1	24	23	0.6
Grove St	2	3.3	10.8	0.1	18	16	4.1
	9	3.3	43.2	0.3	23	23	3.3
	8	5.3	20.8	0.1	19	21	3.2
Savemart Access	6	16.7	26.1	0.1	8	8	16.2
Total		29.6	121.3	0.6	19	19	27.9

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.4	26
	23	0.8	24	0.5	24	0.5	24
Grove St	16	4.5	17	3.6	19	2.4	19
	23	3.2	23	3.1	23	3.5	23
	20	3.9	16	8.4	22	2.0	19
Savemart Access	8	17.1	8	16.0	7	18.9	8
Total	19	29.9	19	32.0	19	27.7	19

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 11142014 Speed	Run 11142014 Delay
	0.4	26	0.4
	0.4	24	0.5
Grove St	2.5	19	2.7
	3.3	23	3.4
	5.1	16	9.0
Savemart Access	17.4	9	14.7
Total	29.2	19	30.7

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.3	8.8	0.1	26	26	0.3
Granlibakken Rd	26	2.0	12.4	0.1	21	21	2.0
	12	0.8	13.1	0.1	23	23	0.8
	19	1.3	20.7	0.1	23	23	1.2
	3	0.5	6.8	0.0	23	23	0.5
64 Acres	20	0.7	8.0	0.0	22	22	0.7
	45	0.7	8.3	0.1	23	23	0.7
	11	0.9	11.2	0.1	23	23	0.9
Tavern shores	22	0.7	8.1	0.1	25	25	0.7
	10	0.5	5.9	0.0	20	20	0.5
SR 28	6	43.5	58.0	0.1	6	8	33.0
	16	1.4	13.8	0.1	17	17	1.3
Fariway Dr	42	1.8	16.9	0.1	23	23	1.7
	13	0.9	12.1	0.1	22	22	0.8
	1	0.9	12.7	0.1	23	23	0.8
	4	0.6	8.5	0.1	23	23	0.6
	5	1.5	18.9	0.1	23	23	1.5
	14	0.7	7.7	0.0	23	23	0.6
	34	0.9	10.2	0.1	23	23	0.9
	35	0.7	7.2	0.0	22	22	0.6
	36	1.3	9.5	0.1	21	21	1.3
Twin Crag	37	1.3	6.5	0.0	25	25	1.3
	38	1.7	13.3	0.1	22	22	1.6
	39	1.1	10.9	0.1	22	22	1.0
Total		66.8	309.6	1.7	19	20	55.1

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
Granlibakken Rd	21	1.9	23	1.3	21	2.3	20
	23	0.7	23	0.8	23	0.7	23
	23	1.3	23	1.3	24	1.2	23
	23	0.5	23	0.5	23	0.5	23
64 Acres	22	0.7	22	0.7	23	0.7	22
	23	0.7	23	0.7	23	0.7	23
	23	0.9	23	0.9	23	0.9	23
Tavern shores	25	0.7	25	0.8	25	0.7	25
	20	0.5	20	0.5	20	0.6	20
SR 28	7	37.5	7	40.2	5	54.8	6
	17	1.4	17	1.5	17	1.2	17
Fariway Dr	23	1.9	24	1.6	23	1.9	23
	22	0.9	22	0.9	22	0.9	22
	23	0.9	23	0.9	23	0.8	23
	23	0.6	24	0.6	24	0.6	23
	23	1.5	23	1.5	23	1.5	23
	23	0.7	23	0.7	23	0.6	23
	23	0.9	23	0.9	23	0.9	23
	22	0.7	23	0.7	23	0.7	22
	21	1.3	21	1.4	21	1.4	21
Twin Crag	25	1.3	24	1.4	25	1.4	24
	22	1.7	21	1.8	21	1.8	21
	22	1.1	22	1.1	22	1.1	22
Total	20	60.6	20	63.2	19	78.3	19

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run 11142014 Speed	Run 11142014 Delay
	0.3	26	0.3
Granlibakken Rd	2.4	21	2.4
	0.8	23	0.7
	1.3	23	1.2
	0.5	23	0.5
64 Acres	0.8	22	0.7
	0.7	24	0.7
	0.9	23	0.9
Tavern shores	0.7	25	0.7
	0.5	20	0.5
SR 28	51.6	6	42.6
	1.5	17	1.4
Fariway Dr	1.9	23	1.8
	0.9	22	0.9
	0.9	23	0.9
	0.7	23	0.7
	1.6	23	1.6
	0.7	23	0.7
	1.0	23	0.9
	0.7	22	0.7
	1.3	21	1.3
Twin Crag	1.4	25	1.3
	1.8	22	1.7
	1.1	22	1.1
Total	76.0	20	66.0

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	7.8	0.1	26	26	0.4
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.3	0.1	25	25	0.8
	36	0.4	5.1	0.0	19	19	0.4
	35	0.7	8.8	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.3	0.1	23	23	0.9
	5	0.8	7.8	0.0	22	22	0.7
	4	2.0	19.4	0.1	22	22	1.9
	1	1.1	9.3	0.1	21	22	1.0
	13	4.3	15.9	0.1	18	17	6.1
Fariway Dr	42	17.9	771.1	0.1	10	9	19.3
	16	27.2	42.5	0.1	9	9	28.2
SR 89	6	45.5	56.3	0.1	4	4	47.4
	10	1.0	17.0	0.1	22	22	1.0
Tavern shores	22	0.4	5.3	0.0	22	22	0.4
	11	0.6	8.3	0.1	24	24	0.7
	45	1.0	11.3	0.1	23	23	1.0
64 Acres	20	0.8	8.1	0.1	24	24	0.8
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.2	21.6	0.1	22	23	2.1
Granlibakken Rd	26	3.6	15.7	0.1	20	20	3.7
	27	1.5	12.0	0.1	22	22	1.5
Total		115.5	1097.5	1.6	17	17	121.6

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.4	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	19	0.4	19	0.4	18	0.4	19
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	23	1.0	23	0.9	23	1.0	23
	22	0.8	22	0.8	22	0.8	22
	22	2.0	22	2.0	22	2.0	22
	22	1.0	22	1.0	21	1.2	21
	20	3.3	19	3.8	18	4.7	18
Fariway Dr	10	17.7	10	17.0	9	19.2	10
	9	27.3	9	27.0	9	27.5	9
SR 89	4	45.7	4	44.5	4	45.4	4
	22	1.0	22	1.0	21	1.0	22
Tavern shores	22	0.4	22	0.4	22	0.4	22
	24	0.6	24	0.6	24	0.6	24
	23	0.9	23	1.0	23	1.0	23
64 Acres	24	0.7	24	0.7	24	0.8	24
	22	0.7	22	0.7	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.0	22	2.2	22	2.2	22
Granlibakken Rd	20	3.0	19	4.1	20	3.2	19
	22	1.4	22	1.5	22	1.5	22
Total	17	113.7	17	112.9	17	117.4	17

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Delay	Run 11142014 Speed	Run 11142014 Delay
	0.4	26	0.4
	0.5	24	0.6
Twin Crag	0.7	25	0.8
	0.4	19	0.4
	0.7	23	0.7
	0.6	23	0.6
	0.9	23	1.0
	0.7	22	0.8
	1.9	22	2.1
	1.0	22	1.1
	4.3	20	3.4
Fariway Dr	17.6	10	16.8
	27.1	9	26.3
SR 89	46.5	4	43.5
	1.0	22	1.0
Tavern shores	0.4	22	0.4
	0.7	24	0.7
	1.0	23	1.0
64 Acres	0.8	24	0.8
	0.7	22	0.7
	0.6	23	0.6
	2.2	22	2.2
Granlibakken Rd	3.8	19	3.9
	1.6	22	1.5
Total	116.3	17	111.3

Design Year (2038) Operations

Design Year (2038) Operations: Alternative 5 (No Build)

Average Annual Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.2	13.9	0.1	13	13	6.8
	9	2.0	17.6	0.1	22	22	2.1
Grove St	2	3.5	25.4	0.3	41	41	3.2
	17	1.0	8.6	0.1	22	22	0.9
	18	0.7	9.9	0.1	23	23	0.7
Total		13.3	75.4	0.6	27	27	13.6

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.8	14	5.5	13	6.2	12
	22	2.0	22	1.9	22	2.0	22
Grove St	41	3.0	41	3.2	41	3.5	38
	22	1.0	22	0.9	22	0.9	22
	23	0.7	23	0.7	23	0.7	23
Total	27	12.4	27	12.2	27	13.3	26

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	7.3	14	5.2
	2.1	22	1.9
Grove St	4.2	41	3.9
	1.1	22	1.1
	0.7	23	0.7
Total	15.3	27	12.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	2.3	9.8	0.1	19	20	1.9
	9	2.8	42.7	0.3	24	24	2.8
	8	2.2	17.8	0.1	22	22	1.6
Savemart Access	6	15.1	22.7	0.1	8	8	15.6
Total		23.1	113.0	0.6	20	20	22.6

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.2	26
	24	0.4	24	0.4	24	0.3	24
Grove St	17	3.4	19	2.7	21	1.6	20
	23	3.1	24	2.6	24	2.4	23
	22	1.7	23	1.4	23	1.2	23
Savemart Access	8	15.5	9	12.8	9	13.8	8
Total	20	24.4	21	20.2	21	19.6	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	0.3	26	0.3
	0.3	24	0.4
Grove St	1.7	19	2.6
	2.8	23	2.9
	1.5	18	5.9
Savemart Access	16.7	8	16.2
Total	23.2	19	28.2

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.2	8.7	0.1	26	26	0.3
Granlibakken Rd	26	1.3	11.7	0.1	22	23	1.1
	12	0.6	12.9	0.1	24	24	0.6
	19	1.0	20.5	0.1	24	24	1.1
	3	0.4	6.7	0.0	23	23	0.4
64 Acres Access	20	0.6	7.9	0.0	23	23	0.6
	45	0.6	8.2	0.1	24	23	0.6
	11	0.8	11.1	0.1	23	23	0.8
Tavern Shores Access	22	0.6	8.0	0.1	25	25	0.6
	10	0.6	7.2	0.0	20	20	0.5
SR 28	6	30.7	44.5	0.1	8	7	32.0
	16	1.4	13.2	0.1	18	18	1.4
Fairway Dr	42	1.6	16.6	0.1	24	24	1.6
	13	0.9	12.0	0.1	22	22	0.9
	1	0.8	12.7	0.1	23	23	0.8
	4	0.6	8.5	0.1	24	24	0.6
	5	1.4	18.9	0.1	23	23	1.3
	14	0.6	7.7	0.0	23	23	0.6
	34	0.9	10.2	0.1	23	23	0.8
	35	0.6	7.1	0.0	23	23	0.6
	36	1.1	9.2	0.1	22	22	1.1
Twin Crag	37	1.1	4.9	0.0	26	26	1.1
	38	1.4	12.9	0.1	22	22	1.4
	39	1.0	10.8	0.1	23	23	0.9
Total		50.8	292.1	1.7	21	21	51.8

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.2	26	0.2	26	0.2	26
Granlibakken Rd	22	1.6	24	0.6	20	2.9	23
	24	0.6	24	0.6	23	0.7	24
	24	1.0	24	1.1	24	1.1	24
	23	0.4	23	0.4	23	0.4	23
64 Acres Access	23	0.6	23	0.5	23	0.6	22
	24	0.6	24	0.6	23	0.6	23
	23	0.8	23	0.7	23	0.8	23
Tavern Shores Access	25	0.6	25	0.6	25	0.7	25
	20	0.6	21	0.6	20	0.6	20
SR 28	7	32.7	8	27.2	8	30.1	7
	18	1.4	18	1.4	18	1.3	18
Fairway Dr	23	1.7	23	1.7	24	1.6	24
	22	0.9	22	0.9	22	0.9	22
	23	0.8	23	0.8	23	0.8	23
	24	0.6	24	0.6	23	0.6	23
	23	1.4	23	1.4	23	1.5	23
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.9	23	0.9	23
	23	0.6	23	0.6	22	0.6	23
	22	1.1	22	1.1	22	1.1	22
Twin Crag	26	1.1	26	1.0	26	1.1	26
	22	1.4	22	1.3	22	1.5	22
	23	1.0	23	1.0	22	1.0	23
Total	20	53.3	21	46.3	20	52.0	20

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Alt 5 12132014 Delay	Run 5 Alt 5 12132014 Speed	Run 5 Alt 5 12132014 Delay
	0.2	26	0.2
Granlibakken Rd	0.8	24	0.7
	0.5	24	0.5
	1.0	24	1.0
	0.4	23	0.4
64 Acres Access	0.6	22	0.6
	0.6	23	0.6
	0.8	23	0.8
Tavern Shores Access	0.6	25	0.6
	0.6	20	0.6
SR 28	32.7	8	29.0
	1.4	19	1.2
Fairway Dr	1.3	24	1.7
	0.8	22	0.9
	0.9	23	0.9
	0.6	23	0.6
	1.5	23	1.6
	0.6	23	0.7
	0.9	23	0.9
	0.6	23	0.6
	1.1	22	1.1
Twin Crag	1.1	26	1.1
	1.4	22	1.4
	0.9	23	1.0
Total	52.2	21	48.9

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.3
	38	0.5	10.3	0.1	24	24	0.5
Twin Crag	37	0.7	11.2	0.1	25	25	0.7
	36	0.4	5.1	0.0	19	19	0.4
	35	0.7	8.7	0.1	23	23	0.7
	34	0.6	7.0	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	23	23	0.7
	4	1.8	19.2	0.1	23	23	1.9
	1	0.9	9.2	0.1	22	22	1.0
	13	3.0	14.7	0.1	20	20	2.8
Fairway Dr	42	15.6	352.1	0.1	11	12	14.3
	16	26.2	41.5	0.1	9	10	25.4
SR 89	6	12.0	14.3	0.1	17	24	7.7
	10	43.4	63.6	0.1	5	5	42.0
Tavern Shores Access	22	0.4	6.5	0.0	23	23	0.4
	11	0.6	8.2	0.1	25	25	0.6
	45	0.9	11.2	0.1	23	23	0.9
64 Acres Access	20	0.7	8.0	0.1	24	24	0.7
	3	0.7	8.0	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.0	21.5	0.1	23	23	2.1
Granlibakken Rd	26	3.2	15.3	0.1	20	20	3.4
	27	1.4	11.9	0.1	22	22	1.5
Total		118.2	680.0	1.6	17	17	110.7

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.4	26
	24	0.5	24	0.5	23	0.5	24
Twin Crag	26	0.6	26	0.7	25	0.7	26
	19	0.3	19	0.4	19	0.4	19
	23	0.6	23	0.7	23	0.6	23
	23	0.5	23	0.6	23	0.6	23
	23	0.8	23	0.9	23	0.9	23
	23	0.7	23	0.7	23	0.7	23
	23	1.7	23	1.9	23	1.8	22
	22	0.9	22	1.0	22	0.9	22
	20	2.9	20	3.1	20	2.9	21
Fairway Dr	11	15.0	10	17.9	12	14.4	13
	10	25.3	9	29.0	10	23.7	11
SR 89	16	12.7	12	17.2	23	8.0	18
	5	42.9	5	44.0	6	40.7	5
Tavern Shores Access	23	0.4	23	0.4	23	0.4	23
	25	0.6	25	0.6	25	0.6	24
	23	0.9	23	0.9	23	0.9	23
64 Acres Access	24	0.7	24	0.7	24	0.7	24
	22	0.7	22	0.7	22	0.6	22
	23	0.6	23	0.6	23	0.6	23
	23	2.0	23	2.1	23	2.0	23
Granlibakken Rd	20	3.2	20	3.3	21	3.0	20
	22	1.4	22	1.4	22	1.3	22
Total	17	116.5	16	129.4	17	107.3	17

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Alt 5 12132014 Delay	Run 5 Alt 5 12132014 Speed	Run 5 Alt 5 12132014 Delay
	0.3	26	0.4
	0.5	24	0.5
Twin Crag	0.7	25	0.7
	0.4	19	0.4
	0.6	23	0.7
	0.6	23	0.6
	0.9	23	0.9
	0.7	23	0.7
	1.9	22	1.9
	0.9	22	1.0
	2.2	19	4.2
Fairway Dr	12.1	9	20.7
	21.7	8	33.3
SR 89	11.1	13	15.8
	42.0	5	49.4
Tavern Shores Access	0.4	23	0.4
	0.6	25	0.5
	0.9	23	0.9
64 Acres Access	0.7	24	0.7
	0.6	22	0.7
	0.6	23	0.6
	2.0	23	2.0
Granlibakken Rd	3.3	20	3.2
	1.4	22	1.3
Total	107.1	16	141.2

Summer Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.2	14.0	0.1	13	13	6.0
	9	2.1	17.7	0.1	22	22	2.0
Grove St	2	4.5	25.4	0.3	41	43	3.1
	17	1.1	8.7	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.8
Total		14.6	75.7	0.6	27	27	13.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	14	5.8	13	6.4	13	6.4
	22	2.1	22	2.2	22	2.0
Grove St	42	3.7	39	5.6	40	5.5
	22	1.1	22	1.1	21	1.2
	23	0.8	23	0.7	23	0.7
Total	27	13.4	26	16.0	26	15.9

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	11.0	0.1	25	25	0.5
	17	0.9	10.1	0.1	23	22	1.1
Grove St	2	5.1	12.5	0.1	15	14	5.6
	9	10.8	50.7	0.3	20	21	7.5
	8	37.7	53.1	0.1	7	9	29.9
Savemart Access	6	18.3	39.4	0.1	7	8	16.3
Total		73.3	176.9	0.6	14	15	60.9

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Alt 5 12132014 Speed	Alt 5 12132014 Delay
	25	0.6	25	0.5	25	0.5
	22	1.1	23	0.7	23	0.8
Grove St	14	5.7	15	4.8	16	4.0
	18	16.8	19	13.4	22	4.9
	5	60.3	9	29.3	9	30.0
Savemart Access	7	19.4	7	18.5	7	19.1
Total	12	103.9	14	67.3	15	59.2

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.3	8.9	0.1	26	26	0.4
Granlibakken Rd	26	2.3	12.6	0.1	21	20	2.6
	12	0.8	13.1	0.1	23	23	0.8
	19	1.3	20.7	0.1	23	23	1.3
	3	0.5	6.8	0.0	23	23	0.5
64 Acres Access	20	0.7	8.0	0.0	22	22	0.7
	45	0.7	8.3	0.1	23	23	0.7
	11	0.9	11.2	0.1	23	23	0.9
Tavern Shores Access	22	0.7	8.1	0.1	25	25	0.7
	10	0.6	7.2	0.0	20	20	0.6
SR 28	6	39.4	53.1	0.1	6	7	37.8
	16	1.6	13.4	0.1	18	18	1.3
Fairway Dr	42	1.8	16.8	0.1	23	23	1.8
	13	1.0	12.1	0.1	22	22	0.9
	1	0.9	12.7	0.1	23	23	0.8
	4	0.7	8.5	0.1	23	24	0.6
	5	1.6	18.9	0.1	23	23	1.4
	14	0.7	7.7	0.0	23	23	0.6
	34	0.9	10.3	0.1	23	23	0.9
	35	0.7	7.2	0.0	22	23	0.6
	36	1.4	9.5	0.1	21	21	1.4
Twin Crag	37	1.3	6.5	0.0	24	24	1.3
	38	1.7	13.2	0.1	22	22	1.6
	39	1.1	10.9	0.1	22	23	1.1
Total		63.4	305.9	1.7	20	20	61.3

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 2 Speed	Run 2 Delay
	26	0.3	26	0.2	26	0.3
Granlibakken Rd	21	1.9	21	2.3	21	2.3
	23	0.9	23	0.7	23	0.7
	23	1.4	23	1.2	24	1.1
	23	0.6	23	0.5	23	0.4
64 Acres Access	22	0.8	22	0.7	23	0.6
	23	0.7	23	0.7	24	0.6
	23	1.0	23	0.9	23	0.8
Tavern Shores Access	24	0.8	25	0.7	25	0.6
	20	0.7	20	0.6	20	0.6
SR 28	6	40.7	7	38.1	6	40.7
	17	2.3	18	1.5	18	1.4
Fairway Dr	23	2.0	23	1.8	23	1.7
	22	1.0	22	1.0	22	0.9
	23	1.0	23	1.0	23	0.9
	23	0.7	23	0.7	23	0.6
	23	1.7	23	1.7	23	1.4
	23	0.7	23	0.7	23	0.6
	23	1.0	23	1.0	23	0.9
	22	0.7	22	0.7	22	0.7
	21	1.6	21	1.4	21	1.2
Twin Crag	23	1.4	24	1.3	25	1.2
	21	1.9	22	1.6	22	1.6
	22	1.1	22	1.1	22	1.1
Total	19	66.8	20	62.0	20	63.0

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.6	0.1	26	26	0.4
	38	0.5	10.4	0.1	24	24	0.5
Twin Crag	37	0.7	11.3	0.1	25	25	0.7
	36	0.4	5.1	0.0	19	19	0.4
	35	0.6	8.7	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	23	22	0.7
	4	1.8	19.2	0.1	23	22	1.9
	1	0.9	9.2	0.1	22	22	1.0
	13	3.7	15.4	0.1	19	19	3.6
Fairway Dr	42	20.6	1048.4	0.1	9	9	19.9
	16	33.5	48.7	0.1	8	8	32.2
SR 89	6	14.2	16.5	0.1	14	13	15.8
	10	51.9	72.0	0.1	5	5	49.7
Tavern Shores Access	22	0.4	6.5	0.0	23	23	0.4
	11	0.6	8.2	0.1	25	24	0.6
	45	1.0	11.2	0.1	23	23	0.9
64 Acres Access	20	0.7	8.0	0.1	24	24	0.7
	3	0.7	8.0	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.1	21.5	0.1	22	22	2.1
Granlibakken Rd	26	3.9	15.9	0.1	19	19	4.1
	27	1.5	12.0	0.1	22	22	1.5
Total		142.9	1395.6	1.6	16	16	140.6

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay
	26	0.3	26	0.3	26	0.3
	24	0.5	24	0.5	24	0.5
Twin Crag	26	0.7	25	0.7	25	0.7
	19	0.4	19	0.3	19	0.3
	23	0.7	23	0.6	23	0.6
	23	0.6	23	0.5	23	0.5
	23	0.9	23	0.8	23	0.8
	23	0.7	23	0.7	23	0.7
	23	1.9	23	1.7	23	1.8
	22	1.0	22	0.9	22	0.9
	19	4.3	20	3.5	19	3.6
Fairway Dr	9	21.8	9	21.6	9	19.4
	8	35.8	8	34.3	8	31.7
SR 89	17	12.2	14	14.5	14	14.4
	5	52.7	5	53.5	5	51.8
Tavern Shores Access	23	0.5	23	0.4	23	0.4
	24	0.6	25	0.6	25	0.6
	23	1.0	23	0.9	23	0.9
64 Acres Access	24	0.8	24	0.7	24	0.7
	22	0.7	22	0.7	22	0.7
	23	0.6	23	0.6	23	0.6
	22	2.2	23	2.1	22	2.2
Granlibakken Rd	20	3.6	20	3.5	19	4.3
	22	1.5	22	1.4	22	1.6
Total	16	146.1	16	145.2	16	140.0

Design Year (2038) Operations: Alternative 1

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	8	0.8
	47	0.1	5.8	0.0	18	18	0.1
	31	1.3	22.2	0.1	23	24	1.0
SR 89	3	5.8	12.5	0.1	17	18	5.1
Total		7.1	40.6	0.3	24	17	6.9

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	8	1.0	-	-	-
	18	0.1	18	0.1	18	0.1	18
	24	0.9	24	1.0	24	1.1	23
SR 89	18	4.9	19	4.7	18	5.2	16
Total	25	5.9	17	6.8	25	6.3	23

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
EB to SB RT	-	-	-
	0.1	18	0.1
	1.8	23	1.8
SR 89	6.8	15	7.1
Total	8.7	23	9.0

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	0.8	9.8	0.1	21	20	1.1
	47	1.3	22.2	0.1	23	23	1.4
New SR 89	24	2.6	8.7	0.0	12	12	3.1
New SR 28	1	4.3	11.7	0.0	13	13	4.3
Total		8.9	52.4	0.3	19	18	9.8

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.8	21	0.8	22	0.6	21
	24	1.1	23	1.5	24	1.2	23
New SR 89	11	3.1	12	2.7	13	2.1	12
New SR 28	13	3.9	12	4.8	13	3.8	13
Total	19	8.9	19	9.7	19	7.7	19

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.8	20	0.8
	1.4	24	1.0
New SR 89	2.6	13	2.1
New SR 28	3.9	12	4.9
Total	8.7	19	8.8

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.1	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	18	0.4
	35	0.7	8.8	0.1	23	23	0.8
	34	0.6	7.2	0.0	23	23	0.6
	14	1.0	10.3	0.1	23	23	1.0
	5	0.8	7.9	0.0	22	22	0.8
SR 89	4	3.6	21.8	0.1	20	20	3.7
New SR 89	1	3.1	11.2	0.1	18	18	2.7
Total		12.2	102.4	0.6	22	22	11.9

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.4	26	0.5	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	18	0.4	19	0.4	18	0.4	18
	23	0.7	23	0.7	23	0.8	23
	23	0.6	23	0.6	23	0.6	23
	23	1.0	23	0.9	23	1.0	23
	22	0.8	22	0.7	22	0.8	22
SR 89	20	3.7	20	3.7	20	3.7	20
New SR 89	18	3.3	18	3.3	18	3.2	18
Total	22	12.4	22	12.3	22	12.4	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.4	26	0.5
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	18	0.4
	0.7	23	0.8
	0.6	23	0.7
	1.0	22	1.0
	0.8	22	0.8
SR 89	3.5	20	3.6
New SR 89	3.1	18	3.0
Total	11.9	22	12.3

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.5	16.1	0.1	12	12	1.6
	5	0.6	22.9	0.1	19	19	0.6
	14	0.3	7.4	0.0	24	24	0.3
	34	0.5	9.9	0.1	24	24	0.5
	35	0.4	7.0	0.0	23	23	0.4
	36	0.6	8.8	0.1	23	23	0.6
Twin Crag	37	0.5	4.1	0.0	24	24	0.5
	38	1.0	12.5	0.1	23	23	1.0
	39	0.9	10.7	0.1	23	23	0.9
Total		6.5	99.4	0.6	20	21	6.5

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	1.6	12	1.5	12	1.5	12
	19	0.7	19	0.6	19	0.7	19
	24	0.3	24	0.3	24	0.3	24
	23	0.5	24	0.5	24	0.6	23
	23	0.4	23	0.4	23	0.5	23
	23	0.6	23	0.6	23	0.7	23
Twin Crag	25	0.5	24	0.5	24	0.5	24
	23	0.9	23	1.0	23	1.0	23
	23	0.8	23	0.8	23	0.9	23
Total	20	6.3	21	6.3	20	6.7	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
SR 89	1.6	12	1.5
	0.6	19	0.7
	0.3	24	0.4
	0.5	23	0.6
	0.4	23	0.5
	0.6	23	0.7
Twin Crag	0.5	24	0.5
	1.0	23	1.0
	0.8	23	0.9
Total	6.5	20	6.7

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.9	14.4	0.1	20	21	1.0
Fairway Dr	42	0.4	11.1	0.1	24	24	0.3
	16	0.9	16.3	0.1	24	24	0.8
Old SR 89	6	19.3	28.4	0.1	8	8	19.2
Total		21.5	70.2	0.3	17	17	21.3

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	0.9	21	1.0	20	0.9	20
Fairway Dr	24	0.4	24	0.4	24	0.4	24
	24	0.9	24	1.0	24	0.9	24
Old SR 89	9	18.8	8	20.9	8	19.1	9
Total	17	20.9	16	23.4	17	21.2	17

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.9	20	1.0
Fairway Dr	0.3	24	0.4
	0.7	24	0.9
Old SR 89	18.0	8	19.4
Total	20.0	17	21.7

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	3.8	13.7	0.1	17	18	3.8
Fairway Dr	42	1.7	16.7	0.1	23	23	1.9
	13	0.9	12.0	0.1	22	22	0.9
SR 89	1	7.1	17.1	0.1	17	18	6.9
Total		13.5	59.6	0.3	20	20	13.5

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.7	17	3.8	17	4.1	17
Fairway Dr	23	1.6	23	1.7	24	1.7	23
	22	0.8	22	0.8	22	0.8	22
SR 89	18	6.7	18	6.6	18	6.5	16
Total	20	12.8	20	12.8	20	13.1	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	3.9	17	3.9
Fairway Dr	1.8	24	1.5
	0.9	22	0.8
SR 89	7.9	17	7.7
Total	14.5	20	13.9

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	4.2	12.0	0.1	16	15	4.4
	9	1.4	15.7	0.1	25	25	1.6
Grove St	2	2.5	23.0	0.3	44	44	2.5
	17	0.8	8.4	0.1	23	22	0.8
	18	0.6	9.8	0.1	23	23	0.6
Total		9.5	68.8	0.6	29	29	10.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	3.8	15	4.7	16	4.0	16
	25	1.4	25	1.4	25	1.4	25
Grove St	44	2.5	46	2.1	45	2.5	43
	23	0.7	23	0.7	23	0.8	22
	23	0.6	23	0.6	23	0.5	23
Total	29	9.1	29	9.5	29	9.2	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	4.0	16	4.1
	1.5	26	1.3
Grove St	3.3	45	2.1
	0.9	23	0.7
	0.6	23	0.5
Total	10.3	30	8.9

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.6	0.1	26	26	0.4
	17	0.4	9.6	0.1	24	24	0.5
Grove St	2	2.4	9.9	0.1	19	19	2.5
	9	2.7	38.7	0.3	26	26	2.9
	8	1.4	16.9	0.1	23	23	1.4
Savemart Access	6	11.5	18.2	0.1	10	11	10.8
Total		18.8	103.9	0.6	22	22	18.5

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.3	24	0.4	24	0.3	24
Grove St	20	1.7	19	2.7	19	2.6	19
	27	2.4	26	2.8	26	2.7	26
	23	1.3	23	1.4	23	1.3	23
Savemart Access	10	13.0	11	11.0	10	11.5	10
Total	22	19.1	22	18.6	22	18.7	22

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.4	25	0.4
	0.4	24	0.5
Grove St	2.5	19	2.3
	2.7	26	2.9
	1.4	23	1.5
Savemart Access	11.3	10	11.7
Total	18.7	22	19.2

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	13.0	0.0	14	14	0.2
	45	0.1	7.7	0.1	25	25	0.1
	11	0.2	10.5	0.1	25	25	0.2
Tavern Shores Access	22	0.2	7.5	0.1	27	27	0.2
	10	0.2	6.8	0.0	21	22	0.2
SR 28	6	8.9	18.9	0.1	18	17	10.0
Total		9.7	64.4	0.4	20	20	10.8

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	14	0.2	14	0.2	14	0.2	13
	25	0.1	25	0.1	25	0.1	25
	25	0.2	25	0.2	25	0.2	24
Tavern Shores Access	27	0.2	27	0.2	27	0.2	27
	22	0.2	22	0.2	22	0.2	21
SR 28	16	11.2	19	7.4	25	3.7	16
Total	20	11.9	21	8.3	22	4.6	20

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
64 Acres Access	0.2	14	0.1
	0.1	25	0.2
	0.2	24	0.2
Tavern Shores Access	0.2	26	0.2
	0.2	21	0.2
SR 28	10.9	17	9.4
Total	11.7	20	10.4

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	10	1.8	15.6	0.1	22	22	1.6
Tavern Shores Access	22	0.2	6.1	0.0	24	24	0.2
	11	0.3	7.9	0.1	25	26	0.3
	45	0.5	10.8	0.1	24	24	0.4
64 Acres Access	20	0.5	8.1	0.1	24	24	0.5
New SR 89	3	5.3	10.8	0.0	16	15	6.1
Total		8.6	59.4	0.4	22	22	9.1

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	1.6	21	2.2	22	1.7	22
Tavern Shores Access	24	0.2	24	0.2	24	0.2	23
	25	0.3	26	0.3	25	0.3	25
	24	0.5	24	0.4	24	0.5	23
64 Acres Access	24	0.5	24	0.4	24	0.5	23
New SR 89	18	4.6	17	4.9	17	4.9	16
Total	23	7.8	22	8.4	22	8.1	22

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	1.7	21	1.8
Tavern Shores Access	0.3	24	0.2
	0.4	25	0.3
	0.6	24	0.5
64 Acres Access	0.5	24	0.5
New SR 89	5.7	16	5.7
Total	9.2	22	9.0

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	4.7	16.8	0.1	18	18	4.7
Total		4.7	16.8	0.1	18	18	4.7

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	19	4.2	18	5.0	18	4.7	18
Total	19	4.2	18	5.0	18	4.7	18

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
New SR 89	5.0	18	4.7
Total	5.0	18	4.7

Summer Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.2	0.1	26	26	0.5
	38	0.7	10.5	0.1	23	23	0.7
Twin Crag	37	0.9	11.4	0.1	25	25	0.9
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	23	22	0.7
	14	1.0	10.4	0.1	22	22	1.0
	5	0.8	7.9	0.0	22	22	0.8
SR 89	4	4.9	23.0	0.1	19	19	5.0
New SR 28	1	4.4	12.4	0.1	16	16	4.3
Total		15.1	105.1	0.6	21	21	15.0

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	25	0.6	26
	23	0.7	23	0.7	23	0.7	23
Twin Crag	25	0.9	25	0.9	25	0.9	25
	18	0.4	18	0.5	18	0.4	18
	23	0.8	23	0.8	23	0.8	23
	22	0.7	22	0.7	22	0.7	23
	22	1.1	22	1.1	22	1.1	23
	22	0.9	22	0.9	22	0.9	22
SR 89	19	4.6	18	6.0	18	5.4	20
New SR 28	16	4.4	15	5.0	16	4.7	17
Total	21	15.0	21	17.1	21	16.2	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.5	26	0.5
	0.6	23	0.6
Twin Crag	0.8	25	0.8
	0.4	19	0.4
	0.8	23	0.8
	0.7	23	0.6
	1.0	23	1.0
	0.8	22	0.8
SR 89	4.0	19	4.4
New SR 28	3.5	16	4.4
Total	13.1	22	14.3

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	2.7	21.2	0.1	9	9	3.0
	5	0.7	23.1	0.1	19	19	0.7
	14	0.4	7.4	0.0	24	24	0.3
	34	0.6	10.0	0.1	23	23	0.6
	35	0.5	7.0	0.0	23	23	0.4
	36	0.7	8.8	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.1	12.6	0.1	23	23	1.0
	39	1.0	10.8	0.1	23	23	0.9
Total		7.9	105.2	0.6	19	19	7.9

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	9	2.7	9	2.6	9	2.7	10
	19	0.7	19	0.7	19	0.7	19
	24	0.4	24	0.4	24	0.4	23
	23	0.6	23	0.7	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.7	23	0.7	23	0.7	23
Twin Crag	23	0.3	22	0.4	23	0.3	22
	23	1.0	23	1.2	23	1.0	23
	23	1.0	23	1.1	23	0.9	22
Total	19	7.9	19	8.2	19	7.7	19

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
SR 89	2.5	9	2.6
	0.7	19	0.7
	0.4	24	0.4
	0.6	23	0.6
	0.5	23	0.5
	0.7	23	0.7
Twin Crag	0.4	23	0.4
	1.1	23	1.1
	1.0	23	1.0
Total	7.9	19	7.8

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	-	-
	47	0.3	6.1	0.0	17	18	0.1
	31	12.3	33.2	0.1	16	15	12.7
SR 89	3	15.9	22.4	0.1	9	8	20.3
Total		28.5	61.7	0.3	16	15	33.1

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	-	-	7	1.6	-
	16	0.9	18	0.1	18	0.1	18
	10	31.3	17	10.4	18	8.4	18
SR 89	7	21.9	8	18.2	10	13.7	11
Total	11	54.2	16	28.8	13	23.8	19

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
EB to SB RT	-	-	-
	0.1	18	0.1
	7.5	23	2.0
SR 89	11.5	12	11.4
Total	19.1	21	13.5

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	0.9	10.0	0.1	21	21	0.9
	47	2.2	23.0	0.1	23	22	3.0
New SR 89	24	7.1	13.2	0.0	8	7	9.8
New SR 28	1	6.1	13.1	0.0	11	11	6.5
Total		16.3	59.3	0.3	17	15	20.2

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	0.9	22	0.8	21	0.9	20
	22	2.8	23	2.2	23	2.0	23
New SR 89	7	8.1	8	6.8	8	7.5	8
New SR 28	11	6.6	11	5.9	10	7.0	12
Total	16	18.4	17	15.8	16	17.4	17

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.2	21	1.0
	1.6	24	1.2
New SR 89	6.5	11	3.7
New SR 28	5.2	12	5.0
Total	14.5	18	10.9

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	1.2	14.2	0.1	21	20	1.4
Fairway Dr	42	0.4	11.1	0.1	24	24	0.5
	16	1.0	16.4	0.1	24	24	1.0
Old SR 89	6	23.4	32.6	0.1	7	7	23.4
Total		26.1	74.2	0.3	16	16	26.3

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.2	21	1.2	21	1.2	21
Fairway Dr	24	0.4	24	0.5	24	0.4	24
	24	1.0	24	1.1	24	1.1	24
Old SR 89	7	24.0	7	25.2	8	21.1	7
Total	16	26.5	16	28.0	17	23.8	16

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	1.1	21	1.0
Fairway Dr	0.4	24	0.4
	0.9	24	0.9
Old SR 89	25.5	8	21.0
Total	27.9	17	23.4

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	5.1	15.0	0.1	16	15	5.5
Fairway Dr	42	2.1	17.3	0.1	23	22	2.4
	13	1.8	13.0	0.1	20	21	1.3
SR 89	1	14.1	24.7	0.1	12	13	13.0
Total		23.2	69.9	0.3	17	17	22.1

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	5.5	16	4.7	15	5.7	16
Fairway Dr	23	2.2	23	2.1	22	2.4	23
	20	2.1	18	3.6	21	1.3	21
SR 89	10	19.5	12	15.0	12	14.4	13
Total	16	29.3	17	25.4	17	23.8	18

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	4.8	17	4.5
Fairway Dr	1.7	23	1.8
	1.2	21	1.1
SR 89	12.2	14	10.4
Total	19.9	18	17.9

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	5.5	13.3	0.1	14	14	5.8
	9	1.6	16.4	0.1	24	24	1.6
Grove St	2	3.7	23.9	0.3	43	43	4.3
	17	1.0	8.6	0.1	22	22	1.0
	18	0.7	9.9	0.1	23	23	0.7
Total		12.5	72.1	0.6	28	28	13.5

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.8	14	5.9	14	5.4	14
	24	1.6	24	1.6	24	1.5	23
Grove St	44	3.5	43	3.3	44	3.0	44
	22	1.0	22	1.0	22	0.9	22
	23	0.7	23	0.7	23	0.7	23
Total	28	12.6	28	12.6	28	11.5	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	5.5	15	4.7
	1.6	24	1.5
Grove St	3.8	44	4.0
	1.1	22	1.0
	0.7	23	0.7
Total	12.7	29	11.9

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	10.8	0.1	25	26	0.4
	17	0.7	9.8	0.1	23	24	0.5
Grove St	2	3.6	11.1	0.1	17	17	3.4
	9	3.3	42.2	0.3	24	24	3.2
	8	1.7	17.2	0.1	23	23	1.5
Savemart Access	6	16.6	23.7	0.1	8	8	16.4
Total		26.4	114.9	0.6	20	20	25.4

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.5	25	0.5	25
	23	0.6	23	0.6	22	1.1	23
Grove St	16	4.3	18	2.8	16	4.0	17
	24	3.5	24	3.4	24	3.3	24
	22	2.3	23	1.5	23	1.5	23
Savemart Access	8	16.9	9	15.1	8	18.1	8
Total	20	28.0	20	23.8	19	28.4	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	0.5	25	0.5
	0.6	23	0.7
Grove St	3.5	16	3.9
	3.3	24	3.3
	1.6	22	1.8
Savemart Access	16.8	8	15.9
Total	26.3	20	26.1

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.3	13.1	0.0	14	14	0.4
	45	0.1	7.7	0.1	25	25	0.1
	11	0.2	10.5	0.1	24	25	0.2
Tavern Shores Access	22	0.3	7.5	0.1	27	27	0.3
	10	0.2	6.9	0.0	21	22	0.2
SR 28	6	9.9	19.8	0.1	17	16	11.0
Total		11.1	65.4	0.4	20	20	12.2

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	14	0.3	14	0.4	14	0.3	14
	25	0.1	25	0.2	25	0.1	25
	25	0.2	24	0.2	24	0.2	24
Tavern Shores Access	27	0.2	27	0.3	27	0.3	27
	21	0.2	21	0.3	22	0.2	21
SR 28	16	11.3	16	10.6	17	9.8	20
Total	20	12.4	20	12.0	20	10.9	21

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
64 Acres Access	0.4	14	0.2
	0.2	25	0.1
	0.3	24	0.2
Tavern Shores Access	0.3	27	0.2
	0.3	21	0.2
SR 28	7.2	17	10.0
Total	8.7	20	11.0

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	10	1.8	15.5	0.1	22	21	1.8
Tavern Shores Access	22	0.2	6.1	0.0	24	24	0.2
	11	0.3	7.9	0.1	25	25	0.3
	45	0.5	10.7	0.1	24	24	0.5
64 Acres Access	20	0.6	8.1	0.1	24	23	0.7
New SR 89	3	7.4	12.9	0.0	14	13	8.3
Total		10.8	61.2	0.4	21	21	11.8

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	1.7	21	1.9	21	1.8	21
Tavern Shores Access	24	0.3	24	0.2	24	0.2	24
	25	0.3	26	0.3	25	0.3	25
	24	0.5	24	0.5	24	0.4	24
64 Acres Access	24	0.7	24	0.5	24	0.4	23
New SR 89	12	9.2	15	6.7	16	5.4	13
Total	21	12.7	22	10.1	22	8.5	21

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Alt 1 11262014 Speed	Alt 1 11262014 Delay
	1.7	24	1.6
Tavern Shores Access	0.3	24	0.3
	0.4	25	0.4
	0.5	24	0.6
64 Acres Access	0.8	24	0.7
New SR 89	8.2	16	6.0
Total	11.9	22	9.4

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	6.2	18.3	0.1	17	17	5.5
Total		6.2	18.3	0.1	17	17	5.5

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	16	7.0	17	6.4	16	6.7	17
Total	16	7.0	17	6.4	16	6.7	17

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	6.2	17	5.5
Total	6.2	17	5.5

Design Year (2038) Operations: Alternative 2

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	5.5	0.0	20	20	0.1
	31	1.8	23.6	0.1	22	22	2.1
SR 89	3	4.2	10.9	0.1	19	17	5.3
Total		6.1	39.9	0.3	25	24	7.5

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	-	-	-	-	-
WB to NB RT	20	0.1	20	0.1	20	0.1	20
	22	2.7	23	1.5	23	1.5	23
SR 89	16	6.3	22	2.9	20	3.8	20
Total	23	9.1	26	4.5	25	5.4	25

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
EB to SB RT	-	-	-
WB to NB RT	0.1	20	0.1
	1.5	23	1.3
SR 89	3.7	22	2.8
Total	5.2	26	4.2

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	0.9	10.4	0.1	20	21	0.7
WB to NB RT	25	3.8	25.0	0.1	21	21	3.7
New SR 89	24	1.5	6.6	0.0	17	19	1.2
New SR 28	1	2.0	9.6	0.0	15	15	1.7
Total		8.1	51.6	0.3	19	20	7.4

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	0.8	20	0.9	20	0.7	19
WB to NB RT	22	3.2	21	3.9	21	4.0	21
New SR 89	17	1.2	17	1.6	17	1.5	17
New SR 28	15	1.7	14	2.2	15	1.8	14
Total	20	6.8	19	8.6	19	8.0	19

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
	1.0	20	1.0
WB to NB RT	4.1	21	4.1
New SR 89	1.8	17	1.6
New SR 28	2.3	14	2.2
Total	9.1	19	8.9

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.3
	38	0.5	10.4	0.1	24	24	0.5
Twin Crag	37	0.7	11.3	0.1	25	25	0.6
	36	0.3	5.1	0.0	19	19	0.3
	35	0.6	8.7	0.1	23	23	0.6
	34	0.6	7.1	0.0	23	23	0.5
	14	0.9	10.2	0.1	23	23	0.8
	5	0.7	7.8	0.0	23	23	0.7
SR 89	4	3.5	21.7	0.1	20	20	3.6
New SR 89	1	3.4	11.5	0.1	17	17	3.7
Total		11.6	101.2	0.6	22	22	11.6

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.4	27	0.3	26
	24	0.5	24	0.5	24	0.4	24
Twin Crag	25	0.7	25	0.7	26	0.6	25
	19	0.3	19	0.4	19	0.3	19
	23	0.6	23	0.7	23	0.6	23
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.9	23	0.9	23
	23	0.7	23	0.7	23	0.7	23
SR 89	20	3.3	20	3.4	20	3.5	20
New SR 89	17	3.5	17	3.4	18	3.3	17
Total	22	11.3	22	11.5	22	11.2	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	RAB Speed	RAB Delay
	0.4	26	0.4
	0.5	23	0.6
Twin Crag	0.7	25	0.7
	0.3	19	0.4
	0.6	23	0.7
	0.5	23	0.6
	0.8	23	0.9
	0.7	22	0.7
SR 89	3.7	20	3.6
New SR 89	4.0	18	2.8
Total	12.3	22	11.4

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.6	16.2	0.1	12	12	1.7
	5	0.6	22.9	0.1	19	19	0.7
	14	0.3	7.4	0.0	24	24	0.4
	34	0.6	9.9	0.1	24	23	0.6
	35	0.4	7.0	0.0	23	23	0.5
	36	0.6	8.8	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.6	0.1	23	23	1.0
	39	0.9	10.8	0.1	23	23	0.9
Total		6.4	99.6	0.6	20	20	6.6

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	1.6	12	1.8	12	1.6	12
	19	0.7	19	0.7	19	0.6	19
	24	0.4	24	0.4	24	0.3	24
	23	0.6	23	0.6	24	0.5	24
	23	0.5	23	0.5	23	0.4	23
	23	0.7	23	0.7	23	0.6	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	1.0	23	1.0	23	0.9	23
	22	1.0	23	0.9	23	0.9	23
Total	20	6.7	20	6.8	20	6.2	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	1.6	12	1.5
	0.6	19	0.6
	0.3	24	0.3
	0.5	24	0.6
	0.4	23	0.4
	0.5	23	0.6
Twin Crag	0.3	23	0.3
	0.9	23	1.0
	0.8	23	0.9
Total	5.8	21	6.2

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	1.5	15.8	0.0	11	11	1.7
Fairway Dr	42	2.1	18.0	0.1	21	21	2.3
	16	0.9	16.3	0.1	24	24	0.9
Savemart Access	6	0.9	10.8	0.1	22	23	0.6
Total		5.4	61.0	0.3	19	19	5.5

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	-	-	-	-	11	1.5	11
Fairway Dr	22	1.9	21	2.1	22	2.2	22
	24	0.8	24	0.9	24	0.9	24
Savemart Access	21	1.2	22	1.1	22	0.9	22
Total	26	3.8	26	4.1	20	5.4	19

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
WB to NB RT	1.6	-	-
Fairway Dr	2.2	21	2.1
	1.0	24	0.9
Savemart Access	0.7	22	0.9
Total	5.5	26	3.9

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	1.5	11.4	0.1	21	21	1.4
Fairway Dr	42	1.5	16.5	0.1	24	24	1.7
WB to NB RT	13	6.2	22.0	0.1	18	18	5.4
SR 89	1	5.9	11.1	0.0	16	16	5.9
Total		15.1	61.0	0.3	19	20	14.4

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.6	21	1.3	21	1.5	21
Fairway Dr	23	1.7	24	1.3	24	1.6	24
WB to NB RT	19	4.9	17	7.3	18	5.2	15
SR 89	16	5.6	15	6.3	15	6.1	15
Total	20	13.8	19	16.2	20	14.3	18

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.5	21	1.4
Fairway Dr	1.4	24	1.6
WB to NB RT	9.5	19	4.7
SR 89	6.3	17	5.0
Total	18.7	20	12.7

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	0.8	8.0	0.1	23	24	0.7
	9	1.0	16.6	0.1	23	24	1.0
Grove St	2	2.8	23.4	0.3	44	44	2.7
	17	0.9	8.5	0.1	22	23	0.8
	18	0.6	9.8	0.1	23	23	0.5
Total		6.2	66.3	0.6	30	31	5.7

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	0.8	23	0.9	23	0.9	23
	23	1.0	23	1.1	23	1.0	23
Grove St	44	2.7	43	3.0	44	2.9	43
	22	0.8	22	0.9	22	0.9	22
	23	0.6	23	0.6	23	0.6	23
Total	30	6.0	30	6.6	30	6.2	30

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	0.8	23	0.8
	1.1	23	1.1
Grove St	3.1	45	2.7
	0.9	22	0.8
	0.6	23	0.6
Total	6.5	31	6.2

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.6	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	2.3	9.8	0.1	19	19	2.7
	9	2.9	43.1	0.3	23	23	2.8
	8	1.3	16.9	0.1	23	23	1.2
Savemart Access	6	1.0	7.9	0.1	24	24	1.1
Total		8.2	97.7	0.6	23	23	8.5

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.3	26	0.3	26
	24	0.4	24	0.4	24	0.4	24
Grove St	20	2.2	18	2.8	20	1.9	19
	23	3.1	24	2.8	23	2.8	23
	23	1.3	23	1.2	23	1.3	23
Savemart Access	23	1.2	24	1.0	24	0.9	24
Total	23	8.7	23	8.6	23	7.6	23

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	0.3	26	0.3
	0.4	24	0.3
Grove St	2.2	20	2.0
	3.0	23	2.7
	1.4	23	1.2
Savemart Access	0.9	24	1.1
Total	8.2	23	7.7

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	13.5	0.0	13	13	0.0
	45	0.0	7.6	0.1	25	25	0.0
	11	0.0	10.3	0.1	25	25	0.0
	22	0.0	7.9	0.1	25	25	0.0
Total		0.2	39.4	0.2	21	21	0.0

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	12	0.3	9	0.1	13	0.0	24
	26	0.0	26	0.0	26	0.0	25
	25	0.1	25	0.0	25	0.0	25
	26	0.1	26	0.0	25	0.0	25
Total	21	0.4	19	0.2	21	0.0	25

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
64 Acres Access	0.7	12	0.0
	0.0	25	0.0
	0.0	24	0.0
	0.0	25	0.0
Total	0.7	20	0.0

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	7.7	0.1	26	25	0.0
	45	0.0	10.1	0.1	25	24	0.0
64 Acres Access	20	0.1	7.8	0.1	25	24	0.2
New SR 89	3	4.6	8.6	0.0	21	18	5.3
Total		4.7	34.2	0.2	24	23	5.5

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.0	25	0.0	26	0.0	25
	25	0.0	24	0.0	26	0.1	25
64 Acres Access	25	0.1	25	0.1	26	0.1	25
New SR 89	21	4.0	17	6.5	25	3.8	28
Total	24	4.1	22	6.7	26	4.0	26

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.0	25	0.0
	0.0	25	0.0
64 Acres Access	0.0	25	0.1
New SR 89	2.7	21	5.4
Total	2.7	24	5.5

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	9.4	21.2	0.1	14	13	10.5
Total		9.4	21.2	0.1	14	13	10.5

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	15	8.6	15	8.7	14	10.0	13
Total	15	8.6	15	8.7	14	10.0	13

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	11.2	15	7.6
Total	11.2	15	7.6

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	6.4	24.2	0.1	12	13	5.8
Total		6.4	24.2	0.1	12	13	5.8

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	13	5.6	12	6.0	12	6.3	12
Total	13	5.6	12	6.0	12	6.3	12

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 5 Delay	RAB OneLane Run 5 Speed	RAB OneLane RAB Delay
New SR 28	7.1	12	7.3
Total	7.1	12	7.3

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB to SB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.4	5.7	0.0	19	20	0.1
	31	9.9	31.7	0.1	17	20	4.2
SR 89	3	7.4	14.1	0.1	15	16	6.4
Total		17.7	51.5	0.3	19	22	10.7

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB to SB RT	-	-	-	-	-	-	-
WB to NB RT	20	0.1	15	1.7	19	0.2	20
	20	4.9	10	28.6	13	17.0	22
SR 89	15	7.2	14	8.1	11	12.1	18
Total	21	12.3	14	38.5	16	29.3	24

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
EB to SB RT	-	-	-
WB to NB RT	0.1	20	0.1
	1.7	21	3.0
SR 89	5.0	17	5.7
Total	6.8	23	8.8

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	31	1.4	10.7	0.1	19	19	1.1
WB to NB RT	25	17.8	38.7	0.1	14	20	5.2
New SR 89	24	2.7	15.7	0.0	15	16	1.8
New SR 28	1	4.4	12.1	0.0	12	14	2.2
Total		26.3	77.2	0.3	14	18	10.4

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	19	1.1	16	3.5	20	1.0	24
WB to NB RT	20	5.0	10	29.5	17	10.7	6
New SR 89	16	1.9	12	4.4	16	1.9	12
New SR 28	14	2.4	12	4.6	14	2.3	6
Total	18	10.3	12	42.0	17	15.8	8

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.8	19	1.3
WB to NB RT	62.7	19	6.5
New SR 89	4.4	16	2.1
New SR 28	15.4	14	2.5
Total	83.4	18	12.4

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	2.8	27.6	0.1	19	26	0.5
	38	4.3	14.1	0.1	17	23	0.7
Twin Crag	37	5.0	15.6	0.1	18	25	0.9
	36	1.8	6.6	0.0	14	18	0.5
	35	3.7	11.8	0.1	17	23	0.8
	34	3.7	10.1	0.0	16	23	0.7
	14	5.8	15.1	0.1	15	22	1.1
	5	4.5	11.6	0.0	15	22	0.9
SR 89	4	16.8	34.9	0.1	12	19	4.5
New SR 89	1	8.2	16.2	0.1	12	15	5.0
Total		56.7	163.6	0.6	15	21	15.5

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.6	13	6.9	26	0.5	11
	23	0.7	12	10.6	23	0.7	10
Twin Crag	25	0.9	13	11.4	25	0.9	10
	18	0.5	10	4.7	18	0.5	9
	23	0.9	11	10.2	23	0.8	11
	22	0.7	11	8.9	22	0.9	8
	22	1.1	10	13.2	19	3.1	8
	22	0.9	10	10.5	17	3.0	9
SR 89	19	4.6	9	31.2	13	14.3	7
New SR 89	15	5.2	14	6.8	15	5.4	6
Total	21	16.1	11	114.5	19	30.1	9

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	9.5	25	0.6
	14.6	23	0.7
Twin Crag	18.4	25	0.9
	5.5	18	0.5
	11.1	23	0.8
	12.5	22	0.8
	18.1	20	2.1
	11.7	18	2.4
SR 89	40.2	14	12.1
New SR 89	26.5	15	4.9
Total	168.2	19	25.9

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	4.3	18.9	0.1	11	12	2.2
	5	0.6	22.8	0.1	19	19	0.6
	14	0.3	7.4	0.0	24	24	0.3
	34	0.6	9.9	0.1	24	24	0.5
	35	0.5	7.0	0.0	23	23	0.4
	36	0.6	8.8	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.5	0.1	23	23	1.0
	39	0.9	10.8	0.1	23	23	0.9
Total		9.2	102.2	0.6	20	20	6.9

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	2.0	11	3.2	12	2.1	6
	19	0.6	19	0.7	19	0.6	19
	24	0.3	24	0.4	24	0.3	24
	24	0.5	23	0.6	24	0.5	23
	23	0.4	23	0.5	23	0.4	23
	23	0.6	23	0.7	23	0.6	23
Twin Crag	23	0.3	23	0.4	23	0.3	23
	23	1.0	23	1.1	23	1.0	23
	23	0.9	23	1.0	23	0.9	23
Total	20	6.7	20	8.6	20	6.9	17

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	18.0	12	2.1
	0.6	19	0.6
	0.3	24	0.3
	0.5	24	0.6
	0.4	23	0.5
	0.6	23	0.6
Twin Crag	0.3	23	0.3
	1.0	23	1.0
	0.9	23	1.0
Total	22.8	20	7.1

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	-	-	0.0	-	-	-
Fairway Dr	42	7.9	24.7	0.1	16	21	2.3
	16	7.0	22.4	0.1	17	24	0.9
Savemart Access	6	11.4	22.0	0.1	11	22	0.9
Total		26.3	69.0	0.3	18	26	4.0

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	-	-	-	-	-	-	-
Fairway Dr	21	2.3	22	2.1	22	2.1	6
	24	0.9	24	0.9	24	1.0	6
Savemart Access	22	0.9	22	0.8	22	1.0	2
Total	26	4.1	27	3.9	26	4.1	5

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	-	-	-
Fairway Dr	46.1	21	2.4
	51.2	24	0.9
Savemart Access	88.2	22	0.7
Total	185.4	26	4.0

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	42.7	52.5	0.1	5	9	18.0
Fairway Dr	42	65.8	96.9	0.1	5	7	41.3
WB to NB RT	13	76.1	133.3	0.1	4	5	66.7
SR 89	1	11.4	17.3	0.0	10	11	9.9
Total		195.8	300.0	0.3	5	7	136.0

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	6	28.3	3	70.0	4	50.7	5
Fairway Dr	6	55.5	4	89.2	5	70.1	5
WB to NB RT	5	67.6	4	84.7	4	74.6	4
SR 89	11	10.1	10	11.3	11	10.9	8
Total	6	161.6	4	255.2	5	206.3	5

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	39.8	4	51.7
Fairway Dr	68.5	4	73.7
WB to NB RT	92.4	4	75.8
SR 89	16.5	11	10.9
Total	217.2	5	212.1

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	0.9	8.0	0.1	23	23	0.9
	9	1.1	16.7	0.1	23	23	1.1
Grove St	2	3.4	23.4	0.3	44	43	3.2
	17	1.0	8.6	0.1	22	22	1.0
	18	0.7	9.9	0.1	23	23	0.7
Total		7.1	66.5	0.6	30	30	7.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	0.9	23	0.9	23	0.9	23
	23	1.1	23	1.2	23	1.0	23
Grove St	44	3.3	43	4.2	44	3.2	51
	22	1.0	22	1.1	22	1.0	22
	23	0.7	23	0.7	23	0.7	23
Total	30	7.1	30	8.0	30	6.9	32

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	0.9	23	0.8
	1.1	23	1.0
Grove St	2.8	44	3.7
	0.9	22	1.1
	0.6	23	0.7
Total	6.2	30	7.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	1.3	12.8	0.1	23	25	0.5
	17	1.9	11.0	0.1	21	23	0.9
Grove St	2	5.5	13.0	0.1	15	15	5.0
	9	31.3	70.8	0.3	14	23	3.6
	8	22.1	37.6	0.1	10	23	1.6
Savemart Access	6	32.4	65.4	0.1	5	16	4.6
Total		94.5	210.6	0.6	12	22	16.1

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.5	25	0.5	17
	23	0.6	20	1.9	23	0.8	14
Grove St	17	3.4	12	8.1	16	4.0	11
	23	3.6	9	72.4	23	3.5	12
	22	1.7	7	38.0	15	10.5	9
Savemart Access	12	9.1	3	61.5	4	39.5	5
Total	21	19.0	8	182.4	15	58.7	11

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	5.8	25	0.5
	6.9	23	0.6
Grove St	9.3	17	3.9
	42.7	10	60.6
	26.4	6	55.2
Savemart Access	27.5	3	54.3
Total	118.6	9	175.1

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	1.4	11.8	0.0	15	18	0.2
	45	0.0	7.6	0.1	25	25	0.0
	11	0.0	10.4	0.1	25	24	0.0
	22	0.0	8.0	0.1	25	25	0.0
Total		1.4	37.8	0.2	22	23	0.2

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	21	0.2	13	3.7	19	0.6	12
	25	0.0	25	0.0	25	0.0	25
	25	0.0	25	0.0	24	0.0	24
	25	0.0	25	0.1	25	0.0	25
Total	24	0.2	21	3.8	23	0.6	20

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
64 Acres Access	0.0	17	0.3
	0.0	26	0.0
	0.0	25	0.1
	0.0	25	0.1
Total	0.0	23	0.5

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	8.0	0.1	25	26	0.0
	45	0.0	10.4	0.1	25	26	0.0
64 Acres Access	20	18.5	26.0	0.1	7	26	0.0
New SR 89	3	5.8	10.0	0.0	19	26	3.5
Total		24.3	54.4	0.2	15	26	3.6

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.0	26	0.0	26	0.0	25
	25	0.0	26	0.0	25	0.0	24
64 Acres Access	25	0.1	18	3.6	25	0.3	2
New SR 89	24	3.8	17	7.0	22	5.2	21
Total	25	3.9	21	10.6	24	5.4	7

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	0.0	26	0.0
	0.0	25	0.1
64 Acres Access	76.5	24	0.4
New SR 89	4.5	12	11.2
Total	81.0	20	11.7

Arterial Level of Service: EB EB to SB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	24.6	36.3	0.1	8	11	15.3
Total		24.6	36.3	0.1	8	11	15.3

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	10	18.8	6	37.1	8	28.0	10
Total	10	18.8	6	37.1	8	28.0	10

Arterial Level of Service: EB EB to SB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	19.2	8	28.1
Total	19.2	8	28.1

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	25.0	42.7	0.1	7	9	17.1
Total		25.0	42.7	0.1	7	9	17.1

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	10	12.2	7	25.4	7	22.8	3
Total	10	12.2	7	25.4	7	22.8	3

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 5 Delay	RAB Speed	RAB Delay
New SR 28	68.7	9	15.6
Total	68.7	9	15.6

Design Year (2038) Operations: Alternative 3

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
NB to EB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	4.7	0.0	18	18	0.1
	44	1.6	24.1	0.2	23	23	1.7
SR 89	3	3.3	9.5	0.1	21	18	4.7
Total		5.1	38.3	0.3	26	25	6.5

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
NB to EB RT	-	-	-	-	-	-	-
WB to NB RT	18	0.1	18	0.1	18	0.1	18
	23	1.7	23	1.6	23	1.6	23
SR 89	22	2.9	22	2.9	22	2.5	20
Total	26	4.7	26	4.6	26	4.2	25

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
NB to EB RT	-	-	-
WB to NB RT	0.1	18	0.1
	1.6	23	1.6
SR 89	3.5	22	2.4
Total	5.2	26	4.1

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	44	1.0	9.8	0.1	20	21	0.7
WB to NB RT	25	5.1	27.6	0.2	20	22	3.7
New SR 89	24	1.5	6.3	0.0	13	14	1.0
New SR 28	1	6.2	13.5	0.0	11	11	6.3
Total		13.7	57.2	0.3	17	18	11.7

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	19	0.8	21	0.7	20	0.9	21
WB to NB RT	21	3.6	21	3.8	21	4.0	21
New SR 89	14	1.1	13	1.7	13	1.4	14
New SR 28	12	4.7	10	7.0	12	5.0	12
Total	18	10.2	17	13.2	18	11.3	18

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	1.0	19	1.5
WB to NB RT	3.9	17	11.5
New SR 89	1.2	11	2.5
New SR 28	5.3	10	8.3
Total	11.3	15	23.7

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.6	0.1	26	26	0.3
	38	0.5	10.3	0.1	24	24	0.5
Twin Crag	37	0.7	11.2	0.1	26	26	0.7
	36	0.3	5.1	0.0	19	19	0.3
	35	0.6	8.7	0.1	23	23	0.6
	34	0.5	7.0	0.0	23	23	0.6
	14	0.8	10.2	0.1	23	23	0.9
	5	0.7	7.7	0.0	23	23	0.7
SR 89	4	3.5	21.6	0.1	20	20	3.7
New SR 89	1	3.4	11.4	0.1	18	16	4.2
Total		11.5	100.8	0.6	22	22	12.4

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	27	0.3	26	0.4	26
	24	0.5	24	0.4	23	0.5	23
Twin Crag	26	0.6	26	0.6	25	0.7	25
	19	0.3	19	0.3	19	0.4	19
	23	0.6	24	0.6	23	0.7	23
	23	0.5	23	0.5	23	0.6	23
	23	0.8	23	0.8	23	0.9	23
	23	0.7	23	0.7	22	0.7	23
SR 89	20	3.4	20	3.4	20	3.3	20
New SR 89	18	3.1	18	3.4	19	2.9	18
Total	22	10.8	22	11.1	22	11.0	22

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	0.3	26	0.4
	0.5	24	0.5
Twin Crag	0.7	26	0.7
	0.3	19	0.4
	0.6	23	0.7
	0.5	23	0.6
	0.8	23	0.9
	0.6	23	0.7
SR 89	3.2	20	3.8
New SR 89	3.1	17	3.9
Total	10.6	22	12.6

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	1.6	16.1	0.1	12	12	1.5
	5	0.6	22.6	0.1	19	19	0.6
	14	0.3	7.3	0.0	24	24	0.3
	34	0.5	9.8	0.1	24	24	0.5
	35	0.4	6.9	0.0	23	23	0.4
	36	0.6	8.7	0.1	23	23	0.6
Twin Crag	37	0.3	4.1	0.0	23	23	0.3
	38	0.9	12.4	0.1	23	23	0.9
	39	0.9	10.7	0.1	23	23	0.9
Total		6.0	98.5	0.6	21	21	6.1

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	1.6	12	1.6	12	1.5	13
	19	0.6	19	0.5	19	0.5	19
	24	0.3	24	0.3	24	0.3	24
	24	0.5	24	0.5	24	0.5	24
	24	0.4	23	0.4	23	0.4	24
	23	0.6	23	0.6	23	0.6	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	0.9	23	0.9	23	0.9	23
	23	0.9	23	0.9	23	0.8	23
Total	21	6.2	21	6.0	21	5.8	21

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
SR 89	1.4	12	1.9
	0.5	19	0.5
	0.3	24	0.3
	0.5	24	0.5
	0.4	23	0.4
	0.5	23	0.6
Twin Crag	0.3	23	0.3
	0.8	23	0.9
	0.8	23	0.8
Total	5.5	21	6.1

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	1.3	8.8	0.0	20	20	1.2
Fairway Dr	42	1.7	17.5	0.1	22	22	1.6
	16	0.8	16.2	0.1	24	24	0.6
Old SR 89	6	7.1	16.4	0.1	14	15	6.1
Total		10.9	58.8	0.3	20	21	9.6

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	20	1.1	19	1.4	20	1.2	20
Fairway Dr	22	1.7	22	1.5	22	1.7	22
	24	0.8	24	0.7	24	0.8	24
Old SR 89	14	7.5	14	7.6	15	6.9	14
Total	20	11.0	20	11.2	20	10.6	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	1.3	19	1.7
Fairway Dr	1.8	22	2.0
	0.8	24	0.9
Old SR 89	7.1	14	7.2
Total	11.0	20	11.8

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	4.2	14.0	0.1	17	17	3.8
Fairway Dr	42	2.0	17.0	0.1	23	23	2.0
WB to NB RT	13	6.3	22.0	0.1	18	17	7.4
SR 89	1	6.0	11.2	0.0	15	15	6.1
Total		18.5	64.2	0.3	18	18	19.3

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.9	17	4.3	17	4.4	18
Fairway Dr	23	2.0	23	2.0	23	1.8	23
WB to NB RT	18	5.4	18	5.2	19	5.1	19
SR 89	15	6.3	15	6.4	16	5.3	17
Total	19	17.6	19	17.8	19	16.5	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	3.8	16	5.0
Fairway Dr	1.8	22	2.4
WB to NB RT	4.0	15	10.1
SR 89	4.9	14	6.9
Total	14.4	17	24.4

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	2.8	10.5	0.1	18	18	2.5
	9	1.2	16.8	0.1	23	23	1.1
Grove St	2	2.8	23.2	0.3	44	45	2.7
	17	0.9	8.4	0.1	22	22	0.9
	18	0.6	9.8	0.1	23	23	0.5
Total		8.2	68.6	0.6	29	30	7.7

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	2.8	18	3.0	18	2.6	18
	23	1.2	23	1.2	23	1.1	23
Grove St	47	2.3	45	3.0	45	2.7	43
	23	0.8	23	0.9	23	0.8	22
	23	0.6	23	0.5	23	0.6	23
Total	30	7.7	29	8.5	30	7.9	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	2.6	17	3.1
	1.1	23	1.2
Grove St	3.0	42	3.2
	0.9	22	1.0
	0.6	23	0.6
Total	8.4	29	9.1

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.6	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.3
Grove St	2	2.2	9.6	0.1	20	19	2.4
	9	2.9	42.6	0.3	24	23	2.7
	8	1.3	16.9	0.1	23	23	1.3
Old SR 89	6	9.7	16.8	0.1	11	12	8.8
Total		16.8	106.0	0.6	21	22	15.8

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.3	26
	24	0.4	24	0.4	24	0.4	24
Grove St	19	2.2	20	2.1	20	2.2	20
	24	2.9	23	2.9	24	2.9	24
	23	1.3	23	1.4	23	1.3	23
Old SR 89	11	9.3	11	10.5	11	9.5	11
Total	21	16.6	21	17.6	22	16.6	22

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	0.3	26	0.4
	0.4	24	0.4
Grove St	1.9	19	2.2
	2.8	23	3.0
	1.3	23	1.4
Old SR 89	9.7	11	10.5
Total	16.3	21	17.9

Arterial Level of Service: EB NB to EB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	9.8	21.8	0.1	14	13	11.1
Total		9.8	21.8	0.1	14	13	11.1

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	12	12.3	14	9.6	14	9.4	15
Total	12	12.3	14	9.6	14	9.4	15

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	7.6	15	8.7
Total	7.6	15	8.7

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	6.1	21.9	0.1	13	14	4.3
Total		6.1	21.9	0.1	13	14	4.3

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	14	4.4	13	5.3	13	6.2	12
Total	14	4.4	13	5.3	13	6.2	12

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 28	7.4	11	8.8
Total	7.4	11	8.8

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
NB to EB RT	24	-	-	0.0	-	-	-
WB to NB RT	25	0.1	4.7	0.0	18	18	0.1
	44	4.1	26.7	0.2	21	22	2.7
SR 89	3	5.6	11.8	0.1	17	18	5.0
Total		9.9	43.2	0.3	23	24	7.9

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
NB to EB RT	-	-	7	2.3	-	-	-
WB to NB RT	18	0.2	18	0.1	18	0.1	18
	22	2.9	21	4.4	21	4.5	19
SR 89	19	4.1	17	5.7	20	3.9	14
Total	24	7.2	15	12.5	24	8.5	20

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
NB to EB RT	-	-	-
WB to NB RT	0.1	18	0.1
	7.3	22	3.1
SR 89	8.2	17	5.8
Total	15.7	23	9.0

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	44	2.8	11.8	0.1	17	19	1.5
WB to NB RT	25	13.9	36.3	0.2	15	14	16.7
New SR 89	24	3.4	8.3	0.0	10	10	3.5
New SR 28	1	10.4	17.7	0.0	8	9	10.0
Total		30.5	74.0	0.3	13	13	31.7

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	1.1	19	1.2	20	0.8	10
WB to NB RT	18	7.6	18	8.6	20	6.2	10
New SR 89	11	2.9	11	2.9	10	3.4	9
New SR 28	8	10.7	9	9.6	8	10.6	8
Total	15	22.3	15	22.3	15	21.0	9

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
	10.9	19	1.2
WB to NB RT	34.8	20	5.7
New SR 89	4.8	11	2.8
New SR 28	10.7	8	10.4
Total	61.3	15	20.1

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.2	0.1	26	26	0.5
	38	0.7	10.6	0.1	23	23	0.6
Twin Crag	37	0.9	11.5	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	22	23	0.7
	14	1.3	10.6	0.1	22	22	1.0
	5	1.4	8.4	0.0	21	22	0.9
SR 89	4	8.5	26.5	0.1	16	16	8.6
New SR 89	1	5.1	13.0	0.1	15	16	4.6
Total		20.3	110.0	0.6	20	21	18.8

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.6	26	0.5	25	0.5	26
	23	0.7	23	0.7	23	0.7	23
Twin Crag	25	0.9	25	0.9	25	0.9	25
	18	0.4	18	0.5	18	0.5	18
	23	0.8	23	0.9	23	0.8	23
	22	0.7	22	0.8	22	0.7	23
	22	1.1	21	2.0	22	1.4	22
	22	0.9	19	2.2	19	2.0	21
SR 89	17	7.1	15	10.8	15	10.1	16
New SR 89	16	4.9	15	5.0	16	4.7	15
Total	21	18.1	20	24.3	20	22.4	20

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Run 5 Speed	RAB Delay
	0.5	26	0.5
	0.7	23	0.7
Twin Crag	0.9	25	0.9
	0.4	18	0.5
	0.8	23	0.8
	0.7	23	0.7
	1.1	22	1.1
	1.5	22	0.9
SR 89	9.3	19	5.2
New SR 89	5.6	15	5.4
Total	21.5	21	16.7

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
SR 89	4	2.1	16.7	0.1	12	12	2.1
	5	0.6	22.6	0.1	19	19	0.6
	14	0.3	7.4	0.0	24	24	0.3
	34	0.5	9.9	0.1	24	24	0.6
	35	0.4	7.0	0.0	23	23	0.5
	36	0.6	8.7	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.5	0.1	23	23	1.0
	39	0.9	10.8	0.1	23	23	1.0
Total		6.9	99.8	0.6	20	20	7.1

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
SR 89	12	2.1	12	2.2	12	2.1	12
	19	0.6	19	0.6	19	0.6	19
	24	0.3	24	0.3	24	0.3	24
	24	0.5	24	0.5	24	0.5	23
	23	0.4	23	0.5	23	0.4	23
	23	0.6	23	0.6	23	0.6	23
Twin Crag	23	0.3	23	0.3	23	0.3	23
	23	1.0	23	1.0	23	1.0	23
	23	0.9	23	1.0	23	0.9	23
Total	20	6.9	20	7.1	20	6.7	20

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	OneLaneRAB Speed	OneLaneRAB Delay
SR 89	2.0	12	2.1
	0.5	19	0.7
	0.3	24	0.4
	0.5	23	0.6
	0.4	23	0.5
	0.6	23	0.7
Twin Crag	0.3	23	0.3
	0.9	23	1.1
	0.8	23	1.0
Total	6.4	20	7.2

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
WB to NB RT	13	1.9	9.4	0.0	18	19	1.8
Fairway Dr	42	2.1	17.8	0.1	22	22	1.7
	16	0.9	16.3	0.1	24	24	0.8
Old SR 89	6	7.5	16.8	0.1	14	13	8.3
Total		12.4	60.4	0.3	20	20	12.7

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
WB to NB RT	18	1.9	19	1.8	18	2.0	18
Fairway Dr	22	2.1	22	2.1	22	2.2	21
	24	1.0	24	0.9	24	1.0	24
Old SR 89	15	6.5	14	7.5	14	7.5	13
Total	20	11.5	20	12.4	20	12.7	19

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
WB to NB RT	2.0	19	1.8
Fairway Dr	2.1	21	2.0
	1.0	24	1.0
Old SR 89	8.6	15	6.3
Total	13.7	20	11.2

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	14.8	24.5	0.1	10	14	6.9
Fairway Dr	42	41.5	60.2	0.1	7	9	28.8
WB to NB RT	13	66.6	106.1	0.1	5	5	62.4
SR 89	1	10.3	15.6	0.0	11	11	10.0
Total		133.2	206.5	0.3	7	8	108.1

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	9	18.0	6	29.5	9	16.7	15
Fairway Dr	6	48.0	6	47.3	6	51.4	11
WB to NB RT	5	68.2	4	70.7	5	68.5	5
SR 89	11	10.1	11	10.8	11	10.3	12
Total	6	144.3	6	158.4	6	146.9	8

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	5.6	11	11.5
Fairway Dr	21.9	6	51.5
WB to NB RT	59.5	4	70.6
SR 89	9.8	11	10.9
Total	96.7	6	144.5

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	3.4	11.0	0.1	17	17	3.6
	9	1.3	16.9	0.1	23	23	1.2
Grove St	2	4.2	24.8	0.3	42	41	5.3
	17	1.1	8.7	0.1	22	21	1.2
	18	0.7	9.9	0.1	23	23	0.7
Total		10.7	71.3	0.6	28	28	12.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.1	17	3.3	17	3.6	16
	23	1.3	23	1.3	23	1.4	23
Grove St	44	3.1	41	4.5	43	3.5	42
	22	1.0	22	1.1	22	1.0	22
	23	0.7	23	0.7	23	0.7	23
Total	29	9.2	28	11.0	29	10.2	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	RAB OneLane Speed	RAB OneLane Delay
	3.8	18	2.9
	1.5	23	1.3
Grove St	4.0	41	4.8
	1.1	22	1.1
	0.7	23	0.6
Total	11.2	28	10.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	11.0	0.1	25	25	0.5
	17	0.8	9.9	0.1	23	23	0.8
Grove St	2	4.3	11.8	0.1	16	14	6.1
	9	3.7	43.7	0.3	23	23	3.7
	8	2.5	18.0	0.1	22	23	1.6
Old SR 89	6	15.8	23.3	0.1	8	10	11.5
Total		27.6	117.7	0.6	19	20	24.2

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.6	26	0.4	25
	22	1.1	23	0.8	24	0.5	23
Grove St	15	5.2	16	4.1	18	2.9	17
	23	3.9	23	3.9	23	3.4	23
	23	1.7	18	6.4	23	1.5	22
Old SR 89	9	13.0	4	34.7	10	11.1	11
Total	20	25.5	16	50.5	21	19.8	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	RAB Speed	OneLane RAB Delay
	0.6	25	0.6
	0.8	23	0.8
Grove St	3.9	17	3.5
	3.7	23	3.8
	1.6	22	1.7
Old SR 89	10.5	9	13.0
Total	21.0	20	23.3

Arterial Level of Service: EB NB to EB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 89	24	28.4	40.3	0.1	7	7	31.0
Total		28.4	40.3	0.1	7	7	31.0

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 89	7	31.2	8	27.4	7	28.2	7
Total	7	31.2	8	27.4	7	28.2	7

Arterial Level of Service: EB NB to EB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 89	31.1	9	21.6
Total	31.1	9	21.6

Arterial Level of Service: NB WB to NB RT

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
New SR 28	13	13.2	28.9	0.1	10	10	12.6
Total		13.2	28.9	0.1	10	10	12.6

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
New SR 28	8	17.0	11	9.7	11	10.3	8
Total	8	17.0	11	9.7	11	10.3	8

Arterial Level of Service: NB WB to NB RT

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
New SR 28	17.7	10	12.0
Total	17.7	10	12.0

Design Year (2038) Operations: Alternative 4

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.4
	38	0.5	10.3	0.1	24	24	0.5
Twin Crag	37	0.6	11.2	0.1	25	25	0.7
	36	0.3	5.1	0.0	19	19	0.4
	35	0.6	8.7	0.1	23	23	0.7
	34	0.5	7.0	0.0	23	23	0.6
	14	0.8	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	23	22	0.7
	4	2.0	19.9	0.1	22	22	2.4
New SR 89	1	17.4	27.3	0.1	9	9	19.8
Total		23.9	115.0	0.6	20	19	27.1

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.5	24	0.5	24	0.4	24
Twin Crag	26	0.6	26	0.6	26	0.6	26
	19	0.3	19	0.3	19	0.3	19
	23	0.6	23	0.6	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.8	23	0.8	23	0.8	23
	23	0.7	23	0.7	23	0.7	23
	22	1.9	22	1.8	22	1.9	22
New SR 89	10	16.6	9	17.5	10	16.3	9
Total	20	22.8	20	23.6	20	22.4	20

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	1.0	11.0	0.1	23	23	1.0
	5	1.0	18.6	0.1	24	24	1.1
	14	0.5	7.5	0.0	23	23	0.5
	34	0.7	10.0	0.1	23	23	0.8
	35	0.5	7.0	0.0	23	23	0.6
	36	0.7	8.8	0.1	23	23	0.8
Twin Crag	37	0.4	4.2	0.0	23	23	0.4
	38	1.0	12.5	0.1	23	23	1.1
	39	0.9	10.8	0.1	23	23	1.0
Total		6.8	90.5	0.6	23	23	7.1

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	23	1.0	23	1.0	23	1.1	22
	24	1.0	24	1.0	24	1.1	23
	23	0.5	23	0.4	23	0.5	23
	23	0.7	23	0.6	23	0.7	23
	23	0.5	23	0.5	23	0.5	23
	23	0.7	23	0.7	23	0.7	23
Twin Crag	23	0.3	23	0.3	23	0.4	22
	23	0.9	23	1.0	23	1.0	23
	23	0.9	23	0.9	23	0.9	22
Total	23	6.4	23	6.5	23	6.8	23

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	13.7	31.5	0.1	9	9	13.4
64 Acres Access	46	1.7	19.1	0.1	23	23	1.8
	20	0.9	10.7	0.1	23	23	0.9
Total		16.4	61.2	0.3	16	16	16.2

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	9	13.7	9	14.6	9	13.3	9
64 Acres Access	23	1.6	23	1.7	23	1.6	23
	23	0.9	23	0.9	23	0.9	23
Total	16	16.3	16	17.2	16	15.9	16

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	46	0.8	10.3	0.1	24	24	0.8
	24	1.5	19.0	0.1	23	23	1.6
New SR 28	1	16.7	28.5	0.1	10	10	15.7
Total		19.0	57.8	0.3	17	17	18.1

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Run Alt 4 12132014 Speed
64 Acres Access	24	0.8	24	0.8	24	0.7	24
	23	1.5	23	1.4	23	1.3	22
New SR 28	10	17.8	10	17.9	10	16.6	10
Total	16	20.1	16	20.1	17	18.7	17

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	2.0	12.9	0.1	21	21	2.0
Fairway Dr	42	0.7	11.6	0.1	23	23	0.7
	16	1.2	16.6	0.1	24	23	1.2
Old SR 89	6	5.9	15.0	0.1	16	15	6.3
Total		9.7	56.1	0.3	21	21	10.1

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Run Alt 4 12132014 Speed
	21	2.1	21	1.9	21	1.9	21
Fairway Dr	23	0.7	23	0.7	23	0.6	23
	24	1.2	24	1.1	24	1.1	23
Old SR 89	16	5.7	16	6.0	16	5.6	16
Total	21	9.7	21	9.8	21	9.2	21

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	4.0	13.8	0.1	17	17	3.8
Fairway Dr	42	1.9	16.9	0.1	23	23	1.9
	13	0.9	12.1	0.1	22	22	1.0
New SR 89	1	5.2	15.8	0.1	17	17	5.3
Total		12.0	58.6	0.3	20	20	12.1

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	17	4.1	17	4.2	18	3.6	17
Fairway Dr	23	2.0	23	2.0	24	1.8	23
	22	0.9	22	0.9	22	0.9	22
New SR 89	17	5.2	18	4.8	17	5.5	17
Total	20	12.1	20	12.0	20	11.8	20

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	2.7	10.5	0.1	18	18	2.7
	9	1.2	16.8	0.1	23	23	1.2
Grove St	2	2.6	23.0	0.3	45	45	2.3
	17	0.8	8.4	0.1	23	23	0.7
	18	0.6	9.8	0.1	23	23	0.5
Total		8.0	68.4	0.6	29	29	7.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	18	2.5	18	2.8	18	2.5	17
	23	1.1	23	1.1	23	1.2	23
Grove St	45	2.3	45	2.8	47	2.5	42
	23	0.8	22	0.9	22	0.9	22
	23	0.6	23	0.6	23	0.6	23
Total	30	7.3	30	8.1	30	7.6	29

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	1.9	9.4	0.1	20	21	1.7
	9	2.8	42.9	0.3	23	23	3.0
	8	1.3	16.9	0.1	23	23	1.4
Savemart Access	6	10.0	17.1	0.1	11	11	9.5
Total		16.6	106.3	0.6	21	21	16.2

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run Alt 4 12132014 Delay	Speed
	26	0.3	26	0.3	26	0.3	25
	24	0.4	24	0.4	24	0.4	24
Grove St	21	1.5	20	2.1	19	2.3	20
	23	2.6	23	2.9	24	2.7	23
	23	1.2	23	1.3	23	1.2	23
Savemart Access	11	9.7	11	10.3	11	9.7	10
Total	21	15.8	21	17.3	21	16.6	21

Summer Peak Hour Analysis Results

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.0	0.1	26	26	0.5
	38	0.6	10.5	0.1	23	23	0.6
Twin Crag	37	0.8	11.4	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	23	22	0.7
	14	1.0	10.3	0.1	22	22	1.1
	5	0.8	7.9	0.0	22	22	0.8
	4	2.7	20.7	0.1	21	21	2.8
New SR 89	1	26.0	36.1	0.1	7	7	25.7
Total		34.3	126.3	0.6	18	18	34.3

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.5	26	0.4	26
	23	0.6	23	0.6	23	0.6	23
Twin Crag	25	0.8	25	0.8	25	0.8	25
	18	0.4	19	0.4	19	0.4	18
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	23	0.9	23	1.0	22	1.0	22
	22	0.8	22	0.8	22	0.8	22
	22	2.5	22	2.3	22	2.4	21
New SR 89	7	25.1	7	26.6	8	23.0	7
Total	18	32.9	18	34.3	19	30.7	18

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 4 11262014 Speed	Alt 4 11262014 Delay
	0.4	25	0.5
	0.6	23	0.7
Twin Crag	0.9	25	0.9
	0.4	18	0.4
	0.8	23	0.8
	0.7	22	0.7
	1.0	22	1.0
	0.8	22	0.8
	2.7	20	3.7
New SR 89	27.2	7	28.1
Total	35.6	18	37.5

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	1.2	11.1	0.1	23	23	1.2
	5	1.3	18.9	0.1	23	23	1.3
	14	0.6	7.6	0.0	23	23	0.6
	34	0.8	10.2	0.1	23	23	0.9
	35	0.6	7.1	0.0	23	23	0.6
	36	0.8	8.9	0.1	23	22	0.8
Twin Crag	37	0.4	4.1	0.0	23	23	0.4
	38	1.0	12.5	0.1	23	23	1.0
	39	0.9	10.8	0.1	23	23	1.0
Total		7.6	91.3	0.6	23	23	7.8

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	1.1	22	1.3	23	1.1	23
	23	1.3	23	1.2	24	1.2	24
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.8	23	0.8	23
	23	0.6	23	0.6	23	0.6	23
	22	0.8	23	0.8	23	0.8	23
Twin Crag	23	0.4	23	0.4	23	0.4	23
	23	1.0	23	1.0	23	1.1	23
	22	1.0	23	0.9	23	1.0	23
Total	23	7.6	23	7.6	23	7.5	23

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 4 11262014 Speed	Alt 4 11262014 Delay
	1.1	23	1.2
	1.2	23	1.3
	0.6	23	0.6
	0.8	23	0.9
	0.6	23	0.6
	0.8	23	0.8
Twin Crag	0.4	23	0.4
	1.0	23	1.0
	0.9	23	0.9
Total	7.3	23	7.8

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	18.2	36.0	0.1	8	8	18.2
64 Acres Access	46	2.8	20.2	0.1	21	22	2.0
	20	1.1	10.9	0.1	23	23	1.1
Total		22.1	67.1	0.3	14	15	21.3

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	8	18.2	8	17.9	8	18.5	8
64 Acres Access	22	2.6	22	2.5	21	2.7	21
	23	1.1	23	1.1	23	1.1	23
Total	14	21.9	14	21.5	14	22.3	14

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 6 Speed	Run 6 Delay
	18.5	8	18.2
64 Acres Access	2.7	20	4.1
	1.1	22	1.3
Total	22.3	14	23.6

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	46	1.0	10.5	0.1	24	24	1.0
	24	1.7	19.3	0.1	22	22	1.7
New SR 28	1	23.5	35.4	0.1	8	8	26.2
Total		26.3	65.2	0.3	15	14	28.9

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	24	1.0	23	1.2	24	1.0	24
	22	1.7	22	1.9	22	1.7	22
New SR 28	8	22.0	8	25.1	9	21.4	8
Total	15	24.7	14	28.2	15	24.0	14

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 4 11262014 Speed	Alt 4 11262014 Delay
64 Acres Access	1.0	24	1.0
	1.8	22	1.7
New SR 28	25.3	9	21.1
Total	28.1	15	23.8

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	2.0	13.0	0.1	21	21	2.1
Fairway Dr	42	0.8	11.7	0.1	22	22	0.8
	16	1.3	16.7	0.1	23	23	1.4
Old SR 89	6	7.3	16.4	0.1	14	15	7.2
Total		11.5	57.8	0.3	20	20	11.5

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.9	21	2.1	21	2.0	21
Fairway Dr	22	0.8	22	0.9	23	0.8	23
	23	1.3	23	1.4	23	1.3	23
Old SR 89	15	7.0	15	6.8	15	6.8	14
Total	20	10.9	20	11.1	20	10.9	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Run 6 Speed	Run 6 Delay
	2.1	21	2.0
Fairway Dr	0.8	22	0.8
	1.3	23	1.3
Old SR 89	7.9	14	8.2
Total	12.1	20	12.3

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	5.5	15.3	0.1	16	15	5.7
Fairway Dr	42	2.4	17.4	0.1	23	22	2.5
	13	1.1	12.3	0.1	21	21	1.1
New SR 89	1	6.6	17.3	0.1	16	15	7.5
Total		15.7	62.2	0.3	19	18	16.8

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	16	5.4	16	5.1	16	5.5	16
Fairway Dr	22	2.5	22	2.4	23	2.5	23
	21	1.2	21	1.1	21	1.2	22
New SR 89	17	5.8	15	7.4	16	6.5	16
Total	19	14.9	19	16.0	19	15.8	19

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	5.2	15	5.8
Fairway Dr	2.2	23	2.4
	1.0	21	1.2
New SR 89	6.1	16	6.5
Total	14.6	19	15.9

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	3.6	11.3	0.1	16	16	3.7
	9	1.4	17.0	0.1	23	23	1.4
Grove St	2	4.3	24.8	0.3	42	41	4.7
	17	1.1	8.7	0.1	22	22	1.2
	18	0.7	9.9	0.1	23	23	0.7
Total		11.1	71.8	0.6	28	28	11.7

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.3	17	3.5	17	3.2	16
	23	1.3	23	1.4	23	1.4	23
Grove St	42	4.3	42	3.9	45	3.3	43
	22	1.1	22	1.0	22	1.0	22
	23	0.7	23	0.7	23	0.6	23
Total	28	10.7	28	10.7	29	9.5	28

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 4 11262014 Speed	Alt 4 11262014 Delay
	3.9	16	3.8
	1.4	23	1.4
Grove St	4.0	40	5.5
	1.1	21	1.2
	0.7	23	0.7
Total	11.1	28	12.6

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	10.9	0.1	25	25	0.4
	17	0.6	9.7	0.1	23	23	0.6
Grove St	2	3.5	11.0	0.1	17	17	3.6
	9	3.5	43.5	0.3	23	23	3.5
	8	1.6	17.2	0.1	23	22	1.6
Savemart Access	6	11.5	18.6	0.1	10	10	12.3
Total		21.1	110.9	0.6	20	20	22.1

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.5	26	0.5	26
	23	0.5	23	0.5	23	0.6	24
Grove St	18	3.0	17	3.5	17	3.6	18
	23	3.5	23	3.6	23	3.6	23
	23	1.6	23	1.6	23	1.6	23
Savemart Access	10	11.5	11	10.4	10	11.3	10
Total	20	20.6	21	20.1	21	21.2	21

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 4 11262014 Speed	Alt 4 11262014 Delay
	0.4	25	0.5
	0.5	23	0.7
Grove St	3.1	16	4.2
	3.4	23	3.6
	1.5	23	1.6
Savemart Access	10.9	10	12.1
Total	19.8	20	22.8

Design Year (2038) Operations: Alternative 6

Average Annual Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	6.3	14.2	0.1	13	13	6.2
	9	1.4	17.0	0.1	23	23	1.4
Grove St	2	3.3	25.4	0.3	41	40	3.8
	17	0.9	8.5	0.1	22	22	1.0
	18	0.7	9.8	0.1	23	23	0.7
Total		12.6	75.0	0.6	27	27	13.1

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	14	5.8	13	6.8	13	6.4	13
	23	1.3	23	1.5	23	1.5	23
Grove St	41	3.0	42	2.8	40	3.4	42
	23	0.8	22	0.9	22	0.9	23
	23	0.7	23	0.7	23	0.7	23
Total	27	11.6	27	12.7	27	12.8	27

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	6.0	13	6.7
	1.4	23	1.5
Grove St	2.8	39	4.0
	0.8	22	1.0
	0.6	23	0.7
Total	11.7	26	13.9

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.4	10.6	0.1	26	26	0.4
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	2.4	9.9	0.1	19	19	2.3
	9	2.9	42.8	0.3	23	23	2.9
	8	4.0	19.6	0.1	20	16	8.0
Savemart Access	6	14.8	24.4	0.1	9	8	16.4
Total		24.9	116.8	0.6	20	19	30.4

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.4	26	0.4	26
	24	0.4	24	0.4	24	0.5	24
Grove St	20	2.0	20	2.0	18	2.9	19
	24	2.8	23	3.2	23	2.9	23
	23	1.4	18	5.8	20	4.3	22
Savemart Access	10	12.5	9	14.2	9	14.4	8
Total	21	19.5	20	26.0	20	25.3	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.4	26	0.3
	0.4	24	0.4
Grove St	2.4	19	2.6
	2.9	24	2.6
	2.4	22	1.8
Savemart Access	15.2	8	15.8
Total	23.7	20	23.5

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.2	8.7	0.1	26	26	0.3
Granlibakken Rd	26	1.0	11.4	0.1	23	23	1.0
	12	0.6	13.0	0.1	23	23	0.7
	19	1.1	20.5	0.1	24	24	1.1
	3	0.4	6.8	0.0	23	23	0.5
64 Acres	20	0.6	8.0	0.0	22	22	0.6
	45	0.6	8.2	0.1	23	24	0.6
	11	0.8	11.2	0.1	23	23	0.9
Tavern shores	22	0.7	8.1	0.1	25	25	0.7
	10	0.5	5.9	0.0	20	20	0.5
SR 28	6	33.4	48.0	0.1	8	8	31.1
	16	1.4	13.8	0.1	17	18	1.4
Fariway Dr	42	1.5	16.5	0.1	24	24	1.5
	13	0.8	12.0	0.1	22	22	0.8
	1	0.8	12.7	0.1	23	23	0.7
	4	0.6	8.5	0.1	24	24	0.5
	5	1.4	18.7	0.1	23	23	1.3
	14	0.6	7.7	0.0	23	23	0.6
	34	0.8	10.2	0.1	23	23	0.8
	35	0.6	7.1	0.0	23	23	0.6
	36	1.1	9.2	0.1	22	22	1.1
Twin Crag	37	1.1	4.9	0.0	26	26	1.1
	38	1.4	13.0	0.1	22	22	1.5
	39	1.0	10.8	0.1	23	23	1.0
Total		52.9	294.7	1.7	20	21	50.6

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.2	26	0.2	26	0.3	26
Granlibakken Rd	23	1.0	24	0.6	24	0.6	22
	24	0.6	24	0.6	23	0.6	24
	24	1.1	23	1.1	23	1.1	24
	23	0.4	23	0.4	23	0.4	23
64 Acres	22	0.7	22	0.6	22	0.6	23
	23	0.7	23	0.6	23	0.6	23
	23	0.8	23	0.8	23	0.8	23
Tavern shores	25	0.7	25	0.6	25	0.7	25
	20	0.5	20	0.4	20	0.5	20
SR 28	8	30.5	8	33.7	8	33.8	7
	17	1.4	17	1.4	17	1.3	17
Fariway Dr	24	1.5	24	1.5	24	1.4	23
	22	0.9	22	0.8	22	0.8	22
	23	0.8	23	0.8	23	0.8	23
	24	0.6	24	0.6	24	0.6	24
	23	1.4	23	1.3	23	1.4	23
	23	0.6	23	0.6	23	0.6	23
	23	0.8	23	0.8	23	0.8	23
	23	0.6	23	0.6	23	0.6	23
	22	1.1	22	0.9	22	1.1	22
Twin Crag	26	1.2	27	1.0	25	1.2	26
	22	1.4	22	1.4	22	1.4	22
	23	1.0	23	1.0	23	1.0	23
Total	21	50.3	20	52.2	20	53.1	20

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.2	26	0.2
Granlibakken Rd	1.2	22	1.7
	0.6	24	0.6
	1.0	24	1.0
	0.4	23	0.4
64 Acres	0.6	23	0.6
	0.6	24	0.6
	0.8	23	0.7
Tavern shores	0.7	25	0.6
	0.5	20	0.4
SR 28	39.4	8	30.8
	1.6	17	1.3
Fariway Dr	1.8	24	1.5
	0.9	22	0.8
	0.8	23	0.8
	0.6	24	0.6
	1.4	23	1.4
	0.6	23	0.6
	0.9	23	0.9
	0.6	23	0.6
	1.1	22	1.0
Twin Crag	1.1	27	1.1
	1.4	22	1.4
	1.0	22	1.0
Total	59.7	20	50.5

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	7.7	0.1	26	26	0.4
	38	0.5	10.4	0.1	24	23	0.6
Twin Crag	37	0.7	11.3	0.1	25	25	0.7
	36	0.4	5.1	0.0	19	19	0.4
	35	0.7	8.7	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	22	22	0.7
	4	1.9	19.3	0.1	22	22	1.8
	1	1.0	9.2	0.1	22	22	1.0
	13	2.8	14.5	0.1	20	19	3.5
Fariway Dr	42	13.4	230.7	0.1	12	12	14.3
	16	21.8	37.1	0.1	11	10	22.4
SR 89	6	41.4	52.6	0.1	5	4	42.2
	10	1.0	17.0	0.1	22	22	1.0
Tavern shores	22	0.4	5.2	0.0	22	22	0.4
	11	0.6	8.3	0.1	24	24	0.6
	45	1.0	11.2	0.1	23	23	1.0
64 Acres	20	0.7	8.0	0.1	24	24	0.7
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	23	0.6
	12	2.1	21.6	0.1	22	22	2.1
Granlibakken Rd	26	3.5	15.6	0.1	20	20	3.1
	27	1.4	11.9	0.1	22	22	1.4
Total		99.1	545.5	1.6	18	17	101.9

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.3	26	0.4	26
	23	0.5	24	0.5	23	0.5	24
Twin Crag	25	0.7	25	0.7	25	0.7	25
	19	0.4	19	0.3	19	0.4	19
	23	0.7	23	0.7	23	0.7	23
	23	0.6	23	0.6	23	0.6	23
	23	0.9	23	0.9	23	0.9	23
	22	0.7	23	0.7	22	0.7	22
	22	1.8	23	1.9	22	1.9	22
	22	0.9	22	1.0	22	1.0	22
	21	2.7	20	2.7	20	3.0	21
Fariway Dr	12	14.3	11	14.9	13	12.4	12
	10	23.5	10	24.3	11	20.3	10
SR 89	4	43.8	4	43.4	5	41.8	4
	22	1.1	22	1.0	22	1.0	22
Tavern shores	22	0.4	22	0.4	22	0.4	22
	24	0.7	24	0.6	24	0.6	24
	23	1.0	23	1.0	23	1.0	23
64 Acres	24	0.7	24	0.7	24	0.8	24
	22	0.7	22	0.6	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.3	23	2.1	23	1.9	23
Granlibakken Rd	19	4.0	19	3.9	20	3.0	20
	22	1.4	22	1.5	22	1.3	22
Total	17	104.8	17	105.4	18	96.4	18

Arterial Level of Service: SB SR 89

Cross Street	Run 3 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.4	26	0.4
	0.5	24	0.5
Twin Crag	0.7	25	0.7
	0.3	19	0.4
	0.7	23	0.7
	0.6	23	0.6
	0.9	23	0.9
	0.7	22	0.8
	1.9	22	2.0
	0.9	22	1.0
	2.1	21	2.4
Fariway Dr	13.6	14	11.3
	23.3	12	17.5
SR 89	43.1	5	34.4
	1.0	22	0.9
Tavern shores	0.4	22	0.3
	0.6	24	0.6
	1.0	23	0.9
64 Acres	0.7	24	0.7
	0.7	22	0.7
	0.6	23	0.6
	2.0	22	2.1
Granlibakken Rd	3.4	20	3.6
	1.4	22	1.4
Total	101.4	18	85.4

Summer Peak Hour Analysis Results

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	7.2	15.1	0.1	12	12	7.3
	9	1.5	17.1	0.1	23	23	1.5
Grove St	2	5.2	26.6	0.3	39	40	4.8
	17	1.2	8.7	0.1	22	22	1.1
	18	0.7	9.9	0.1	23	23	0.7
Total		15.8	77.4	0.6	26	26	15.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	13	6.9	12	7.2	12	7.4	12
	23	1.5	23	1.4	23	1.6	23
Grove St	40	5.0	38	6.3	40	5.0	39
	22	1.1	21	1.3	22	1.1	21
	23	0.7	23	0.7	23	0.7	23
Total	26	15.3	26	16.9	26	15.7	26

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	7.4	13	6.9
	1.5	23	1.5
Grove St	5.8	40	4.4
	1.3	22	1.1
	0.7	23	0.7
Total	16.7	26	14.7

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	11.0	0.1	25	25	0.5
	17	0.7	9.9	0.1	23	23	0.6
Grove St	2	4.4	11.9	0.1	16	16	4.0
	9	32.5	72.3	0.3	14	23	3.7
	8	42.1	57.6	0.1	7	13	13.8
Savemart Access	6	20.2	41.4	0.1	7	8	17.7
Total		100.3	204.0	0.6	12	17	40.3

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.4	25	0.5	25
	23	0.8	23	0.6	23	0.8	23
Grove St	15	5.4	15	4.8	16	4.0	16
	7	101.9	19	12.2	15	28.8	19
	5	62.2	10	23.4	6	46.6	7
Savemart Access	7	19.6	6	22.6	7	20.7	9
Total	8	190.5	15	64.0	12	101.4	14

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.4	25	0.6
	0.8	23	0.7
Grove St	4.5	17	3.6
	13.9	15	28.5
	38.2	5	67.0
Savemart Access	13.4	5	28.0
Total	71.2	10	128.4

Arterial Level of Service: NB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	27	0.4	9.0	0.1	26	26	0.3
Granlibakken Rd	26	2.8	13.2	0.1	20	20	2.5
	12	0.8	13.2	0.1	23	23	0.9
	19	1.3	20.8	0.1	23	23	1.3
	3	0.5	6.8	0.0	23	23	0.5
64 Acres	20	0.7	8.1	0.0	22	22	0.8
	45	0.7	8.3	0.1	23	23	0.7
	11	1.0	11.3	0.1	23	23	0.9
Tavern shores	22	1.1	8.5	0.1	24	25	0.7
	10	1.0	6.4	0.0	18	20	0.5
SR 28	6	51.1	65.6	0.1	6	6	50.3
	16	1.5	13.8	0.1	17	17	1.5
Fariway Dr	42	2.0	17.0	0.1	23	23	2.1
	13	1.0	12.2	0.1	22	22	1.0
	1	0.9	12.8	0.1	23	23	0.9
	4	0.7	8.6	0.1	23	23	0.6
	5	1.6	19.0	0.1	23	23	1.5
	14	0.7	7.7	0.0	23	23	0.7
	34	0.9	10.3	0.1	23	23	0.9
	35	0.7	7.2	0.0	22	23	0.7
	36	1.5	9.6	0.1	21	21	1.5
Twin Crag	37	1.5	8.8	0.0	24	24	1.4
	38	1.9	13.5	0.1	21	21	1.9
	39	1.1	11.0	0.1	22	22	1.1
Total		77.5	322.5	1.7	19	19	75.2

Arterial Level of Service: NB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.3	26
Granlibakken Rd	21	2.2	22	1.6	20	2.6	17
	23	0.8	23	0.8	23	0.7	23
	23	1.3	23	1.3	23	1.2	23
	23	0.5	23	0.5	23	0.5	23
64 Acres	22	0.7	22	0.7	22	0.7	22
	23	0.7	23	0.7	23	0.7	23
	23	1.0	23	0.9	22	1.3	23
Tavern shores	25	0.8	25	0.7	20	2.7	25
	20	0.5	20	0.5	13	3.3	20
SR 28	7	41.5	6	44.1	4	80.3	7
	17	1.4	17	1.5	17	1.2	17
Fariway Dr	23	1.9	23	2.0	23	1.8	23
	22	0.9	22	1.0	22	1.0	22
	23	0.9	23	1.0	23	0.9	23
	23	0.6	23	0.7	23	0.7	23
	23	1.5	23	1.6	23	1.5	23
	23	0.7	23	0.7	23	0.7	23
	23	0.9	23	0.9	23	0.9	23
	22	0.7	23	0.7	22	0.7	22
	21	1.7	21	1.5	21	1.6	21
Twin Crag	24	1.5	24	1.5	23	1.5	24
	21	1.9	21	1.9	21	2.0	21
	22	1.1	22	1.1	22	1.1	22
Total	20	66.4	19	68.6	17	109.9	19

Arterial Level of Service: NB SR 89

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.4	26	0.4
Granlibakken Rd	5.1	19	3.3
	0.9	23	0.9
	1.3	23	1.4
	0.5	23	0.5
64 Acres	0.7	22	0.7
	0.7	23	0.7
	0.9	23	0.9
Tavern shores	0.7	25	0.8
	0.5	20	0.5
SR 28	40.7	6	47.9
	1.5	17	1.8
Fariway Dr	1.8	23	2.2
	0.9	21	1.1
	0.9	23	1.0
	0.6	23	0.7
	1.5	23	1.7
	0.7	23	0.7
	0.9	23	1.0
	0.6	22	0.8
	1.3	21	1.7
Twin Crag	1.4	24	1.5
	1.8	21	2.0
	1.1	22	1.2
Total	67.4	19	75.5

Arterial Level of Service: SB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.3	0.1	26	25	0.5
	38	0.7	10.6	0.1	23	23	0.7
Twin Crag	37	0.9	11.5	0.1	25	25	0.9
	36	0.4	5.2	0.0	18	18	0.5
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	22	22	0.7
	14	1.1	10.4	0.1	22	22	1.1
	5	0.8	7.9	0.0	22	22	0.9
	4	2.3	19.7	0.1	22	22	2.2
	1	1.8	10.0	0.1	20	21	1.2
	13	7.8	19.5	0.1	15	18	5.1
Fariway Dr	42	19.9	1202.1	0.1	9	10	18.1
	16	27.9	43.2	0.1	9	9	26.7
SR 89	6	47.8	58.8	0.1	4	4	46.2
	10	1.0	17.0	0.1	22	22	1.0
Tavern shores	22	0.4	5.3	0.0	22	22	0.4
	11	0.7	8.3	0.1	24	24	0.7
	45	1.0	11.3	0.1	23	23	1.1
64 Acres	20	0.8	8.1	0.1	24	24	0.9
	3	0.7	8.1	0.0	22	22	0.7
	19	0.6	6.9	0.0	23	22	0.6
	12	2.3	21.7	0.1	22	22	2.2
Granlibakken Rd	26	4.0	16.1	0.1	19	19	4.1
	27	1.5	12.0	0.1	22	22	1.5
Total		126.6	1538.1	1.6	16	17	119.0

Arterial Level of Service: SB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.4	25	0.5	25
	23	0.7	23	0.6	23	0.7	23
Twin Crag	25	0.9	25	0.9	25	0.9	25
	18	0.4	18	0.4	18	0.5	18
	23	0.8	23	0.8	22	0.9	23
	22	0.7	23	0.7	22	0.7	22
	22	1.0	22	1.1	22	1.1	22
	22	0.8	22	0.9	22	0.8	22
	22	2.2	22	2.4	22	2.2	22
	21	1.3	20	1.8	20	1.6	17
	16	6.6	15	7.4	15	8.1	13
Fariway Dr	9	20.1	9	20.7	9	20.2	9
	9	29.3	9	28.9	9	27.9	9
SR 89	4	49.8	4	47.4	4	46.6	4
	22	1.0	22	1.0	22	1.0	22
Tavern shores	22	0.4	22	0.4	22	0.4	22
	24	0.7	24	0.6	24	0.7	24
	23	1.0	23	1.0	23	1.0	23
64 Acres	24	0.8	24	0.8	24	0.8	24
	22	0.7	22	0.7	22	0.7	22
	23	0.6	23	0.6	23	0.6	23
	22	2.4	22	2.2	22	2.2	22
Granlibakken Rd	18	4.8	20	3.4	19	4.4	20
	22	1.5	22	1.4	22	1.5	22
Total	16	129.2	16	126.7	16	126.0	16

Arterial Level of Service: SB SR 89

Cross Street	Run 5 Delay	Run 11262014 Speed	Run 11262014 Delay
	0.6	26	0.5
	0.7	23	0.7
Twin Crag	0.9	25	0.9
	0.5	18	0.4
	0.9	23	0.8
	0.7	23	0.7
	1.1	23	1.0
	0.9	22	0.8
	2.6	22	2.1
	3.4	21	1.4
	11.9	15	7.9
Fariway Dr	20.2	9	20.2
	28.0	9	26.8
SR 89	49.6	4	47.0
	1.0	22	1.0
Tavern shores	0.4	22	0.4
	0.6	24	0.7
	1.0	23	1.1
64 Acres	0.8	24	0.8
	0.7	22	0.7
	0.6	23	0.6
	2.2	22	2.3
Granlibakken Rd	3.7	20	3.6
	1.4	22	1.5
Total	134.4	16	124.1

Appendix F: Intersection Operations Analysis Results

Existing Conditions

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	23	68	10	242	56	231	35	261	317	275	245	16
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.89	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	25	74	11	263	61	0	38	284	0	299	266	17
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	63	187	28	364	382	325	52	594	266	357	1212	531
Arrive On Green	0.16	0.16	0.16	0.22	0.22	0.00	0.03	0.18	0.00	0.21	0.35	0.35
Sat Flow, veh/h	401	1188	177	1691	1776	1509	1691	3374	1509	1723	3438	1505
Grp Volume(v), veh/h	110	0	0	263	61	0	38	284	0	299	266	17
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1505
Q Serve(g_s), s	3.7	0.0	0.0	9.4	1.8	0.0	1.5	4.9	0.0	10.9	3.5	0.5
Cycle Q Clear(g_c), s	3.7	0.0	0.0	9.4	1.8	0.0	1.5	4.9	0.0	10.9	3.5	0.5
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	0	364	382	325	52	594	266	357	1212	531
V/C Ratio(X)	0.40	0.00	0.00	0.72	0.16	0.00	0.74	0.48	0.00	0.84	0.22	0.03
Avail Cap(c_a), veh/h	433	0	0	466	489	416	155	826	370	633	1789	783
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	0.0	0.0	23.8	20.8	0.0	31.4	24.2	0.0	24.9	14.8	13.9
Incr Delay (d2), s/veh	0.9	0.0	0.0	4.0	0.2	0.0	18.3	0.6	0.0	5.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.8	0.0	0.0	4.8	0.9	0.0	0.9	2.3	0.0	5.7	1.7	0.2
LnGrp Delay(d),s/veh	25.7	0.0	0.0	27.8	21.0	0.0	49.7	24.8	0.0	30.1	14.9	13.9
LnGrp LOS	C			C	C		D	C		C	B	B
Approach Vol, veh/h		110			324			322			582	
Approach Delay, s/veh		25.7			26.5			27.7			22.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.0	17.5	15.5		14.3	6.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	24.0	16.0		16.0	6.0	34.0
Max Q Clear Time (g_c+I1), s		11.4	12.9	6.9		5.7	3.5	5.5
Green Ext Time (p_c), s		0.6	0.7	2.5		0.3	0.0	4.2

Intersection Summary	
HCM 2010 Ctrl Delay	25.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.6

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	28	0	27	5	0	14	21	572	9	13	454	16
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	30	0	29	5	0	15	23	622	10	14	493	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1360	1357	652	1367	1361	777	586	0	0	707	0	0
Stage 1	605	605	-	747	747	-	-	-	-	-	-	-
Stage 2	755	752	-	620	614	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	125	148	466	124	147	395	974	-	-	878	-	-
Stage 1	483	486	-	403	419	-	-	-	-	-	-	-
Stage 2	399	416	-	474	481	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	102	125	410	98	124	347	913	-	-	823	-	-
Mov Cap-2 Maneuver	102	125	-	98	124	-	-	-	-	-	-	-
Stage 1	441	448	-	368	383	-	-	-	-	-	-	-
Stage 2	349	380	-	406	443	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	39.7	24.2	0.3	0.3
HCM LOS	E	C		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	913	-	-	208	162	823	-	-
HCM Lane V/C Ratio	0.025	-	-	0.099	0.369	0.017	-	-
HCM Control Delay (s)	9	-	-	24.2	39.7	9.5	-	-
HCM Lane LOS	A	-	-	C	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	1.6	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	678	0	0	706
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	737	0	0	767

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1504	737	0	0	737	0
Stage 1	737	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	133	417	-	-	864	-
Stage 1	472	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	133	417	-	-	864	-
Mov Cap-2 Maneuver	273	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	457	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	864	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	52	21	4	510	586	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	57	23	4	554	637	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1200	637	637	0	-	0
Stage 1	637	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	184	438	923	-	-	-
Stage 1	486	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	183	438	923	-	-	-
Mov Cap-2 Maneuver	183	-	-	-	-	-
Stage 1	486	-	-	-	-	-
Stage 2	525	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	30.3	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	923	-	220	-	-
HCM Lane V/C Ratio	0.005	-	0.361	-	-
HCM Control Delay (s)	8.9	-	30.3	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	1.6	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	541	2	11	632
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	3	9	588	2	12	687

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1300	589	0	0	590	0
Stage 1	589	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	177	506	-	-	961	-
Stage 1	553	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	175	506	-	-	961	-
Mov Cap-2 Maneuver	175	-	-	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	479	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.2	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	334	961	-
HCM Lane V/C Ratio	-	-	0.036	0.012	-
HCM Control Delay (s)	-	-	16.2	8.8	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	115	2	36	4	2	11	14	388	3	15	527	65
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	125	2	39	4	2	12	15	422	3	16	573	71

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1066	1060	573	1080	1059	423	573	0	0	425	0	0
Stage 1	605	605	-	454	454	-	-	-	-	-	-	-
Stage 2	461	455	-	626	605	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	199	223	517	195	223	629	976	-	-	1108	-	0
Stage 1	483	486	-	584	568	-	-	-	-	-	-	0
Stage 2	579	567	-	470	486	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	188	214	517	173	214	629	976	-	-	1108	-	-
Mov Cap-2 Maneuver	188	214	-	173	214	-	-	-	-	-	-	-
Stage 1	473	476	-	572	557	-	-	-	-	-	-	-
Stage 2	554	556	-	423	476	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	57.8	16.2	0.3	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	976	-	-	222	340	1108	-
HCM Lane V/C Ratio	0.016	-	-	0.749	0.054	0.015	-
HCM Control Delay (s)	8.7	0	-	57.8	16.2	8.3	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0	-	-	5.1	0.2	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	838	639	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	911	695	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	695	0	-	0	1606	695
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	911	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	878	-	-	-	113	434
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	384	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	878	-	-	-	113	434
Mov Cap-2 Maneuver	-	-	-	-	113	-
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	384	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	878	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	20	44	593	466	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	26	22	48	645	507	45

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1269	529	551	0	-	0
Stage 1	529	-	-	-	-	-
Stage 2	740	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	185	548	994	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	470	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	176	548	994	-	-	-
Mov Cap-2 Maneuver	310	-	-	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	447	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	15.6	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	994	-	386	-	-
HCM Lane V/C Ratio	0.048	-	0.124	-	-
HCM Control Delay (s)	8.8	-	15.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	30	89	13	318	74	304	46	344	417	362	323	21
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	33	97	14	346	80	0	50	374	0	393	351	23
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	181	26	379	397	338	62	584	261	435	1337	587
Arrive On Green	0.15	0.15	0.15	0.22	0.22	0.00	0.04	0.17	0.00	0.25	0.39	0.39
Sat Flow, veh/h	405	1190	172	1691	1776	1509	1691	3374	1509	1723	3438	1508
Grp Volume(v), veh/h	144	0	0	346	80	0	50	374	0	393	351	23
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1508
Q Serve(g_s), s	6.1	0.0	0.0	16.1	2.9	0.0	2.4	8.3	0.0	17.8	5.6	0.8
Cycle Q Clear(g_c), s	6.1	0.0	0.0	16.1	2.9	0.0	2.4	8.3	0.0	17.8	5.6	0.8
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	268	0	0	379	397	338	62	584	261	435	1337	587
V/C Ratio(X)	0.54	0.00	0.00	0.91	0.20	0.00	0.81	0.64	0.00	0.90	0.26	0.04
Avail Cap(c_a), veh/h	352	0	0	379	397	338	126	671	300	514	1454	638
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.5	0.0	0.0	30.5	25.4	0.0	38.5	30.9	0.0	29.1	16.7	15.2
Incr Delay (d2), s/veh	1.7	0.0	0.0	26.1	0.2	0.0	21.3	1.7	0.0	17.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.1	0.0	0.0	10.2	1.5	0.0	1.5	4.0	0.0	10.5	2.7	0.3
LnGrp Delay(d),s/veh	33.2	0.0	0.0	56.6	25.6	0.0	59.8	32.6	0.0	46.5	16.8	15.3
LnGrp LOS	C			E	C		E	C		D	B	B
Approach Vol, veh/h		144			426			424			767	
Approach Delay, s/veh		33.2			50.8			35.8			32.0	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	24.3	17.9		16.2	6.9	35.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	24.0	16.0		16.0	6.0	34.0
Max Q Clear Time (g_c+I1), s		18.1	19.8	10.3		8.1	4.4	7.6
Green Ext Time (p_c), s		0.0	0.5	2.4		0.4	0.0	5.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	7.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	37	0	35	7	0	19	27	752	12	17	598	21
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	40	0	38	8	0	21	29	817	13	18	650	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1737	811	1750	1743	974	748	0	0	905	0	0
Stage 1	773	773	-	958	958	-	-	-	-	-	-	-
Stage 2	968	964	-	792	785	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	68	87	378	67	86	304	847	-	-	739	-	-
Stage 1	390	407	-	308	334	-	-	-	-	-	-	-
Stage 2	304	332	-	381	402	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	53	72	332	50	71	267	794	-	-	693	-	-
Mov Cap-2 Maneuver	53	72	-	50	71	-	-	-	-	-	-	-
Stage 1	352	372	-	278	302	-	-	-	-	-	-	-
Stage 2	253	300	-	308	367	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	144.2	42.8	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	794	-	-	123	90	693	-	-
HCM Lane V/C Ratio	0.037	-	-	0.23	0.87	0.027	-	-
HCM Control Delay (s)	9.7	-	-	42.8	144.2	10.3	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	4.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	678	0	0	706
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	737	0	0	767

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1504	737	0	0	737	0
Stage 1	737	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	133	417	-	-	864	-
Stage 1	472	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	133	417	-	-	864	-
Mov Cap-2 Maneuver	273	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	457	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	864	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	69	27	5	671	771	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	75	29	5	729	838	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1578	838	838	0	-	0
Stage 1	838	-	-	-	-	-
Stage 2	740	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	106	334	775	-	-	-
Stage 1	388	-	-	-	-	-
Stage 2	433	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	105	334	775	-	-	-
Mov Cap-2 Maneuver	105	-	-	-	-	-
Stage 1	388	-	-	-	-	-
Stage 2	430	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	97.7	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	775	-	130	-	-
HCM Lane V/C Ratio	0.007	-	0.803	-	-
HCM Control Delay (s)	9.7	-	97.7	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	4.9	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	11	712	3	14	832
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	4	12	774	3	15	904

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1711	776	0	0	777	0
Stage 1	776	-	-	-	-	-
Stage 2	935	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	99	396	-	-	818	-
Stage 1	452	-	-	-	-	-
Stage 2	380	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	97	396	-	-	818	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	373	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	217	818	-
HCM Lane V/C Ratio	-	-	0.075	0.019	-
HCM Control Delay (s)	-	-	22.9	9.5	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	57.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	151	3	47	5	2	15	18	511	4	20	694	85
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	164	3	51	5	2	16	20	555	4	22	754	92

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1404	1397	754	1422	1395	558	754	0	0	560	0	0
Stage 1	798	798	-	597	597	-	-	-	-	-	-	-
Stage 2	606	599	-	825	798	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 116	140	407	113	141	527	834	-	-	987	-	0
Stage 1	378	397	-	488	490	-	-	-	-	-	-	0
Stage 2	482	489	-	365	397	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 105	130	407	92	131	527	834	-	-	987	-	-
Mov Cap-2 Maneuver	~ 105	130	-	92	131	-	-	-	-	-	-	-
Stage 1	365	382	-	471	473	-	-	-	-	-	-	-
Stage 2	449	472	-	304	382	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 415	23	0.3	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	834	-	-	127	224	987	-
HCM Lane V/C Ratio	0.023	-	-	1.72	0.107	0.022	-
HCM Control Delay (s)	9.4	0	-	$ 415	23	8.7	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	16.4	0.4	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	838	639	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	911	695	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	695	0	-	0	1606	695
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	911	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	878	-	-	-	113	434
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	384	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	878	-	-	-	113	434
Mov Cap-2 Maneuver	-	-	-	-	113	-
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	384	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	878	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	31	26	58	780	613	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	34	28	63	848	666	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1670	696	725	0	-	0
Stage 1	696	-	-	-	-	-
Stage 2	974	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	105	440	855	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	365	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	97	440	855	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	338	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	20.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	855	-	290	-	-
HCM Lane V/C Ratio	0.074	-	0.214	-	-
HCM Control Delay (s)	9.5	-	20.8	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	-	-

Opening Day (2018) Operations

Opening Day (2018) Operations: Alternative 5 (No Build)

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	24	69	10	253	58	245	36	268	360	302	252	17
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	26	75	11	275	63	0	39	291	0	328	274	18
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	63	183	27	362	381	324	52	596	267	379	1258	551
Arrive On Green	0.15	0.15	0.15	0.21	0.21	0.00	0.03	0.18	0.00	0.22	0.37	0.37
Sat Flow, veh/h	410	1183	174	1691	1776	1509	1691	3374	1509	1723	3438	1507
Grp Volume(v), veh/h	112	0	0	275	63	0	39	291	0	328	274	18
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1507
Q Serve(g_s), s	3.9	0.0	0.0	10.4	2.0	0.0	1.6	5.3	0.0	12.5	3.7	0.5
Cycle Q Clear(g_c), s	3.9	0.0	0.0	10.4	2.0	0.0	1.6	5.3	0.0	12.5	3.7	0.5
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	273	0	0	362	381	324	52	596	267	379	1258	551
V/C Ratio(X)	0.41	0.00	0.00	0.76	0.17	0.00	0.75	0.49	0.00	0.87	0.22	0.03
Avail Cap(c_a), veh/h	414	0	0	496	521	443	149	890	398	505	1613	707
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.0	0.0	0.0	25.1	21.8	0.0	32.8	25.3	0.0	25.6	14.9	13.9
Incr Delay (d2), s/veh	1.0	0.0	0.0	4.5	0.2	0.0	19.5	0.6	0.0	11.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.0	0.0	0.0	5.3	1.0	0.0	1.0	2.5	0.0	7.1	1.8	0.2
LnGrp Delay(d),s/veh	27.0	0.0	0.0	29.7	22.0	0.0	52.3	25.9	0.0	37.2	15.0	13.9
LnGrp LOS	C			C	C		D	C		D	B	B
Approach Vol, veh/h		112			338			330			620	
Approach Delay, s/veh		27.0			28.2			29.0			26.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		18.6	19.0	16.1		14.5	6.1	29.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		20.0	20.0	18.0		16.0	6.0	32.0
Max Q Clear Time (g_c+I1), s		12.4	14.5	7.3		5.9	3.6	5.7
Green Ext Time (p_c), s		0.7	0.5	2.9		0.3	0.0	4.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	54	21	4	537	609	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	59	23	4	584	662	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1254	662	662	0	-	0
Stage 1	662	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	170	424	903	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	424	903	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	508	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	34.2	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	903	-	203	-	-
HCM Lane V/C Ratio	0.005	-	0.402	-	-
HCM Control Delay (s)	9	-	34.2	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	1.8	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	568	2	11	703
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	3	9	617	2	12	764

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1406	618	0	0	620	0
Stage 1	618	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	153	487	-	-	937	-
Stage 1	536	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	151	487	-	-	937	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	440	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	303	937	-
HCM Lane V/C Ratio	-	-	0.039	0.013	-
HCM Control Delay (s)	-	-	17.4	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	16.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	69	4	2	11	16	412	3	16	596	66
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	75	4	2	12	17	448	3	17	648	72

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1174	1169	648	1205	1167	449	648	0	0	451	0	0
Stage 1	683	683	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	721	683	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	168	192	469	160	193	608	914	-	-	1084	-	0
Stage 1	438	448	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	417	448	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	157	183	469	128	183	608	914	-	-	1084	-	-
Mov Cap-2 Maneuver	157	183	-	128	183	-	-	-	-	-	-	-
Stage 1	427	437	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	340	437	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	107.3	18.7	0.3	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	914	-	-	208	282	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.988	0.066	0.016	-
HCM Control Delay (s)	9	0	-	107.3	18.7	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	8.6	0.2	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	643	483	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	26	23	49	699	525	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1345	548	571	0	-	0
Stage 1	548	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	166	534	977	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	158	534	977	-	-	-
Mov Cap-2 Maneuver	291	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	420	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	16.2	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	977	-	369	-	-
HCM Lane V/C Ratio	0.05	-	0.133	-	-
HCM Control Delay (s)	8.9	-	16.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	31	91	13	333	76	323	47	353	474	397	331	22
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	34	99	14	362	83	0	51	384	0	432	360	24
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	178	25	395	415	353	63	552	247	452	1336	586
Arrive On Green	0.15	0.15	0.15	0.23	0.23	0.00	0.04	0.16	0.00	0.26	0.39	0.39
Sat Flow, veh/h	409	1190	168	1691	1776	1509	1691	3374	1509	1723	3438	1508
Grp Volume(v), veh/h	147	0	0	362	83	0	51	384	0	432	360	24
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1508
Q Serve(g_s), s	6.5	0.0	0.0	17.5	3.1	0.0	2.5	9.0	0.0	20.7	6.0	0.8
Cycle Q Clear(g_c), s	6.5	0.0	0.0	17.5	3.1	0.0	2.5	9.0	0.0	20.7	6.0	0.8
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	264	0	0	395	415	353	63	552	247	452	1336	586
V/C Ratio(X)	0.56	0.00	0.00	0.92	0.20	0.00	0.80	0.70	0.00	0.96	0.27	0.04
Avail Cap(c_a), veh/h	337	0	0	404	424	360	121	644	288	452	1336	586
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.1	0.0	0.0	31.3	25.8	0.0	40.0	33.1	0.0	30.4	17.5	15.9
Incr Delay (d2), s/veh	1.8	0.0	0.0	25.0	0.2	0.0	20.5	2.7	0.0	31.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.3	0.0	0.0	10.9	1.6	0.0	1.5	4.4	0.0	13.7	2.9	0.4
LnGrp Delay(d),s/veh	34.9	0.0	0.0	56.3	26.0	0.0	60.6	35.8	0.0	61.4	17.6	15.9
LnGrp LOS	C			E	C		E	D		E	B	B
Approach Vol, veh/h		147			445			435			816	
Approach Delay, s/veh		34.9			50.6			38.7			40.8	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.6	26.0	17.7		16.5	7.1	36.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		20.0	22.0	16.0		16.0	6.0	32.0
Max Q Clear Time (g_c+I1), s		19.5	22.7	11.0		8.5	4.5	8.0
Green Ext Time (p_c), s		0.1	0.0	1.7		0.4	0.0	5.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.2
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	71	28	5	706	801	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	77	30	5	767	871	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1649	871	871	0	-	0
Stage 1	871	-	-	-	-	-
Stage 2	778	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	96	319	753	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	415	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	95	319	753	-	-	-
Mov Cap-2 Maneuver	95	-	-	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	126.7	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	753	-	119	-	-
HCM Lane V/C Ratio	0.007	-	0.904	-	-
HCM Control Delay (s)	9.8	-	126.7	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	5.7	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	11	748	3	14	925
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	4	12	813	3	15	1005

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1851	815	0	0	816	0
Stage 1	815	-	-	-	-	-
Stage 2	1036	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	81	376	-	-	790	-
Stage 1	433	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	79	376	-	-	790	-
Mov Cap-2 Maneuver	79	-	-	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	335	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	188	790	-
HCM Lane V/C Ratio	-	-	0.087	0.019	-
HCM Control Delay (s)	-	-	26	9.6	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	84.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	21	784	87
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	23	852	95

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1544	1537	852	1564	1535	591	852	0	0	593	0	0
Stage 1	898	898	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	927	898	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 93	115	358	90	116	505	766	-	-	959	-	0
Stage 1	333	357	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	320	357	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 83	105	358	69	106	505	766	-	-	959	-	-
Mov Cap-2 Maneuver	~ 83	105	-	69	106	-	-	-	-	-	-	-
Stage 1	318	341	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	256	341	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 640.2	27.8	0.4	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	766	-	-	103	182	959	-
HCM Lane V/C Ratio	0.03	-	-	2.206	0.131	0.024	-
HCM Control Delay (s)	9.8	0	-	$ 640.2	27.8	8.8	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	19.8	0.4	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NEL	NER
Vol, veh/h	0	0	0	662	0	905
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	0	0	720	0	984

Major/Minor	Minor2		Major2		Major1	
Conflicting Flow All	1704	720	984	0	720	0
Stage 1	720	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Critical Hdwy	6.57	6.27	-	-	4.17	-
Critical Hdwy Stg 1	5.57	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	4.063	3.363	-	-	2.263	-
Pot Cap-1 Maneuver	89	420	-	-	859	-
Stage 1	425	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %				-		-
Mov Cap-1 Maneuver	0	420	-	-	859	-
Mov Cap-2 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-

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

Minor Lane/Major Mvmt	NEL	NER	EBLn1	WBL	WBT
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	0	-
HCM Lane LOS	A	-	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	846	635	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	35	29	64	920	690	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1768	720	750	0	-	0
Stage 1	720	-	-	-	-	-
Stage 2	1048	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	91	426	837	-	-	-
Stage 1	480	-	-	-	-	-
Stage 2	336	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	84	426	837	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-
Stage 1	480	-	-	-	-	-
Stage 2	310	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	22.3	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	837	-	272	-	-
HCM Lane V/C Ratio	0.077	-	0.236	-	-
HCM Control Delay (s)	9.7	-	22.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Opening Day (2018) Operations: Alternative 1

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	30	33	40	74	27	128	56	372	65	179	370	21
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.89	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1810	1810	1810	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	33	36	43	80	29	0	61	404	0	195	402	23
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	5	5	5	5	5	5	5	5	5
Cap, veh/h	82	89	107	294	309	263	76	803	359	250	1150	503
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.00	0.04	0.23	0.00	0.14	0.33	0.33
Sat Flow, veh/h	479	522	624	1723	1810	1538	1723	3438	1538	1723	3438	1504
Grp Volume(v), veh/h	112	0	0	80	29	0	61	404	0	195	402	23
Grp Sat Flow(s),veh/h/ln	1624	0	0	1723	1810	1538	1723	1719	1538	1723	1719	1504
Q Serve(g_s), s	3.5	0.0	0.0	2.3	0.8	0.0	2.0	5.8	0.0	6.2	5.0	0.6
Cycle Q Clear(g_c), s	3.5	0.0	0.0	2.3	0.8	0.0	2.0	5.8	0.0	6.2	5.0	0.6
Prop In Lane	0.29		0.38	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	0	294	309	263	76	803	359	250	1150	503
V/C Ratio(X)	0.40	0.00	0.00	0.27	0.09	0.00	0.81	0.50	0.00	0.78	0.35	0.05
Avail Cap(c_a), veh/h	455	0	0	512	538	457	271	1203	538	633	1924	842
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	0.0	0.0	20.6	20.0	0.0	27.1	19.0	0.0	23.6	14.3	12.9
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.5	0.1	0.0	17.8	0.5	0.0	5.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.6	0.0	0.0	1.1	0.4	0.0	1.3	2.8	0.0	3.3	2.4	0.2
LnGrp Delay(d),s/veh	22.0	0.0	0.0	21.1	20.1	0.0	44.8	19.5	0.0	28.9	14.5	12.9
LnGrp LOS	C			C	C		D	B		C	B	B
Approach Vol, veh/h		112			109			465			620	
Approach Delay, s/veh		22.0			20.8			22.8			19.0	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		13.8	12.3	17.3		13.8	6.5	23.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	21.0	20.0		16.0	9.0	32.0
Max Q Clear Time (g_c+I1), s		4.3	8.2	7.8		5.5	4.0	7.0
Green Ext Time (p_c), s		0.2	0.4	4.5		0.4	0.0	6.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.8
HCM 2010 LOS	C

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	536	0	0	557
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	583	0	0	605

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1188	583	0	0	583	0
Stage 1	583	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	207	510	-	-	986	-
Stage 1	556	-	-	-	-	-
Stage 2	543	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	207	510	-	-	986	-
Mov Cap-2 Maneuver	345	-	-	-	-	-
Stage 1	556	-	-	-	-	-
Stage 2	543	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	986	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	54	21	4	204	208	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	59	23	4	222	226	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	456	226	226	0	-	0
Stage 1	226	-	-	-	-	-
Stage 2	230	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	522	759	1325	-	-	-
Stage 1	760	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	520	759	1325	-	-	-
Mov Cap-2 Maneuver	520	-	-	-	-	-
Stage 1	760	-	-	-	-	-
Stage 2	755	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1325	-	570	-	-
HCM Lane V/C Ratio	0.003	-	0.143	-	-
HCM Control Delay (s)	7.7	-	12.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	252	2	11	228
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	3	9	274	2	12	248

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	547	275	0	0	276	0
Stage 1	275	-	-	-	-	-
Stage 2	272	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.15	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.245	-
Pot Cap-1 Maneuver	496	761	-	-	1270	-
Stage 1	769	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	491	761	-	-	1270	-
Mov Cap-2 Maneuver	491	-	-	-	-	-
Stage 1	769	-	-	-	-	-
Stage 2	764	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	662	1270	-
HCM Lane V/C Ratio	-	-	0.018	0.009	-
HCM Control Delay (s)	-	-	10.5	7.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	39	4	2	11	16	412	3	24	602	80
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	42	4	2	12	17	448	3	26	654	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1193	654	1213	1191	449	654	0	0	451	0	0
Stage 1	707	707	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	729	707	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	162	186	465	158	187	608	910	-	-	1084	-	0
Stage 1	424	437	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	413	437	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	150	174	465	135	175	608	910	-	-	1084	-	-
Mov Cap-2 Maneuver	150	174	-	135	175	-	-	-	-	-	-	-
Stage 1	413	420	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	359	420	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	109.4	18.4	0.3	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	910	-	-	180	287	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.96	0.064	0.024	-
HCM Control Delay (s)	9	0	-	109.4	18.4	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	7.6	0.2	0.1	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	756	540	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	822	587	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	587	0	-	0	1409	587
Stage 1	-	-	-	-	587	-
Stage 2	-	-	-	-	822	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	964	-	-	-	149	500
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	423	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	964	-	-	-	149	500
Mov Cap-2 Maneuver	-	-	-	-	149	-
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	423	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	964	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	470	443	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	26	23	49	511	482	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1113	504	527	0	-	0
Stage 1	504	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	230	566	1025	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	541	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	219	566	1025	-	-	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	515	-	-	-	-	-

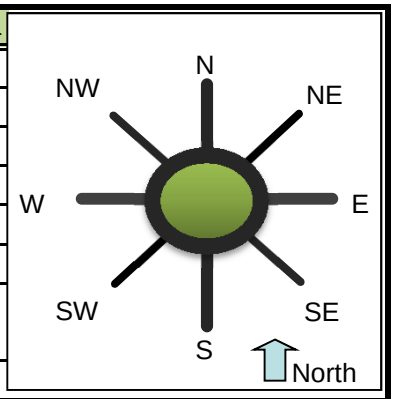
Approach	SB	NE	SW
HCM Control Delay, s	14.5	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	1025	-	428	-	-
HCM Lane V/C Ratio	0.048	-	0.114	-	-
HCM Control Delay (s)	8.7	-	14.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 1 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					186		18	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	198						505	
	SW (6), vph								
	W (7), vph	31				355			
	NW (8), vph								
Output	Total Vehicles	229	0	0	0	541	0	523	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	216	0	21	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	226	0	0	0	0	0	587	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	35	0	0	0	413	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	261	0	0	0	629	0	608	0
Conflicting flow, pcu/h	413	0	0	0	21	0	226	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	712	NA	NA	NA	1034	NA	842	NA
Entry Flow Rates, vph	249	NA	NA	NA	588	NA	568	NA
V/C ratio	**0.35**				**0.57**		**0.67**	
Control Delay, s/veh	**9**				**11**		**16**	
LOS	A				B		C	
95th % Queue (ft)	**41**				**99**		**144**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	863	NA	NA	NA	1262	NA	1024	NA
Entry Flow Rates, vph	249	NA	NA	NA	588	NA	568	NA
V/C ratio	**0.30**				**0.50**		**0.59**	
Control Delay, sec/pcu	**7**				**8**		**11**	
LOS	A				A		B	
95th % Queue (ft)	**34**				**77**		**109**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.2

East_Roundabout_2018_AA_EF = 1.2
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: SR 89											
3	L2	386	7.0	0.528	10.3	LOS B	5.4	142.6	0.23	0.53	35.7
8	T1	202	7.0	0.528	3.5	LOS A	5.4	142.6	0.23	0.53	35.7
Approach		588	7.0	0.528	7.9	LOS A	5.4	142.6	0.23	0.53	35.7
North: Old SR 89											
4	T1	215	3.0	0.312	6.4	LOS A	1.8	46.7	0.63	0.66	36.5
14	R2	34	3.0	0.312	6.9	LOS A	1.8	46.7	0.63	0.66	35.3
Approach		249	3.0	0.312	6.5	LOS A	1.8	46.7	0.63	0.66	36.4
West: New SR 89											
5	L2	20	7.0	0.640	13.8	LOS B	6.6	175.5	0.77	0.72	36.1
12	R2	549	7.0	0.640	7.5	LOS A	6.6	175.5	0.77	0.72	34.8
Approach		568	7.0	0.640	7.7	LOS A	6.6	175.5	0.77	0.72	34.8
All Vehicles		1405	6.3	0.640	7.6	LOS A	6.6	175.5	0.52	0.63	35.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.1

East_Roundabout_2018_AA_EF = 1.1
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: SR 89											
3	L2	386	7.0	0.482	10.2	LOS B	4.5	119.5	0.20	0.53	35.8
8	T1	202	7.0	0.482	3.4	LOS A	4.5	119.5	0.20	0.53	35.8
Approach		588	7.0	0.482	7.9	LOS A	4.5	119.5	0.20	0.53	35.8
North: Old SR 89											
4	T1	215	3.0	0.275	5.9	LOS A	1.6	41.0	0.59	0.62	36.7
14	R2	34	3.0	0.275	6.4	LOS A	1.6	41.0	0.59	0.62	35.4
Approach		249	3.0	0.275	5.9	LOS A	1.6	41.0	0.59	0.62	36.5
West: New SR 89											
5	L2	20	7.0	0.572	12.4	LOS B	5.1	133.6	0.69	0.65	36.6
12	R2	549	7.0	0.572	6.0	LOS A	5.1	133.6	0.69	0.65	35.2
Approach		568	7.0	0.572	6.2	LOS A	5.1	133.6	0.69	0.65	35.2
All Vehicles		1405	6.3	0.572	6.9	LOS A	5.1	133.6	0.47	0.60	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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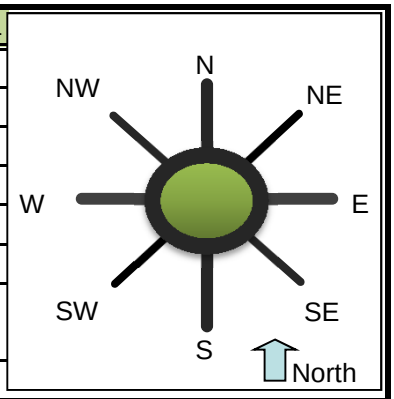
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 1 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph			21		27		56	
Exit	NE (2), vph								
Legs	E (3), vph	30				128		372	
(TO)	SE (4), vph								
	S (5), vph	33		179				65	
	SW (6), vph								
	W (7), vph	40		370		74			
	NW (8), vph								
Output	Total Vehicles	103	0	570	0	229	0	493	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	0.992	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	24	0	31	0	64	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	34	0	0	0	146	0	425	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	37	0	204	0	0	0	74	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	45	0	422	0	84	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	115	0	651	0	261	0	563	0
Conflicting flow, pcu/h	711	0	179	0	522	0	275	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	534	NA	898	NA	632	NA	815	NA
Entry Flow Rates, vph	112	NA	620	NA	249	NA	536	NA
V/C ratio	**0.21**		**0.69**		**0.39**		**0.66**	
Control Delay, s/veh	**10**		**16**		**11**		**16**	
LOS	A		C		B		C	
95th % Queue (ft)	**20**		**151**		**49**		**132**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	643	NA	1092	NA	764	NA	990	NA
Entry Flow Rates, vph	112	NA	620	NA	249	NA	536	NA
V/C ratio	**0.18**		**0.60**		**0.34**		**0.57**	
Control Delay, sec/pcu	**8**		**11**		**9**		**11**	
LOS	A		B		A		B	
95th % Queue (ft)	**17**		**108**		**40**		**97**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.2

2018 Average Annual PM - Old Wye Roundabout Env = 1.2
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: SR 89											
3	L2	80	3.0	0.339	14.1	LOS B	2.2	56.9	0.74	0.78	35.9
8	T1	29	3.0	0.339	7.0	LOS A	2.2	56.9	0.74	0.78	35.6
18	R2	139	3.0	0.339	7.3	LOS A	2.2	56.9	0.74	0.78	34.3
Approach		249	3.0	0.339	9.4	LOS A	2.2	56.9	0.74	0.78	34.9
East: SR 28											
1	L2	195	5.0	0.607	12.2	LOS B	5.4	141.5	0.64	0.58	36.2
6	T1	402	5.0	0.607	5.2	LOS A	5.4	141.5	0.64	0.58	35.9
16	R2	23	5.0	0.607	5.4	LOS A	5.4	141.5	0.64	0.58	34.6
Approach		620	5.0	0.607	7.4	LOS A	5.4	141.5	0.64	0.58	35.9
North: Savemart											
7	L2	33	3.0	0.182	15.3	LOS C	1.1	28.4	0.76	0.79	35.5
4	T1	36	3.0	0.182	8.0	LOS A	1.1	28.4	0.76	0.79	35.1
14	R2	43	3.0	0.182	8.5	LOS A	1.1	28.4	0.76	0.79	33.9
Approach		112	3.0	0.182	10.3	LOS B	1.1	28.4	0.76	0.79	34.7
West: SR 89											
5	L2	61	5.0	0.593	14.0	LOS B	5.5	143.0	0.75	0.71	36.4
2	T1	404	5.0	0.593	6.8	LOS A	5.5	143.0	0.75	0.71	36.0
12	R2	71	5.0	0.593	7.2	LOS A	5.5	143.0	0.75	0.71	34.7
Approach		536	5.0	0.593	7.6	LOS A	5.5	143.0	0.75	0.71	35.9
All Vehicles		1516	4.5	0.607	8.0	LOS A	5.5	143.0	0.70	0.68	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.1

2018 Average Annual PM - Old Wye Roundabout
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: SR 89											
3	L2	80	3.0	0.295	13.5	LOS B	1.9	49.8	0.71	0.74	36.2
8	T1	29	3.0	0.295	6.4	LOS A	1.9	49.8	0.71	0.74	35.8
18	R2	139	3.0	0.295	6.6	LOS A	1.9	49.8	0.71	0.74	34.5
Approach		249	3.0	0.295	8.8	LOS A	1.9	49.8	0.71	0.74	35.2
East: SR 28											
1	L2	195	5.0	0.547	11.8	LOS B	4.6	119.4	0.57	0.55	36.5
6	T1	402	5.0	0.547	4.7	LOS A	4.6	119.4	0.57	0.55	36.2
16	R2	23	5.0	0.547	5.0	LOS A	4.6	119.4	0.57	0.55	34.8
Approach		620	5.0	0.547	7.0	LOS A	4.6	119.4	0.57	0.55	36.2
North: Savemart											
7	L2	33	3.0	0.156	14.6	LOS B	1.0	25.0	0.75	0.75	35.8
4	T1	36	3.0	0.156	7.3	LOS A	1.0	25.0	0.75	0.75	35.4
14	R2	43	3.0	0.156	7.8	LOS A	1.0	25.0	0.75	0.75	34.1
Approach		112	3.0	0.156	9.6	LOS A	1.0	25.0	0.75	0.75	35.0
West: SR 89											
5	L2	61	5.0	0.527	12.7	LOS B	4.3	110.6	0.68	0.60	36.7
2	T1	404	5.0	0.527	5.5	LOS A	4.3	110.6	0.68	0.60	36.4
12	R2	71	5.0	0.527	5.9	LOS A	4.3	110.6	0.68	0.60	35.0
Approach		536	5.0	0.527	6.3	LOS A	4.3	110.6	0.68	0.60	36.2
All Vehicles		1516	4.5	0.547	7.2	LOS A	4.6	119.4	0.64	0.61	35.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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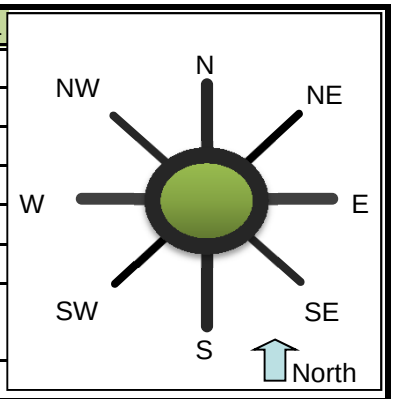
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	West Roundabout w/ EBR Bypass



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph					166		348	
	SE (4), vph								
	S (5), vph			183					
	SW (6), vph								
	W (7), vph			280		220			
	NW (8), vph								
Output	Total Vehicles	0	0	463	0	386	0	348	0

Volume Characteristics

	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows

	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	193	0	405	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	209	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	320	0	256	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	528	0	449	0	405	0
Conflicting flow, pcu/h	0	0	256	0	405	0	209	0

Roundabout Type

Standard Single Lane or Urban Compact

Enter type here… Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	833	NA	705	NA	857	NA
Entry Flow Rates, vph	NA	NA	503	NA	420	NA	378	NA
V/C ratio			**0.60**		**0.60**		**0.44**	
Control Delay, s/veh			**14**		**15**		**10**	
LOS			B		C		A	
95th % Queue (ft)			**109**		**106**		**61**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	1012	NA	854	NA	1042	NA
Entry Flow Rates, vph	NA	NA	503	NA	420	NA	378	NA
V/C ratio			**0.52**		**0.53**		**0.39**	
Control Delay, sec/pcu			**10**		**11**		**8**	
LOS			A		B		A	
95th % Queue (ft)			**82**		**84**		**50**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**					
Select Exit Leg for Bypass (TO)	**S (5)**					
Does the bypass have a dedicated receiving lane?	**No**					
Volumes						
Right Turn Volume removed from Entry Leg	**340**					
Volume Characteristics (for entry leg)						
PHF	0.92					
F_{HV}	0.93					
F_{ped}	1.00					
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	395					
Conflicting Flow, pcu/hr	209					
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	857					
Flow Rates of Exiting Traffic, vph	370					
V/C ratio	**0.43**					
Control Delay, s/veh	**9.5**					
LOS	A					
95th % Queue (ft)	**59**					
Approach w/Bypass Delay, s/veh	***9.6***					
Approach w/Bypass LOS	*A*					

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 AA

2018_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	239	7.0	0.568	10.1	LOS B	4.9	128.5	0.79	0.87	24.1
18x	R2	180	7.0	0.568	6.4	LOS A	4.9	128.5	0.79	0.87	23.2
Approach		420	7.0	0.568	8.5	LOS A	4.9	128.5	0.79	0.87	23.7
NorthEast: New SR 28											
1x	L2	199	5.0	0.583	8.5	LOS A	5.2	136.1	0.74	0.67	25.2
16ax	R1	304	5.0	0.583	3.3	LOS A	5.2	136.1	0.74	0.67	23.5
Approach		503	5.0	0.583	5.4	LOS A	5.2	136.1	0.74	0.67	24.1
West: SR 89											
5a	L1	378	7.0	0.344	5.9	LOS A	2.5	66.8	0.54	0.57	24.5
12a	R1	370	7.0	0.336	1.4	LOS A	2.5	64.8	0.53	0.25	24.2
Approach		748	7.0	0.344	3.7	LOS A	2.5	66.8	0.53	0.41	24.3
All Vehicles		1671	6.4	0.583	5.4	LOS A	5.2	136.1	0.66	0.61	24.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 AA

2018_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	239	7.0	0.499	8.3	LOS A	3.8	100.3	0.74	0.75	24.6
18x	R2	180	7.0	0.499	4.6	LOS A	3.8	100.3	0.74	0.75	23.6
Approach		420	7.0	0.499	6.7	LOS A	3.8	100.3	0.74	0.75	24.2
NorthEast: New SR 28											
1x	L2	199	5.0	0.519	7.5	LOS A	4.2	108.5	0.67	0.52	25.3
16ax	R1	304	5.0	0.519	2.3	LOS A	4.2	108.5	0.67	0.52	23.6
Approach		503	5.0	0.519	4.3	LOS A	4.2	108.5	0.67	0.52	24.3
West: SR 89											
5a	L1	378	7.0	0.308	5.6	LOS A	2.2	58.6	0.50	0.55	24.5
12a	R1	370	7.0	0.301	1.2	LOS A	2.2	56.9	0.50	0.21	24.2
Approach		748	7.0	0.308	3.4	LOS A	2.2	58.6	0.50	0.38	24.4
All Vehicles		1671	6.4	0.519	4.5	LOS A	4.2	108.5	0.61	0.52	24.3

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

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Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	40	43	53	98	35	169	74	489	86	235	487	27
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.90	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1810	1810	1810	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	43	47	58	107	38	0	80	532	0	255	529	29
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	5	5	5	5	5	5	5	5	5
Cap, veh/h	81	89	110	287	302	256	102	827	370	309	1239	543
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.00	0.06	0.24	0.00	0.18	0.36	0.36
Sat Flow, veh/h	471	515	636	1723	1810	1538	1723	3438	1538	1723	3438	1506
Grp Volume(v), veh/h	148	0	0	107	38	0	80	532	0	255	529	29
Grp Sat Flow(s),veh/h/ln	1622	0	0	1723	1810	1538	1723	1719	1538	1723	1719	1506
Q Serve(g_s), s	5.5	0.0	0.0	3.7	1.2	0.0	3.0	9.2	0.0	9.5	7.7	0.8
Cycle Q Clear(g_c), s	5.5	0.0	0.0	3.7	1.2	0.0	3.0	9.2	0.0	9.5	7.7	0.8
Prop In Lane	0.29		0.39	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	280	0	0	287	302	256	102	827	370	309	1239	543
V/C Ratio(X)	0.53	0.00	0.00	0.37	0.13	0.00	0.78	0.64	0.00	0.83	0.43	0.05
Avail Cap(c_a), veh/h	391	0	0	442	464	394	234	1037	464	546	1659	727
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.0	0.0	0.0	24.6	23.5	0.0	30.8	22.6	0.0	26.2	16.0	13.8
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.8	0.2	0.0	12.3	0.9	0.0	5.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.6	0.0	0.0	1.8	0.6	0.0	1.8	4.5	0.0	4.9	3.7	0.4
LnGrp Delay(d),s/veh	26.5	0.0	0.0	25.4	23.7	0.0	43.1	23.6	0.0	31.8	16.3	13.9
LnGrp LOS	C			C	C		D	C		C	B	B
Approach Vol, veh/h		148			145			612			813	
Approach Delay, s/veh		26.5			24.9			26.1			21.1	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		15.1	15.9	20.0		15.4	7.9	27.9
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	21.0	20.0		16.0	9.0	32.0
Max Q Clear Time (g_c+I1), s		5.7	11.5	11.2		7.5	5.0	9.7
Green Ext Time (p_c), s		0.3	0.5	4.7		0.5	0.1	8.2

Intersection Summary	
HCM 2010 Ctrl Delay	23.7
HCM 2010 LOS	C

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	696	0	0	712
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	757	0	0	774

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1531	757	0	0	757	0
Stage 1	757	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	128	406	-	-	849	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	128	406	-	-	849	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	849	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	71	28	5	269	275	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	77	30	5	292	299	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	602	299	299	0	-	0
Stage 1	299	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	427	689	1245	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	425	689	1245	-	-	-
Mov Cap-2 Maneuver	425	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	697	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1245	-	477	-	-
HCM Lane V/C Ratio	0.004	-	0.226	-	-
HCM Control Delay (s)	7.9	-	14.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	11	332	3	14	300
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	4	12	361	3	15	326

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	720	363	0	0	364	0
Stage 1	363	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.15	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.245	-
Pot Cap-1 Maneuver	393	680	-	-	1178	-
Stage 1	702	-	-	-	-	-
Stage 2	706	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	388	680	-	-	1178	-
Mov Cap-2 Maneuver	388	-	-	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	697	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	566	1178	-
HCM Lane V/C Ratio	-	-	0.029	0.013	-
HCM Control Delay (s)	-	-	11.5	8.1	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	93

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	32	792	105
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	35	861	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1576	1569	861	1597	1567	591	861	0	0	593	0	0
Stage 1	930	930	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	960	930	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 88	110	354	85	110	505	760	-	-	959	-	0
Stage 1	319	345	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	307	345	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 77	98	354	64	98	505	760	-	-	959	-	-
Mov Cap-2 Maneuver	~ 77	98	-	64	98	-	-	-	-	-	-	-
Stage 1	305	321	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	238	321	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 716.6	29.3	0.4	0.3
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	760	-	-	96	172	959	-
HCM Lane V/C Ratio	0.03	-	-	2.366	0.139	0.036	-
HCM Control Delay (s)	9.9	0	-	$ 716.6	29.3	8.9	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	20.5	0.5	0.1	-

Notes

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

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	618	583	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	35	29	64	672	634	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1464	664	693	0	-	0
Stage 1	664	-	-	-	-	-
Stage 2	800	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	141	459	888	-	-	-
Stage 1	510	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	131	459	888	-	-	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	510	-	-	-	-	-
Stage 2	409	-	-	-	-	-

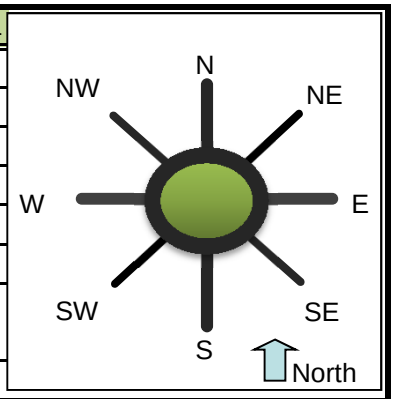
Approach	SB	NE	SW
HCM Control Delay, s	18.6	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	888	-	329	-	-
HCM Lane V/C Ratio	0.072	-	0.195	-	-
HCM Control Delay (s)	9.4	-	18.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 1 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					245		24	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	260						664	
	SW (6), vph								
	W (7), vph	41				467			
	NW (8), vph								
Output	Total Vehicles	301	0	0	0	712	0	688	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	285	0	28	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	297	0	0	0	0	0	772	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	47	0	0	0	543	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	344	0	0	0	828	0	800	0
Conflicting flow, pcu/h	543	0	0	0	28	0	297	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	625	NA	NA	NA	1027	NA	785	NA
Entry Flow Rates, vph	327	NA	NA	NA	774	NA	748	NA
V/C ratio	**0.52**				**0.75**		**0.95**	
Control Delay, s/veh	**15**				**17**		**44**	
LOS	B				C		E	
95th % Queue (ft)	**80**				**199**		**390**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	755	NA	NA	NA	1254	NA	953	NA
Entry Flow Rates, vph	327	NA	NA	NA	774	NA	748	NA
V/C ratio	**0.45**				**0.66**		**0.84**	
Control Delay, sec/pcu	**11**				**12**		**24**	
LOS	B				B		C	
95th % Queue (ft)	**63**				**142**		**274**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.2

East_Roundabout_2018_Summer_EF = 1.2
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: SR 89											
3	L2	508	7.0	0.703	10.6	LOS B	10.9	287.8	0.42	0.50	35.3
8	T1	266	7.0	0.703	3.7	LOS A	10.9	287.8	0.42	0.50	35.2
Approach		774	7.0	0.703	8.2	LOS A	10.9	287.8	0.42	0.50	35.3
North: Old SR 89											
4	T1	283	3.0	0.474	8.9	LOS A	3.4	88.3	0.79	0.85	35.4
14	R2	45	3.0	0.474	9.4	LOS A	3.4	88.3	0.79	0.85	34.2
Approach		327	3.0	0.474	9.0	LOS A	3.4	88.3	0.79	0.85	35.3
West: New SR 89											
5	L2	26	7.0	0.919	28.5	LOS D	22.2	587.1	1.00	1.20	29.2
12	R2	722	7.0	0.919	22.1	LOS C	22.2	587.1	1.00	1.20	28.3
Approach		748	7.0	0.919	22.4	LOS C	22.2	587.1	1.00	1.20	28.3
All Vehicles		1849	6.3	0.919	14.1	LOS B	22.2	587.1	0.72	0.84	32.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.1

East_Roundabout_2018_Summer_EF = 1.1
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: SR 89											
3	L2	508	7.0	0.642	10.4	LOS B	8.7	229.2	0.35	0.51	35.5
8	T1	266	7.0	0.642	3.6	LOS A	8.7	229.2	0.35	0.51	35.4
Approach		774	7.0	0.642	8.1	LOS A	8.7	229.2	0.35	0.51	35.4
North: Old SR 89											
4	T1	283	3.0	0.410	7.3	LOS A	2.7	69.2	0.74	0.76	36.1
14	R2	45	3.0	0.410	7.7	LOS A	2.7	69.2	0.74	0.76	34.9
Approach		327	3.0	0.410	7.3	LOS A	2.7	69.2	0.74	0.76	35.9
West: New SR 89											
5	L2	26	7.0	0.815	19.0	LOS C	13.9	366.3	1.00	0.98	33.3
12	R2	722	7.0	0.815	12.6	LOS B	13.9	366.3	1.00	0.98	32.2
Approach		748	7.0	0.815	12.9	LOS B	13.9	366.3	1.00	0.98	32.2
All Vehicles		1849	6.3	0.815	9.9	LOS A	13.9	366.3	0.68	0.74	34.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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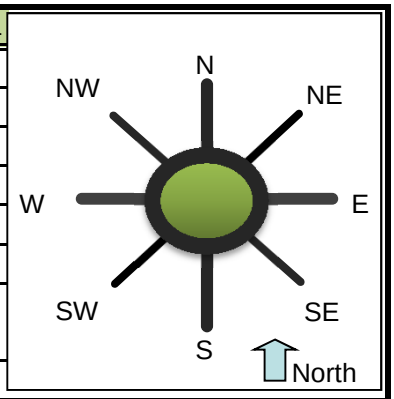
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 1 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			27		35		74	
	NE (2), vph								
	E (3), vph	40				169		489	
	SE (4), vph								
	S (5), vph	43		235				86	
	SW (6), vph								
	W (7), vph	53		487		98			
	NW (8), vph								
Output	Total Vehicles	136	0	749	0	302	0	649	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	1.000	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	31	0	40	0	84	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	45	0	0	0	193	0	558	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	48	0	268	0	0	0	98	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	59	0	556	0	112	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	152	0	855	0	345	0	741	0
Conflicting flow, pcu/h	936	0	236	0	687	0	361	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	430	NA	848	NA	536	NA	747	NA
Entry Flow Rates, vph	148	NA	814	NA	328	NA	705	NA
V/C ratio	**0.34**		**0.96**		**0.61**		**0.94**	
Control Delay, s/veh	**14**		**44**		**20**		**44**	
LOS	B		E		C		E	
95th % Queue (ft)	**39**		**406**		**108**		**364**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	516	NA	1031	NA	645	NA	906	NA
Entry Flow Rates, vph	148	NA	814	NA	328	NA	705	NA
V/C ratio	**0.30**		**0.83**		**0.53**		**0.82**	
Control Delay, sec/pcu	**11**		**22**		**14**		**23**	
LOS	B		C		B		C	
95th % Queue (ft)	**32**		**263**		**83**		**243**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.2

2018 Summer PM - Old Wye Roundabout Env = 1.2
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: SR 89											
3	L2	107	3.0	0.573	19.2	LOS C	5.2	133.7	0.95	1.05	33.4
8	T1	38	3.0	0.573	12.1	LOS B	5.2	133.7	0.95	1.05	33.0
18	R2	184	3.0	0.573	12.3	LOS B	5.2	133.7	0.95	1.05	31.9
Approach		328	3.0	0.573	14.5	LOS B	5.2	133.7	0.95	1.05	32.5
East: SR 28											
1	L2	255	5.0	0.849	18.8	LOS C	15.8	410.4	1.00	0.92	33.6
6	T1	529	5.0	0.849	11.8	LOS B	15.8	410.4	1.00	0.92	33.4
16	R2	29	5.0	0.849	12.0	LOS B	15.8	410.4	1.00	0.92	32.2
Approach		814	5.0	0.849	14.0	LOS B	15.8	410.4	1.00	0.92	33.4
North: Savemart											
7	L2	43	3.0	0.366	19.0	LOS C	2.6	67.7	0.96	0.99	33.6
4	T1	47	3.0	0.366	11.7	LOS B	2.6	67.7	0.96	0.99	33.2
14	R2	58	3.0	0.366	12.2	LOS B	2.6	67.7	0.96	0.99	32.1
Approach		148	3.0	0.366	14.0	LOS B	2.6	67.7	0.96	0.99	32.9
West: SR 89											
5	L2	80	5.0	0.872	25.3	LOS D	17.1	444.3	1.00	1.17	31.3
2	T1	532	5.0	0.872	18.0	LOS C	17.1	444.3	1.00	1.17	31.0
12	R2	93	5.0	0.872	18.5	LOS C	17.1	444.3	1.00	1.17	30.0
Approach		705	5.0	0.872	18.9	LOS C	17.1	444.3	1.00	1.17	30.9
All Vehicles		1996	4.5	0.872	15.8	LOS C	17.1	444.3	0.99	1.04	32.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.1

2018 Summer PM - Old Wye Roundabout Env = 1.1
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: SR 89											
3	L2	107	3.0	0.493	16.5	LOS C	4.2	108.1	0.92	0.95	34.7
8	T1	38	3.0	0.493	9.4	LOS A	4.2	108.1	0.92	0.95	34.3
18	R2	184	3.0	0.493	9.7	LOS A	4.2	108.1	0.92	0.95	33.1
Approach		328	3.0	0.493	11.9	LOS B	4.2	108.1	0.92	0.95	33.8
East: SR 28											
1	L2	255	5.0	0.760	14.8	LOS B	10.5	273.1	0.85	0.77	35.2
6	T1	529	5.0	0.760	7.7	LOS A	10.5	273.1	0.85	0.77	34.9
16	R2	29	5.0	0.760	8.0	LOS A	10.5	273.1	0.85	0.77	33.7
Approach		814	5.0	0.760	10.0	LOS A	10.5	273.1	0.85	0.77	35.0
North: Savemart											
7	L2	43	3.0	0.296	17.5	LOS C	2.2	55.4	0.94	0.92	34.3
4	T1	47	3.0	0.296	10.3	LOS B	2.2	55.4	0.94	0.92	34.0
14	R2	58	3.0	0.296	10.7	LOS B	2.2	55.4	0.94	0.92	32.8
Approach		148	3.0	0.296	12.6	LOS B	2.2	55.4	0.94	0.92	33.6
West: SR 89											
5	L2	80	5.0	0.764	18.3	LOS C	11.1	288.1	0.95	0.97	34.6
2	T1	532	5.0	0.764	11.0	LOS B	11.1	288.1	0.95	0.97	34.3
12	R2	93	5.0	0.764	11.4	LOS B	11.1	288.1	0.95	0.97	33.0
Approach		705	5.0	0.764	11.9	LOS B	11.1	288.1	0.95	0.97	34.1
All Vehicles		1996	4.5	0.764	11.2	LOS B	11.1	288.1	0.90	0.88	34.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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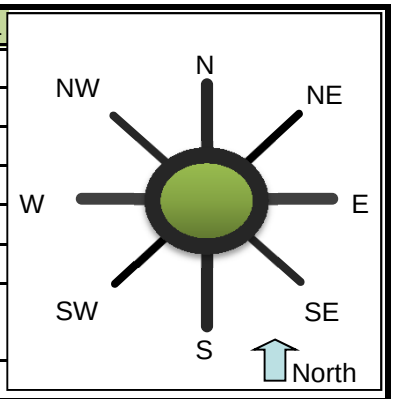
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 1 West Roundabout w/ EBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph					218		458	
	SE (4), vph								
	S (5), vph			241					
	SW (6), vph								
	W (7), vph			369		290			
	NW (8), vph								
Output	Total Vehicles	0	0	610	0	508	0	458	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	254	0	533	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	275	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	421	0	337	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	696	0	591	0	533	0
Conflicting flow, pcu/h	0	0	337	0	533	0	275	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	768	NA	620	NA	802	NA
Entry Flow Rates, vph	NA	NA	663	NA	552	NA	498	NA
V/C ratio			**0.86**		**0.89**		**0.62**	
Control Delay, s/veh			**31**		**40**		**15**	
LOS			D		E		B	
95th % Queue (ft)			**276**		**288**		**118**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	932	NA	749	NA	974	NA
Entry Flow Rates, vph	NA	NA	663	NA	552	NA	498	NA
V/C ratio			**0.75**		**0.79**		**0.55**	
Control Delay, sec/pcu			**18**		**24**		**11**	
LOS			C		C		B	
95th % Queue (ft)			**187**		**213**		**91**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**					
Select Exit Leg for Bypass (TO)	**S (5)**					
Does the bypass have a dedicated receiving lane?	**No**					
Volumes						
Right Turn Volume removed from Entry Leg	**447**					
Volume Characteristics (for entry leg)						
PHF	0.92					
F_{HV}	0.93					
F_{ped}	1.00					
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	520					
Conflicting Flow, pcu/hr	275					
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	802					
Flow Rates of Exiting Traffic, vph	486					
V/C ratio	**0.61**					
Control Delay, s/veh	**14.2**					
LOS	B					
95th % Queue (ft)	**112**					
Approach w/Bypass Delay, s/veh	***14.4***					
Approach w/Bypass LOS	*B*					

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 Summer

2018_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	315	7.0	0.876	25.2	LOS D	14.8	390.2	1.00	1.50	20.8
18x	R2	237	7.0	0.876	21.5	LOS C	14.8	390.2	1.00	1.50	20.1
Approach		552	7.0	0.876	23.6	LOS C	14.8	390.2	1.00	1.50	20.5
NorthEast: New SR 28											
1x	L2	262	5.0	0.854	18.0	LOS C	15.1	393.3	1.00	1.21	22.9
16ax	R1	401	5.0	0.854	12.8	LOS B	15.1	393.3	1.00	1.21	21.5
Approach		663	5.0	0.854	14.9	LOS B	15.1	393.3	1.00	1.21	22.0
West: SR 89											
5a	L1	498	7.0	0.492	6.7	LOS A	4.2	111.2	0.71	0.67	24.2
12a	R1	486	7.0	0.480	2.2	LOS A	4.1	107.4	0.70	0.38	23.9
Approach		984	7.0	0.492	4.4	LOS A	4.2	111.2	0.70	0.53	24.1
All Vehicles		2199	6.4	0.876	12.4	LOS B	15.1	393.3	0.87	0.98	22.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 Summer

2018_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	315	7.0	0.761	16.0	LOS C	9.9	261.2	0.98	1.23	22.7
18x	R2	237	7.0	0.761	12.3	LOS B	9.9	261.2	0.98	1.23	21.9
Approach		552	7.0	0.761	14.4	LOS B	9.9	261.2	0.98	1.23	22.3
NorthEast: New SR 28											
1x	L2	262	5.0	0.757	12.4	LOS B	10.5	272.4	0.95	0.99	24.3
16ax	R1	401	5.0	0.757	7.2	LOS A	10.5	272.4	0.95	0.99	22.7
Approach		663	5.0	0.757	9.3	LOS A	10.5	272.4	0.95	0.99	23.3
West: SR 89											
5a	L1	498	7.0	0.438	6.2	LOS A	3.7	96.9	0.66	0.63	24.3
12a	R1	486	7.0	0.427	1.8	LOS A	3.5	93.7	0.65	0.31	24.0
Approach		984	7.0	0.438	4.0	LOS A	3.7	96.9	0.65	0.47	24.2
All Vehicles		2199	6.4	0.761	8.2	LOS A	10.5	272.4	0.83	0.82	23.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Opening Day (2018) Operations: Alternative 2

Average Annual Peak Hour Analysis Results

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	1.6

Movement	SEL	SER	NEL	NET	SWT	SWR
Vol, veh/h	30	40	93	514	553	17
Conflicting Peds, #/hr	60	0	0	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	348	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	33	43	101	559	601	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1143	361	661	0	-	0
Stage 1	661	-	-	-	-	-
Stage 2	482	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.2	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.25	-	-	-
Pot Cap-1 Maneuver	192	633	903	-	-	-
Stage 1	473	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	154	601	903	-	-	-
Mov Cap-2 Maneuver	285	-	-	-	-	-
Stage 1	449	-	-	-	-	-
Stage 2	493	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	15.9	1.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	903	-	407	-	-
HCM Lane V/C Ratio	0.112	-	0.187	-	-
HCM Control Delay (s)	9.5	-	15.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.4	-	0.7	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	75	27	29	21	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	0	82	29	32	23	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	113	23	23	0	-	0
Stage 1	23	-	-	-	-	-
Stage 2	90	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	831	991	1573	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	816	991	1573	-	-	-
Mov Cap-2 Maneuver	816	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	3.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1573	-	991	-	-
HCM Lane V/C Ratio	0.019	-	0.082	-	-
HCM Control Delay (s)	7.3	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	39	4	2	11	16	412	3	24	602	80
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	42	4	2	12	17	448	3	26	654	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1193	654	1213	1191	449	654	0	0	451	0	0
Stage 1	707	707	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	729	707	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	162	186	465	158	187	608	910	-	-	1084	-	0
Stage 1	424	437	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	413	437	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	150	174	465	135	175	608	910	-	-	1084	-	-
Mov Cap-2 Maneuver	150	174	-	135	175	-	-	-	-	-	-	-
Stage 1	413	420	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	359	420	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	109.4	18.4	0.3	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	910	-	-	180	287	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.96	0.064	0.024	-
HCM Control Delay (s)	9	0	-	109.4	18.4	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	7.6	0.2	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	580	562	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	26	23	49	630	611	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1362	634	657	0	-	0
Stage 1	634	-	-	-	-	-
Stage 2	728	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	162	477	916	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	476	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	153	477	916	-	-	-
Mov Cap-2 Maneuver	291	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	451	-	-	-	-	-

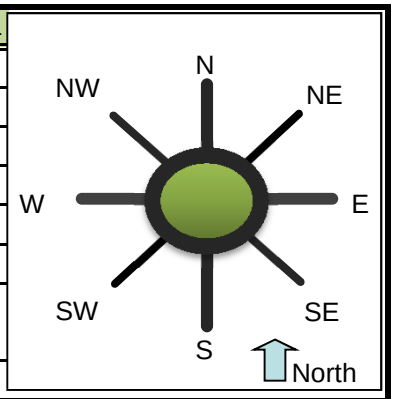
Approach	SB	NE	SW
HCM Control Delay, s	16.7	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	916	-	356	-	-
HCM Lane V/C Ratio	0.053	-	0.137	-	-
HCM Control Delay (s)	9.2	-	16.7	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 2 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					6		50	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	24						682	
	W (7), vph	71				535			
	NW (8), vph								
Output	Total Vehicles	95	0	0	0	541	0	732	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	7	0	58	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	27	0	0	0	0	0	793	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	81	0	0	0	622	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	108	0	0	0	629	0	851	0
Conflicting flow, pcu/h	622	0	0	0	58	0	27	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	578	NA	NA	NA	996	NA	1028	NA
Entry Flow Rates, vph	103	NA	NA	NA	588	NA	796	NA
V/C ratio	**0.18**				**0.59**		**0.77**	
Control Delay, s/veh	**8**				**12**		**18**	
LOS	A				B		C	
95th % Queue (ft)	**17**				**107**		**215**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	697	NA	NA	NA	1215	NA	1254	NA
Entry Flow Rates, vph	103	NA	NA	NA	588	NA	796	NA
V/C ratio	**0.16**				**0.52**		**0.68**	
Control Delay, sec/pcu	**7**				**9**		**12**	
LOS	A				A		B	
95th % Queue (ft)	**14**				**83**		**152**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.2

East_Roundabout_2018_AA_EF = 1.2
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: SR 89											
3	L2	582	7.0	0.551	10.8	LOS B	5.1	134.7	0.38	0.59	34.2
8	T1	7	7.0	0.551	4.0	LOS A	5.1	134.7	0.38	0.59	34.1
Approach		588	7.0	0.551	10.7	LOS B	5.1	134.7	0.38	0.59	34.2
North: Old SR 89											
4	T1	26	3.0	0.160	7.8	LOS A	0.9	22.9	0.69	0.73	35.9
14	R2	77	3.0	0.160	8.2	LOS A	0.9	22.9	0.69	0.73	34.6
Approach		103	3.0	0.160	8.1	LOS A	0.9	22.9	0.69	0.73	34.9
West: New SR 89											
5	L2	54	7.0	0.708	10.6	LOS B	11.1	291.9	0.41	0.42	37.3
12	R2	741	7.0	0.708	4.2	LOS A	11.1	291.9	0.41	0.42	35.8
Approach		796	7.0	0.708	4.7	LOS A	11.1	291.9	0.41	0.42	35.9
All Vehicles		1487	6.7	0.708	7.3	LOS A	11.1	291.9	0.42	0.51	35.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.1

East_Roundabout_2018_AA_EF = 1.1
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: SR 89											
3	L2	582	7.0	0.501	10.6	LOS B	4.2	111.8	0.33	0.59	34.3
8	T1	7	7.0	0.501	3.8	LOS A	4.2	111.8	0.33	0.59	34.2
Approach		588	7.0	0.501	10.5	LOS B	4.2	111.8	0.33	0.59	34.3
North: Old SR 89											
4	T1	26	3.0	0.139	7.1	LOS A	0.8	20.2	0.67	0.70	36.2
14	R2	77	3.0	0.139	7.6	LOS A	0.8	20.2	0.67	0.70	35.0
Approach		103	3.0	0.139	7.4	LOS A	0.8	20.2	0.67	0.70	35.3
West: New SR 89											
5	L2	54	7.0	0.647	10.4	LOS B	8.7	229.1	0.33	0.42	37.5
12	R2	741	7.0	0.647	4.1	LOS A	8.7	229.1	0.33	0.42	36.0
Approach		796	7.0	0.647	4.5	LOS A	8.7	229.1	0.33	0.42	36.1
All Vehicles		1487	6.7	0.647	7.1	LOS A	8.7	229.1	0.36	0.51	35.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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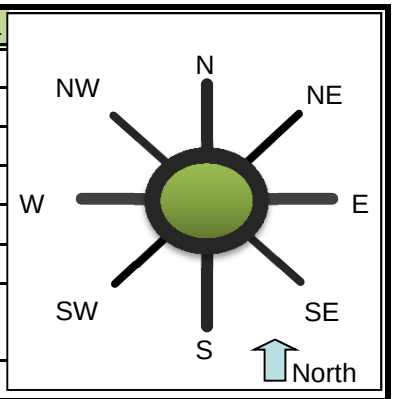
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph							259	
(TO)	SE (4), vph								
	S (5), vph			300					
	SW (6), vph								
	W (7), vph			283		241			
	NW (8), vph								
Output	Total Vehicles	0	0	583	0	241	0	259	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	301	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	342	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	323	0	280	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	665	0	280	0	301	0
Conflicting flow, pcu/h	0	0	280	0	301	0	342	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	813	NA	781	NA	750	NA
Entry Flow Rates, vph	NA	NA	634	NA	262	NA	282	NA
V/C ratio			**0.78**		**0.34**		**0.38**	
Control Delay, s/veh			**22**		**9**		**10**	
LOS			C		A		A	
95th % Queue (ft)			**206**		**40**		**47**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	987	NA	949	NA	910	NA
Entry Flow Rates, vph	NA	NA	634	NA	262	NA	282	NA
V/C ratio			**0.67**		**0.30**		**0.33**	
Control Delay, sec/pcu			**14**		**7**		**8**	
LOS			B		A		A	
95th % Queue (ft)			**143**		**33**		**39**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**430**	**366**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	500	426				
Conflicting Flow, pcu/hr	342	301				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	910	949				
Flow Rates of Exiting Traffic, vph	467	398				
V/C ratio	**0.51**	**0.45**				
Control Delay, s/veh	**10.6**	**9.1**				
LOS	B	A				
95th % Queue (ft)	**80**	**63**				
Approach w/Bypass Delay, s/veh	***10.2***	***8.9***				
Approach w/Bypass LOS	*B*	*A*				

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 AA

2018_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	262	7.0	0.259	6.2	LOS A	1.6	43.3	0.55	0.61	24.4
18x	R2	398	7.0	0.394	2.7	LOS A	2.8	73.4	0.61	0.52	24.5
Approach		660	7.0	0.394	4.1	LOS A	2.8	73.4	0.59	0.55	24.5
NorthEast: New SR 28											
1x	L2	326	5.0	0.740	12.0	LOS B	9.6	248.6	0.88	0.91	24.2
16ax	R1	308	5.0	0.740	6.8	LOS A	9.6	248.6	0.88	0.91	22.7
Approach		634	5.0	0.740	9.5	LOS A	9.6	248.6	0.88	0.91	23.5
West: SR 89											
5a	L1	282	7.0	0.294	6.7	LOS A	2.1	54.8	0.64	0.65	24.3
12a	R1	467	7.0	0.488	2.7	LOS A	4.0	105.8	0.74	0.47	23.9
Approach		749	7.0	0.488	4.2	LOS A	4.0	105.8	0.71	0.54	24.1
All Vehicles		2042	6.4	0.740	5.8	LOS A	9.6	248.6	0.72	0.66	24.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 AA

2018_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	262	7.0	0.231	5.9	LOS A	1.5	38.6	0.53	0.58	24.5
18x	R2	398	7.0	0.351	2.4	LOS A	2.4	64.5	0.58	0.46	24.5
Approach		660	7.0	0.351	3.8	LOS A	2.4	64.5	0.56	0.51	24.5
NorthEast: New SR 28											
1x	L2	326	5.0	0.659	9.4	LOS A	7.0	181.3	0.78	0.75	24.9
16ax	R1	308	5.0	0.659	4.2	LOS A	7.0	181.3	0.78	0.75	23.2
Approach		634	5.0	0.659	6.8	LOS A	7.0	181.3	0.78	0.75	24.1
West: SR 89											
5a	L1	282	7.0	0.259	6.3	LOS A	1.8	47.9	0.61	0.62	24.4
12a	R1	467	7.0	0.430	2.2	LOS A	3.4	90.7	0.69	0.39	24.0
Approach		749	7.0	0.430	3.7	LOS A	3.4	90.7	0.66	0.47	24.1
All Vehicles		2042	6.4	0.659	4.7	LOS A	7.0	181.3	0.66	0.57	24.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Summer Peak Hour Analysis Results

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2

Movement	SEL	SER	NEL	NET	SWT	SWR
Vol, veh/h	40	53	123	676	728	22
Conflicting Peds, #/hr	60	0	0	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	348	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	43	58	134	735	791	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1486	456	851	0	-	0
Stage 1	851	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.2	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.25	-	-	-
Pot Cap-1 Maneuver	114	549	764	-	-	-
Stage 1	376	-	-	-	-	-
Stage 2	487	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	85	522	764	-	-	-
Mov Cap-2 Maneuver	207	-	-	-	-	-
Stage 1	357	-	-	-	-	-
Stage 2	382	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	21.7	1.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	764	-	316	-	-
HCM Lane V/C Ratio	0.175	-	0.32	-	-
HCM Control Delay (s)	10.7	-	21.7	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.6	-	1.3	-	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	99	36	38	27	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	0	108	39	41	29	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	149	29	29	0	-	0
Stage 1	29	-	-	-	-	-
Stage 2	120	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	792	983	1565	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	772	983	1565	-	-	-
Mov Cap-2 Maneuver	772	-	-	-	-	-
Stage 1	937	-	-	-	-	-
Stage 2	830	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.1	3.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1565	-	983	-	-
HCM Lane V/C Ratio	0.025	-	0.109	-	-
HCM Control Delay (s)	7.4	-	9.1	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	93

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	32	792	105
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	35	861	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1576	1569	861	1597	1567	591	861	0	0	593	0	0
Stage 1	930	930	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	960	930	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 88	110	354	85	110	505	760	-	-	959	-	0
Stage 1	319	345	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	307	345	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 77	98	354	64	98	505	760	-	-	959	-	-
Mov Cap-2 Maneuver	~ 77	98	-	64	98	-	-	-	-	-	-	-
Stage 1	305	321	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	238	321	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 716.6	29.3	0.4	0.3
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	760	-	-	96	172	959	-
HCM Lane V/C Ratio	0.03	-	-	2.366	0.139	0.036	-
HCM Control Delay (s)	9.9	0	-	$ 716.6	29.3	8.9	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	20.5	0.5	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	763	739	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	35	29	64	829	803	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1791	833	863	0	-	0
Stage 1	833	-	-	-	-	-
Stage 2	958	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	88	367	767	-	-	-
Stage 1	425	-	-	-	-	-
Stage 2	371	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	81	367	767	-	-	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	425	-	-	-	-	-
Stage 2	340	-	-	-	-	-

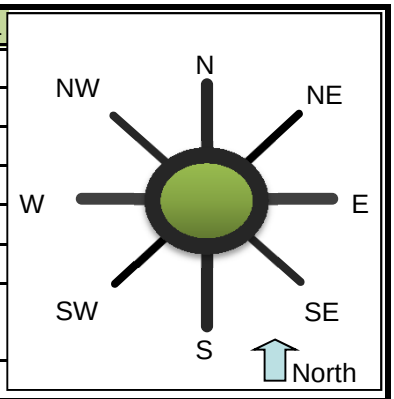
Approach	SB	NE	SW
HCM Control Delay, s	23.3	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	767	-	260	-	-
HCM Lane V/C Ratio	0.084	-	0.247	-	-
HCM Control Delay (s)	10.1	-	23.3	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 2 East Roundabout



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph					8		66	
	NE (2), vph								
	E (3), vph								
	SE (4), vph								
	S (5), vph	32						897	
	SW (6), vph								
	W (7), vph	94				704			
	NW (8), vph								
Output	Total Vehicles	126	0	0	0	712	0	963	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	9	0	77	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	37	0	0	0	0	0	1043	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	107	0	0	0	819	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	144	0	0	0	828	0	1120	0
Conflicting flow, pcu/h	819	0	0	0	77	0	37	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	475	NA	NA	NA	978	NA	1018	NA
Entry Flow Rates, vph	137	NA	NA	NA	774	NA	1047	NA
V/C ratio	**0.29**				**0.79**		**1.03**	
Control Delay, s/veh	**12**				**20**		**56**	
LOS	B				C		F	
95th % Queue (ft)	**31**				**228**		**580**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	570	NA	NA	NA	1193	NA	1243	NA
Entry Flow Rates, vph	137	NA	NA	NA	774	NA	1047	NA
V/C ratio	**0.25**				**0.69**		**0.90**	
Control Delay, sec/pcu	**10**				**13**		**26**	
LOS	A				B		D	
95th % Queue (ft)	**26**				**161**		**380**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.2

East_Roundabout_2018_Summer_EF = 1.2
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: SR 89											
3	L2	765	7.0	0.752	11.6	LOS B	11.3	297.2	0.71	0.58	33.4
8	T1	9	7.0	0.752	4.7	LOS A	11.3	297.2	0.71	0.58	33.3
Approach		774	7.0	0.752	11.5	LOS B	11.3	297.2	0.71	0.58	33.4
North: Old SR 89											
4	T1	35	3.0	0.294	10.4	LOS B	1.9	48.4	0.87	0.90	34.4
14	R2	102	3.0	0.294	10.9	LOS B	1.9	48.4	0.87	0.90	33.3
Approach		137	3.0	0.294	10.7	LOS B	1.9	48.4	0.87	0.90	33.6
West: New SR 89											
5	L2	72	7.0	0.945	12.4	LOS B	42.6	1125.3	1.00	0.42	35.7
12	R2	975	7.0	0.945	6.1	LOS A	42.6	1125.3	1.00	0.42	34.4
Approach		1047	7.0	0.945	6.5	LOS A	42.6	1125.3	1.00	0.42	34.5
All Vehicles		1958	6.7	0.945	8.8	LOS A	42.6	1125.3	0.88	0.51	33.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.1

East_Roundabout_2018_Summer_EF = 1.1
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: SR 89											
3	L2	765	7.0	0.679	11.1	LOS B	8.5	223.8	0.57	0.58	33.7
8	T1	9	7.0	0.679	4.3	LOS A	8.5	223.8	0.57	0.58	33.7
Approach		774	7.0	0.679	11.1	LOS B	8.5	223.8	0.57	0.58	33.7
North: Old SR 89											
4	T1	35	3.0	0.241	9.4	LOS A	1.6	40.2	0.83	0.84	35.0
14	R2	102	3.0	0.241	9.8	LOS A	1.6	40.2	0.83	0.84	33.8
Approach		137	3.0	0.241	9.7	LOS A	1.6	40.2	0.83	0.84	34.1
West: New SR 89											
5	L2	72	7.0	0.862	11.2	LOS B	23.3	614.9	0.78	0.41	36.3
12	R2	975	7.0	0.862	4.8	LOS A	23.3	614.9	0.78	0.41	34.9
Approach		1047	7.0	0.862	5.3	LOS A	23.3	614.9	0.78	0.41	35.0
All Vehicles		1958	6.7	0.862	7.9	LOS A	23.3	614.9	0.70	0.51	34.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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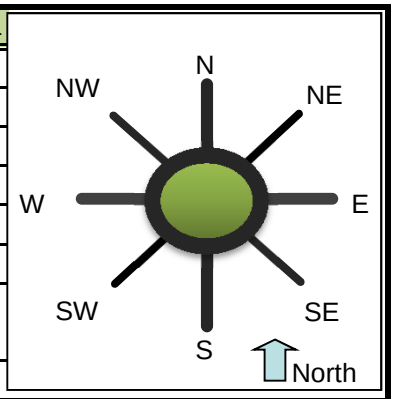
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							341	
	SE (4), vph								
	S (5), vph			395					
	SW (6), vph								
	W (7), vph			372		317			
	NW (8), vph								
Output	Total Vehicles	0	0	767	0	317	0	341	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	397	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	451	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	425	0	369	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	875	0	369	0	397	0
Conflicting flow, pcu/h	0	0	369	0	397	0	451	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	744	NA	710	NA	673	NA
Entry Flow Rates, vph	NA	NA	834	NA	345	NA	371	NA
V/C ratio			**1.12**		**0.49**		**0.55**	
Control Delay, s/veh			**93**		**12**		**14**	
LOS			F		B		B	
95th % Queue (ft)			**633**		**71**		**90**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	902	NA	861	NA	814	NA
Entry Flow Rates, vph	NA	NA	834	NA	345	NA	371	NA
V/C ratio			**0.97**		**0.43**		**0.49**	
Control Delay, sec/pcu			**44**		**9**		**11**	
LOS			E		A		B	
95th % Queue (ft)			**433**		**58**		**72**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**566**	**481**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	658	559				
Conflicting Flow, pcu/hr	451	397				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	814	861				
Flow Rates of Exiting Traffic, vph	615	523				
V/C ratio	**0.76**	**0.65**				
Control Delay, s/veh	**20.5**	**14.9**				
LOS	C	B				
95th % Queue (ft)	**192**	**132**				
Approach w/Bypass Delay, s/veh	***18.2***	***13.8***				
Approach w/Bypass LOS	*C*	*B*				

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 Summer

2018_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	345	7.0	0.377	7.1	LOS A	2.7	70.0	0.69	0.70	24.3
18x	R2	523	7.0	0.572	4.7	LOS A	5.3	138.6	0.80	0.76	24.1
Approach		867	7.0	0.572	5.7	LOS A	5.3	138.6	0.76	0.73	24.2
NorthEast: New SR 28											
1x	L2	429	5.0	1.079	63.7	LOS F	45.4	1179.6	1.00	2.47	15.7
16ax	R1	404	5.0	1.079	58.5	LOS F	45.4	1179.6	1.00	2.47	15.0
Approach		834	5.0	1.079	61.2	LOS F	45.4	1179.6	1.00	2.47	15.4
West: SR 89											
5a	L1	371	7.0	0.425	7.5	LOS A	3.3	87.6	0.77	0.75	24.2
12a	R1	615	7.0	0.705	7.0	LOS A	9.0	236.4	0.95	0.98	23.2
Approach		986	7.0	0.705	7.2	LOS A	9.0	236.4	0.88	0.89	23.6
All Vehicles		2687	6.4	1.079	23.4	LOS C	45.4	1179.6	0.88	1.33	20.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 Summer

2018_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	345	7.0	0.334	6.6	LOS A	2.4	62.6	0.66	0.67	24.3
18x	R2	523	7.0	0.507	3.3	LOS A	4.1	109.2	0.75	0.64	24.3
Approach		867	7.0	0.507	4.6	LOS A	4.1	109.2	0.71	0.65	24.3
NorthEast: New SR 28											
1x	L2	429	5.0	0.953	27.4	LOS D	25.6	666.2	1.00	1.56	20.9
16ax	R1	404	5.0	0.953	22.2	LOS C	25.6	666.2	1.00	1.56	19.7
Approach		834	5.0	0.953	24.9	LOS C	25.6	666.2	1.00	1.56	20.3
West: SR 89											
5a	L1	371	7.0	0.388	7.2	LOS A	3.1	81.7	0.77	0.73	24.2
12a	R1	615	7.0	0.644	5.3	LOS A	7.4	196.7	0.92	0.88	23.6
Approach		986	7.0	0.644	6.0	LOS A	7.4	196.7	0.86	0.83	23.8
All Vehicles		2687	6.4	0.953	11.4	LOS B	25.6	666.2	0.86	1.00	22.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Opening Day (2018) Operations: Alternative 3

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	24	0	40	8	0	13	84	492	10	18	511	17
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.92		0.93	0.94		0.92	1.00		1.00	1.00		0.98
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	1845	1900	1900	1776	1776	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	26	0	43	9	0	14	91	535	0	20	555	18
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	7	7	7	5	5	5	5	5	5
Cap, veh/h	234	48	245	539	0	377	113	1319	0	35	1162	508
Arrive On Green	0.27	0.00	0.27	0.27	0.00	0.27	0.07	0.38	0.00	0.02	0.34	0.34
Sat Flow, veh/h	366	178	900	1264	0	1385	1723	3529	0	1723	3438	1504
Grp Volume(v), veh/h	69	0	0	9	0	14	91	535	0	20	555	18
Grp Sat Flow(s),veh/h/ln	1445	0	0	1264	0	1385	1723	1719	0	1723	1719	1504
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.3	1.9	4.2	0.0	0.4	4.7	0.3
Cycle Q Clear(g_c), s	1.2	0.0	0.0	0.2	0.0	0.3	1.9	4.2	0.0	0.4	4.7	0.3
Prop In Lane	0.38		0.62	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	527	0	0	539	0	377	113	1319	0	35	1162	508
V/C Ratio(X)	0.13	0.00	0.00	0.02	0.00	0.04	0.80	0.41	0.00	0.58	0.48	0.04
Avail Cap(c_a), veh/h	748	0	0	733	0	598	279	1670	0	186	1485	649
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	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.3	0.0	0.0	9.9	0.0	9.9	17.1	8.3	0.0	18.0	9.7	8.2
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	12.4	0.2	0.0	14.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.6	0.0	0.0	0.1	0.0	0.1	1.3	2.0	0.0	0.3	2.3	0.1
LnGrp Delay(d),s/veh	10.4	0.0	0.0	9.9	0.0	9.9	29.5	8.5	0.0	32.3	10.0	8.2
LnGrp LOS	B			A		A	C	A		C	A	A
Approach Vol, veh/h		69			23			626			593	
Approach Delay, s/veh		10.4			9.9			11.6			10.7	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.1	4.7	18.2		14.1	6.4	16.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.3	2.4	6.2		3.2	3.9	6.7
Green Ext Time (p_c), s		0.3	0.0	5.9		0.3	0.0	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.1
HCM 2010 LOS	B

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	39	4	2	11	16	412	3	24	602	80
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	42	4	2	12	17	448	3	26	654	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1193	654	1213	1191	449	654	0	0	451	0	0
Stage 1	707	707	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	729	707	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	162	186	465	158	187	608	910	-	-	1084	-	0
Stage 1	424	437	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	413	437	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	150	174	465	135	175	608	910	-	-	1084	-	-
Mov Cap-2 Maneuver	150	174	-	135	175	-	-	-	-	-	-	-
Stage 1	413	420	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	359	420	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	109.4	18.4	0.3	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	910	-	-	180	287	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.96	0.064	0.024	-
HCM Control Delay (s)	9	0	-	109.4	18.4	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	7.6	0.2	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	565	525	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	26	23	49	614	571	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1305	593	616	0	-	0
Stage 1	593	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	176	504	949	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	167	504	949	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	459	-	-	-	-	-

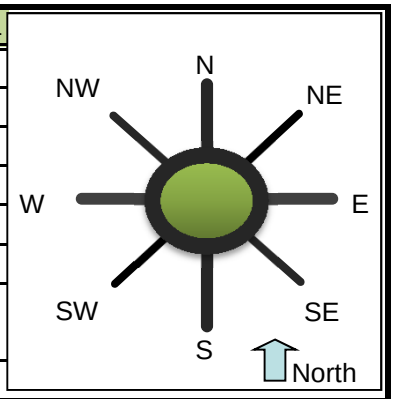
Approach	SB	NE	SW
HCM Control Delay, s	16.1	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	949	-	373	-	-
HCM Lane V/C Ratio	0.052	-	0.131	-	-
HCM Control Delay (s)	9	-	16.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					4		24	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	21						698	
	SW (6), vph								
	W (7), vph	54				537			
	NW (8), vph								
Output	Total Vehicles	75	0	0	0	541	0	722	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	5	0	28	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	24	0	0	0	0	0	812	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	62	0	0	0	625	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	86	0	0	0	629	0	840	0
Conflicting flow, pcu/h	625	0	0	0	28	0	24	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	576	NA	NA	NA	1027	NA	1031	NA
Entry Flow Rates, vph	82	NA	NA	NA	588	NA	785	NA
V/C ratio	**0.14**				**0.57**		**0.76**	
Control Delay, s/veh	**8**				**11**		**17**	
LOS	A				B		C	
95th % Queue (ft)	**13**				**101**		**205**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	695	NA	NA	NA	1254	NA	1259	NA
Entry Flow Rates, vph	82	NA	NA	NA	588	NA	785	NA
V/C ratio	**0.12**				**0.50**		**0.67**	
Control Delay, sec/pcu	**7**				**8**		**12**	
LOS	A				A		B	
95th % Queue (ft)	**11**				**78**		**146**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.2

East_Roundabout_2018_AA_EF = 1.2
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: SR 89											
3	L2	584	7.0	0.531	10.4	LOS B	4.9	129.8	0.25	0.58	34.5
8	T1	4	7.0	0.531	3.6	LOS A	4.9	129.8	0.25	0.58	34.4
Approach		588	7.0	0.531	10.3	LOS B	4.9	129.8	0.25	0.58	34.5
North: Old SR 89											
4	T1	23	3.0	0.124	7.7	LOS A	0.7	16.9	0.66	0.70	35.9
14	R2	59	3.0	0.124	8.2	LOS A	0.7	16.9	0.66	0.70	34.7
Approach		82	3.0	0.124	8.0	LOS A	0.7	16.9	0.66	0.70	35.0
West: New SR 89											
5	L2	26	7.0	0.695	10.5	LOS B	10.5	278.0	0.37	0.41	37.5
12	R2	759	7.0	0.695	4.2	LOS A	10.5	278.0	0.37	0.41	36.0
Approach		785	7.0	0.695	4.4	LOS A	10.5	278.0	0.37	0.41	36.1
All Vehicles		1454	6.8	0.695	7.0	LOS A	10.5	278.0	0.34	0.50	35.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_AA_EF = 1.1

East_Roundabout_2018_AA_EF = 1.1
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: SR 89											
3	L2	584	7.0	0.485	10.3	LOS B	4.1	108.1	0.22	0.59	34.6
8	T1	4	7.0	0.485	3.5	LOS A	4.1	108.1	0.22	0.59	34.5
Approach		588	7.0	0.485	10.2	LOS B	4.1	108.1	0.22	0.59	34.6
North: Old SR 89											
4	T1	23	3.0	0.107	7.0	LOS A	0.6	15.0	0.65	0.67	36.3
14	R2	59	3.0	0.107	7.5	LOS A	0.6	15.0	0.65	0.67	35.0
Approach		82	3.0	0.107	7.4	LOS A	0.6	15.0	0.65	0.67	35.4
West: New SR 89											
5	L2	26	7.0	0.635	10.4	LOS B	8.3	219.6	0.30	0.42	37.7
12	R2	759	7.0	0.635	4.0	LOS A	8.3	219.6	0.30	0.42	36.2
Approach		785	7.0	0.635	4.2	LOS A	8.3	219.6	0.30	0.42	36.2
All Vehicles		1454	6.8	0.635	6.8	LOS A	8.3	219.6	0.29	0.50	35.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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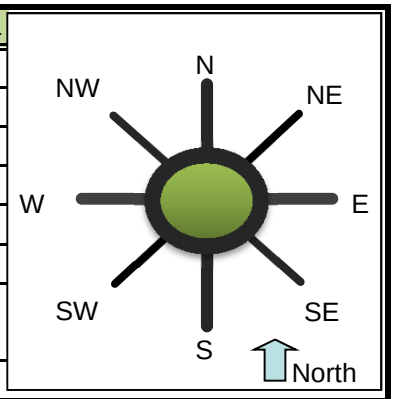
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph			17				84	
Exit	NE (2), vph								
Legs	E (3), vph	24				13		492	
(TO)	SE (4), vph								
	S (5), vph			18				10	
	SW (6), vph								
	W (7), vph	40		511		8			
	NW (8), vph								
Output	Total Vehicles	64	0	546	0	21	0	586	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	0.992	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	19	0	0	0	96	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	27	0	0	0	15	0	562	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	21	0	0	0	11	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	45	0	583	0	9	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	72	0	623	0	24	0	669	0
Conflicting flow, pcu/h	613	0	105	0	684	0	47	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	590	NA	967	NA	537	NA	1023	NA
Entry Flow Rates, vph	70	NA	593	NA	23	NA	637	NA
V/C ratio	**0.12**		**0.61**		**0.04**		**0.62**	
Control Delay, s/veh	**8**		**13**		**7**		**12**	
LOS	A		B		A		B	
95th % Queue (ft)	**10**		**114**		**3**		**119**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	711	NA	1178	NA	647	NA	1248	NA
Entry Flow Rates, vph	70	NA	593	NA	23	NA	637	NA
V/C ratio	**0.10**		**0.53**		**0.04**		**0.54**	
Control Delay, sec/pcu	**6**		**9**		**6**		**9**	
LOS	A		A		A		A	
95th % Queue (ft)	**9**		**84**		**3**		**87**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.2

Old Wye 2018 AA EF = 1.2
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: SR 89											
3	L2	9	3.0	0.036	14.5	LOS B	0.2	5.0	0.68	0.68	35.6
8	T1	1	3.0	0.036	7.5	LOS A	0.2	5.0	0.68	0.68	35.2
18	R2	14	3.0	0.036	7.7	LOS A	0.2	5.0	0.68	0.68	33.9
Approach		24	3.0	0.036	10.2	LOS B	0.2	5.0	0.68	0.68	34.6
East: SR 28											
1	L2	20	5.0	0.539	11.4	LOS B	4.6	118.5	0.46	0.44	37.6
6	T1	555	5.0	0.539	4.3	LOS A	4.6	118.5	0.46	0.44	37.3
16	R2	18	5.0	0.539	4.6	LOS A	4.6	118.5	0.46	0.44	35.9
Approach		593	5.0	0.539	4.6	LOS A	4.6	118.5	0.46	0.44	37.3
North: Savemart											
7	L2	26	3.0	0.101	14.1	LOS B	0.6	14.6	0.67	0.72	35.7
4	T1	1	3.0	0.101	6.9	LOS A	0.6	14.6	0.67	0.72	35.4
14	R2	43	3.0	0.101	7.3	LOS A	0.6	14.6	0.67	0.72	34.1
Approach		71	3.0	0.101	9.8	LOS A	0.6	14.6	0.67	0.72	34.7
West: SR 89											
5	L2	91	5.0	0.551	10.9	LOS B	5.5	142.7	0.36	0.40	37.9
2	T1	535	5.0	0.551	3.6	LOS A	5.5	142.7	0.36	0.40	37.5
12	R2	11	5.0	0.551	4.1	LOS A	5.5	142.7	0.36	0.40	36.0
Approach		637	5.0	0.551	4.7	LOS A	5.5	142.7	0.36	0.40	37.5
All Vehicles		1325	4.9	0.551	5.0	LOS A	5.5	142.7	0.43	0.44	37.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.1

2018 Average Annual PM - Old Wye Roundabout Env =1.1
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: SR 89											
3	L2	9	3.0	0.031	13.9	LOS B	0.2	4.4	0.66	0.65	35.9
8	T1	1	3.0	0.031	6.9	LOS A	0.2	4.4	0.66	0.65	35.5
18	R2	14	3.0	0.031	7.1	LOS A	0.2	4.4	0.66	0.65	34.2
Approach		24	3.0	0.031	9.6	LOS A	0.2	4.4	0.66	0.65	34.9
East: SR 28											
1	L2	20	5.0	0.488	11.1	LOS B	3.8	100.0	0.41	0.41	37.8
6	T1	555	5.0	0.488	4.1	LOS A	3.8	100.0	0.41	0.41	37.5
16	R2	18	5.0	0.488	4.3	LOS A	3.8	100.0	0.41	0.41	36.1
Approach		593	5.0	0.488	4.3	LOS A	3.8	100.0	0.41	0.41	37.5
North: Savemart											
7	L2	26	3.0	0.087	13.6	LOS B	0.5	12.9	0.66	0.69	36.1
4	T1	1	3.0	0.087	6.3	LOS A	0.5	12.9	0.66	0.69	35.7
14	R2	43	3.0	0.087	6.8	LOS A	0.5	12.9	0.66	0.69	34.4
Approach		71	3.0	0.087	9.3	LOS A	0.5	12.9	0.66	0.69	35.0
West: SR 89											
5	L2	91	5.0	0.503	10.7	LOS B	4.6	120.4	0.31	0.39	38.0
2	T1	535	5.0	0.503	3.5	LOS A	4.6	120.4	0.31	0.39	37.6
12	R2	11	5.0	0.503	3.9	LOS A	4.6	120.4	0.31	0.39	36.1
Approach		637	5.0	0.503	4.5	LOS A	4.6	120.4	0.31	0.39	37.7
All Vehicles		1325	4.9	0.503	4.8	LOS A	4.6	120.4	0.38	0.42	37.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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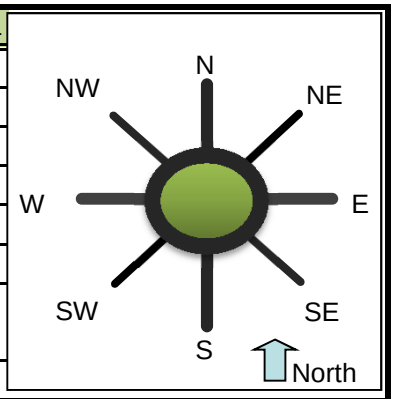
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph							259	
(TO)	SE (4), vph								
	S (5), vph			292					
	SW (6), vph								
	W (7), vph			262		241			
	NW (8), vph								
Output	Total Vehicles	0	0	554	0	241	0	259	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	301	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	333	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	299	0	280	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	632	0	280	0	301	0
Conflicting flow, pcu/h	0	0	280	0	301	0	333	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	813	NA	781	NA	757	NA
Entry Flow Rates, vph	NA	NA	602	NA	262	NA	282	NA
V/C ratio			**0.74**		**0.34**		**0.37**	
Control Delay, s/veh			**20**		**9**		**9**	
LOS			C		A		A	
95th % Queue (ft)			**179**		**40**		**46**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	987	NA	949	NA	918	NA
Entry Flow Rates, vph	NA	NA	602	NA	262	NA	282	NA
V/C ratio			**0.64**		**0.30**		**0.33**	
Control Delay, sec/pcu			**13**		**7**		**7**	
LOS			B		A		A	
95th % Queue (ft)			**126**		**33**		**38**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**430**	**350**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	500	407				
Conflicting Flow, pcu/hr	333	301				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	918	949				
Flow Rates of Exiting Traffic, vph	467	380				
V/C ratio	**0.51**	**0.43**				
Control Delay, s/veh	**10.5**	**8.8**				
LOS	B	A				
95th % Queue (ft)	**79**	**58**				
Approach w/Bypass Delay, s/veh	***10.1***	***8.7***				
Approach w/Bypass LOS	*B*	*A*				

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 AA

2018_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	262	7.0	0.259	6.2	LOS A	1.6	43.1	0.55	0.61	24.4
18x	R2	380	7.0	0.376	2.7	LOS A	2.6	68.9	0.60	0.51	24.5
Approach		642	7.0	0.376	4.1	LOS A	2.6	68.9	0.58	0.55	24.5
NorthEast: New SR 28											
1x	L2	317	5.0	0.704	11.1	LOS B	8.2	214.4	0.84	0.86	24.4
16ax	R1	285	5.0	0.704	5.9	LOS A	8.2	214.4	0.84	0.86	22.9
Approach		602	5.0	0.704	8.6	LOS A	8.2	214.4	0.84	0.86	23.7
West: SR 89											
5a	L1	282	7.0	0.290	6.6	LOS A	2.0	53.6	0.63	0.64	24.3
12a	R1	467	7.0	0.482	2.6	LOS A	3.9	103.6	0.73	0.46	23.9
Approach		749	7.0	0.482	4.1	LOS A	3.9	103.6	0.69	0.53	24.1
All Vehicles		1993	6.4	0.704	5.5	LOS A	8.2	214.4	0.70	0.63	24.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 AA

2018_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	262	7.0	0.231	5.9	LOS A	1.5	38.5	0.52	0.58	24.5
18x	R2	380	7.0	0.335	2.3	LOS A	2.3	60.7	0.57	0.45	24.5
Approach		642	7.0	0.335	3.8	LOS A	2.3	60.7	0.55	0.50	24.5
NorthEast: New SR 28											
1x	L2	317	5.0	0.626	8.9	LOS A	6.1	158.9	0.75	0.72	25.0
16ax	R1	285	5.0	0.626	3.7	LOS A	6.1	158.9	0.75	0.72	23.3
Approach		602	5.0	0.626	6.4	LOS A	6.1	158.9	0.75	0.72	24.1
West: SR 89											
5a	L1	282	7.0	0.256	6.2	LOS A	1.8	47.1	0.60	0.61	24.4
12a	R1	467	7.0	0.426	2.1	LOS A	3.4	89.1	0.68	0.37	24.0
Approach		749	7.0	0.426	3.7	LOS A	3.4	89.1	0.65	0.46	24.1
All Vehicles		1993	6.4	0.626	4.5	LOS A	6.1	158.9	0.65	0.55	24.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	53	0	31	10	0	17	110	648	13	24	673	22
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.92		0.93	0.94		0.91	1.00		1.00	1.00		0.98
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	1845	1900	1900	1776	1776	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	58	0	34	11	0	18	120	704	0	26	732	24
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	7	7	7	5	5	5	5	5	5
Cap, veh/h	338	31	131	513	0	357	151	1440	0	43	1225	536
Arrive On Green	0.26	0.00	0.26	0.26	0.00	0.26	0.09	0.42	0.00	0.03	0.36	0.36
Sat Flow, veh/h	743	118	505	1292	0	1378	1723	3529	0	1723	3438	1506
Grp Volume(v), veh/h	92	0	0	11	0	18	120	704	0	26	732	24
Grp Sat Flow(s),veh/h/ln	1366	0	0	1292	0	1378	1723	1719	0	1723	1719	1506
Q Serve(g_s), s	0.7	0.0	0.0	0.0	0.0	0.4	2.8	6.0	0.0	0.6	7.0	0.4
Cycle Q Clear(g_c), s	1.9	0.0	0.0	0.2	0.0	0.4	2.8	6.0	0.0	0.6	7.0	0.4
Prop In Lane	0.63		0.37	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	499	0	0	513	0	357	151	1440	0	43	1225	536
V/C Ratio(X)	0.18	0.00	0.00	0.02	0.00	0.05	0.79	0.49	0.00	0.60	0.60	0.04
Avail Cap(c_a), veh/h	681	0	0	681	0	546	256	1532	0	171	1362	596
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	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.8	0.0	0.0	11.2	0.0	11.2	18.1	8.6	0.0	19.5	10.6	8.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.1	9.0	0.3	0.0	12.7	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.8	0.0	0.0	0.1	0.0	0.2	1.7	2.9	0.0	0.4	3.4	0.2
LnGrp Delay(d),s/veh	11.9	0.0	0.0	11.2	0.0	11.3	27.1	8.8	0.0	32.2	11.2	8.5
LnGrp LOS	B			B		B	C	A		C	B	A
Approach Vol, veh/h		92			29			824			782	
Approach Delay, s/veh		11.9			11.3			11.5			11.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.5	5.0	20.9		14.5	7.5	18.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.4	2.6	8.0		3.9	4.8	9.0
Green Ext Time (p_c), s		0.5	0.0	6.6		0.4	0.0	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.7
HCM 2010 LOS	B

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	93

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	32	792	105
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	35	861	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1576	1569	861	1597	1567	591	861	0	0	593	0	0
Stage 1	930	930	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	960	930	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 88	110	354	85	110	505	760	-	-	959	-	0
Stage 1	319	345	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	307	345	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 77	98	354	64	98	505	760	-	-	959	-	-
Mov Cap-2 Maneuver	~ 77	98	-	64	98	-	-	-	-	-	-	-
Stage 1	305	321	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	238	321	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 716.6	29.3	0.4	0.3
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	760	-	-	96	172	959	-
HCM Lane V/C Ratio	0.03	-	-	2.366	0.139	0.036	-
HCM Control Delay (s)	9.9	0	-	$ 716.6	29.3	8.9	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	20.5	0.5	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	743	691	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	35	29	64	808	751	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1717	781	811	0	-	0
Stage 1	781	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	98	393	802	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	380	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	90	393	802	-	-	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	350	-	-	-	-	-

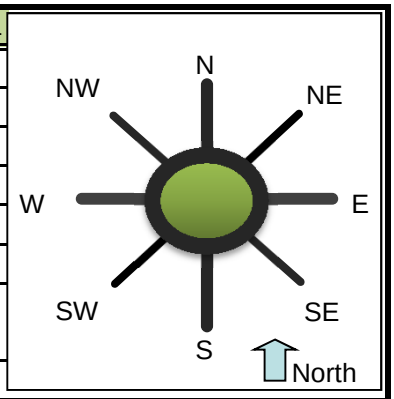
Approach	SB	NE	SW
HCM Control Delay, s	22	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	802	-	275	-	-
HCM Lane V/C Ratio	0.08	-	0.233	-	-
HCM Control Delay (s)	9.9	-	22	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 3 East Roundabout



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					5		31	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	28						919	
	W (7), vph	71				707			
	NW (8), vph								
Output	Total Vehicles	99	0	0	0	712	0	950	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	6	0	36	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	32	0	0	0	0	0	1069	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	81	0	0	0	822	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	113	0	0	0	828	0	1105	0
Conflicting flow, pcu/h	822	0	0	0	36	0	32	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	473	NA	NA	NA	1019	NA	1023	NA
Entry Flow Rates, vph	108	NA	NA	NA	774	NA	1033	NA
V/C ratio	**0.23**				**0.76**		**1.01**	
Control Delay, s/veh	**11**				**18**		**51**	
LOS	B				C		F	
95th % Queue (ft)	**23**				**203**		**543**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	568	NA	NA	NA	1243	NA	1248	NA
Entry Flow Rates, vph	108	NA	NA	NA	774	NA	1033	NA
V/C ratio	**0.20**				**0.67**		**0.89**	
Control Delay, sec/pcu	**9**				**12**		**24**	
LOS	A				B		C	
95th % Queue (ft)	**19**				**145**		**355**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.2

East_Roundabout_2018_Summer_EF = 1.2
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: SR 89											
3	L2	768	7.0	0.711	10.7	LOS B	11.0	289.2	0.48	0.54	33.9
8	T1	5	7.0	0.711	3.9	LOS A	11.0	289.2	0.48	0.54	33.9
Approach		774	7.0	0.711	10.7	LOS B	11.0	289.2	0.48	0.54	33.9
North: Old SR 89											
4	T1	30	3.0	0.214	10.2	LOS B	1.3	32.9	0.81	0.85	34.5
14	R2	77	3.0	0.214	10.7	LOS B	1.3	32.9	0.81	0.85	33.4
Approach		108	3.0	0.214	10.6	LOS B	1.3	32.9	0.81	0.85	33.7
West: New SR 89											
5	L2	34	7.0	0.926	11.9	LOS B	37.5	991.1	1.00	0.40	35.8
12	R2	999	7.0	0.926	5.6	LOS A	37.5	991.1	1.00	0.40	34.4
Approach		1033	7.0	0.926	5.8	LOS A	37.5	991.1	1.00	0.40	34.5
All Vehicles		1914	6.8	0.926	8.0	LOS A	37.5	991.1	0.78	0.48	34.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2018_Summer_EF = 1.1

East_Roundabout_2018_Summer_EF = 1.1
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: SR 89											
3	L2	768	7.0	0.646	10.5	LOS B	8.1	212.6	0.37	0.56	34.2
8	T1	5	7.0	0.646	3.7	LOS A	8.1	212.6	0.37	0.56	34.1
Approach		774	7.0	0.646	10.5	LOS B	8.1	212.6	0.37	0.56	34.2
North: Old SR 89											
4	T1	30	3.0	0.178	9.2	LOS A	1.1	27.9	0.79	0.80	35.1
14	R2	77	3.0	0.178	9.7	LOS A	1.1	27.9	0.79	0.80	33.9
Approach		108	3.0	0.178	9.6	LOS A	1.1	27.9	0.79	0.80	34.2
West: New SR 89											
5	L2	34	7.0	0.845	11.0	LOS B	21.5	567.2	0.68	0.40	36.6
12	R2	999	7.0	0.845	4.6	LOS A	21.5	567.2	0.68	0.40	35.2
Approach		1033	7.0	0.845	4.8	LOS A	21.5	567.2	0.68	0.40	35.3
All Vehicles		1914	6.8	0.845	7.4	LOS A	21.5	567.2	0.56	0.49	34.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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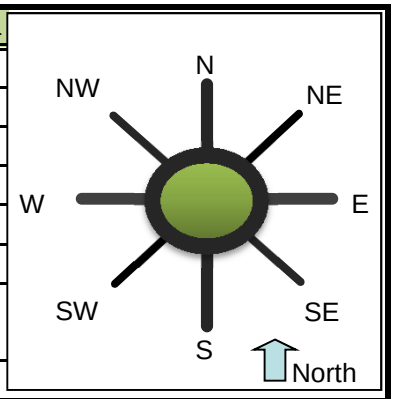
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 3 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			22				110	
	NE (2), vph								
	E (3), vph	31				17		648	
	SE (4), vph								
	S (5), vph			24				13	
	SW (6), vph								
	W (7), vph	53		673		10			
	NW (8), vph								
Output	Total Vehicles	84	0	719	0	27	0	771	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	0.992	1.000	0.998	1.000	1.000	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	25	0	0	0	126	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	35	0	0	0	19	0	740	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	27	0	0	0	15	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	59	0	768	0	11	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	94	0	821	0	31	0	880	0
Conflicting flow, pcu/h	807	0	137	0	900	0	62	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	486	NA	937	NA	438	NA	1008	NA
Entry Flow Rates, vph	91	NA	782	NA	29	NA	838	NA
V/C ratio	**0.19**		**0.83**		**0.07**		**0.83**	
Control Delay, s/veh	**10**		**24**		**9**		**22**	
LOS	B		C		A		C	
95th % Queue (ft)	**18**		**262**		**6**		**264**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	583	NA	1141	NA	525	NA	1229	NA
Entry Flow Rates, vph	91	NA	782	NA	29	NA	838	NA
V/C ratio	**0.16**		**0.72**		**0.06**		**0.72**	
Control Delay, sec/pcu	**8**		**14**		**8**		**13**	
LOS	A		B		A		B	
95th % Queue (ft)	**15**		**173**		**5**		**172**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.2

Old Wye 2018 Summer EF = 1.2
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: SR 89											
3	L2	11	3.0	0.062	17.1	LOS C	0.4	9.8	0.82	0.78	34.3
8	T1	1	3.0	0.062	10.0	LOS B	0.4	9.8	0.82	0.78	33.9
18	R2	18	3.0	0.062	10.3	LOS B	0.4	9.8	0.82	0.78	32.7
Approach		30	3.0	0.062	12.7	LOS B	0.4	9.8	0.82	0.78	33.3
East: SR 28											
1	L2	26	5.0	0.739	12.3	LOS B	8.8	228.9	0.74	0.53	36.5
6	T1	732	5.0	0.739	5.3	LOS A	8.8	228.9	0.74	0.53	36.2
16	R2	24	5.0	0.739	5.6	LOS A	8.8	228.9	0.74	0.53	34.8
Approach		782	5.0	0.739	5.5	LOS A	8.8	228.9	0.74	0.53	36.2
North: Savemart											
7	L2	34	3.0	0.178	16.3	LOS C	1.1	29.3	0.83	0.85	34.6
4	T1	1	3.0	0.178	9.1	LOS A	1.1	29.3	0.83	0.85	34.2
14	R2	58	3.0	0.178	9.5	LOS A	1.1	29.3	0.83	0.85	33.1
Approach		92	3.0	0.178	12.0	LOS B	1.1	29.3	0.83	0.85	33.6
West: SR 89											
5	L2	120	5.0	0.740	11.5	LOS B	10.8	281.4	0.60	0.45	36.9
2	T1	704	5.0	0.740	4.3	LOS A	10.8	281.4	0.60	0.45	36.6
12	R2	14	5.0	0.740	4.7	LOS A	10.8	281.4	0.60	0.45	35.2
Approach		838	5.0	0.740	5.3	LOS A	10.8	281.4	0.60	0.45	36.6
All Vehicles		1742	4.9	0.740	5.9	LOS A	10.8	281.4	0.68	0.51	36.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.1

Old Wye 2018 Summer EF = 1.1
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: SR 89											
3	L2	11	3.0	0.052	16.2	LOS C	0.3	8.4	0.81	0.74	34.7
8	T1	1	3.0	0.052	9.2	LOS A	0.3	8.4	0.81	0.74	34.4
18	R2	18	3.0	0.052	9.4	LOS A	0.3	8.4	0.81	0.74	33.1
Approach		30	3.0	0.052	11.8	LOS B	0.3	8.4	0.81	0.74	33.7
East: SR 28											
1	L2	26	5.0	0.665	11.8	LOS B	6.9	179.9	0.62	0.47	37.0
6	T1	732	5.0	0.665	4.7	LOS A	6.9	179.9	0.62	0.47	36.7
16	R2	24	5.0	0.665	5.0	LOS A	6.9	179.9	0.62	0.47	35.3
Approach		782	5.0	0.665	5.0	LOS A	6.9	179.9	0.62	0.47	36.7
North: Savemart											
7	L2	34	3.0	0.148	15.5	LOS C	1.0	24.9	0.81	0.80	35.0
4	T1	1	3.0	0.148	8.2	LOS A	1.0	24.9	0.81	0.80	34.7
14	R2	58	3.0	0.148	8.7	LOS A	1.0	24.9	0.81	0.80	33.5
Approach		92	3.0	0.148	11.2	LOS B	1.0	24.9	0.81	0.80	34.0
West: SR 89											
5	L2	120	5.0	0.673	11.1	LOS B	8.5	219.8	0.49	0.42	37.4
2	T1	704	5.0	0.673	3.9	LOS A	8.5	219.8	0.49	0.42	37.0
12	R2	14	5.0	0.673	4.3	LOS A	8.5	219.8	0.49	0.42	35.5
Approach		838	5.0	0.673	4.9	LOS A	8.5	219.8	0.49	0.42	37.0
All Vehicles		1742	4.9	0.673	5.4	LOS A	8.5	219.8	0.57	0.47	36.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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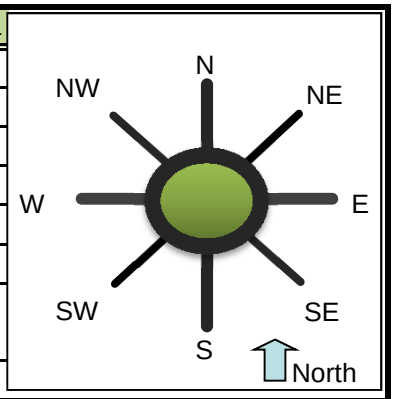
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							341	
	SE (4), vph								
	S (5), vph			384					
	SW (6), vph								
	W (7), vph			345		317			
	NW (8), vph								
Output	Total Vehicles	0	0	729	0	317	0	341	0

Volume Characteristics

	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows

	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	397	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	438	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	394	0	369	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	832	0	369	0	397	0
Conflicting flow, pcu/h	0	0	369	0	397	0	438	0

Roundabout Type

Standard Single Lane or Urban Compact

Enter type here… Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	744	NA	710	NA	681	NA
Entry Flow Rates, vph	NA	NA	792	NA	345	NA	371	NA
V/C ratio			**1.06**		**0.49**		**0.54**	
Control Delay, s/veh			**75**		**12**		**14**	
LOS			F		B		B	
95th % Queue (ft)			**538**		**71**		**88**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	902	NA	861	NA	825	NA
Entry Flow Rates, vph	NA	NA	792	NA	345	NA	371	NA
V/C ratio			**0.92**		**0.43**		**0.48**	
Control Delay, sec/pcu			**35**		**9**		**11**	
LOS			E		A		B	
95th % Queue (ft)			**362**		**58**		**71**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**566**	**461**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	658	536				
Conflicting Flow, pcu/hr	438	397				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	825	861				
Flow Rates of Exiting Traffic, vph	615	501				
V/C ratio	**0.75**	**0.62**				
Control Delay, s/veh	**19.7**	**13.9**				
LOS	C	B				
95th % Queue (ft)	**186**	**119**				
Approach w/Bypass Delay, s/veh	***17.6***	***13.2***				
Approach w/Bypass LOS	*C*	*B*				

MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.2 Summer

2018_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	345	7.0	0.377	7.1	LOS A	2.7	70.2	0.69	0.70	24.3
18x	R2	501	7.0	0.549	4.4	LOS A	4.8	127.1	0.78	0.73	24.2
Approach		846	7.0	0.549	5.5	LOS A	4.8	127.1	0.75	0.72	24.2
NorthEast: New SR 28											
1x	L2	417	5.0	1.025	46.4	LOS F	35.4	921.2	1.00	2.05	17.8
16ax	R1	375	5.0	1.025	41.2	LOS F	35.4	921.2	1.00	2.05	16.9
Approach		792	5.0	1.025	43.9	LOS E	35.4	921.2	1.00	2.05	17.4
West: SR 89											
5a	L1	371	7.0	0.429	7.6	LOS A	3.4	88.7	0.78	0.75	24.2
12a	R1	615	7.0	0.712	7.3	LOS A	9.2	242.3	0.96	1.01	23.1
Approach		986	7.0	0.712	7.4	LOS A	9.2	242.3	0.89	0.91	23.5
All Vehicles		2624	6.4	1.025	17.8	LOS C	35.4	921.2	0.88	1.19	21.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2018_West_Roundabout Single Lane EF = 1.1 Summer

2018_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	345	7.0	0.334	6.6	LOS A	2.4	62.4	0.66	0.67	24.3
18x	R2	501	7.0	0.486	3.2	LOS A	3.9	101.9	0.74	0.62	24.3
Approach		846	7.0	0.486	4.6	LOS A	3.9	101.9	0.70	0.64	24.3
NorthEast: New SR 28											
1x	L2	417	5.0	0.905	21.3	LOS C	19.8	515.6	1.00	1.36	22.1
16ax	R1	375	5.0	0.905	16.1	LOS C	19.8	515.6	1.00	1.36	20.8
Approach		792	5.0	0.905	18.8	LOS C	19.8	515.6	1.00	1.36	21.4
West: SR 89											
5a	L1	371	7.0	0.383	7.1	LOS A	3.0	80.4	0.76	0.72	24.2
12a	R1	615	7.0	0.636	4.9	LOS A	7.2	190.8	0.91	0.86	23.6
Approach		986	7.0	0.636	5.8	LOS A	7.2	190.8	0.85	0.81	23.9
All Vehicles		2624	6.4	0.905	9.3	LOS A	19.8	515.6	0.85	0.92	23.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Opening Day (2018) Operations: Alternative 4

Average Annual Peak Hour Analysis Results

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	241	350	259	430	292	262
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1810	1810
Adj Flow Rate, veh/h	262	0	282	0	317	285
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	5	5
Cap, veh/h	352	314	444	378	409	1066
Arrive On Green	0.21	0.00	0.25	0.00	0.24	0.59
Sat Flow, veh/h	1691	1509	1776	1509	1723	1810
Grp Volume(v), veh/h	262	0	282	0	317	285
Grp Sat Flow(s),veh/h/ln	1691	1509	1776	1509	1723	1810
Q Serve(g_s), s	5.7	0.0	5.6	0.0	6.8	3.0
Cycle Q Clear(g_c), s	5.7	0.0	5.6	0.0	6.8	3.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	352	314	444	378	409	1066
V/C Ratio(X)	0.74	0.00	0.63	0.00	0.77	0.27
Avail Cap(c_a), veh/h	686	612	720	612	699	1651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	14.6	0.0	13.2	0.0	14.1	4.0
Incr Delay (d2), s/veh	3.1	0.0	1.5	0.0	3.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.9	0.0	2.8	0.0	3.5	1.5
LnGrp Delay(d),s/veh	17.7	0.0	14.7	0.0	17.2	4.1
LnGrp LOS	B		B		B	A
Approach Vol, veh/h	262		282			602
Approach Delay, s/veh	17.7		14.7			11.0
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		12.2	13.4	13.9				27.2
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		7.7	8.8	7.6				5.0
Green Ext Time (p_c), s		0.5	0.6	2.3				4.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	24	0	40	8	0	13	84	492	10	18	511	17
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.92	0.93		0.97	1.00		0.91	1.00		0.98
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	1845	1900	1900	1845	1845	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	26	0	43	9	0	14	91	535	11	20	555	18
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Cap, veh/h	219	47	209	504	0	349	115	1419	29	35	1260	552
Arrive On Green	0.23	0.00	0.23	0.23	0.00	0.23	0.07	0.41	0.41	0.02	0.37	0.37
Sat Flow, veh/h	346	205	911	1312	0	1517	1723	3437	71	1723	3438	1507
Grp Volume(v), veh/h	69	0	0	9	0	14	91	267	279	20	555	18
Grp Sat Flow(s),veh/h/ln	1462	0	0	1312	0	1517	1723	1719	1789	1723	1719	1507
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.3	1.9	3.8	3.9	0.4	4.3	0.3
Cycle Q Clear(g_c), s	1.3	0.0	0.0	0.2	0.0	0.3	1.9	3.8	3.9	0.4	4.3	0.3
Prop In Lane	0.38		0.62	1.00		1.00	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	475	0	0	504	0	349	115	710	739	35	1260	552
V/C Ratio(X)	0.15	0.00	0.00	0.02	0.00	0.04	0.79	0.38	0.38	0.58	0.44	0.03
Avail Cap(c_a), veh/h	783	0	0	779	0	682	290	869	904	194	1545	677
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	0.0	10.6	0.0	10.7	16.4	7.3	7.3	17.3	8.5	7.2
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	11.5	0.3	0.3	14.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.6	0.0	0.0	0.1	0.0	0.1	1.2	1.8	1.9	0.3	2.0	0.1
LnGrp Delay(d),s/veh	11.2	0.0	0.0	10.6	0.0	10.7	27.9	7.6	7.6	31.4	8.8	7.3
LnGrp LOS	B			B		B	C	A	A	C	A	A
Approach Vol, veh/h		69			23			637			593	
Approach Delay, s/veh		11.2			10.7			10.5			9.5	
Approach LOS		B			B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.2	4.7	18.7		12.2	6.4	17.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.3	2.4	5.9		3.3	3.9	6.3
Green Ext Time (p_c), s		0.3	0.0	5.8		0.3	0.0	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.1
HCM 2010 LOS	B

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	39	4	2	11	16	412	3	24	602	80
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	42	4	2	12	17	448	3	26	654	87

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1193	654	1213	1191	449	654	0	0	451	0	0
Stage 1	707	707	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	729	707	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	162	186	465	158	187	608	910	-	-	1084	-	0
Stage 1	424	437	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	413	437	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	150	174	465	135	175	608	910	-	-	1084	-	-
Mov Cap-2 Maneuver	150	174	-	135	175	-	-	-	-	-	-	-
Stage 1	413	420	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	359	420	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	109.4	18.4	0.3	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	910	-	-	180	287	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.96	0.064	0.024	-
HCM Control Delay (s)	9	0	-	109.4	18.4	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	7.6	0.2	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	565	525	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	26	23	49	614	571	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1305	593	616	0	-	0
Stage 1	593	-	-	-	-	-
Stage 2	712	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	176	504	940	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	167	504	940	-	-	-
Mov Cap-2 Maneuver	304	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	16.1	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	940	-	373	-	-
HCM Lane V/C Ratio	0.052	-	0.131	-	-
HCM Control Delay (s)	9	-	16.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	24	698	537	4	21	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	25	25
Mvmt Flow	26	759	584	4	23	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	588	0	-	0	1397	586
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	811	-
Critical Hdwy	4.17	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.263	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	963	-	-	-	138	470
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	400	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	963	-	-	-	132	470
Mov Cap-2 Maneuver	-	-	-	-	258	-
Stage 1	-	-	-	-	514	-
Stage 2	-	-	-	-	381	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	17
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	963	-	-	-	382
HCM Lane V/C Ratio	0.027	-	-	-	0.213
HCM Control Delay (s)	8.8	0	-	-	17
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Summer Peak Hour Analysis Results

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	317	461	341	566	384	345
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1810	1810
Adj Flow Rate, veh/h	345	0	371	0	417	375
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	5	5
Cap, veh/h	405	362	466	396	472	1105
Arrive On Green	0.24	0.00	0.26	0.00	0.27	0.61
Sat Flow, veh/h	1691	1509	1776	1509	1723	1810
Grp Volume(v), veh/h	345	0	371	0	417	375
Grp Sat Flow(s),veh/h/ln	1691	1509	1776	1509	1723	1810
Q Serve(g_s), s	10.4	0.0	10.4	0.0	12.4	5.4
Cycle Q Clear(g_c), s	10.4	0.0	10.4	0.0	12.4	5.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	405	362	466	396	472	1105
V/C Ratio(X)	0.85	0.00	0.80	0.00	0.88	0.34
Avail Cap(c_a), veh/h	506	451	531	451	515	1217
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	18.4	0.0	18.6	5.1
Incr Delay (d2), s/veh	11.0	0.0	7.4	0.0	15.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	6.0	0.0	6.0	0.0	7.8	2.8
LnGrp Delay(d),s/veh	30.4	0.0	25.8	0.0	34.2	5.3
LnGrp LOS	C		C		C	A
Approach Vol, veh/h	345		371			792
Approach Delay, s/veh	30.4		25.8			20.5
Approach LOS	C		C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		16.8	18.7	18.0				36.7
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		12.4	14.4	12.4				7.4
Green Ext Time (p_c), s		0.4	0.3	1.6				5.4

Intersection Summary	
HCM 2010 Ctrl Delay	24.1
HCM 2010 LOS	C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	31	0	53	10	0	17	110	648	13	24	673	22
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.92	0.93		0.97	1.00		0.92	1.00		0.98
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	1845	1900	1900	1845	1845	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	34	0	58	11	0	18	120	704	14	26	732	24
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Cap, veh/h	203	44	202	480	0	333	151	1520	30	43	1305	572
Arrive On Green	0.22	0.00	0.22	0.22	0.00	0.22	0.09	0.44	0.44	0.03	0.38	0.38
Sat Flow, veh/h	337	201	918	1326	0	1515	1723	3441	68	1723	3438	1508
Grp Volume(v), veh/h	92	0	0	11	0	18	120	352	366	26	732	24
Grp Sat Flow(s),veh/h/ln	1456	0	0	1326	0	1515	1723	1719	1790	1723	1719	1508
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.4	2.6	5.5	5.5	0.6	6.4	0.4
Cycle Q Clear(g_c), s	1.9	0.0	0.0	0.2	0.0	0.4	2.6	5.5	5.5	0.6	6.4	0.4
Prop In Lane	0.37		0.63	1.00		1.00	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	449	0	0	480	0	333	151	759	791	43	1305	572
V/C Ratio(X)	0.20	0.00	0.00	0.02	0.00	0.05	0.80	0.46	0.46	0.60	0.56	0.04
Avail Cap(c_a), veh/h	724	0	0	724	0	632	270	807	840	180	1434	629
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	0.0	0.0	11.7	0.0	11.8	17.2	7.5	7.5	18.5	9.4	7.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.1	9.1	0.4	0.4	12.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.8	0.0	0.0	0.1	0.0	0.2	1.6	2.6	2.7	0.4	3.0	0.2
LnGrp Delay(d),s/veh	12.6	0.0	0.0	11.8	0.0	11.9	26.3	8.0	7.9	30.9	9.8	7.5
LnGrp LOS	B			B		B	C	A	A	C	A	A
Approach Vol, veh/h		92			29			838			782	
Approach Delay, s/veh		12.6			11.8			10.6			10.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.4	5.0	20.9		12.4	7.4	18.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.4	2.6	7.5		3.9	4.6	8.4
Green Ext Time (p_c), s		0.5	0.0	6.7		0.4	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	93

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	32	792	105
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	35	861	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1576	1569	861	1597	1567	591	861	0	0	593	0	0
Stage 1	930	930	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	960	930	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 88	110	354	85	110	505	760	-	-	959	-	0
Stage 1	319	345	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	307	345	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 77	98	354	64	98	505	760	-	-	959	-	-
Mov Cap-2 Maneuver	~ 77	98	-	64	98	-	-	-	-	-	-	-
Stage 1	305	321	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	238	321	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 716.6	29.3	0.4	0.3
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	760	-	-	96	172	959	-
HCM Lane V/C Ratio	0.03	-	-	2.366	0.139	0.036	-
HCM Control Delay (s)	9.9	0	-	$ 716.6	29.3	8.9	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	20.5	0.5	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	743	691	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	35	29	64	808	751	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1717	781	811	0	-	0
Stage 1	781	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	98	393	794	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	380	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	90	393	794	-	-	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	349	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	22	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	794	-	275	-	-
HCM Lane V/C Ratio	0.081	-	0.233	-	-
HCM Control Delay (s)	9.9	-	22	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	31	919	707	5	28	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	25	25
Mvmt Flow	34	999	768	5	30	77

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	774	0	-	0	1837	771
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	1066	-
Critical Hdwy	4.17	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.263	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	820	-	-	-	73	366
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	299	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	820	-	-	-	66	366
Mov Cap-2 Maneuver	-	-	-	-	178	-
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	271	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	25.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	820	-	-	-	282
HCM Lane V/C Ratio	0.041	-	-	-	0.382
HCM Control Delay (s)	9.6	0	-	-	25.4
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	1.7

Opening Day (2018) Operations: Alternative 6

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	24	69	10	253	58	245	36	268	360	302	252	17
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.89	1.00		0.94	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	26	75	11	275	63	266	39	291	391	328	274	18
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	176	26	347	364	596	50	732	618	366	1374	832
Arrive On Green	0.15	0.15	0.15	0.21	0.21	0.21	0.03	0.22	0.22	0.21	0.40	0.40
Sat Flow, veh/h	410	1182	173	1691	1776	1344	1691	3374	1422	1723	3438	1509
Grp Volume(v), veh/h	112	0	0	275	63	266	39	291	391	328	274	18
Grp Sat Flow(s),veh/h/ln	1765	0	0	1691	1776	1344	1691	1687	1422	1723	1719	1509
Q Serve(g_s), s	4.3	0.0	0.0	11.4	2.2	10.6	1.7	5.5	16.0	13.7	3.8	0.4
Cycle Q Clear(g_c), s	4.3	0.0	0.0	11.4	2.2	10.6	1.7	5.5	16.0	13.7	3.8	0.4
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	263	0	0	347	364	596	50	732	618	366	1374	832
V/C Ratio(X)	0.43	0.00	0.00	0.79	0.17	0.45	0.77	0.40	0.63	0.90	0.20	0.02
Avail Cap(c_a), veh/h	383	0	0	367	385	612	138	732	618	374	1374	832
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	0.0	27.8	24.2	15.6	35.5	24.8	17.0	28.3	14.5	7.6
Incr Delay (d2), s/veh	1.1	0.0	0.0	10.8	0.2	0.5	21.6	0.4	2.1	22.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.2	0.0	0.0	6.3	1.1	4.0	1.1	2.6	8.2	8.8	1.8	0.2
LnGrp Delay(d),s/veh	29.6	0.0	0.0	38.7	24.4	16.1	57.2	25.1	19.1	51.1	14.5	7.6
LnGrp LOS	C			D	C	B	E	C	B	D	B	A
Approach Vol, veh/h		112			604			721			620	
Approach Delay, s/veh		29.6			27.3			23.6			33.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.1	19.7	20.0		15.0	6.2	33.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0		16.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		13.4	15.7	18.0		6.3	3.7	5.8
Green Ext Time (p_c), s		0.7	0.0	0.0		0.3	0.0	5.6

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	29	0	27	5	0	14	21	594	9	13	486	17
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	32	0	29	5	0	15	23	646	10	14	528	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1420	1417	688	1426	1421	801	622	0	0	730	0	0
Stage 1	641	641	-	771	771	-	-	-	-	-	-	-
Stage 2	779	776	-	655	650	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	114	136	445	112	136	383	944	-	-	860	-	-
Stage 1	461	468	-	391	408	-	-	-	-	-	-	-
Stage 2	387	406	-	453	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	93	114	391	88	114	337	885	-	-	806	-	-
Mov Cap-2 Maneuver	93	114	-	88	114	-	-	-	-	-	-	-
Stage 1	421	431	-	357	373	-	-	-	-	-	-	-
Stage 2	337	371	-	386	427	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45.8	25.9	0.3	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	885	-	-	193	147	806	-	-
HCM Lane V/C Ratio	0.026	-	-	0.107	0.414	0.018	-	-
HCM Control Delay (s)	9.2	-	-	25.9	45.8	9.5	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	1.8	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	54	21	4	537	609	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	59	23	4	584	662	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1254	662	662	0	-	0
Stage 1	662	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	170	424	903	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	424	903	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	508	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	34.2	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	903	-	203	-	-
HCM Lane V/C Ratio	0.005	-	0.402	-	-
HCM Control Delay (s)	9	-	34.2	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0	-	1.8	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	568	2	11	703
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	3	9	617	2	12	764

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1406	618	0	0	620	0
Stage 1	618	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	153	487	-	-	937	-
Stage 1	536	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	151	487	-	-	937	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	440	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	303	937	-
HCM Lane V/C Ratio	-	-	0.039	0.013	-
HCM Control Delay (s)	-	-	17.4	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	13.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	118	2	39	4	2	11	16	412	3	16	596	66
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	128	2	42	4	2	12	17	448	3	17	648	72

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1174	1169	648	1189	1167	449	648	0	0	451	0	0
Stage 1	683	683	-	484	484	-	-	-	-	-	-	-
Stage 2	491	486	-	705	683	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	168	192	469	164	193	608	914	-	-	1084	-	0
Stage 1	438	448	-	562	550	-	-	-	-	-	-	0
Stage 2	557	549	-	426	448	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	157	183	469	142	183	608	914	-	-	1084	-	-
Mov Cap-2 Maneuver	157	183	-	142	183	-	-	-	-	-	-	-
Stage 1	427	437	-	548	536	-	-	-	-	-	-	-
Stage 2	530	535	-	376	437	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	96.8	17.9	0.3	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	914	-	-	188	297	1084	-
HCM Lane V/C Ratio	0.019	-	-	0.919	0.062	0.016	-
HCM Control Delay (s)	9	0	-	96.8	17.9	8.4	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	7.2	0.2	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	24	21	45	643	483	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	26	23	49	699	525	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1345	548	571	0	-	0
Stage 1	548	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	166	534	977	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	158	534	977	-	-	-
Mov Cap-2 Maneuver	291	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	420	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	16.2	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	977	-	369	-	-
HCM Lane V/C Ratio	0.05	-	0.133	-	-
HCM Control Delay (s)	8.9	-	16.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	31	91	13	333	76	323	47	353	474	397	331	22
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.90	1.00		0.93	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	34	99	14	362	83	351	51	384	515	432	360	24
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	60	174	25	390	410	697	64	623	608	437	1378	830
Arrive On Green	0.15	0.15	0.15	0.23	0.23	0.23	0.04	0.18	0.18	0.25	0.40	0.40
Sat Flow, veh/h	409	1190	168	1691	1776	1362	1691	3374	1407	1723	3438	1509
Grp Volume(v), veh/h	147	0	0	362	83	351	51	384	515	432	360	24
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1362	1691	1687	1407	1723	1719	1509
Q Serve(g_s), s	6.7	0.0	0.0	18.2	3.3	15.5	2.6	9.1	16.0	21.6	6.1	0.6
Cycle Q Clear(g_c), s	6.7	0.0	0.0	18.2	3.3	15.5	2.6	9.1	16.0	21.6	6.1	0.6
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	0	0	390	410	697	64	623	608	437	1378	830
V/C Ratio(X)	0.57	0.00	0.00	0.93	0.20	0.50	0.80	0.62	0.85	0.99	0.26	0.03
Avail Cap(c_a), veh/h	326	0	0	390	410	697	137	623	608	437	1378	830
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.4	0.0	0.0	32.6	26.9	15.5	41.4	32.5	19.5	32.2	17.4	9.0
Incr Delay (d2), s/veh	2.0	0.0	0.0	28.2	0.2	0.6	20.2	1.8	10.8	39.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.4	0.0	0.0	11.5	1.6	5.9	1.6	4.4	14.0	15.0	2.9	0.3
LnGrp Delay(d),s/veh	36.4	0.0	0.0	60.9	27.2	16.1	61.6	34.4	30.3	72.0	17.5	9.0
LnGrp LOS	D			E	C	B	E	C	C	E	B	A
Approach Vol, veh/h		147			796			950			816	
Approach Delay, s/veh		36.4			37.6			33.6			46.1	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.0	26.0	20.0		16.7	7.3	38.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		20.0	22.0	16.0		16.0	7.0	31.0
Max Q Clear Time (g_c+I1), s		20.2	23.6	18.0		8.7	4.6	8.1
Green Ext Time (p_c), s		0.0	0.0	0.0		0.4	0.0	8.2

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	10.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	38	0	36	7	0	19	28	782	12	17	639	22
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	41	0	39	8	0	21	30	850	13	18	695	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1817	857	1830	1822	1007	793	0	0	938	0	0
Stage 1	818	818	-	992	992	-	-	-	-	-	-	-
Stage 2	1003	999	-	838	830	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	59	77	356	59	77	291	815	-	-	718	-	-
Stage 1	369	388	-	295	322	-	-	-	-	-	-	-
Stage 2	291	320	-	359	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	45	63	313	43	63	256	764	-	-	673	-	-
Mov Cap-2 Maneuver	45	63	-	43	63	-	-	-	-	-	-	-
Stage 1	332	354	-	266	290	-	-	-	-	-	-	-
Stage 2	241	288	-	287	349	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	210.4	48.7	0.3	0.3
HCM LOS	F	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	764	-	-	110	77	673	-	-
HCM Lane V/C Ratio	0.04	-	-	0.257	1.045	0.027	-	-
HCM Control Delay (s)	9.9	-	-	48.7	210.4	10.5	-	-
HCM Lane LOS	A	-	-	E	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	5.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	71	28	5	706	801	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	77	30	5	767	871	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1649	871	871	0	-	0
Stage 1	871	-	-	-	-	-
Stage 2	778	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	96	319	753	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	415	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	95	319	753	-	-	-
Mov Cap-2 Maneuver	95	-	-	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	412	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	126.7	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	753	-	119	-	-
HCM Lane V/C Ratio	0.007	-	0.904	-	-
HCM Control Delay (s)	9.8	-	126.7	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	5.7	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	11	748	3	14	925
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	4	12	813	3	15	1005

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1851	815	0	0	816	0
Stage 1	815	-	-	-	-	-
Stage 2	1036	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	81	376	-	-	790	-
Stage 1	433	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	79	376	-	-	790	-
Mov Cap-2 Maneuver	79	-	-	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	335	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	188	790	-
HCM Lane V/C Ratio	-	-	0.087	0.019	-
HCM Control Delay (s)	-	-	26	9.6	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	84.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	155	3	51	5	2	15	21	542	4	21	784	87
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	168	3	55	5	2	16	23	589	4	23	852	95

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1544	1537	852	1564	1535	591	852	0	0	593	0	0
Stage 1	898	898	-	637	637	-	-	-	-	-	-	-
Stage 2	646	639	-	927	898	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 93	115	358	90	116	505	766	-	-	959	-	0
Stage 1	333	357	-	464	470	-	-	-	-	-	-	0
Stage 2	459	469	-	320	357	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 83	105	358	69	106	505	766	-	-	959	-	-
Mov Cap-2 Maneuver	~ 83	105	-	69	106	-	-	-	-	-	-	-
Stage 1	318	341	-	443	449	-	-	-	-	-	-	-
Stage 2	422	448	-	256	341	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 640.2	27.8	0.4	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	766	-	-	103	182	959	-
HCM Lane V/C Ratio	0.03	-	-	2.206	0.131	0.024	-
HCM Control Delay (s)	9.8	0	-	$ 640.2	27.8	8.8	0
HCM Lane LOS	A	A	-	F	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	19.8	0.4	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	32	27	59	846	635	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	35	29	64	920	690	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1768	720	750	0	-	0
Stage 1	720	-	-	-	-	-
Stage 2	1048	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	91	426	837	-	-	-
Stage 1	480	-	-	-	-	-
Stage 2	336	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	84	426	837	-	-	-
Mov Cap-2 Maneuver	208	-	-	-	-	-
Stage 1	480	-	-	-	-	-
Stage 2	310	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	22.3	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	837	-	272	-	-
HCM Lane V/C Ratio	0.077	-	0.236	-	-
HCM Control Delay (s)	9.7	-	22.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

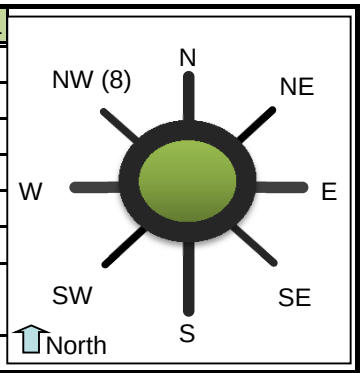
Opening Day (2018) Operations: Alternative 6A

Average Annual Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Average Annual
County/District:	Placer County
Intersection:	Alt 6A Old Wye



Volumes

		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph								
	SE (4), vph								
	S (5), vph					337			
	SW (6), vph								
	W (7), vph						252		
	NW (8), vph								
	Entry Volume, vph	0	0	0	0	337	252	0	0

		S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
	N (1), vph								
	NE (2), vph								
	E (3), vph		274			286			
	SE (4), vph								
	S (5), vph						394		
	SW (6), vph								
	W (7), vph	282							
	NW (8), vph								
	Entry Volume, vph	282	274	0	0	286	394	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.987	1.000	0.938	1.000	0.981	1.000

Entry/Conflicting Flows		N	NE	E	SE	S	SW	W	NW
Flow to	N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #									
	NE (2), pcu/h	0	0	0	0	0	0	0	0
	E (3), pcu/h	0	0	0	0	319	0	333	0
	SE (4), pcu/h	0	0	0	0	0	0	0	0
	S (5), pcu/h	0	0	385	0	0	0	458	0
	SW (6), pcu/h	0	0	0	0	0	0	0	0
	W (7), pcu/h	0	0	288	0	328	0	0	0
	NW (8), pcu/h	0	0	0	0	0	0	0	0
	Entry flow, pcu/h	0	0	672	0	647	0	791	0
	Entry flow Lane 1, pcu/h	0	0	385	0	328	0	333	0
	Entry flow Lane 2, pcu/h	0	0	288	0	319	0	458	0
	Conflicting flow, pcu/h	0	0	328	0	333	0	385	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	831	845	772	785	776	791
Entry Flow Rates, veh/h	NA	NA	366	274	307	298	311	428
V/C ratio	#VALUE!	#VALUE!	**0.44**	**0.32**	**0.40**	**0.38**	**0.40**	**0.54**
Control Delay, s/veh	#VALUE!	#VALUE!	**9.9**	**7.9**	**9.7**	**9.3**	**9.7**	**12.5**
LOS	#VALUE!	#VALUE!	A	A	A	A	A	B
95th % Queue (ft)	#VALUE!	#VALUE!	**60**	**37**	**51**	**48**	**52**	**88**
Approach Delay, LOS	#VALUE!		9.1 sec, LOS A		9.5 sec, LOS A		11.3 sec, LOS B	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	939	1011	871	938	869	939
Entry Flow Rates, veh/h	NA	NA	366	274	307	298	311	428
V/C ratio	#VALUE!	#VALUE!	**0.39**	**0.27**	**0.35**	**0.32**	**0.36**	**0.46**
Control Delay, s/veh	#VALUE!	#VALUE!	**8.2**	**6.2**	**8.1**	**7.2**	**8.2**	**9.3**
LOS	#VALUE!	#VALUE!	A	A	A	A	A	A
95th % Queue (ft)	#VALUE!	#VALUE!	**49**	**29**	**43**	**37**	**44**	**65**
Approach Delay, LOS	#VALUE!		7.4 sec, LOS A		7.7 sec, LOS A		8.8 sec, LOS A	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
******Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.***						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.2

Old Wye 2018 AA EF = 1.2
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: SR 89											
3	L2	307	7.0	0.338	12.2	LOS B	1.9	50.9	0.55	0.73	34.2
18	R2	298	7.0	0.331	5.6	LOS A	1.9	49.4	0.55	0.63	35.8
Approach		604	7.0	0.338	8.9	LOS A	1.9	50.9	0.55	0.68	34.9
East: SR 28											
1	L2	366	5.0	0.395	12.2	LOS B	2.3	59.9	0.56	0.74	34.2
6	T1	274	5.0	0.318	5.2	LOS A	1.7	44.3	0.54	0.51	37.1
Approach		640	5.0	0.395	9.2	LOS A	2.3	59.9	0.55	0.64	35.3
West: SR 89											
2	T1	311	7.0	0.388	6.1	LOS A	2.4	62.1	0.64	0.59	36.6
12	R2	428	7.0	0.485	6.6	LOS A	3.4	89.1	0.68	0.72	35.5
Approach		739	7.0	0.485	6.4	LOS A	3.4	89.1	0.66	0.67	36.0
All Vehicles		1984	6.4	0.485	8.1	LOS A	3.4	89.1	0.59	0.66	35.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 AA EF = 1.1

2018 Average Annual PM - Old Wye Roundabout Env =1.1
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: SR 89											
3	L2	307	7.0	0.302	11.9	LOS B	1.7	45.2	0.52	0.71	34.2
18	R2	298	7.0	0.312	5.4	LOS A	1.8	46.3	0.53	0.61	35.8
Approach		604	7.0	0.312	8.7	LOS A	1.8	46.3	0.53	0.66	35.0
East: SR 28											
1	L2	366	5.0	0.353	11.9	LOS B	2.0	52.8	0.53	0.71	34.3
6	T1	274	5.0	0.295	4.9	LOS A	1.6	40.9	0.52	0.48	37.2
Approach		640	5.0	0.353	8.9	LOS A	2.0	52.8	0.52	0.62	35.4
West: SR 89											
2	T1	311	7.0	0.358	5.7	LOS A	2.2	56.9	0.61	0.56	36.7
12	R2	428	7.0	0.430	5.9	LOS A	2.9	75.5	0.64	0.67	35.6
Approach		739	7.0	0.430	5.8	LOS A	2.9	75.5	0.63	0.62	36.1
All Vehicles		1984	6.4	0.430	7.7	LOS A	2.9	75.5	0.56	0.63	35.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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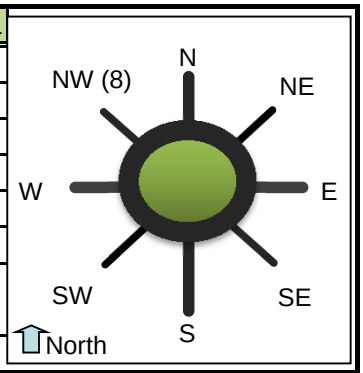
Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection:	Alt 6A Old Wye



Volumes

	Entry Legs (FROM)							
	N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO) N (1), vph								
NE (2), vph								
E (3), vph								
SE (4), vph								
S (5), vph					443			
SW (6), vph								
W (7), vph						331		
NW (8), vph								
Entry Volume, vph	0	0	0	0	443	331	0	0

	S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
N (1), vph								
NE (2), vph								
E (3), vph		361			376			
SE (4), vph								
S (5), vph						519		
SW (6), vph								
W (7), vph	371							
NW (8), vph								
Entry Volume, vph	371	361	0	0	376	519	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.989	1.000	0.947	1.000	0.984	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #								
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	420	0	437	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	506	0	0	0	604	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	378	0	431	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	883	0	851	0	1041	0
Entry flow Lane 1, pcu/h	0	0	506	0	431	0	437	0
Entry flow Lane 2, pcu/h	0	0	378	0	420	0	604	0
Conflicting flow, pcu/h	0	0	431	0	437	0	506	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	770	787	720	736	711	730
Entry Flow Rates, veh/h	NA	NA	482	360	403	392	409	564
V/C ratio	#VALUE!	#VALUE!	**0.63**	**0.46**	**0.56**	**0.53**	**0.57**	**0.77**
Control Delay, s/veh	#VALUE!	#VALUE!	**15.3**	**10.7**	**14.0**	**13.0**	**14.5**	**23.5**
LOS	#VALUE!	#VALUE!	C	B	B	B	B	C
95th % Queue (ft)	#VALUE!	#VALUE!	**117**	**63**	**94**	**85**	**99**	**201**
Approach Delay, LOS	#VALUE!		13.3 sec, LOS B		13.5 sec, LOS B		19.7 sec, LOS C	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	855	927	799	866	780	850
Entry Flow Rates, veh/h	NA	NA	482	360	403	392	409	564
V/C ratio	#VALUE!	#VALUE!	**0.56**	**0.39**	**0.50**	**0.45**	**0.52**	**0.66**
Control Delay, s/veh	#VALUE!	#VALUE!	**12.3**	**8.3**	**11.5**	**9.8**	**12.2**	**15.5**
LOS	#VALUE!	#VALUE!	B	A	B	A	B	C
95th % Queue (ft)	#VALUE!	#VALUE!	**94**	**49**	**77**	**64**	**83**	**138**
Approach Delay, LOS	#VALUE!		10.6 sec, LOS B		10.7 sec, LOS B		14.1 sec, LOS B	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
******Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.***						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.2

Old Wye 2018 Summer EF = 1.2
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: SR 89											
3	L2	403	7.0	0.498	13.7	LOS B	3.6	94.0	0.72	0.84	33.7
18	R2	392	7.0	0.493	7.0	LOS A	3.5	91.8	0.72	0.78	35.3
Approach		796	7.0	0.498	10.4	LOS B	3.6	94.0	0.72	0.81	34.5
East: SR 28											
1	L2	482	5.0	0.575	14.3	LOS B	4.6	119.9	0.75	0.88	33.7
6	T1	360	5.0	0.467	6.5	LOS A	3.0	78.8	0.69	0.65	36.4
Approach		841	5.0	0.575	11.0	LOS B	4.6	119.9	0.73	0.78	34.8
West: SR 89											
2	T1	409	7.0	0.592	9.6	LOS A	5.1	134.4	0.83	0.92	35.5
12	R2	564	7.0	0.732	12.1	LOS B	8.5	225.0	0.93	1.05	32.7
Approach		973	7.0	0.732	11.1	LOS B	8.5	225.0	0.89	1.00	33.9
All Vehicles		2610	6.4	0.732	10.8	LOS B	8.5	225.0	0.79	0.87	34.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2018 Summer EF = 1.1

Old Wye 2018 Summer EF = 1.1
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: SR 89											
3	L2	403	7.0	0.441	12.7	LOS B	2.9	77.4	0.68	0.79	33.8
18	R2	392	7.0	0.462	6.5	LOS A	3.1	81.9	0.70	0.74	35.4
Approach		796	7.0	0.462	9.6	LOS A	3.1	81.9	0.69	0.77	34.5
East: SR 28											
1	L2	482	5.0	0.509	13.1	LOS B	3.7	95.4	0.70	0.81	33.8
6	T1	360	5.0	0.431	5.9	LOS A	2.7	69.0	0.66	0.58	36.6
Approach		841	5.0	0.509	10.0	LOS A	3.7	95.4	0.68	0.71	34.9
West: SR 89											
2	T1	409	7.0	0.542	8.3	LOS A	4.4	114.9	0.80	0.85	36.0
12	R2	564	7.0	0.642	9.2	LOS A	6.5	170.4	0.86	0.92	34.2
Approach		973	7.0	0.642	8.8	LOS A	6.5	170.4	0.83	0.89	34.9
All Vehicles		2610	6.4	0.642	9.4	LOS A	6.5	170.4	0.74	0.79	34.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Design Year (2038) Operations

Design Year (2038) Operations: Alternative 5 (No Build)

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	76	11	280	64	271	39	296	398	333	278	18
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	28	83	12	304	70	0	42	322	0	362	302	20
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	63	185	27	365	384	326	54	591	265	391	1272	558
Arrive On Green	0.16	0.16	0.16	0.22	0.22	0.00	0.03	0.18	0.00	0.23	0.37	0.37
Sat Flow, veh/h	402	1193	172	1691	1776	1509	1691	3374	1509	1723	3438	1507
Grp Volume(v), veh/h	123	0	0	304	70	0	42	322	0	362	302	20
Grp Sat Flow(s),veh/h/ln	1768	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1507
Q Serve(g_s), s	4.5	0.0	0.0	12.1	2.3	0.0	1.7	6.1	0.0	14.5	4.3	0.6
Cycle Q Clear(g_c), s	4.5	0.0	0.0	12.1	2.3	0.0	1.7	6.1	0.0	14.5	4.3	0.6
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	275	0	0	365	384	326	54	591	265	391	1272	558
V/C Ratio(X)	0.45	0.00	0.00	0.83	0.18	0.00	0.78	0.54	0.00	0.93	0.24	0.04
Avail Cap(c_a), veh/h	401	0	0	383	402	342	144	765	342	391	1272	558
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	0.0	26.4	22.6	0.0	33.9	26.5	0.0	26.7	15.4	14.2
Incr Delay (d2), s/veh	1.1	0.0	0.0	13.9	0.2	0.0	21.2	0.8	0.0	28.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.3	0.0	0.0	7.1	1.1	0.0	1.1	2.9	0.0	9.9	2.0	0.3
LnGrp Delay(d),s/veh	28.2	0.0	0.0	40.4	22.8	0.0	55.2	27.3	0.0	54.7	15.4	14.2
LnGrp LOS	C			D	C		E	C		D	B	B
Approach Vol, veh/h		123			374			364			684	
Approach Delay, s/veh		28.2			37.1			30.5			36.2	
Approach LOS		C			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.3	20.0	16.4		15.0	6.2	30.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0		16.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		14.1	16.5	8.1		6.5	3.7	6.3
Green Ext Time (p_c), s		0.3	0.0	2.5		0.4	0.0	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	34.4
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	32	0	30	6	0	16	24	657	10	14	537	18
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	35	0	33	7	0	17	26	714	11	15	584	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1554	1551	743	1562	1556	870	678	0	0	800	0	0
Stage 1	699	699	-	847	847	-	-	-	-	-	-	-
Stage 2	855	852	-	715	709	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	92	113	413	90	112	349	900	-	-	810	-	-
Stage 1	429	440	-	355	377	-	-	-	-	-	-	-
Stage 2	351	375	-	420	436	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	73	94	363	69	94	307	844	-	-	759	-	-
Mov Cap-2 Maneuver	73	94	-	69	94	-	-	-	-	-	-	-
Stage 1	390	404	-	323	343	-	-	-	-	-	-	-
Stage 2	301	341	-	351	401	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	68.9	31.8	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	844	-	-	158	119	759	-	-
HCM Lane V/C Ratio	0.031	-	-	0.151	0.566	0.02	-	-
HCM Control Delay (s)	9.4	-	-	31.8	68.9	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	2.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	60	24	4	593	673	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	65	26	4	645	732	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1385	732	732	0	-	0
Stage 1	732	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	141	385	850	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	140	385	850	-	-	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	475	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.9	0.1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	850	-	171	-	-
HCM Lane V/C Ratio	0.005	-	0.534	-	-
HCM Control Delay (s)	9.3	-	47.9	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0	-	2.7	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	9	628	3	12	777
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	3	10	683	3	13	845

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1555	684	0	0	686	0
Stage 1	684	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	124	447	-	-	885	-
Stage 1	499	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	122	447	-	-	885	-
Mov Cap-2 Maneuver	122	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	402	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	268	885	-
HCM Lane V/C Ratio	-	-	0.049	0.015	-
HCM Control Delay (s)	-	-	19.1	9.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	27.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	130	3	43	4	2	13	18	455	3	18	658	73
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	141	3	47	4	2	14	20	495	3	20	715	79

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1297	1291	715	1314	1289	496	715	0	0	498	0	0
Stage 1	754	754	-	535	535	-	-	-	-	-	-	-
Stage 2	543	537	-	779	754	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 138	162	429	134	163	572	863	-	-	1041	-	0
Stage 1	400	416	-	527	522	-	-	-	-	-	-	0
Stage 2	522	521	-	387	416	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 127	152	429	112	153	572	863	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 127	152	-	112	153	-	-	-	-	-	-	-
Stage 1	387	403	-	510	505	-	-	-	-	-	-	-
Stage 2	491	504	-	331	403	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	209.5	19.7	0.4	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	863	-	-	154	266	1041	-
HCM Lane V/C Ratio	0.023	-	-	1.242	0.078	0.019	-
HCM Control Delay (s)	9.3	0	-	209.5	19.7	8.5	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	11.1	0.2	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NEL	NER
Vol, veh/h	0	0	0	662	0	905
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	0	0	720	0	984

Major/Minor	Minor2		Major2		Major1	
Conflicting Flow All	1704	720	984	0	720	0
Stage 1	720	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Critical Hdwy	6.57	6.27	-	-	4.17	-
Critical Hdwy Stg 1	5.57	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	4.063	3.363	-	-	2.263	-
Pot Cap-1 Maneuver	89	420	-	-	859	-
Stage 1	425	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %				-		-
Mov Cap-1 Maneuver	0	420	-	-	859	-
Mov Cap-2 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-

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

Minor Lane/Major Mvmt	NEL	NER	EBLn1	WBL	WBT
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	0	-
HCM Lane LOS	A	-	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	27	23	50	710	534	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	29	25	54	772	580	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1485	605	630	0	-	0
Stage 1	605	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	137	496	929	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	129	496	929	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	381	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	17.9	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	929	-	334	-	-
HCM Lane V/C Ratio	0.059	-	0.163	-	-
HCM Control Delay (s)	9.1	-	17.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	101	15	368	84	357	52	390	524	439	366	24
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	37	110	16	400	91	0	57	424	0	477	398	26
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	182	26	399	419	356	71	552	247	447	1309	574
Arrive On Green	0.15	0.15	0.15	0.24	0.24	0.00	0.04	0.16	0.00	0.26	0.38	0.38
Sat Flow, veh/h	401	1192	173	1691	1776	1509	1691	3374	1509	1723	3438	1508
Grp Volume(v), veh/h	163	0	0	400	91	0	57	424	0	477	398	26
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1509	1691	1687	1509	1723	1719	1508
Q Serve(g_s), s	7.3	0.0	0.0	20.0	3.5	0.0	2.8	10.2	0.0	22.0	6.9	0.9
Cycle Q Clear(g_c), s	7.3	0.0	0.0	20.0	3.5	0.0	2.8	10.2	0.0	22.0	6.9	0.9
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	270	0	0	399	419	356	71	552	247	447	1309	574
V/C Ratio(X)	0.60	0.00	0.00	1.00	0.22	0.00	0.80	0.77	0.00	1.07	0.30	0.05
Avail Cap(c_a), veh/h	333	0	0	399	419	356	140	636	285	447	1309	574
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.5	0.0	0.0	32.4	26.1	0.0	40.3	33.9	0.0	31.4	18.4	16.6
Incr Delay (d2), s/veh	2.2	0.0	0.0	45.9	0.3	0.0	17.9	4.9	0.0	61.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.7	0.0	0.0	14.3	1.7	0.0	1.7	5.1	0.0	18.0	3.3	0.4
LnGrp Delay(d),s/veh	35.7	0.0	0.0	78.3	26.4	0.0	58.2	38.9	0.0	93.1	18.5	16.6
LnGrp LOS	D			F	C		E	D		F	B	B
Approach Vol, veh/h		163			491			481			901	
Approach Delay, s/veh		35.7			68.7			41.1			58.0	
Approach LOS		D			E			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.0	26.0	17.9		17.0	7.6	36.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		20.0	22.0	16.0		16.0	7.0	31.0
Max Q Clear Time (g_c+I1), s		22.0	24.0	12.2		9.3	4.8	8.9
Green Ext Time (p_c), s		0.0	0.0	1.0		0.4	0.0	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	54.8
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	16.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	78	31	6	780	885	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	85	34	7	848	962	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1823	962	962	0	-	0
Stage 1	962	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	~ 74	281	696	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 73	281	696	-	-	-
Mov Cap-2 Maneuver	~ 73	-	-	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	374	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	272.8	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	696	-	92	-	-
HCM Lane V/C Ratio	0.009	-	1.288	-	-
HCM Control Delay (s)	10.2	-	272.8	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0	-	8.5	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	12	826	3	15	1022
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	4	13	898	3	16	1111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2042	899	0	0	901	0
Stage 1	899	-	-	-	-	-
Stage 2	1143	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	62	336	-	-	734	-
Stage 1	396	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	336	-	-	734	-
Mov Cap-2 Maneuver	61	-	-	-	-	-
Stage 1	396	-	-	-	-	-
Stage 2	296	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.6	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	158	734	-
HCM Lane V/C Ratio	-	-	0.11	0.022	-
HCM Control Delay (s)	-	-	30.6	10	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	147.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	23	866	96
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	25	941	104

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1705	1696	941	1726	1694	653	941	0	0	655	0	0
Stage 1	991	991	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1023	991	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 72	92	318	69	92	466	709	-	-	909	-	0
Stage 1	295	323	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	283	323	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 62	82	318	50	82	466	709	-	-	909	-	-
Mov Cap-2 Maneuver	~ 62	82	-	50	82	-	-	-	-	-	-	-
Stage 1	279	304	-	404	414	-	-	-	-	-	-	-
Stage 2	380	414	-	213	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1126.4	37.4	0.4	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	709	-	-	77	138	909	-
HCM Lane V/C Ratio	0.035	-	-	3.247	0.197	0.028	-
HCM Control Delay (s)	10.3	0		$ 1126.4	37.4	9.1	0
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	25.3	0.7	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NEL	NER
Vol, veh/h	0	0	0	662	0	905
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	0	0	720	0	984

Major/Minor	Minor2		Major2		Major1	
Conflicting Flow All	1704	720	984	0	720	0
Stage 1	720	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Critical Hdwy	6.57	6.27	-	-	4.17	-
Critical Hdwy Stg 1	5.57	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	4.063	3.363	-	-	2.263	-
Pot Cap-1 Maneuver	89	420	-	-	859	-
Stage 1	425	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %				-		-
Mov Cap-1 Maneuver	0	420	-	-	859	-
Mov Cap-2 Maneuver	0	-	-	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-

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

Minor Lane/Major Mvmt	NEL	NER	EBLn1	WBL	WBT
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	0	-
HCM Lane LOS	A	-	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	935	702	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	38	33	71	1016	763	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1954	796	829	0	-	0
Stage 1	796	-	-	-	-	-
Stage 2	1158	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	70	385	781	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	64	385	781	-	-	-
Mov Cap-2 Maneuver	181	-	-	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	271	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	26.1	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	781	-	240	-	-
HCM Lane V/C Ratio	0.09	-	0.294	-	-
HCM Control Delay (s)	10.1	-	26.1	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	-	-

Design Year (2038) Operations: Alternative 1

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	36	45	82	28	142	62	411	72	197	409	23
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.90	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1810	1810	1810	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	37	39	49	89	30	0	67	447	0	214	445	25
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	5	5	5	5	5	5	5	5	5
Cap, veh/h	84	88	111	296	311	264	84	784	351	262	1139	498
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.00	0.05	0.23	0.00	0.15	0.33	0.33
Sat Flow, veh/h	480	506	636	1723	1810	1538	1723	3438	1538	1723	3438	1503
Grp Volume(v), veh/h	125	0	0	89	30	0	67	447	0	214	445	25
Grp Sat Flow(s),veh/h/ln	1622	0	0	1723	1810	1538	1723	1719	1538	1723	1719	1503
Q Serve(g_s), s	4.0	0.0	0.0	2.6	0.8	0.0	2.2	6.7	0.0	7.0	5.8	0.7
Cycle Q Clear(g_c), s	4.0	0.0	0.0	2.6	0.8	0.0	2.2	6.7	0.0	7.0	5.8	0.7
Prop In Lane	0.30		0.39	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	283	0	0	296	311	264	84	784	351	262	1139	498
V/C Ratio(X)	0.44	0.00	0.00	0.30	0.10	0.00	0.80	0.57	0.00	0.82	0.39	0.05
Avail Cap(c_a), veh/h	445	0	0	472	496	422	207	942	422	325	1178	515
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	0.0	0.0	21.1	20.4	0.0	27.5	20.0	0.0	24.0	15.0	13.3
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.6	0.1	0.0	15.9	0.7	0.0	12.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.9	0.0	0.0	1.3	0.4	0.0	1.4	3.2	0.0	4.2	2.8	0.3
LnGrp Delay(d),s/veh	22.6	0.0	0.0	21.7	20.5	0.0	43.4	20.7	0.0	36.5	15.2	13.3
LnGrp LOS	C			C	C		D	C		D	B	B
Approach Vol, veh/h		125			119			514			684	
Approach Delay, s/veh		22.6			21.4			23.6			21.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.0	12.9	17.3		14.2	6.8	23.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	11.0	16.0		16.0	7.0	20.0
Max Q Clear Time (g_c+I1), s		4.6	9.0	8.7		6.0	4.2	7.8
Green Ext Time (p_c), s		0.3	0.1	3.5		0.4	0.0	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	3.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	32	0	30	6	0	16	24	657	10	14	537	18
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	35	0	33	7	0	17	26	714	11	15	584	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1554	1551	743	1562	1556	870	678	0	0	800	0	0
Stage 1	699	699	-	847	847	-	-	-	-	-	-	-
Stage 2	855	852	-	715	709	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	92	113	413	90	112	349	900	-	-	810	-	-
Stage 1	429	440	-	355	377	-	-	-	-	-	-	-
Stage 2	351	375	-	420	436	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	73	94	363	69	94	307	844	-	-	759	-	-
Mov Cap-2 Maneuver	73	94	-	69	94	-	-	-	-	-	-	-
Stage 1	390	404	-	323	343	-	-	-	-	-	-	-
Stage 2	301	341	-	351	401	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	68.9	31.8	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	844	-	-	158	119	759	-	-
HCM Lane V/C Ratio	0.031	-	-	0.151	0.566	0.02	-	-
HCM Control Delay (s)	9.4	-	-	31.8	68.9	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	2.7	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	696	0	0	712
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	757	0	0	774

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1531	757	0	0	757	0
Stage 1	757	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	128	406	-	-	849	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	128	406	-	-	849	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	849	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	60	24	4	226	231	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	65	26	4	246	251	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	505	251	251	0	-	0
Stage 1	251	-	-	-	-	-
Stage 2	254	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	488	735	1297	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	486	735	1297	-	-	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1297	-	538	-	-
HCM Lane V/C Ratio	0.003	-	0.17	-	-
HCM Control Delay (s)	7.8	-	13.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	9	279	3	12	252
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	3	10	303	3	13	274

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	605	305	0	0	307	0
Stage 1	305	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.15	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.245	-
Pot Cap-1 Maneuver	459	732	-	-	1237	-
Stage 1	745	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	454	732	-	-	1237	-
Mov Cap-2 Maneuver	454	-	-	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	635	1237	-
HCM Lane V/C Ratio	-	-	0.021	0.011	-
HCM Control Delay (s)	-	-	10.8	7.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	31.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	130	3	43	4	2	13	18	455	3	27	665	88
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	141	3	47	4	2	14	20	495	3	29	723	96

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1325	1319	723	1342	1317	496	723	0	0	498	0	0
Stage 1	782	782	-	535	535	-	-	-	-	-	-	-
Stage 2	543	537	-	807	782	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 132	156	425	129	157	572	857	-	-	1041	-	0
Stage 1	386	403	-	527	522	-	-	-	-	-	-	0
Stage 2	522	521	-	374	403	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 120	144	425	106	145	572	857	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 120	144	-	106	145	-	-	-	-	-	-	-
Stage 1	374	384	-	510	505	-	-	-	-	-	-	-
Stage 2	491	504	-	315	384	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	238.8	20.3	0.4	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	857	-	-	146	256	1041	-
HCM Lane V/C Ratio	0.023	-	-	1.31	0.081	0.028	-
HCM Control Delay (s)	9.3	0	-	238.8	20.3	8.6	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	11.8	0.3	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	27	23	50	519	490	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	29	25	54	564	533	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1231	558	583	0	-	0
Stage 1	558	-	-	-	-	-
Stage 2	673	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	195	527	977	-	-	-
Stage 1	571	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	184	527	977	-	-	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	571	-	-	-	-	-
Stage 2	477	-	-	-	-	-

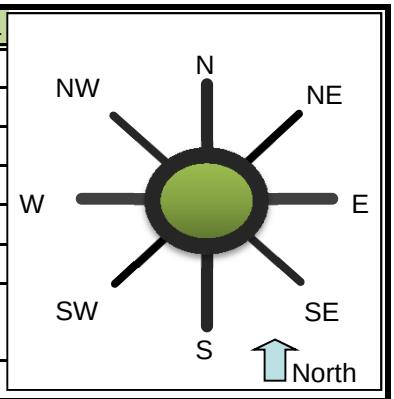
Approach	SB	NE	SW
HCM Control Delay, s	15.7	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	977	-	391	-	-
HCM Lane V/C Ratio	0.056	-	0.139	-	-
HCM Control Delay (s)	8.9	-	15.7	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 1 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					206		20	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	218						558	
	SW (6), vph								
	W (7), vph	34				392			
	NW (8), vph								
Output	Total Vehicles	252	0	0	0	598	0	578	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	240	0	23	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	249	0	0	0	0	0	649	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	39	0	0	0	456	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	288	0	0	0	696	0	672	0
Conflicting flow, pcu/h	456	0	0	0	23	0	249	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	682	NA	NA	NA	1032	NA	823	NA
Entry Flow Rates, vph	274	NA	NA	NA	650	NA	628	NA
V/C ratio	**0.40**				**0.63**		**0.76**	
Control Delay, s/veh	**11**				**12**		**21**	
LOS	B				B		C	
95th % Queue (ft)	**51**				**124**		**198**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	826	NA	NA	NA	1259	NA	1001	NA
Entry Flow Rates, vph	274	NA	NA	NA	650	NA	628	NA
V/C ratio	**0.35**				**0.55**		**0.67**	
Control Delay, sec/pcu	**8**				**9**		**14**	
LOS	A				A		B	
95th % Queue (ft)	**41**				**94**		**145**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.2

East_Roundabout_2038_AA_EF = 1.2
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: SR 89											
3	L2	426	7.0	0.586	10.4	LOS B	6.8	180.4	0.28	0.52	35.6
8	T1	224	7.0	0.586	3.5	LOS A	6.8	180.4	0.28	0.52	35.6
Approach		650	7.0	0.586	8.0	LOS A	6.8	180.4	0.28	0.52	35.6
North: Old SR 89											
4	T1	237	3.0	0.359	6.9	LOS A	2.2	55.8	0.67	0.71	36.3
14	R2	37	3.0	0.359	7.4	LOS A	2.2	55.8	0.67	0.71	35.1
Approach		274	3.0	0.359	7.0	LOS A	2.2	55.8	0.67	0.71	36.2
West: New SR 89											
5	L2	22	7.0	0.727	16.2	LOS C	9.6	252.2	0.88	0.83	34.8
12	R2	607	7.0	0.727	9.8	LOS A	9.6	252.2	0.88	0.83	33.6
Approach		628	7.0	0.727	10.0	LOS B	9.6	252.2	0.88	0.83	33.6
All Vehicles		1552	6.3	0.727	8.6	LOS A	9.6	252.2	0.60	0.68	34.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.1

East_Roundabout_2038_AA_EF = 1.1
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: SR 89											
3	L2	426	7.0	0.535	10.3	LOS B	5.6	147.9	0.24	0.53	35.7
8	T1	224	7.0	0.535	3.4	LOS A	5.6	147.9	0.24	0.53	35.7
Approach		650	7.0	0.535	7.9	LOS A	5.6	147.9	0.24	0.53	35.7
North: Old SR 89											
4	T1	237	3.0	0.314	6.3	LOS A	1.9	48.7	0.64	0.66	36.5
14	R2	37	3.0	0.314	6.8	LOS A	1.9	48.7	0.64	0.66	35.2
Approach		274	3.0	0.314	6.4	LOS A	1.9	48.7	0.64	0.66	36.3
West: New SR 89											
5	L2	22	7.0	0.648	13.7	LOS B	6.9	182.9	0.78	0.73	36.2
12	R2	607	7.0	0.648	7.3	LOS A	6.9	182.9	0.78	0.73	34.9
Approach		628	7.0	0.648	7.5	LOS A	6.9	182.9	0.78	0.73	34.9
All Vehicles		1552	6.3	0.648	7.5	LOS A	6.9	182.9	0.53	0.63	35.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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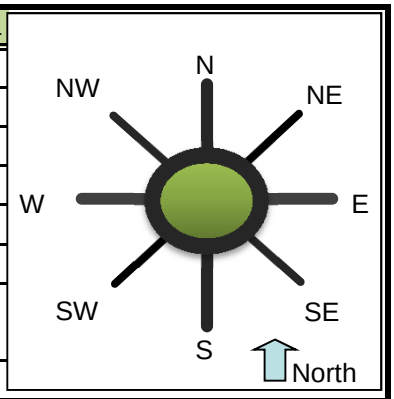
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 1 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph			23		29		62	
Exit	NE (2), vph								
Legs	E (3), vph	34				142		411	
(TO)	SE (4), vph								
	S (5), vph	36		197				72	
	SW (6), vph								
	W (7), vph	45		409		82			
	NW (8), vph								
Output	Total Vehicles	115	0	629	0	253	0	545	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	0.992	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	26	0	33	0	71	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	38	0	0	0	162	0	469	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	40	0	225	0	0	0	82	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	50	0	467	0	94	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	129	0	718	0	289	0	622	0
Conflicting flow, pcu/h	785	0	197	0	578	0	303	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	496	NA	882	NA	598	NA	792	NA
Entry Flow Rates, vph	125	NA	684	NA	275	NA	592	NA
V/C ratio	**0.25**		**0.78**		**0.46**		**0.75**	
Control Delay, s/veh	**11**		**21**		**13**		**20**	
LOS	B		C		B		C	
95th % Queue (ft)	**25**		**206**		**63**		**183**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	597	NA	1072	NA	721	NA	961	NA
Entry Flow Rates, vph	125	NA	684	NA	275	NA	592	NA
V/C ratio	**0.22**		**0.67**		**0.40**		**0.65**	
Control Delay, sec/pcu	**9**		**13**		**10**		**14**	
LOS	A		B		B		B	
95th % Queue (ft)	**21**		**142**		**51**		**129**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.2

2038 Average Annual PM - Old Wye Roundabout Env =1.2
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: SR 89											
3	L2	89	3.0	0.404	14.8	LOS B	2.8	72.0	0.81	0.84	35.6
8	T1	32	3.0	0.404	7.7	LOS A	2.8	72.0	0.81	0.84	35.2
18	R2	154	3.0	0.404	8.0	LOS A	2.8	72.0	0.81	0.84	33.9
Approach		275	3.0	0.404	10.1	LOS B	2.8	72.0	0.81	0.84	34.6
East: SR 28											
1	L2	214	5.0	0.684	13.3	LOS B	7.4	192.0	0.74	0.67	35.8
6	T1	445	5.0	0.684	6.2	LOS A	7.4	192.0	0.74	0.67	35.5
16	R2	25	5.0	0.684	6.5	LOS A	7.4	192.0	0.74	0.67	34.2
Approach		684	5.0	0.684	8.5	LOS A	7.4	192.0	0.74	0.67	35.5
North: Savemart											
7	L2	37	3.0	0.227	16.2	LOS C	1.5	37.3	0.83	0.85	35.0
4	T1	39	3.0	0.227	9.0	LOS A	1.5	37.3	0.83	0.85	34.6
14	R2	49	3.0	0.227	9.4	LOS A	1.5	37.3	0.83	0.85	33.4
Approach		125	3.0	0.227	11.3	LOS B	1.5	37.3	0.83	0.85	34.2
West: SR 89											
5	L2	67	5.0	0.678	16.0	LOS C	7.8	202.5	0.84	0.83	35.8
2	T1	447	5.0	0.678	8.8	LOS A	7.8	202.5	0.84	0.83	35.5
12	R2	78	5.0	0.678	9.2	LOS A	7.8	202.5	0.84	0.83	34.1
Approach		592	5.0	0.678	9.7	LOS A	7.8	202.5	0.84	0.83	35.3
All Vehicles		1676	4.5	0.684	9.4	LOS A	7.8	202.5	0.79	0.77	35.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.1

2038 Average Annual PM - Old Wye Roundabout Env =1.1
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: SR 89											
3	L2	89	3.0	0.349	14.0	LOS B	2.4	62.1	0.78	0.79	36.0
8	T1	32	3.0	0.349	6.9	LOS A	2.4	62.1	0.78	0.79	35.6
18	R2	154	3.0	0.349	7.2	LOS A	2.4	62.1	0.78	0.79	34.3
Approach		275	3.0	0.349	9.4	LOS A	2.4	62.1	0.78	0.79	34.9
East: SR 28											
1	L2	214	5.0	0.614	12.1	LOS B	5.6	145.8	0.65	0.57	36.2
6	T1	445	5.0	0.614	5.1	LOS A	5.6	145.8	0.65	0.57	35.9
16	R2	25	5.0	0.614	5.3	LOS A	5.6	145.8	0.65	0.57	34.6
Approach		684	5.0	0.614	7.3	LOS A	5.6	145.8	0.65	0.57	35.9
North: Savemart											
7	L2	37	3.0	0.192	15.4	LOS C	1.3	32.4	0.81	0.80	35.4
4	T1	39	3.0	0.192	8.1	LOS A	1.3	32.4	0.81	0.80	35.0
14	R2	49	3.0	0.192	8.6	LOS A	1.3	32.4	0.81	0.80	33.8
Approach		125	3.0	0.192	10.5	LOS B	1.3	32.4	0.81	0.80	34.6
West: SR 89											
5	L2	67	5.0	0.600	13.8	LOS B	5.7	148.9	0.76	0.72	36.4
2	T1	447	5.0	0.600	6.6	LOS A	5.7	148.9	0.76	0.72	36.0
12	R2	78	5.0	0.600	7.0	LOS A	5.7	148.9	0.76	0.72	34.6
Approach		592	5.0	0.600	7.5	LOS A	5.7	148.9	0.76	0.72	35.9
All Vehicles		1676	4.5	0.614	7.9	LOS A	5.7	148.9	0.72	0.68	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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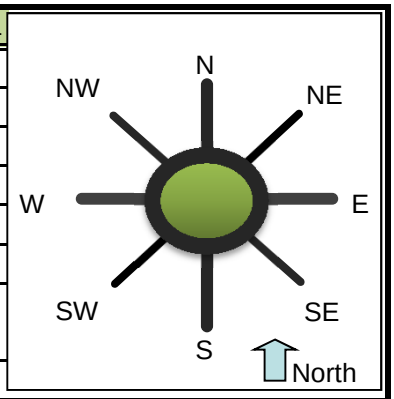
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	West Roundabout w/ EBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph					183		385	
	SE (4), vph								
	S (5), vph			202					
	SW (6), vph								
	W (7), vph			310		244			
	NW (8), vph								
Output	Total Vehicles	0	0	512	0	427	0	385	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	213	0	448	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	231	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	354	0	284	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	584	0	497	0	448	0
Conflicting flow, pcu/h	0	0	284	0	448	0	231	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	810	NA	675	NA	839	NA
Entry Flow Rates, vph	NA	NA	557	NA	464	NA	418	NA
V/C ratio			**0.69**		**0.69**		**0.50**	
Control Delay, s/veh			**17**		**20**		**11**	
LOS			C		C		B	
95th % Queue (ft)			**147**		**146**		**76**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	984	NA	817	NA	1019	NA
Entry Flow Rates, vph	NA	NA	557	NA	464	NA	418	NA
V/C ratio			**0.59**		**0.61**		**0.44**	
Control Delay, sec/pcu			**12**		**14**		**8**	
LOS			B		B		A	
95th % Queue (ft)			**107**		**113**		**61**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**					
Select Exit Leg for Bypass (TO)	**S (5)**					
Does the bypass have a dedicated receiving lane?	**No**					
Volumes						
Right Turn Volume removed from Entry Leg	**375**					
Volume Characteristics (for entry leg)						
PHF	0.92					
F_{HV}	0.93					
F_{ped}	1.00					
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	436					
Conflicting Flow, pcu/hr	231					
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	839					
Flow Rates of Exiting Traffic, vph	408					
V/C ratio	**0.49**					
Control Delay, s/veh	**10.7**					
LOS	B					
95th % Queue (ft)	**72**					
Approach w/Bypass Delay, s/veh	***10.9***					
Approach w/Bypass LOS	*B*					

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 AA

2038_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	265	7.0	0.660	12.6	LOS B	6.8	178.5	0.88	1.02	23.5
18x	R2	199	7.0	0.660	8.9	LOS A	6.8	178.5	0.88	1.02	22.6
Approach		464	7.0	0.660	11.1	LOS B	6.8	178.5	0.88	1.02	23.1
NorthEast: New SR 28											
1x	L2	220	5.0	0.669	10.4	LOS B	7.4	191.5	0.84	0.82	24.8
16ax	R1	337	5.0	0.669	5.2	LOS A	7.4	191.5	0.84	0.82	23.2
Approach		557	5.0	0.669	7.2	LOS A	7.4	191.5	0.84	0.82	23.8
West: SR 89											
5a	L1	418	7.0	0.391	6.1	LOS A	3.0	80.0	0.59	0.60	24.4
12a	R1	408	7.0	0.381	1.7	LOS A	2.9	77.2	0.59	0.29	24.1
Approach		826	7.0	0.391	3.9	LOS A	3.0	80.0	0.59	0.45	24.3
All Vehicles		1847	6.4	0.669	6.7	LOS A	7.4	191.5	0.74	0.70	23.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 AA

2038_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	265	7.0	0.578	10.0	LOS A	5.2	137.2	0.81	0.88	24.1
18x	R2	199	7.0	0.578	6.3	LOS A	5.2	137.2	0.81	0.88	23.2
Approach		464	7.0	0.578	8.4	LOS A	5.2	137.2	0.81	0.88	23.7
NorthEast: New SR 28											
1x	L2	220	5.0	0.593	8.4	LOS A	5.5	144.1	0.76	0.67	25.2
16ax	R1	337	5.0	0.593	3.2	LOS A	5.5	144.1	0.76	0.67	23.5
Approach		557	5.0	0.593	5.3	LOS A	5.5	144.1	0.76	0.67	24.1
West: SR 89											
5a	L1	418	7.0	0.349	5.8	LOS A	2.6	69.6	0.55	0.57	24.5
12a	R1	408	7.0	0.340	1.4	LOS A	2.5	67.3	0.54	0.24	24.2
Approach		826	7.0	0.349	3.6	LOS A	2.6	69.6	0.55	0.41	24.3
All Vehicles		1847	6.4	0.593	5.3	LOS A	5.5	144.1	0.68	0.61	24.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	44	48	59	108	39	187	82	540	95	260	538	30
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.90	1.00		1.00	1.00		1.00	1.00		0.98
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	1845	1900	1810	1810	1810	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	48	52	64	117	42	0	89	587	0	283	585	33
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	5	5	5	5	5	5	5	5	5
Cap, veh/h	87	94	116	299	314	267	113	750	336	299	1121	490
Arrive On Green	0.18	0.18	0.18	0.17	0.17	0.00	0.07	0.22	0.00	0.17	0.33	0.33
Sat Flow, veh/h	476	516	635	1723	1810	1538	1723	3438	1538	1723	3438	1503
Grp Volume(v), veh/h	164	0	0	117	42	0	89	587	0	283	585	33
Grp Sat Flow(s),veh/h/ln	1627	0	0	1723	1810	1538	1723	1719	1538	1723	1719	1503
Q Serve(g_s), s	5.8	0.0	0.0	3.8	1.2	0.0	3.2	10.2	0.0	10.3	8.8	1.0
Cycle Q Clear(g_c), s	5.8	0.0	0.0	3.8	1.2	0.0	3.2	10.2	0.0	10.3	8.8	1.0
Prop In Lane	0.29		0.39	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	296	0	0	299	314	267	113	750	336	299	1121	490
V/C Ratio(X)	0.55	0.00	0.00	0.39	0.13	0.00	0.79	0.78	0.00	0.95	0.52	0.07
Avail Cap(c_a), veh/h	411	0	0	435	457	389	218	869	389	299	1121	490
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.6	0.0	0.0	23.2	22.2	0.0	29.1	23.3	0.0	25.9	17.3	14.7
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.8	0.2	0.0	11.2	4.1	0.0	37.6	0.4	0.1
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(-26165%),veh/ln	2.7	0.0	0.0	1.9	0.6	0.0	1.9	5.2	0.0	8.0	4.2	0.4
LnGrp Delay(d),s/veh	25.2	0.0	0.0	24.0	22.3	0.0	40.4	27.4	0.0	63.5	17.8	14.8
LnGrp LOS	C			C	C		D	C		E	B	B
Approach Vol, veh/h		164			159			676			901	
Approach Delay, s/veh		25.2			23.6			29.1			32.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		15.0	15.0	17.8		15.5	8.2	24.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	11.0	16.0		16.0	8.0	19.0
Max Q Clear Time (g_c+I1), s		5.8	12.3	12.2		7.8	5.2	10.8
Green Ext Time (p_c), s		0.3	0.0	1.3		0.5	0.0	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	29.7
HCM 2010 LOS	C

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	0	0	696	0	0	712
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	0	757	0	0	774

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1531	757	0	0	757	0
Stage 1	757	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	128	406	-	-	849	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	128	406	-	-	849	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	-	849	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	78	31	6	297	304	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	85	34	7	323	330	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	666	330	330	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	336	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	391	662	1213	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	389	662	1213	-	-	-
Mov Cap-2 Maneuver	389	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1213	-	441	-	-
HCM Lane V/C Ratio	0.005	-	0.269	-	-
HCM Control Delay (s)	8	-	16.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	1.1	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	12	367	3	15	331
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	4	13	399	3	16	360

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	793	401	0	0	402	0
Stage 1	401	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.15	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.245	-
Pot Cap-1 Maneuver	356	647	-	-	1141	-
Stage 1	674	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	351	647	-	-	1141	-
Mov Cap-2 Maneuver	351	-	-	-	-	-
Stage 1	674	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	534	1141	-
HCM Lane V/C Ratio	-	-	0.033	0.014	-
HCM Control Delay (s)	-	-	12	8.2	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	162.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	35	875	116
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	38	951	126

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1732	951	1762	1730	653	951	0	0	655	0	0
Stage 1	1027	1027	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1059	1027	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 68	87	314	65	88	466	702	-	-	909	-	0
Stage 1	282	310	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	270	310	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 57	75	314	45	76	466	702	-	-	909	-	-
Mov Cap-2 Maneuver	~ 57	75	-	45	76	-	-	-	-	-	-	-
Stage 1	266	282	-	403	413	-	-	-	-	-	-	-
Stage 2	380	413	-	196	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1257.1	40.9	0.4	0.4
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	702	-	-	71	127	909	-
HCM Lane V/C Ratio	0.036	-	-	3.521	0.214	0.042	-
HCM Control Delay (s)	10.3	0		$ 1257.1	40.9	9.1	0
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	26	0.8	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	1000	728	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	1087	791	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	791	0	-	0	1878	791
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	1087	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	808	-	-	-	76	382
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	808	-	-	-	76	382
Mov Cap-2 Maneuver	-	-	-	-	76	-
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	316	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	808	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	683	644	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	38	33	71	742	700	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1617	733	766	0	-	0
Stage 1	733	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	113	419	834	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	103	419	834	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	368	-	-	-	-	-

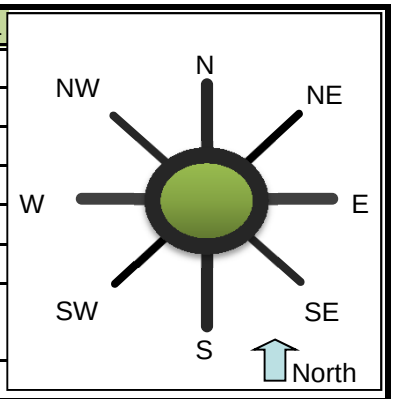
Approach	SB	NE	SW
HCM Control Delay, s	21	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	834	-	295	-	-
HCM Lane V/C Ratio	0.085	-	0.239	-	-
HCM Control Delay (s)	9.7	-	21	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 East Roundabout



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					271		27	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	287						734	
	SW (6), vph								
	W (7), vph	45				516			
	NW (8), vph								
Output	Total Vehicles	332	0	0	0	787	0	761	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	315	0	31	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	328	0	0	0	0	0	854	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	51	0	0	0	600	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	379	0	0	0	915	0	885	0
Conflicting flow, pcu/h	600	0	0	0	31	0	328	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	591	NA	NA	NA	1023	NA	761	NA
Entry Flow Rates, vph	361	NA	NA	NA	855	NA	827	NA
V/C ratio	**0.61**				**0.84**		**1.09**	
Control Delay, s/veh	**18**				**23**		**81**	
LOS	C				C		F	
95th % Queue (ft)	**108**				**275**		**594**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	713	NA	NA	NA	1249	NA	923	NA
Entry Flow Rates, vph	361	NA	NA	NA	855	NA	827	NA
V/C ratio	**0.53**				**0.73**		**0.96**	
Control Delay, sec/pcu	**13**				**14**		**41**	
LOS	B				B		E	
95th % Queue (ft)	**83**				**188**		**427**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.2

East_Roundabout_2038_Summer_EF = 1.2
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: SR 89											
3	L2	561	7.0	0.779	10.8	LOS B	15.1	399.3	0.54	0.48	35.0
8	T1	295	7.0	0.779	4.0	LOS A	15.1	399.3	0.54	0.48	35.0
Approach		855	7.0	0.779	8.4	LOS A	15.1	399.3	0.54	0.48	35.0
North: Old SR 89											
4	T1	312	3.0	0.566	11.4	LOS B	4.9	124.7	0.87	0.98	34.1
14	R2	49	3.0	0.566	11.8	LOS B	4.9	124.7	0.87	0.98	33.0
Approach		361	3.0	0.566	11.4	LOS B	4.9	124.7	0.87	0.98	34.0
West: New SR 89											
5	L2	29	7.0	1.059	61.9	LOS F	43.6	1150.2	1.00	1.81	20.3
12	R2	798	7.0	1.059	55.5	LOS F	43.6	1150.2	1.00	1.81	19.9
Approach		827	7.0	1.059	55.7	LOS F	43.6	1150.2	1.00	1.81	19.9
All Vehicles		2043	6.3	1.059	28.1	LOS D	43.6	1150.2	0.78	1.11	26.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.1

East_Roundabout_2038_Summer_EF = 1.1
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: SR 89											
3	L2	561	7.0	0.713	10.6	LOS B	11.4	300.4	0.43	0.50	35.3
8	T1	295	7.0	0.713	3.7	LOS A	11.4	300.4	0.43	0.50	35.2
Approach		855	7.0	0.713	8.2	LOS A	11.4	300.4	0.43	0.50	35.2
North: Old SR 89											
4	T1	312	3.0	0.485	8.9	LOS A	3.7	95.8	0.81	0.86	35.5
14	R2	49	3.0	0.485	9.4	LOS A	3.7	95.8	0.81	0.86	34.3
Approach		361	3.0	0.485	9.0	LOS A	3.7	95.8	0.81	0.86	35.3
West: New SR 89											
5	L2	29	7.0	0.935	29.4	LOS D	24.6	649.3	1.00	1.24	28.8
12	R2	798	7.0	0.935	23.1	LOS C	24.6	649.3	1.00	1.24	28.0
Approach		827	7.0	0.935	23.3	LOS C	24.6	649.3	1.00	1.24	28.0
All Vehicles		2043	6.3	0.935	14.4	LOS B	24.6	649.3	0.73	0.86	32.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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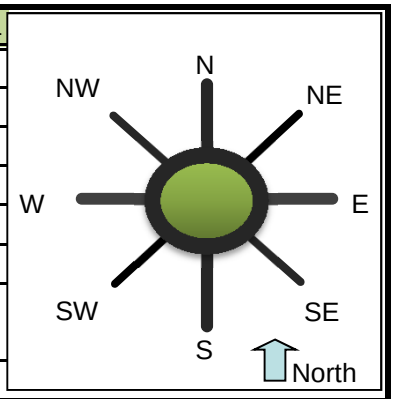
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph			30		39		82	
Exit	NE (2), vph								
Legs	E (3), vph	44				187		540	
(TO)	SE (4), vph								
	S (5), vph	48		260				95	
	SW (6), vph								
	W (7), vph	59		538		108			
	NW (8), vph								
Output	Total Vehicles	151	0	828	0	334	0	717	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	1.000	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	34	0	45	0	94	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	49	0	0	0	213	0	616	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	54	0	297	0	0	0	108	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	66	0	614	0	123	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	169	0	945	0	381	0	818	0
Conflicting flow, pcu/h	1034	0	261	0	759	0	400	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	390	NA	827	NA	499	NA	719	NA
Entry Flow Rates, vph	164	NA	900	NA	363	NA	779	NA
V/C ratio	**0.42**		**1.09**		**0.73**		**1.08**	
Control Delay, s/veh	**18**		**79**		**28**		**82**	
LOS	C		F		D		F	
95th % Queue (ft)	**52**		**617**		**156**		**558**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	467	NA	1005	NA	600	NA	871	NA
Entry Flow Rates, vph	164	NA	900	NA	363	NA	779	NA
V/C ratio	**0.36**		**0.94**		**0.64**		**0.94**	
Control Delay, sec/pcu	**14**		**36**		**19**		**39**	
LOS	B		E		C		E	
95th % Queue (ft)	**42**		**406**		**118**		**381**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2038 Summer EF = 1.2

Old Wye 2038 Summer EF = 1.2
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: SR 89											
3	L2	117	3.0	0.700	24.6	LOS C	7.6	194.8	1.00	1.16	30.9
8	T1	42	3.0	0.700	17.5	LOS C	7.6	194.8	1.00	1.16	30.7
18	R2	203	3.0	0.700	17.7	LOS C	7.6	194.8	1.00	1.16	29.7
Approach		363	3.0	0.700	19.9	LOS C	7.6	194.8	1.00	1.16	30.2
East: SR 28											
1	L2	283	5.0	0.963	30.9	LOS D	29.2	760.0	1.00	1.22	28.6
6	T1	585	5.0	0.963	23.8	LOS C	29.2	760.0	1.00	1.22	28.5
16	R2	33	5.0	0.963	24.1	LOS C	29.2	760.0	1.00	1.22	27.6
Approach		900	5.0	0.963	26.0	LOS D	29.2	760.0	1.00	1.22	28.5
North: Savemart											
7	L2	48	3.0	0.478	24.6	LOS C	3.9	99.1	1.00	1.07	31.0
4	T1	52	3.0	0.478	17.3	LOS C	3.9	99.1	1.00	1.07	30.8
14	R2	64	3.0	0.478	17.8	LOS C	3.9	99.1	1.00	1.07	29.8
Approach		164	3.0	0.478	19.6	LOS C	3.9	99.1	1.00	1.07	30.5
West: SR 89											
5	L2	89	5.0	1.003	47.3	LOS F	32.6	846.5	1.00	1.63	24.1
2	T1	587	5.0	1.003	40.1	LOS F	32.6	846.5	1.00	1.63	23.9
12	R2	103	5.0	1.003	40.5	LOS F	32.6	846.5	1.00	1.63	23.3
Approach		779	5.0	1.003	40.9	LOS E	32.6	846.5	1.00	1.63	23.9
All Vehicles		2207	4.5	1.003	29.8	LOS D	32.6	846.5	1.00	1.34	27.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2038 Summer EF = 1.1

Old Wye 2038 Summer EF = 1.1
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: SR 89											
3	L2	117	3.0	0.610	20.2	LOS C	6.2	158.2	1.00	1.09	32.9
8	T1	42	3.0	0.610	13.1	LOS B	6.2	158.2	1.00	1.09	32.6
18	R2	203	3.0	0.610	13.4	LOS B	6.2	158.2	1.00	1.09	31.5
Approach		363	3.0	0.610	15.5	LOS C	6.2	158.2	1.00	1.09	32.0
East: SR 28											
1	L2	283	5.0	0.862	18.8	LOS C	16.9	439.8	1.00	0.94	33.6
6	T1	585	5.0	0.862	11.8	LOS B	16.9	439.8	1.00	0.94	33.4
16	R2	33	5.0	0.862	12.1	LOS B	16.9	439.8	1.00	0.94	32.2
Approach		900	5.0	0.862	14.0	LOS B	16.9	439.8	1.00	0.94	33.4
North: Savemart											
7	L2	48	3.0	0.410	20.7	LOS C	3.3	85.1	1.00	1.02	32.7
4	T1	52	3.0	0.410	13.5	LOS B	3.3	85.1	1.00	1.02	32.4
14	R2	64	3.0	0.410	13.9	LOS B	3.3	85.1	1.00	1.02	31.4
Approach		164	3.0	0.410	15.8	LOS C	3.3	85.1	1.00	1.02	32.1
West: SR 89											
5	L2	89	5.0	0.886	25.7	LOS D	18.7	485.7	1.00	1.20	31.1
2	T1	587	5.0	0.886	18.5	LOS C	18.7	485.7	1.00	1.20	30.9
12	R2	103	5.0	0.886	18.9	LOS C	18.7	485.7	1.00	1.20	29.8
Approach		779	5.0	0.886	19.3	LOS C	18.7	485.7	1.00	1.20	30.7
All Vehicles		2207	4.5	0.886	16.3	LOS C	18.7	485.7	1.00	1.06	32.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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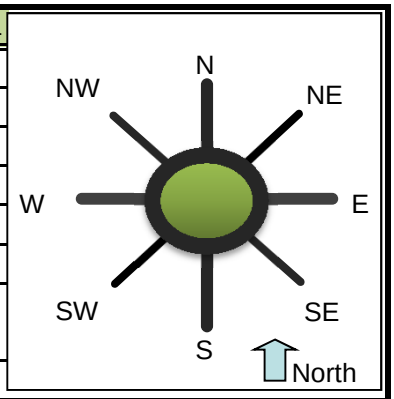
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 West Roundabout w/ EBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph					241		506	
	SE (4), vph								
	S (5), vph			266					
	SW (6), vph								
	W (7), vph			408		320			
	NW (8), vph								
Output	Total Vehicles	0	0	674	0	561	0	506	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	280	0	589	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	304	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	466	0	372	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	769	0	652	0	589	0
Conflicting flow, pcu/h	0	0	372	0	589	0	304	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	742	NA	586	NA	780	NA
Entry Flow Rates, vph	NA	NA	733	NA	610	NA	550	NA
V/C ratio			**0.99**		**1.04**		**0.71**	
Control Delay, s/veh			**54**		**75**		**18**	
LOS			F		F		C	
95th % Queue (ft)			**420**		**446**		**159**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	899	NA	708	NA	946	NA
Entry Flow Rates, vph	NA	NA	733	NA	610	NA	550	NA
V/C ratio			**0.86**		**0.92**		**0.62**	
Control Delay, sec/pcu			**27**		**41**		**13**	
LOS			D		E		B	
95th % Queue (ft)			**281**		**336**		**120**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**					
Select Exit Leg for Bypass (TO)	**S (5)**					
Does the bypass have a dedicated receiving lane?	**No**					
Volumes						
Right Turn Volume removed from Entry Leg	**494**					
Volume Characteristics (for entry leg)						
PHF	0.92					
F_{HV}	0.93					
F_{ped}	1.00					
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	575					
Conflicting Flow, pcu/hr	304					
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	780					
Flow Rates of Exiting Traffic, vph	537					
V/C ratio	**0.69**					
Control Delay, s/veh	**17.6**					
LOS	C					
95th % Queue (ft)	**150**					
Approach w/Bypass Delay, s/veh	***18.0***					
Approach w/Bypass LOS	*C*					

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 Summer

2038_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	348	7.0	1.045	60.6	LOS F	31.1	822.0	1.00	2.33	15.7
18x	R2	262	7.0	1.045	56.9	LOS F	31.1	822.0	1.00	2.33	15.3
Approach		610	7.0	1.045	59.1	LOS F	31.1	822.0	1.00	2.33	15.5
NorthEast: New SR 28											
1x	L2	289	5.0	0.964	31.2	LOS D	25.7	667.8	1.00	1.62	20.2
16ax	R1	443	5.0	0.964	26.0	LOS D	25.7	667.8	1.00	1.62	19.1
Approach		733	5.0	0.964	28.1	LOS D	25.7	667.8	1.00	1.62	19.6
West: SR 89											
5a	L1	550	7.0	0.559	7.2	LOS A	5.2	136.5	0.78	0.72	24.2
12a	R1	537	7.0	0.546	2.6	LOS A	4.9	129.4	0.77	0.46	23.8
Approach		1087	7.0	0.559	4.9	LOS A	5.2	136.5	0.77	0.59	24.0
All Vehicles		2429	6.4	1.045	25.5	LOS D	31.1	822.0	0.90	1.34	19.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 Summer

2038_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	348	7.0	0.903	27.7	LOS D	17.3	457.3	1.00	1.61	20.3
18x	R2	262	7.0	0.903	24.0	LOS C	17.3	457.3	1.00	1.61	19.7
Approach		610	7.0	0.903	26.1	LOS D	17.3	457.3	1.00	1.61	20.0
NorthEast: New SR 28											
1x	L2	289	5.0	0.870	18.3	LOS C	16.5	429.6	1.00	1.25	22.8
16ax	R1	443	5.0	0.870	13.1	LOS B	16.5	429.6	1.00	1.25	21.5
Approach		733	5.0	0.870	15.2	LOS C	16.5	429.6	1.00	1.25	22.0
West: SR 89											
5a	L1	550	7.0	0.499	6.5	LOS A	4.4	116.4	0.72	0.67	24.2
12a	R1	537	7.0	0.487	2.1	LOS A	4.3	112.5	0.72	0.36	23.9
Approach		1087	7.0	0.499	4.3	LOS A	4.4	116.4	0.72	0.52	24.1
All Vehicles		2429	6.4	0.903	13.1	LOS B	17.3	457.3	0.87	1.01	22.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Design Year (2038) Operations: Alternative 2

Average Annual Peak Hour Analysis Results

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	3.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	32	0	30	6	0	16	24	657	10	14	537	18
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	35	0	33	7	0	17	26	714	11	15	584	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1554	1551	743	1562	1556	870	678	0	0	800	0	0
Stage 1	699	699	-	847	847	-	-	-	-	-	-	-
Stage 2	855	852	-	715	709	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	92	113	413	90	112	349	900	-	-	810	-	-
Stage 1	429	440	-	355	377	-	-	-	-	-	-	-
Stage 2	351	375	-	420	436	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	73	94	363	69	94	307	844	-	-	759	-	-
Mov Cap-2 Maneuver	73	94	-	69	94	-	-	-	-	-	-	-
Stage 1	390	404	-	323	343	-	-	-	-	-	-	-
Stage 2	301	341	-	351	401	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	68.9	31.8	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	844	-	-	158	119	759	-	-
HCM Lane V/C Ratio	0.031	-	-	0.151	0.566	0.02	-	-
HCM Control Delay (s)	9.4	-	-	31.8	68.9	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	2.7	0.1	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	1.7

Movement	SEL	SER	NEL	NET	SWT	SWR
Vol, veh/h	34	45	103	568	611	18
Conflicting Peds, #/hr	60	0	0	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	348	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	37	49	112	617	664	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1257	392	724	0	-	0
Stage 1	724	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.2	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.25	-	-	-
Pot Cap-1 Maneuver	162	604	855	-	-	-
Stage 1	438	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	127	574	855	-	-	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	416	-	-	-	-	-
Stage 2	454	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	17.5	1.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	855	-	374	-	-
HCM Lane V/C Ratio	0.131	-	0.23	-	-
HCM Control Delay (s)	9.8	-	17.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.5	-	0.9	-	-

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	83	30	32	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	0	90	33	35	25	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	125	25	25	0	-	0
Stage 1	25	-	-	-	-	-
Stage 2	100	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	818	989	1570	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	870	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	801	989	1570	-	-	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	941	-	-	-	-	-
Stage 2	852	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	3.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1570	-	989	-	-
HCM Lane V/C Ratio	0.021	-	0.091	-	-
HCM Control Delay (s)	7.3	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	31.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	130	3	43	4	2	13	18	455	3	27	665	88
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	141	3	47	4	2	14	20	495	3	29	723	96

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1325	1319	723	1342	1317	496	723	0	0	498	0	0
Stage 1	782	782	-	535	535	-	-	-	-	-	-	-
Stage 2	543	537	-	807	782	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 132	156	425	129	157	572	857	-	-	1041	-	0
Stage 1	386	403	-	527	522	-	-	-	-	-	-	0
Stage 2	522	521	-	374	403	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 120	144	425	106	145	572	857	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 120	144	-	106	145	-	-	-	-	-	-	-
Stage 1	374	384	-	510	505	-	-	-	-	-	-	-
Stage 2	491	504	-	315	384	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	238.8	20.3	0.4	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	857	-	-	146	256	1041	-
HCM Lane V/C Ratio	0.023	-	-	1.31	0.081	0.028	-
HCM Control Delay (s)	9.3	0	-	238.8	20.3	8.6	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	11.8	0.3	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	27	23	50	641	621	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	29	25	54	697	675	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1505	700	725	0	-	0
Stage 1	700	-	-	-	-	-
Stage 2	805	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	133	438	864	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	125	438	864	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	411	-	-	-	-	-

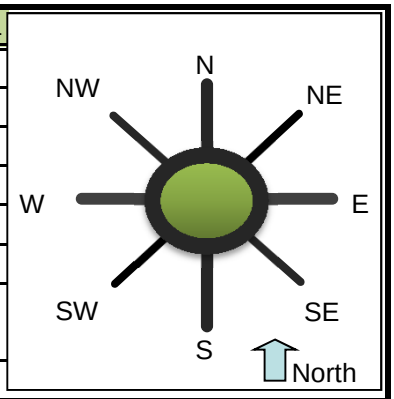
Approach	SB	NE	SW
HCM Control Delay, s	18.5	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	864	-	321	-	-
HCM Lane V/C Ratio	0.063	-	0.169	-	-
HCM Control Delay (s)	9.4	-	18.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 2 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					7		55	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	27						753	
	SW (6), vph								
	W (7), vph	79				591			
	NW (8), vph								
Output	Total Vehicles	106	0	0	0	598	0	808	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	8	0	64	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	31	0	0	0	0	0	876	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	90	0	0	0	687	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	121	0	0	0	696	0	940	0
Conflicting flow, pcu/h	687	0	0	0	64	0	31	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	541	NA	NA	NA	991	NA	1024	NA
Entry Flow Rates, vph	115	NA	NA	NA	650	NA	878	NA
V/C ratio	**0.21**				**0.66**		**0.86**	
Control Delay, s/veh	**10**				**14**		**25**	
LOS	A				B		C	
95th % Queue (ft)	**21**				**137**		**299**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	652	NA	NA	NA	1208	NA	1250	NA
Entry Flow Rates, vph	115	NA	NA	NA	650	NA	878	NA
V/C ratio	**0.19**				**0.58**		**0.75**	
Control Delay, sec/pcu	**8**				**10**		**15**	
LOS	A				A		B	
95th % Queue (ft)	**18**				**103**		**203**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.2

East_Roundabout_2038_AA_EF = 1.2
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: SR 89											
3	L2	642	7.0	0.615	11.0	LOS B	6.5	172.2	0.46	0.59	34.0
8	T1	8	7.0	0.615	4.2	LOS A	6.5	172.2	0.46	0.59	33.9
Approach		650	7.0	0.615	10.9	LOS B	6.5	172.2	0.46	0.59	34.0
North: Old SR 89											
4	T1	29	3.0	0.195	8.5	LOS A	1.1	29.0	0.74	0.78	35.4
14	R2	86	3.0	0.195	9.0	LOS A	1.1	29.0	0.74	0.78	34.2
Approach		115	3.0	0.195	8.9	LOS A	1.1	29.0	0.74	0.78	34.5
West: New SR 89											
5	L2	60	7.0	0.785	10.9	LOS B	15.6	411.3	0.55	0.42	36.9
12	R2	818	7.0	0.785	4.5	LOS A	15.6	411.3	0.55	0.42	35.5
Approach		878	7.0	0.785	4.9	LOS A	15.6	411.3	0.55	0.42	35.5
All Vehicles		1643	6.7	0.785	7.6	LOS A	15.6	411.3	0.53	0.51	34.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.1

East_Roundabout_2038_AA_EF = 1.1
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: SR 89											
3	L2	642	7.0	0.558	10.7	LOS B	5.3	138.8	0.39	0.59	34.2
8	T1	8	7.0	0.558	3.9	LOS A	5.3	138.8	0.39	0.59	34.1
Approach		650	7.0	0.558	10.7	LOS B	5.3	138.8	0.39	0.59	34.2
North: Old SR 89											
4	T1	29	3.0	0.166	7.7	LOS A	1.0	25.3	0.72	0.74	35.9
14	R2	86	3.0	0.166	8.2	LOS A	1.0	25.3	0.72	0.74	34.6
Approach		115	3.0	0.166	8.1	LOS A	1.0	25.3	0.72	0.74	35.0
West: New SR 89											
5	L2	60	7.0	0.717	10.6	LOS B	11.5	304.0	0.42	0.42	37.2
12	R2	818	7.0	0.717	4.2	LOS A	11.5	304.0	0.42	0.42	35.8
Approach		878	7.0	0.717	4.7	LOS A	11.5	304.0	0.42	0.42	35.9
All Vehicles		1643	6.7	0.717	7.3	LOS A	11.5	304.0	0.43	0.51	35.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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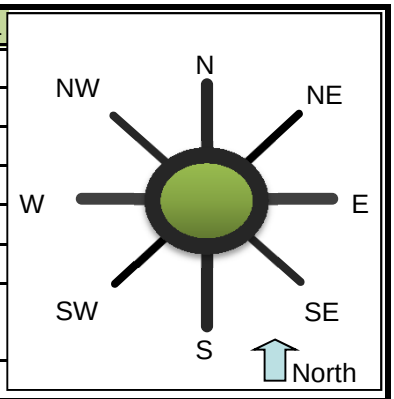
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							286	
	SE (4), vph								
	S (5), vph			332					
	SW (6), vph								
	W (7), vph			312		266			
	NW (8), vph								
Output	Total Vehicles	0	0	644	0	266	0	286	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	333	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	379	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	356	0	309	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	735	0	309	0	333	0
Conflicting flow, pcu/h	0	0	309	0	333	0	379	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	790	NA	757	NA	723	NA
Entry Flow Rates, vph	NA	NA	700	NA	289	NA	311	NA
V/C ratio			**0.89**		**0.38**		**0.43**	
Control Delay, s/veh			**33**		**10**		**11**	
LOS			D		A		B	
95th % Queue (ft)			**303**		**48**		**58**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	959	NA	919	NA	876	NA
Entry Flow Rates, vph	NA	NA	700	NA	289	NA	311	NA
V/C ratio			**0.77**		**0.34**		**0.38**	
Control Delay, sec/pcu			**19**		**8**		**8**	
LOS			C		A		A	
95th % Queue (ft)			**203**		**40**		**48**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**475**	**404**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	552	470				
Conflicting Flow, pcu/hr	379	333				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	876	919				
Flow Rates of Exiting Traffic, vph	516	439				
V/C ratio	**0.59**	**0.51**				
Control Delay, s/veh	**12.8**	**10.5**				
LOS	B	B				
95th % Queue (ft)	**106**	**80**				
Approach w/Bypass Delay, s/veh	***12.0***	***10.1***				
Approach w/Bypass LOS	*B*	*B*				

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 AA

2038_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	289	7.0	0.296	6.5	LOS A	1.9	51.3	0.60	0.64	24.4
18x	R2	439	7.0	0.450	3.1	LOS A	3.3	88.3	0.67	0.58	24.4
Approach		728	7.0	0.450	4.4	LOS A	3.3	88.3	0.64	0.60	24.4
NorthEast: New SR 28											
1x	L2	361	5.0	0.846	16.8	LOS C	14.8	384.8	1.00	1.16	23.1
16ax	R1	339	5.0	0.846	11.6	LOS B	14.8	384.8	1.00	1.16	21.7
Approach		700	5.0	0.846	14.3	LOS B	14.8	384.8	1.00	1.16	22.4
West: SR 89											
5a	L1	311	7.0	0.341	7.0	LOS A	2.5	66.8	0.70	0.69	24.3
12a	R1	516	7.0	0.567	3.9	LOS A	5.5	143.9	0.83	0.73	23.8
Approach		827	7.0	0.567	5.1	LOS A	5.5	143.9	0.78	0.71	23.9
All Vehicles		2255	6.4	0.846	7.7	LOS A	14.8	384.8	0.81	0.82	23.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 AA

2038_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	289	7.0	0.263	6.1	LOS A	1.7	45.6	0.57	0.61	24.4
18x	R2	439	7.0	0.399	2.6	LOS A	2.9	77.1	0.63	0.51	24.4
Approach		728	7.0	0.399	4.0	LOS A	2.9	77.1	0.61	0.55	24.4
NorthEast: New SR 28											
1x	L2	361	5.0	0.750	11.8	LOS B	10.1	261.8	0.89	0.92	24.3
16ax	R1	339	5.0	0.750	6.6	LOS A	10.1	261.8	0.89	0.92	22.7
Approach		700	5.0	0.750	9.2	LOS A	10.1	261.8	0.89	0.92	23.5
West: SR 89											
5a	L1	311	7.0	0.299	6.6	LOS A	2.2	58.2	0.67	0.66	24.3
12a	R1	516	7.0	0.497	2.6	LOS A	4.2	112.0	0.77	0.45	23.8
Approach		827	7.0	0.497	4.1	LOS A	4.2	112.0	0.73	0.53	24.0
All Vehicles		2255	6.4	0.750	5.7	LOS A	10.1	261.8	0.74	0.66	24.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Summer Peak Hour Analysis Results

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	2.3

Movement	SEL	SER	NEL	NET	SWT	SWR
Vol, veh/h	44	59	136	747	804	24
Conflicting Peds, #/hr	60	0	0	0	0	15
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	0	-	348	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	48	64	148	812	874	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1636	497	934	0	-	0
Stage 1	934	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Critical Hdwy	6.86	6.96	4.2	-	-	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	2.25	-	-	-
Pot Cap-1 Maneuver	91	516	710	-	-	-
Stage 1	340	-	-	-	-	-
Stage 2	450	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	65	490	710	-	-	-
Mov Cap-2 Maneuver	180	-	-	-	-	-
Stage 1	323	-	-	-	-	-
Stage 2	338	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	25.9	1.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	710	-	282	-	-
HCM Lane V/C Ratio	0.208	-	0.397	-	-
HCM Control Delay (s)	11.4	-	25.9	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.8	-	1.8	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	109	40	42	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	5	5	5	5
Mvmt Flow	0	118	43	46	33	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	166	33	33	0	-	0
Stage 1	33	-	-	-	-	-
Stage 2	133	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.15	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.245	-	-	-
Pot Cap-1 Maneuver	774	978	1560	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	840	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	753	978	1560	-	-	-
Mov Cap-2 Maneuver	753	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	817	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	3.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1560	-	978	-	-
HCM Lane V/C Ratio	0.028	-	0.121	-	-
HCM Control Delay (s)	7.4	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	162.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	35	875	116
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	38	951	126

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1732	951	1762	1730	653	951	0	0	655	0	0
Stage 1	1027	1027	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1059	1027	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 68	87	314	65	88	466	702	-	-	909	-	0
Stage 1	282	310	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	270	310	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 57	75	314	45	76	466	702	-	-	909	-	-
Mov Cap-2 Maneuver	~ 57	75	-	45	76	-	-	-	-	-	-	-
Stage 1	266	282	-	403	413	-	-	-	-	-	-	-
Stage 2	380	413	-	196	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1257.1	40.9	0.4	0.4
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	702	-	-	71	127	909	-
HCM Lane V/C Ratio	0.036	-	-	3.521	0.214	0.042	-
HCM Control Delay (s)	10.3	0		$ 1257.1	40.9	9.1	0
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	26	0.8	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	1002	761	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	1089	827	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	827	0	-	0	1916	827
Stage 1	-	-	-	-	827	-
Stage 2	-	-	-	-	1089	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	783	-	-	-	72	364
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	783	-	-	-	72	364
Mov Cap-2 Maneuver	-	-	-	-	72	-
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	316	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	783	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	843	817	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	38	33	71	916	888	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1979	921	954	0	-	0
Stage 1	921	-	-	-	-	-
Stage 2	1058	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	67	326	708	-	-	-
Stage 1	386	-	-	-	-	-
Stage 2	332	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	60	326	708	-	-	-
Mov Cap-2 Maneuver	181	-	-	-	-	-
Stage 1	386	-	-	-	-	-
Stage 2	299	-	-	-	-	-

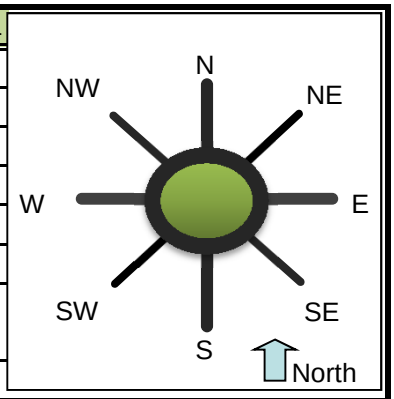
Approach	SB	NE	SW
HCM Control Delay, s	27.7	0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	708	-	228	-	-
HCM Lane V/C Ratio	0.1	-	0.31	-	-
HCM Control Delay (s)	10.6	-	27.7	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.3	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 2 East Roundabout



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					9		73	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	35						991	
	SW (6), vph								
	W (7), vph	104				778			
	NW (8), vph								
Output	Total Vehicles	139	0	0	0	787	0	1064	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	10	0	85	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	40	0	0	0	0	0	1153	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	119	0	0	0	905	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	159	0	0	0	915	0	1237	0
Conflicting flow, pcu/h	905	0	0	0	85	0	40	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	435	NA	NA	NA	970	NA	1015	NA
Entry Flow Rates, vph	151	NA	NA	NA	855	NA	1157	NA
V/C ratio	**0.35**				**0.88**		**1.14**	
Control Delay, s/veh	**14**				**28**		**93**	
LOS	B				D		F	
95th % Queue (ft)	**40**				**324**		**842**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	522	NA	NA	NA	1183	NA	1238	NA
Entry Flow Rates, vph	151	NA	NA	NA	855	NA	1157	NA
V/C ratio	**0.30**				**0.77**		**1.00**	
Control Delay, sec/pcu	**11**				**16**		**44**	
LOS	B				C		E	
95th % Queue (ft)	**33**				**220**		**575**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.2

East_Roundabout_2038_Summer_EF = 1.2
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: SR 89											
3	L2	846	7.0	0.836	12.1	LOS B	15.6	410.9	0.91	0.57	32.9
8	T1	10	7.0	0.836	5.3	LOS A	15.6	410.9	0.91	0.57	32.9
Approach		855	7.0	0.836	12.0	LOS B	15.6	410.9	0.91	0.57	32.9
North: Old SR 89											
4	T1	38	3.0	0.400	13.2	LOS B	2.9	73.8	0.95	1.00	33.0
14	R2	113	3.0	0.400	13.6	LOS B	2.9	73.8	0.95	1.00	32.0
Approach		151	3.0	0.400	13.5	LOS B	2.9	73.8	0.95	1.00	32.2
West: New SR 89											
5	L2	79	7.0	1.050	42.3	LOS F	108.0	2852.4	1.00	0.60	24.7
12	R2	1077	7.0	1.050	35.9	LOS F	108.0	2852.4	1.00	0.60	24.0
Approach		1157	7.0	1.050	36.4	LOS E	108.0	2852.4	1.00	0.60	24.1
All Vehicles		2163	6.7	1.050	25.1	LOS D	108.0	2852.4	0.96	0.61	27.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.1

East_Roundabout_2038_Summer_EF = 1.1
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: SR 89											
3	L2	846	7.0	0.763	11.5	LOS B	11.7	309.3	0.73	0.58	33.3
8	T1	10	7.0	0.763	4.7	LOS A	11.7	309.3	0.73	0.58	33.3
Approach		855	7.0	0.763	11.4	LOS B	11.7	309.3	0.73	0.58	33.3
North: Old SR 89											
4	T1	38	3.0	0.317	10.7	LOS B	2.2	56.8	0.92	0.93	34.3
14	R2	113	3.0	0.317	11.2	LOS B	2.2	56.8	0.92	0.93	33.1
Approach		151	3.0	0.317	11.1	LOS B	2.2	56.8	0.92	0.93	33.4
West: New SR 89											
5	L2	79	7.0	0.958	13.0	LOS B	49.3	1300.2	1.00	0.42	35.7
12	R2	1077	7.0	0.958	6.6	LOS A	49.3	1300.2	1.00	0.42	34.4
Approach		1157	7.0	0.958	7.1	LOS A	49.3	1300.2	1.00	0.42	34.5
All Vehicles		2163	6.7	0.958	9.1	LOS A	49.3	1300.2	0.89	0.52	33.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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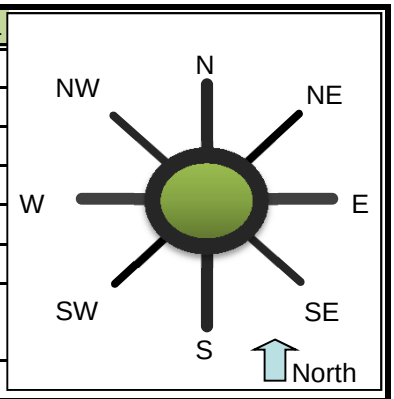
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							377	
	SE (4), vph								
	S (5), vph			436					
	SW (6), vph								
	W (7), vph			411		350			
	NW (8), vph								
Output	Total Vehicles	0	0	847	0	350	0	377	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	438	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	498	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	469	0	407	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	967	0	407	0	438	0
Conflicting flow, pcu/h	0	0	407	0	438	0	498	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	716	NA	681	NA	642	NA
Entry Flow Rates, vph	NA	NA	921	NA	380	NA	410	NA
V/C ratio			**1.29**		**0.56**		**0.64**	
Control Delay, s/veh			**158**		**15**		**18**	
LOS			F		B		C	
95th % Queue (ft)			**927**		**93**		**122**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	868	NA	825	NA	776	NA
Entry Flow Rates, vph	NA	NA	921	NA	380	NA	410	NA
V/C ratio			**1.11**		**0.49**		**0.56**	
Control Delay, sec/pcu			**87**		**11**		**13**	
LOS			F		B		B	
95th % Queue (ft)			**688**		**74**		**96**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**625**	**531**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	727	618				
Conflicting Flow, pcu/hr	498	438				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	776	825				
Flow Rates of Exiting Traffic, vph	679	577				
V/C ratio	**0.88**	**0.75**				
Control Delay, s/veh	**32.0**	**19.9**				
LOS	D	C				
95th % Queue (ft)	**295**	**188**				
Approach w/Bypass Delay, s/veh	***26.8***	***17.8***				
Approach w/Bypass LOS	*D*	*C*				

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 Summer

2038_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	380	7.0	0.434	7.5	LOS A	3.2	83.8	0.74	0.75	24.2
18x	R2	577	7.0	0.658	6.7	LOS A	7.2	190.3	0.88	0.91	23.6
Approach		958	7.0	0.658	7.0	LOS A	7.2	190.3	0.83	0.85	23.9
NorthEast: New SR 28											
1x	L2	474	5.0	1.248	132.3	LOS F	79.3	2062.4	1.00	3.89	10.7
16ax	R1	447	5.0	1.248	127.1	LOS F	79.3	2062.4	1.00	3.89	10.4
Approach		921	5.0	1.248	129.8	LOS F	79.3	2062.4	1.00	3.89	10.6
West: SR 89											
5a	L1	410	7.0	0.460	7.4	LOS A	3.7	97.5	0.78	0.75	24.2
12a	R1	679	7.0	0.763	8.3	LOS A	11.1	293.9	1.00	1.07	22.9
Approach		1089	7.0	0.763	7.9	LOS A	11.1	293.9	0.91	0.95	23.4
All Vehicles		2967	6.4	1.248	45.4	LOS E	79.3	2062.4	0.91	1.83	17.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 Summer

2038_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	380	7.0	0.384	7.0	LOS A	2.8	75.1	0.71	0.71	24.2
18x	R2	577	7.0	0.583	4.7	LOS A	5.7	149.3	0.83	0.78	24.1
Approach		958	7.0	0.583	5.6	LOS A	5.7	149.3	0.78	0.75	24.2
NorthEast: New SR 28											
1x	L2	474	5.0	1.099	69.8	LOS F	51.9	1349.5	1.00	2.73	15.1
16ax	R1	447	5.0	1.099	64.7	LOS F	51.9	1349.5	1.00	2.73	14.5
Approach		921	5.0	1.099	67.3	LOS F	51.9	1349.5	1.00	2.73	14.8
West: SR 89											
5a	L1	410	7.0	0.431	7.3	LOS A	3.5	93.1	0.79	0.74	24.1
12a	R1	679	7.0	0.714	6.7	LOS A	9.5	251.5	0.97	1.00	23.3
Approach		1089	7.0	0.714	6.9	LOS A	9.5	251.5	0.90	0.90	23.6
All Vehicles		2967	6.4	1.099	25.2	LOS D	51.9	1349.5	0.89	1.42	20.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Design Year (2038) Operations: Alternative 3

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	0	59	11	0	19	122	716	14	27	744	24
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.92		0.93	0.94		0.91	1.00		1.00	1.00		0.98
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	1845	1900	1900	1776	1776	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	37	0	64	12	0	21	133	778	0	29	809	26
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	7	7	7	5	5	5	5	5	5
Cap, veh/h	208	44	232	498	0	350	168	1478	0	47	1237	542
Arrive On Green	0.25	0.00	0.25	0.25	0.00	0.25	0.10	0.43	0.00	0.03	0.36	0.36
Sat Flow, veh/h	354	172	910	1276	0	1376	1723	3529	0	1723	3438	1506
Grp Volume(v), veh/h	101	0	0	12	0	21	133	778	0	29	809	26
Grp Sat Flow(s),veh/h/ln	1436	0	0	1276	0	1376	1723	1719	0	1723	1719	1506
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.5	3.1	6.9	0.0	0.7	8.2	0.5
Cycle Q Clear(g_c), s	2.1	0.0	0.0	0.2	0.0	0.5	3.1	6.9	0.0	0.7	8.2	0.5
Prop In Lane	0.37		0.63	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	484	0	0	498	0	350	168	1478	0	47	1237	542
V/C Ratio(X)	0.21	0.00	0.00	0.02	0.00	0.06	0.79	0.53	0.00	0.61	0.65	0.05
Avail Cap(c_a), veh/h	663	0	0	653	0	529	249	1487	0	166	1322	579
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	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	0.0	0.0	11.7	0.0	11.7	18.4	8.7	0.0	20.0	11.2	8.7
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.1	10.0	0.3	0.0	12.3	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.0	0.0	0.0	0.1	0.0	0.2	1.9	3.3	0.0	0.5	4.0	0.2
LnGrp Delay(d),s/veh	12.6	0.0	0.0	11.7	0.0	11.8	28.3	9.1	0.0	32.3	12.2	8.7
LnGrp LOS	B			B		B	C	A		C	B	A
Approach Vol, veh/h		101			33			911			864	
Approach Delay, s/veh		12.6			11.8			11.9			12.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.6	5.1	21.9		14.6	8.1	19.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.5	2.7	8.9		4.1	5.1	10.2
Green Ext Time (p_c), s		0.6	0.0	6.6		0.5	0.0	4.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	162.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	35	875	116
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	38	951	126

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1732	951	1762	1730	653	951	0	0	655	0	0
Stage 1	1027	1027	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1059	1027	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 68	87	314	65	88	466	702	-	-	909	-	0
Stage 1	282	310	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	270	310	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 57	75	314	45	76	466	702	-	-	909	-	-
Mov Cap-2 Maneuver	~ 57	75	-	45	76	-	-	-	-	-	-	-
Stage 1	266	282	-	403	413	-	-	-	-	-	-	-
Stage 2	380	413	-	196	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1257.1	40.9	0.4	0.4
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	702	-	-	71	127	909	-
HCM Lane V/C Ratio	0.036	-	-	3.521	0.214	0.042	-
HCM Control Delay (s)	10.3	0		$ 1257.1	40.9	9.1	0
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	26	0.8	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	1002	731	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	1089	795	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	795	0	-	0	1884	795
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	1089	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	805	-	-	-	75	380
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	805	-	-	-	75	380
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	805	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	821	763	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	38	33	71	892	829	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1897	863	896	0	-	0
Stage 1	863	-	-	-	-	-
Stage 2	1034	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	76	353	745	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	69	353	745	-	-	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	309	-	-	-	-	-

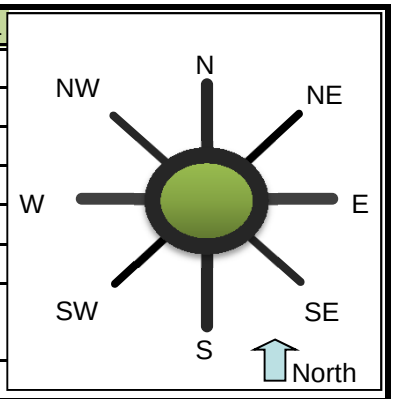
Approach	SB	NE	SW
HCM Control Delay, s	25.8	0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	745	-	243	-	-
HCM Lane V/C Ratio	0.095	-	0.291	-	-
HCM Control Delay (s)	10.3	-	25.8	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					4		26	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	24						772	
	SW (6), vph								
	W (7), vph	60				594			
	NW (8), vph								
Output	Total Vehicles	84	0	0	0	598	0	798	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	5	0	30	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	27	0	0	0	0	0	898	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	68	0	0	0	691	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	96	0	0	0	696	0	928	0
Conflicting flow, pcu/h	691	0	0	0	30	0	27	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	539	NA	NA	NA	1025	NA	1028	NA
Entry Flow Rates, vph	91	NA	NA	NA	650	NA	867	NA
V/C ratio	**0.17**				**0.63**		**0.84**	
Control Delay, s/veh	**9**				**13**		**23**	
LOS	A				B		C	
95th % Queue (ft)	**16**				**126**		**284**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	650	NA	NA	NA	1251	NA	1254	NA
Entry Flow Rates, vph	91	NA	NA	NA	650	NA	867	NA
V/C ratio	**0.15**				**0.56**		**0.74**	
Control Delay, sec/pcu	**7**				**9**		**14**	
LOS	A				A		B	
95th % Queue (ft)	**14**				**96**		**194**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.2

East_Roundabout_2038_AA_EF = 1.2
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: SR 89											
3	L2	646	7.0	0.589	10.5	LOS B	6.3	165.3	0.30	0.57	34.4
8	T1	4	7.0	0.589	3.6	LOS A	6.3	165.3	0.30	0.57	34.3
Approach		650	7.0	0.589	10.4	LOS B	6.3	165.3	0.30	0.57	34.4
North: Old SR 89											
4	T1	26	3.0	0.149	8.4	LOS A	0.8	21.1	0.71	0.75	35.5
14	R2	65	3.0	0.149	8.9	LOS A	0.8	21.1	0.71	0.75	34.3
Approach		91	3.0	0.149	8.8	LOS A	0.8	21.1	0.71	0.75	34.6
West: New SR 89											
5	L2	28	7.0	0.772	10.8	LOS B	14.7	388.8	0.49	0.41	37.1
12	R2	839	7.0	0.772	4.4	LOS A	14.7	388.8	0.49	0.41	35.7
Approach		867	7.0	0.772	4.6	LOS A	14.7	388.8	0.49	0.41	35.7
All Vehicles		1609	6.8	0.772	7.2	LOS A	14.7	388.8	0.43	0.49	35.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_AA_EF = 1.1

East_Roundabout_2038_AA_EF = 1.1
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: SR 89											
3	L2	646	7.0	0.537	10.4	LOS B	5.1	133.8	0.25	0.58	34.5
8	T1	4	7.0	0.537	3.5	LOS A	5.1	133.8	0.25	0.58	34.4
Approach		650	7.0	0.537	10.3	LOS B	5.1	133.8	0.25	0.58	34.5
North: Old SR 89											
4	T1	26	3.0	0.128	7.7	LOS A	0.7	18.6	0.69	0.71	35.9
14	R2	65	3.0	0.128	8.1	LOS A	0.7	18.6	0.69	0.71	34.7
Approach		91	3.0	0.128	8.0	LOS A	0.7	18.6	0.69	0.71	35.0
West: New SR 89											
5	L2	28	7.0	0.705	10.5	LOS B	11.0	290.3	0.38	0.41	37.4
12	R2	839	7.0	0.705	4.1	LOS A	11.0	290.3	0.38	0.41	36.0
Approach		867	7.0	0.705	4.4	LOS A	11.0	290.3	0.38	0.41	36.0
All Vehicles		1609	6.8	0.705	7.0	LOS A	11.0	290.3	0.35	0.50	35.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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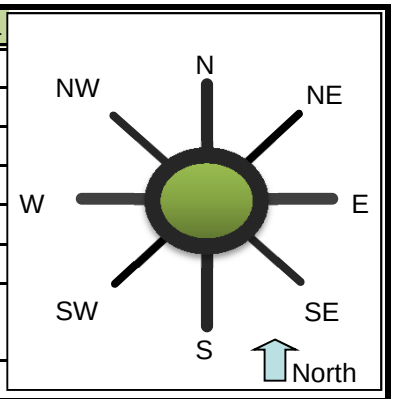
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 Old Wye



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			18				92	
	NE (2), vph								
	E (3), vph	26				14		544	
	SE (4), vph								
	S (5), vph			20				11	
	SW (6), vph								
	W (7), vph	45		565		8			
	NW (8), vph								
Output	Total Vehicles	71	0	603	0	22	0	647	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	0.992	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	21	0	0	0	105	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	29	0	0	0	16	0	621	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	23	0	0	0	13	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	50	0	645	0	9	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	79	0	688	0	25	0	738	0
Conflicting flow, pcu/h	677	0	114	0	755	0	52	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	553	NA	958	NA	501	NA	1018	NA
Entry Flow Rates, vph	77	NA	655	NA	24	NA	703	NA
V/C ratio	**0.14**		**0.68**		**0.05**		**0.69**	
Control Delay, s/veh	**8**		**15**		**8**		**14**	
LOS	A		B		A		B	
95th % Queue (ft)	**12**		**148**		**4**		**153**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	666	NA	1167	NA	602	NA	1242	NA
Entry Flow Rates, vph	77	NA	655	NA	24	NA	703	NA
V/C ratio	**0.12**		**0.59**		**0.04**		**0.59**	
Control Delay, sec/pcu	**7**		**10**		**6**		**10**	
LOS	A		B		A		B	
95th % Queue (ft)	**10**		**106**		**3**		**108**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.2

Old Wye 2038 AA EF = 1.2
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: SR 89											
3	L2	9	3.0	0.041	15.2	LOS C	0.2	5.9	0.72	0.70	35.3
8	T1	1	3.0	0.041	8.2	LOS A	0.2	5.9	0.72	0.70	34.9
18	R2	15	3.0	0.041	8.4	LOS A	0.2	5.9	0.72	0.70	33.6
Approach		25	3.0	0.041	10.8	LOS B	0.2	5.9	0.72	0.70	34.3
East: SR 28											
1	L2	22	5.0	0.602	11.6	LOS B	5.6	146.2	0.53	0.46	37.3
6	T1	614	5.0	0.602	4.6	LOS A	5.6	146.2	0.53	0.46	37.0
16	R2	20	5.0	0.602	4.8	LOS A	5.6	146.2	0.53	0.46	35.6
Approach		655	5.0	0.602	4.8	LOS A	5.6	146.2	0.53	0.46	37.0
North: Savemart											
7	L2	28	3.0	0.121	14.8	LOS B	0.7	18.2	0.72	0.76	35.4
4	T1	1	3.0	0.121	7.5	LOS A	0.7	18.2	0.72	0.76	35.1
14	R2	49	3.0	0.121	8.0	LOS A	0.7	18.2	0.72	0.76	33.8
Approach		78	3.0	0.121	10.4	LOS B	0.7	18.2	0.72	0.76	34.4
West: SR 89											
5	L2	100	5.0	0.612	11.0	LOS B	6.8	177.0	0.42	0.41	37.6
2	T1	591	5.0	0.612	3.8	LOS A	6.8	177.0	0.42	0.41	37.3
12	R2	12	5.0	0.612	4.2	LOS A	6.8	177.0	0.42	0.41	35.8
Approach		703	5.0	0.612	4.8	LOS A	6.8	177.0	0.42	0.41	37.3
All Vehicles		1462	4.9	0.612	5.2	LOS A	6.8	177.0	0.49	0.45	36.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.1

Old Wye 2038 AA EF = 1.1
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: SR 89											
3	L2	9	3.0	0.035	14.6	LOS B	0.2	5.2	0.71	0.67	35.6
8	T1	1	3.0	0.035	7.5	LOS A	0.2	5.2	0.71	0.67	35.3
18	R2	15	3.0	0.035	7.8	LOS A	0.2	5.2	0.71	0.67	34.0
Approach		25	3.0	0.035	10.1	LOS B	0.2	5.2	0.71	0.67	34.6
East: SR 28											
1	L2	22	5.0	0.544	11.3	LOS B	4.7	121.2	0.47	0.43	37.6
6	T1	614	5.0	0.544	4.2	LOS A	4.7	121.2	0.47	0.43	37.3
16	R2	20	5.0	0.544	4.5	LOS A	4.7	121.2	0.47	0.43	35.9
Approach		655	5.0	0.544	4.5	LOS A	4.7	121.2	0.47	0.43	37.3
North: Savemart											
7	L2	28	3.0	0.104	14.1	LOS B	0.6	16.0	0.71	0.72	35.8
4	T1	1	3.0	0.104	6.9	LOS A	0.6	16.0	0.71	0.72	35.4
14	R2	49	3.0	0.104	7.3	LOS A	0.6	16.0	0.71	0.72	34.2
Approach		78	3.0	0.104	9.8	LOS A	0.6	16.0	0.71	0.72	34.7
West: SR 89											
5	L2	100	5.0	0.558	10.8	LOS B	5.6	146.4	0.36	0.40	37.8
2	T1	591	5.0	0.558	3.6	LOS A	5.6	146.4	0.36	0.40	37.5
12	R2	12	5.0	0.558	4.0	LOS A	5.6	146.4	0.36	0.40	36.0
Approach		703	5.0	0.558	4.6	LOS A	5.6	146.4	0.36	0.40	37.5
All Vehicles		1462	4.9	0.558	4.9	LOS A	5.6	146.4	0.43	0.43	37.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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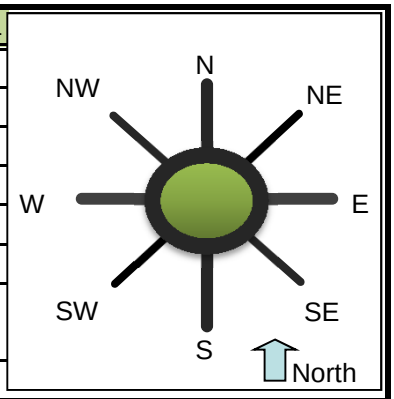
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							286	
	SE (4), vph								
	S (5), vph			322					
	SW (6), vph								
	W (7), vph			290		266			
	NW (8), vph								
Output	Total Vehicles	0	0	612	0	266	0	286	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	333	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	368	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	331	0	309	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	698	0	309	0	333	0
Conflicting flow, pcu/h	0	0	309	0	333	0	368	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	790	NA	757	NA	731	NA
Entry Flow Rates, vph	NA	NA	665	NA	289	NA	311	NA
V/C ratio			**0.84**		**0.38**		**0.43**	
Control Delay, s/veh			**28**		**10**		**11**	
LOS			D		A		B	
95th % Queue (ft)			**258**		**48**		**57**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	959	NA	919	NA	887	NA
Entry Flow Rates, vph	NA	NA	665	NA	289	NA	311	NA
V/C ratio			**0.73**		**0.34**		**0.38**	
Control Delay, sec/pcu			**17**		**8**		**8**	
LOS			C		A		A	
95th % Queue (ft)			**175**		**40**		**47**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**475**	**387**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	552	450				
Conflicting Flow, pcu/hr	368	333				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	887	919				
Flow Rates of Exiting Traffic, vph	516	421				
V/C ratio	**0.58**	**0.49**				
Control Delay, s/veh	**12.5**	**10.1**				
LOS	B	B				
95th % Queue (ft)	**103**	**74**				
Approach w/Bypass Delay, s/veh	***11.8***	***9.9***				
Approach w/Bypass LOS	*B*	*A*				

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 AA

2038_West_Roundabout Single Lane EF = 1.2 AA
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
SouthEast: New SR 89											
3ax	L1	289	7.0	0.295	6.5	LOS A	1.9	51.1	0.60	0.64	24.4
18x	R2	421	7.0	0.430	3.0	LOS A	3.1	82.8	0.66	0.56	24.4
Approach		710	7.0	0.430	4.4	LOS A	3.1	82.8	0.64	0.59	24.4
NorthEast: New SR 28											
1x	L2	350	5.0	0.803	14.7	LOS B	12.3	318.8	0.97	1.07	23.5
16ax	R1	315	5.0	0.803	9.5	LOS A	12.3	318.8	0.97	1.07	22.1
Approach		665	5.0	0.803	12.2	LOS B	12.3	318.8	0.97	1.07	22.8
West: SR 89											
5a	L1	311	7.0	0.336	6.9	LOS A	2.5	65.3	0.69	0.68	24.3
12a	R1	516	7.0	0.558	3.6	LOS A	5.2	138.5	0.82	0.67	23.8
Approach		827	7.0	0.558	4.9	LOS A	5.2	138.5	0.77	0.68	24.0
All Vehicles		2202	6.4	0.803	7.0	LOS A	12.3	318.8	0.79	0.77	23.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 AA

2038_West_Roundabout Single Lane EF = 1.1 AA
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
SouthEast: New SR 89											
3ax	L1	289	7.0	0.262	6.1	LOS A	1.7	45.4	0.57	0.61	24.4
18x	R2	421	7.0	0.382	2.6	LOS A	2.7	72.5	0.62	0.50	24.5
Approach		710	7.0	0.382	4.1	LOS A	2.7	72.5	0.60	0.55	24.4
NorthEast: New SR 28											
1x	L2	350	5.0	0.713	10.9	LOS B	8.7	225.4	0.85	0.87	24.5
16ax	R1	315	5.0	0.713	5.7	LOS A	8.7	225.4	0.85	0.87	22.9
Approach		665	5.0	0.713	8.4	LOS A	8.7	225.4	0.85	0.87	23.7
West: SR 89											
5a	L1	311	7.0	0.295	6.5	LOS A	2.1	56.7	0.65	0.65	24.3
12a	R1	516	7.0	0.490	2.5	LOS A	4.1	109.3	0.75	0.44	23.9
Approach		827	7.0	0.490	4.0	LOS A	4.1	109.3	0.71	0.52	24.0
All Vehicles		2202	6.4	0.713	5.3	LOS A	8.7	225.4	0.72	0.63	24.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	0	59	11	0	19	122	716	14	27	744	24
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.92		0.93	0.94		0.91	1.00		1.00	1.00		0.98
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	1845	1900	1900	1776	1776	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	37	0	64	12	0	21	133	778	0	29	809	26
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	7	7	7	5	5	5	5	5	5
Cap, veh/h	208	44	232	498	0	350	168	1478	0	47	1237	542
Arrive On Green	0.25	0.00	0.25	0.25	0.00	0.25	0.10	0.43	0.00	0.03	0.36	0.36
Sat Flow, veh/h	354	172	910	1276	0	1376	1723	3529	0	1723	3438	1506
Grp Volume(v), veh/h	101	0	0	12	0	21	133	778	0	29	809	26
Grp Sat Flow(s),veh/h/ln	1436	0	0	1276	0	1376	1723	1719	0	1723	1719	1506
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.5	3.1	6.9	0.0	0.7	8.2	0.5
Cycle Q Clear(g_c), s	2.1	0.0	0.0	0.2	0.0	0.5	3.1	6.9	0.0	0.7	8.2	0.5
Prop In Lane	0.37		0.63	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	484	0	0	498	0	350	168	1478	0	47	1237	542
V/C Ratio(X)	0.21	0.00	0.00	0.02	0.00	0.06	0.79	0.53	0.00	0.61	0.65	0.05
Avail Cap(c_a), veh/h	663	0	0	653	0	529	249	1487	0	166	1322	579
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	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.4	0.0	0.0	11.7	0.0	11.7	18.4	8.7	0.0	20.0	11.2	8.7
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.1	10.0	0.3	0.0	12.3	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.0	0.0	0.0	0.1	0.0	0.2	1.9	3.3	0.0	0.5	4.0	0.2
LnGrp Delay(d),s/veh	12.6	0.0	0.0	11.7	0.0	11.8	28.3	9.1	0.0	32.3	12.2	8.7
LnGrp LOS	B			B		B	C	A		C	B	A
Approach Vol, veh/h		101			33			911			864	
Approach Delay, s/veh		12.6			11.8			11.9			12.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.6	5.1	21.9		14.6	8.1	19.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.5	2.7	8.9		4.1	5.1	10.2
Green Ext Time (p_c), s		0.6	0.0	6.6		0.5	0.0	4.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Two Way Analysis cannot be performed on Signalized Intersection.

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection	
Int Delay, s/veh	162.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	35	875	116
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	38	951	126

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1732	951	1762	1730	653	951	0	0	655	0	0
Stage 1	1027	1027	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1059	1027	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 68	87	314	65	88	466	702	-	-	909	-	0
Stage 1	282	310	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	270	310	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 57	75	314	45	76	466	702	-	-	909	-	-
Mov Cap-2 Maneuver	~ 57	75	-	45	76	-	-	-	-	-	-	-
Stage 1	266	282	-	403	413	-	-	-	-	-	-	-
Stage 2	380	413	-	196	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1257.1	40.9	0.4	0.4
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	702	-	-	71	127	909	-
HCM Lane V/C Ratio	0.036	-	-	3.521	0.214	0.042	-
HCM Control Delay (s)	10.3	0	$ 1257.1	40.9	9.1	0	
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	26	0.8	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	1002	731	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	1089	795	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	795	0	-	0	1884	795
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	1089	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	805	-	-	-	75	380
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	805	-	-	-	75	380
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	805	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	821	763	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	5	5	5	5
Mvmt Flow	38	33	71	892	829	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1897	863	896	0	-	0
Stage 1	863	-	-	-	-	-
Stage 2	1034	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.15	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.245	-	-	-
Pot Cap-1 Maneuver	76	353	745	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	69	353	745	-	-	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	309	-	-	-	-	-

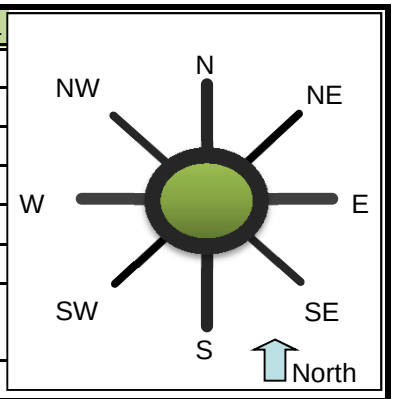
Approach	SB	NE	SW
HCM Control Delay, s	25.8	0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	745	-	243	-	-
HCM Lane V/C Ratio	0.095	-	0.291	-	-
HCM Control Delay (s)	10.3	-	25.8	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	-	-

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 3 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					6		34	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	31						1015	
	SW (6), vph								
	W (7), vph	78				781			
	NW (8), vph								
Output	Total Vehicles	109	0	0	0	787	0	1049	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	7	0	40	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	35	0	0	0	0	0	1180	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	89	0	0	0	908	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	124	0	0	0	915	0	1220	0
Conflicting flow, pcu/h	908	0	0	0	40	0	35	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	434	NA	NA	NA	1015	NA	1019	NA
Entry Flow Rates, vph	118	NA	NA	NA	855	NA	1140	NA
V/C ratio	**0.27**				**0.84**		**1.12**	
Control Delay, s/veh	**13**				**23**		**85**	
LOS	B				C		F	
95th % Queue (ft)	**29**				**281**		**791**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	520	NA	NA	NA	1239	NA	1244	NA
Entry Flow Rates, vph	118	NA	NA	NA	855	NA	1140	NA
V/C ratio	**0.24**				**0.74**		**0.98**	
Control Delay, sec/pcu	**10**				**14**		**39**	
LOS	B				B		E	
95th % Queue (ft)	**24**				**193**		**533**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.2

East_Roundabout_2038_Summer_EF = 1.2
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: SR 89											
3	L2	849	7.0	0.789	11.0	LOS B	15.2	401.1	0.62	0.51	33.6
8	T1	7	7.0	0.789	4.2	LOS A	15.2	401.1	0.62	0.51	33.5
Approach		855	7.0	0.789	11.0	LOS B	15.2	401.1	0.62	0.51	33.6
North: Old SR 89											
4	T1	34	3.0	0.277	11.7	LOS B	1.8	45.2	0.88	0.92	33.8
14	R2	85	3.0	0.277	12.2	LOS B	1.8	45.2	0.88	0.92	32.7
Approach		118	3.0	0.277	12.0	LOS B	1.8	45.2	0.88	0.92	33.0
West: New SR 89											
5	L2	37	7.0	1.028	33.3	LOS F	109.3	2884.9	1.00	0.52	27.5
12	R2	1103	7.0	1.028	26.9	LOS F	109.3	2884.9	1.00	0.52	26.7
Approach		1140	7.0	1.028	27.1	LOS D	109.3	2884.9	1.00	0.52	26.7
All Vehicles		2114	6.8	1.028	19.7	LOS C	109.3	2884.9	0.84	0.54	29.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: East_Roundabout_2038_Summer_EF = 1.1

East_Roundabout_2038_Summer_EF = 1.1
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: SR 89											
3	L2	849	7.0	0.721	10.7	LOS B	11.4	301.6	0.49	0.54	33.9
8	T1	7	7.0	0.721	3.9	LOS A	11.4	301.6	0.49	0.54	33.8
Approach		855	7.0	0.721	10.7	LOS B	11.4	301.6	0.49	0.54	33.9
North: Old SR 89											
4	T1	34	3.0	0.226	10.5	LOS B	1.5	37.7	0.86	0.86	34.4
14	R2	85	3.0	0.226	11.0	LOS B	1.5	37.7	0.86	0.86	33.2
Approach		118	3.0	0.226	10.9	LOS B	1.5	37.7	0.86	0.86	33.5
West: New SR 89											
5	L2	37	7.0	0.938	12.0	LOS B	41.4	1094.0	1.00	0.40	35.8
12	R2	1103	7.0	0.938	5.6	LOS A	41.4	1094.0	1.00	0.40	34.5
Approach		1140	7.0	0.938	5.8	LOS A	41.4	1094.0	1.00	0.40	34.5
All Vehicles		2114	6.8	0.938	8.0	LOS A	41.4	1094.0	0.79	0.48	34.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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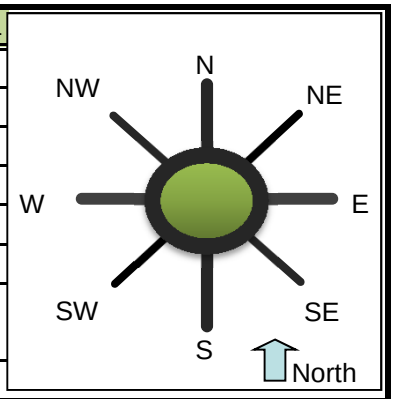
General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 3 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			24				122	
	NE (2), vph								
	E (3), vph	34				19		716	
	SE (4), vph								
	S (5), vph			27				14	
	SW (6), vph								
	W (7), vph	59		744		11			
	NW (8), vph								
Output	Total Vehicles	93	0	795	0	30	0	852	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	1.000	1.000	0.998	1.000	1.000	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	27	0	0	0	139	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	38	0	0	0	22	0	817	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	31	0	0	0	16	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	66	0	849	0	13	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	104	0	907	0	34	0	972	0
Conflicting flow, pcu/h	893	0	152	0	994	0	69	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	449	NA	923	NA	398	NA	1001	NA
Entry Flow Rates, vph	101	NA	864	NA	33	NA	926	NA
V/C ratio	**0.22**		**0.94**		**0.08**		**0.93**	
Control Delay, s/veh	**11**		**37**		**10**		**34**	
LOS	B		E		B		D	
95th % Queue (ft)	**22**		**386**		**7**		**381**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	539	NA	1123	NA	477	NA	1221	NA
Entry Flow Rates, vph	101	NA	864	NA	33	NA	926	NA
V/C ratio	**0.19**		**0.81**		**0.07**		**0.80**	
Control Delay, sec/pcu	**9**		**19**		**8**		**17**	
LOS	A		C		A		C	
95th % Queue (ft)	**18**		**246**		**6**		**238**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

MOVEMENT SUMMARY

Site: Old Wye 2038 Summer EF = 1.2

2038 Summer PM - Old Wye Roundabout Env =1.2

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: SR 89											
3	L2	12	3.0	0.087	18.7	LOS C	0.6	14.6	0.90	0.84	33.5
8	T1	1	3.0	0.087	11.6	LOS B	0.6	14.6	0.90	0.84	33.1
18	R2	21	3.0	0.087	11.9	LOS B	0.6	14.6	0.90	0.84	32.0
Approach		34	3.0	0.087	14.3	LOS B	0.6	14.6	0.90	0.84	32.6
East: SR 28											
1	L2	29	5.0	0.836	15.2	LOS C	15.0	389.2	0.95	0.72	35.6
6	T1	809	5.0	0.836	8.2	LOS A	15.0	389.2	0.95	0.72	35.3
16	R2	26	5.0	0.836	8.4	LOS A	15.0	389.2	0.95	0.72	34.1
Approach		864	5.0	0.836	8.4	LOS A	15.0	389.2	0.95	0.72	35.3
North: Savemart											
7	L2	37	3.0	0.243	17.6	LOS C	1.7	43.1	0.92	0.92	33.9
4	T1	1	3.0	0.243	10.3	LOS B	1.7	43.1	0.92	0.92	33.6
14	R2	64	3.0	0.243	10.8	LOS B	1.7	43.1	0.92	0.92	32.5
Approach		102	3.0	0.243	13.2	LOS B	1.7	43.1	0.92	0.92	33.0
West: SR 89											
5	L2	133	5.0	0.825	12.1	LOS B	15.3	396.8	0.80	0.49	36.2
2	T1	778	5.0	0.825	4.8	LOS A	15.3	396.8	0.80	0.49	35.9
12	R2	15	5.0	0.825	5.2	LOS A	15.3	396.8	0.80	0.49	34.5
Approach		926	5.0	0.825	5.9	LOS A	15.3	396.8	0.80	0.49	35.9
All Vehicles		1926	4.9	0.836	7.5	LOS A	15.3	396.8	0.88	0.62	35.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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: Old Wye 2038 Summer EF = 1.1

2038 Summer PM - Old Wye Roundabout Env =1.1
Roundabout

Movement Performance - Vehicles

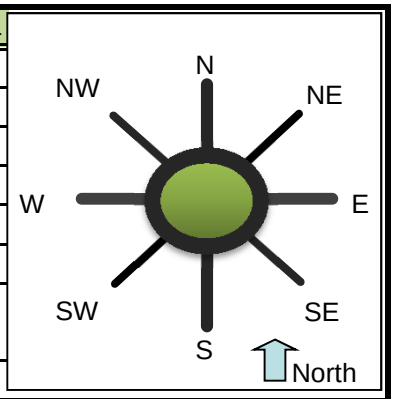
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SR 89											
3	L2	12	3.0	0.068	17.7	LOS C	0.5	11.7	0.88	0.79	34.0
8	T1	1	3.0	0.068	10.6	LOS B	0.5	11.7	0.88	0.79	33.6
18	R2	21	3.0	0.068	10.8	LOS B	0.5	11.7	0.88	0.79	32.5
Approach		34	3.0	0.068	13.3	LOS B	0.5	11.7	0.88	0.79	33.0
East: SR 28											
1	L2	29	5.0	0.749	12.4	LOS B	9.3	240.7	0.76	0.53	36.4
6	T1	809	5.0	0.749	5.3	LOS A	9.3	240.7	0.76	0.53	36.1
16	R2	26	5.0	0.749	5.6	LOS A	9.3	240.7	0.76	0.53	34.8
Approach		864	5.0	0.749	5.6	LOS A	9.3	240.7	0.76	0.53	36.1
North: Savemart											
7	L2	37	3.0	0.192	16.6	LOS C	1.3	34.5	0.89	0.86	34.4
4	T1	1	3.0	0.192	9.4	LOS A	1.3	34.5	0.89	0.86	34.1
14	R2	64	3.0	0.192	9.8	LOS A	1.3	34.5	0.89	0.86	32.9
Approach		102	3.0	0.192	12.3	LOS B	1.3	34.5	0.89	0.86	33.5
West: SR 89											
5	L2	133	5.0	0.750	11.5	LOS B	11.2	291.6	0.61	0.45	36.9
2	T1	778	5.0	0.750	4.2	LOS A	11.2	291.6	0.61	0.45	36.5
12	R2	15	5.0	0.750	4.6	LOS A	11.2	291.6	0.61	0.45	35.1
Approach		926	5.0	0.750	5.3	LOS A	11.2	291.6	0.61	0.45	36.6
All Vehicles		1926	4.9	0.750	5.9	LOS A	11.2	291.6	0.70	0.52	36.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph								
Exit	NE (2), vph								
Legs	E (3), vph							377	
(TO)	SE (4), vph								
	S (5), vph			424					
	SW (6), vph								
	W (7), vph			381		350			
	NW (8), vph								
Output	Total Vehicles	0	0	805	0	350	0	377	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	438	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	484	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	435	0	407	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	919	0	407	0	438	0
Conflicting flow, pcu/h	0	0	407	0	438	0	484	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	716	NA	681	NA	651	NA
Entry Flow Rates, vph	NA	NA	875	NA	380	NA	410	NA
V/C ratio			**1.22**		**0.56**		**0.63**	
Control Delay, s/veh			**132**		**15**		**18**	
LOS			F		B		C	
95th % Queue (ft)			**802**		**93**		**119**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	868	NA	825	NA	787	NA
Entry Flow Rates, vph	NA	NA	875	NA	380	NA	410	NA
V/C ratio			**1.06**		**0.49**		**0.56**	
Control Delay, sec/pcu			**69**		**11**		**13**	
LOS			F		B		B	
95th % Queue (ft)			**578**		**74**		**93**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**625**	**509**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	727	592				
Conflicting Flow, pcu/hr	484	438				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	787	825				
Flow Rates of Exiting Traffic, vph	679	553				
V/C ratio	**0.86**	**0.72**				
Control Delay, s/veh	**30.3**	**18.2**				
LOS	D	C				
95th % Queue (ft)	**283**	**168**				
Approach w/Bypass Delay, s/veh	***25.5***	***16.7***				
Approach w/Bypass LOS	*D*	*C*				

MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.2 Summer

2038_West_Roundabout Single Lane EF = 1.2 Summer
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
SouthEast: New SR 89											
3ax	L1	380	7.0	0.434	7.5	LOS A	3.2	84.1	0.74	0.75	24.2
18x	R2	553	7.0	0.631	6.2	LOS A	6.6	173.1	0.86	0.88	23.8
Approach		934	7.0	0.631	6.7	LOS A	6.6	173.1	0.82	0.83	23.9
NorthEast: New SR 28											
1x	L2	461	5.0	1.186	106.5	LOS F	65.6	1705.4	1.00	3.40	12.2
16ax	R1	414	5.0	1.186	101.3	LOS F	65.6	1705.4	1.00	3.40	11.8
Approach		875	5.0	1.186	104.0	LOS F	65.6	1705.4	1.00	3.40	12.0
West: SR 89											
5a	L1	410	7.0	0.465	7.5	LOS A	3.7	98.7	0.79	0.75	24.2
12a	R1	679	7.0	0.770	8.7	LOS A	11.4	301.8	1.00	1.09	22.8
Approach		1089	7.0	0.770	8.2	LOS A	11.4	301.8	0.92	0.96	23.3
All Vehicles		2898	6.4	1.186	36.7	LOS E	65.6	1705.4	0.91	1.65	18.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: 2038_West_Roundabout Single Lane EF = 1.1 Summer

2038_West_Roundabout Single Lane EF = 1.1 Summer
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
SouthEast: New SR 89											
3ax	L1	380	7.0	0.385	7.0	LOS A	2.9	75.3	0.72	0.71	24.2
18x	R2	553	7.0	0.560	4.4	LOS A	5.2	136.9	0.81	0.75	24.2
Approach		934	7.0	0.560	5.4	LOS A	5.2	136.9	0.77	0.73	24.2
NorthEast: New SR 28											
1x	L2	461	5.0	1.044	50.9	LOS F	40.4	1049.3	1.00	2.25	17.2
16ax	R1	414	5.0	1.044	45.7	LOS F	40.4	1049.3	1.00	2.25	16.4
Approach		875	5.0	1.044	48.4	LOS E	40.4	1049.3	1.00	2.25	16.8
West: SR 89											
5a	L1	410	7.0	0.435	7.4	LOS A	3.6	94.4	0.80	0.75	24.1
12a	R1	679	7.0	0.722	7.1	LOS A	9.8	258.6	0.98	1.02	23.2
Approach		1089	7.0	0.722	7.2	LOS A	9.8	258.6	0.91	0.92	23.5
All Vehicles		2898	6.4	1.044	19.1	LOS C	40.4	1049.3	0.89	1.26	21.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Design Year (2038) Operations: Alternative 4

Average Annual Peak Hour Analysis Results

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	266	387	286	475	322	290
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1810	1810
Adj Flow Rate, veh/h	289	0	311	0	350	315
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	5	5
Cap, veh/h	370	330	455	387	431	1082
Arrive On Green	0.22	0.00	0.26	0.00	0.25	0.60
Sat Flow, veh/h	1691	1509	1776	1509	1723	1810
Grp Volume(v), veh/h	289	0	311	0	350	315
Grp Sat Flow(s),veh/h/ln	1691	1509	1776	1509	1723	1810
Q Serve(g_s), s	7.0	0.0	6.9	0.0	8.3	3.7
Cycle Q Clear(g_c), s	7.0	0.0	6.9	0.0	8.3	3.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	370	330	455	387	431	1082
V/C Ratio(X)	0.78	0.00	0.68	0.00	0.81	0.29
Avail Cap(c_a), veh/h	620	554	651	554	632	1494
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	0.0	14.6	0.0	15.4	4.3
Incr Delay (d2), s/veh	3.6	0.0	1.8	0.0	5.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.6	0.0	3.6	0.0	4.5	1.9
LnGrp Delay(d),s/veh	19.7	0.0	16.5	0.0	20.5	4.4
LnGrp LOS	B		B		C	A
Approach Vol, veh/h	289		311			665
Approach Delay, s/veh	19.7		16.5			12.9
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		13.5	14.9	15.2				30.1
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		9.0	10.3	8.9				5.7
Green Ext Time (p_c), s		0.5	0.6	2.3				4.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	0	45	8	0	14	92	544	11	20	565	18
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.92	0.93		0.97	1.00		0.91	1.00		0.98
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	1845	1900	1900	1845	1845	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	28	0	49	9	0	15	100	591	12	22	614	20
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Cap, veh/h	209	46	211	495	0	343	124	1454	29	38	1281	562
Arrive On Green	0.23	0.00	0.23	0.23	0.00	0.23	0.07	0.42	0.42	0.02	0.37	0.37
Sat Flow, veh/h	327	204	930	1316	0	1516	1723	3439	70	1723	3438	1507
Grp Volume(v), veh/h	77	0	0	9	0	15	100	295	308	22	614	20
Grp Sat Flow(s),veh/h/ln	1461	0	0	1316	0	1516	1723	1719	1789	1723	1719	1507
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.3	2.1	4.4	4.4	0.5	5.0	0.3
Cycle Q Clear(g_c), s	1.5	0.0	0.0	0.2	0.0	0.3	2.1	4.4	4.4	0.5	5.0	0.3
Prop In Lane	0.36		0.64	1.00		1.00	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	466	0	0	495	0	343	124	727	756	38	1281	562
V/C Ratio(X)	0.17	0.00	0.00	0.02	0.00	0.04	0.81	0.41	0.41	0.58	0.48	0.04
Avail Cap(c_a), veh/h	763	0	0	760	0	665	283	848	882	189	1507	661
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.5	0.0	0.0	11.0	0.0	11.0	16.7	7.3	7.3	17.7	8.7	7.3
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.1	11.5	0.4	0.4	13.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.6	0.0	0.0	0.1	0.0	0.1	1.4	2.1	2.2	0.4	2.4	0.1
LnGrp Delay(d),s/veh	11.6	0.0	0.0	11.0	0.0	11.1	28.2	7.7	7.7	31.1	9.0	7.3
LnGrp LOS	B			B		B	C	A	A	C	A	A
Approach Vol, veh/h		77			24			703			656	
Approach Delay, s/veh		11.6			11.0			10.6			9.7	
Approach LOS		B			B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	4.8	19.4		12.3	6.6	17.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.3	2.5	6.4		3.5	4.1	7.0
Green Ext Time (p_c), s		0.4	0.0	6.2		0.4	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	3.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	32	0	30	6	0	16	24	657	10	14	537	18
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	35	0	33	7	0	17	26	714	11	15	584	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1554	1551	743	1562	1556	870	678	0	0	800	0	0
Stage 1	699	699	-	847	847	-	-	-	-	-	-	-
Stage 2	855	852	-	715	709	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	92	113	413	90	112	349	900	-	-	810	-	-
Stage 1	429	440	-	355	377	-	-	-	-	-	-	-
Stage 2	351	375	-	420	436	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	73	94	363	69	94	307	844	-	-	759	-	-
Mov Cap-2 Maneuver	73	94	-	69	94	-	-	-	-	-	-	-
Stage 1	390	404	-	323	343	-	-	-	-	-	-	-
Stage 2	301	341	-	351	401	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	68.9	31.8	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	844	-	-	158	119	759	-	-
HCM Lane V/C Ratio	0.031	-	-	0.151	0.566	0.02	-	-
HCM Control Delay (s)	9.4	-	-	31.8	68.9	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	2.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	31.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	130	3	43	4	2	13	18	455	3	27	665	88
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	141	3	47	4	2	14	20	495	3	29	723	96

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1325	1319	723	1342	1317	496	723	0	0	498	0	0
Stage 1	782	782	-	535	535	-	-	-	-	-	-	-
Stage 2	543	537	-	807	782	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 132	156	425	129	157	572	857	-	-	1041	-	0
Stage 1	386	403	-	527	522	-	-	-	-	-	-	0
Stage 2	522	521	-	374	403	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 120	144	425	106	145	572	857	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 120	144	-	106	145	-	-	-	-	-	-	-
Stage 1	374	384	-	510	505	-	-	-	-	-	-	-
Stage 2	491	504	-	315	384	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	238.8	20.3	0.4	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	857	-	-	146	256	1041	-
HCM Lane V/C Ratio	0.023	-	-	1.31	0.081	0.028	-
HCM Control Delay (s)	9.3	0	-	238.8	20.3	8.6	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	11.8	0.3	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	27	23	50	624	580	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	29	25	54	678	630	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1442	655	680	0	-	0
Stage 1	655	-	-	-	-	-
Stage 2	787	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	145	464	889	-	-	-
Stage 1	515	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	136	464	889	-	-	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	515	-	-	-	-	-
Stage 2	420	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	17.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	889	-	336	-	-
HCM Lane V/C Ratio	0.061	-	0.162	-	-
HCM Control Delay (s)	9.3	-	17.8	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	26	772	594	4	24	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	25	25
Mvmt Flow	28	839	646	4	26	65

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	650	0	-	0	1544	648
Stage 1	-	-	-	-	648	-
Stage 2	-	-	-	-	896	-
Critical Hdwy	4.17	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.263	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	913	-	-	-	112	432
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	363	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	913	-	-	-	106	432
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	342	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	19.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	913	-	-	-	345
HCM Lane V/C Ratio	0.031	-	-	-	0.265
HCM Control Delay (s)	9.1	0	-	-	19.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1

Summer Peak Hour Analysis Results

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (veh/h)	350	509	377	625	424	381
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1810	1810
Adj Flow Rate, veh/h	380	0	410	0	461	414
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	5	5
Cap, veh/h	431	385	488	415	510	1138
Arrive On Green	0.25	0.00	0.27	0.00	0.30	0.63
Sat Flow, veh/h	1691	1509	1776	1509	1723	1810
Grp Volume(v), veh/h	380	0	410	0	461	414
Grp Sat Flow(s),veh/h/ln	1691	1509	1776	1509	1723	1810
Q Serve(g_s), s	14.9	0.0	15.0	0.0	17.7	7.6
Cycle Q Clear(g_c), s	14.9	0.0	15.0	0.0	17.7	7.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	431	385	488	415	510	1138
V/C Ratio(X)	0.88	0.00	0.84	0.00	0.90	0.36
Avail Cap(c_a), veh/h	565	504	541	460	600	1287
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	0.0	23.5	0.0	23.3	6.1
Incr Delay (d2), s/veh	12.3	0.0	10.5	0.0	15.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	8.4	0.0	8.7	0.0	10.5	3.7
LnGrp Delay(d),s/veh	37.0	0.0	34.0	0.0	38.8	6.3
LnGrp LOS	D		C		D	A
Approach Vol, veh/h	380		410			875
Approach Delay, s/veh	37.0		34.0			23.4
Approach LOS	D		C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.5	24.4	22.9				47.3
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		23.0	24.0	21.0				49.0
Max Q Clear Time (g_c+I1), s		16.9	19.7	17.0				9.6
Green Ext Time (p_c), s		0.7	0.7	1.9				6.5

Intersection Summary	
HCM 2010 Ctrl Delay	29.1
HCM 2010 LOS	C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	0	59	11	0	19	122	716	14	27	744	24
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.97		0.92	0.93		0.97	1.00		0.92	1.00		0.98
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	1845	1900	1900	1845	1845	1810	1810	1900	1810	1810	1810
Adj Flow Rate, veh/h	37	0	64	12	0	21	133	778	15	29	809	26
Adj No. of Lanes	0	1	0	0	1	1	1	2	0	1	2	1
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Cap, veh/h	197	43	199	472	0	328	168	1554	30	48	1311	575
Arrive On Green	0.22	0.00	0.22	0.22	0.00	0.22	0.10	0.45	0.45	0.03	0.38	0.38
Sat Flow, veh/h	333	199	921	1334	0	1514	1723	3443	66	1723	3438	1508
Grp Volume(v), veh/h	101	0	0	12	0	21	133	388	405	29	809	26
Grp Sat Flow(s),veh/h/ln	1454	0	0	1334	0	1514	1723	1719	1791	1723	1719	1508
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.4	3.0	6.3	6.3	0.7	7.5	0.4
Cycle Q Clear(g_c), s	2.1	0.0	0.0	0.2	0.0	0.4	3.0	6.3	6.3	0.7	7.5	0.4
Prop In Lane	0.37		0.63	1.00		1.00	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	440	0	0	472	0	328	168	776	808	48	1311	575
V/C Ratio(X)	0.23	0.00	0.00	0.03	0.00	0.06	0.79	0.50	0.50	0.61	0.62	0.05
Avail Cap(c_a), veh/h	704	0	0	705	0	615	262	785	818	175	1396	612
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	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.9	0.0	0.0	12.2	0.0	12.3	17.4	7.7	7.7	18.9	9.9	7.7
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.0	0.1	8.5	0.5	0.5	11.9	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.9	0.0	0.0	0.1	0.0	0.2	1.8	3.0	3.1	0.5	3.6	0.2
LnGrp Delay(d),s/veh	13.2	0.0	0.0	12.2	0.0	12.3	25.9	8.2	8.1	30.9	10.6	7.7
LnGrp LOS	B			B		B	C	A	A	C	B	A
Approach Vol, veh/h		101			33			926			864	
Approach Delay, s/veh		13.2			12.3			10.7			11.2	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.5	5.1	21.8		12.5	7.8	19.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.4	2.7	8.3		4.1	5.0	9.5
Green Ext Time (p_c), s		0.5	0.0	6.8		0.5	0.0	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.1
HCM 2010 LOS	B

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	162.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	35	875	116
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	38	951	126

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1741	1732	951	1762	1730	653	951	0	0	655	0	0
Stage 1	1027	1027	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1059	1027	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 68	87	314	65	88	466	702	-	-	909	-	0
Stage 1	282	310	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	270	310	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 57	75	314	45	76	466	702	-	-	909	-	-
Mov Cap-2 Maneuver	~ 57	75	-	45	76	-	-	-	-	-	-	-
Stage 1	266	282	-	403	413	-	-	-	-	-	-	-
Stage 2	380	413	-	196	282	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1257.1	40.9	0.4	0.4
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	702	-	-	71	127	909	-
HCM Lane V/C Ratio	0.036	-	-	3.521	0.214	0.042	-
HCM Control Delay (s)	10.3	0	$ 1257.1	40.9	9.1	0	
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	26	0.8	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	905	662	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	984	720	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	720	0	-	0	1704	720
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	859	-	-	-	98	420
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	859	-	-	-	98	420
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	354	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	859	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	821	763	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	38	33	71	892	829	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1897	863	896	0	-	0
Stage 1	863	-	-	-	-	-
Stage 2	1034	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	76	353	737	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	69	353	737	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	411	-	-	-	-	-
Stage 2	308	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	25.9	0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	737	-	242	-	-
HCM Lane V/C Ratio	0.096	-	0.292	-	-
HCM Control Delay (s)	10.4	-	25.9	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	34	1015	781	6	31	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	25	25
Mvmt Flow	37	1103	849	7	34	85

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	855	0	-	0	2029	852
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	1177	-
Critical Hdwy	4.17	-	-	-	6.65	6.45
Critical Hdwy Stg 1	-	-	-	-	5.65	-
Critical Hdwy Stg 2	-	-	-	-	5.65	-
Follow-up Hdwy	2.263	-	-	-	3.725	3.525
Pot Cap-1 Maneuver	764	-	-	-	54	327
Stage 1	-	-	-	-	382	-
Stage 2	-	-	-	-	264	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	764	-	-	-	47	327
Mov Cap-2 Maneuver	-	-	-	-	151	-
Stage 1	-	-	-	-	382	-
Stage 2	-	-	-	-	231	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	32.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	764	-	-	-	246
HCM Lane V/C Ratio	0.048	-	-	-	0.482
HCM Control Delay (s)	10	0	-	-	32.5
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	2.4

Design Year (2038) Operations: Alternative 6

Average Annual Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	76	11	280	64	271	39	296	398	333	278	18
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.89	1.00		0.94	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	28	83	12	304	70	295	42	322	433	362	302	20
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	180	26	354	372	604	53	720	619	368	1360	829
Arrive On Green	0.15	0.15	0.15	0.21	0.21	0.21	0.03	0.21	0.21	0.21	0.40	0.40
Sat Flow, veh/h	402	1192	172	1691	1776	1347	1691	3374	1421	1723	3438	1509
Grp Volume(v), veh/h	123	0	0	304	70	295	42	322	433	362	302	20
Grp Sat Flow(s),veh/h/ln	1767	0	0	1691	1776	1347	1691	1687	1421	1723	1719	1509
Q Serve(g_s), s	4.8	0.0	0.0	13.0	2.4	12.1	1.9	6.2	16.0	15.7	4.4	0.5
Cycle Q Clear(g_c), s	4.8	0.0	0.0	13.0	2.4	12.1	1.9	6.2	16.0	15.7	4.4	0.5
Prop In Lane	0.23		0.10	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	267	0	0	354	372	604	53	720	619	368	1360	829
V/C Ratio(X)	0.46	0.00	0.00	0.86	0.19	0.49	0.80	0.45	0.70	0.98	0.22	0.02
Avail Cap(c_a), veh/h	377	0	0	361	379	609	135	720	619	368	1360	829
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.1	0.0	0.0	28.6	24.4	16.0	36.1	25.7	17.1	29.4	15.0	7.8
Incr Delay (d2), s/veh	1.2	0.0	0.0	18.2	0.2	0.6	23.3	0.4	3.5	42.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.4	0.0	0.0	7.9	1.2	4.6	1.2	3.0	9.5	11.8	2.1	0.3
LnGrp Delay(d),s/veh	30.3	0.0	0.0	46.7	24.7	16.6	59.4	26.1	20.6	72.1	15.1	7.8
LnGrp LOS	C			D	C	B	E	C	C	E	B	A
Approach Vol, veh/h		123			669			797			684	
Approach Delay, s/veh		30.3			31.2			24.9			45.1	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.7	20.0	20.0		15.3	6.3	33.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0		16.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		15.0	17.7	18.0		6.8	3.9	6.4
Green Ext Time (p_c), s		0.3	0.0	0.0		0.4	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	33.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	32	0	30	6	0	16	24	657	10	14	537	18
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	35	0	33	7	0	17	26	714	11	15	584	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1554	1551	743	1562	1556	870	678	0	0	800	0	0
Stage 1	699	699	-	847	847	-	-	-	-	-	-	-
Stage 2	855	852	-	715	709	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	92	113	413	90	112	349	900	-	-	810	-	-
Stage 1	429	440	-	355	377	-	-	-	-	-	-	-
Stage 2	351	375	-	420	436	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	73	94	363	69	94	307	844	-	-	759	-	-
Mov Cap-2 Maneuver	73	94	-	69	94	-	-	-	-	-	-	-
Stage 1	390	404	-	323	343	-	-	-	-	-	-	-
Stage 2	301	341	-	351	401	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	68.9	31.8	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	844	-	-	158	119	759	-	-
HCM Lane V/C Ratio	0.031	-	-	0.151	0.566	0.02	-	-
HCM Control Delay (s)	9.4	-	-	31.8	68.9	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	2.7	0.1	-	-

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	60	24	4	593	673	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	65	26	4	645	732	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1385	732	732	0	-	0
Stage 1	732	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	141	385	850	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	140	385	850	-	-	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	475	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.9	0.1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	850	-	171	-	-
HCM Lane V/C Ratio	0.005	-	0.534	-	-
HCM Control Delay (s)	9.3	-	47.9	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q(veh)	0	-	2.7	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	9	628	3	12	777
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	3	10	683	3	13	845

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1555	684	0	0	686	0
Stage 1	684	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	124	447	-	-	885	-
Stage 1	499	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	122	447	-	-	885	-
Mov Cap-2 Maneuver	122	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	402	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	268	885	-
HCM Lane V/C Ratio	-	-	0.049	0.015	-
HCM Control Delay (s)	-	-	19.1	9.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	27.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	130	3	43	4	2	13	18	455	3	18	658	73
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	141	3	47	4	2	14	20	495	3	20	715	79

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1297	1291	715	1314	1289	496	715	0	0	498	0	0
Stage 1	754	754	-	535	535	-	-	-	-	-	-	-
Stage 2	543	537	-	779	754	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 138	162	429	134	163	572	863	-	-	1041	-	0
Stage 1	400	416	-	527	522	-	-	-	-	-	-	0
Stage 2	522	521	-	387	416	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 127	152	429	112	153	572	863	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 127	152	-	112	153	-	-	-	-	-	-	-
Stage 1	387	403	-	510	505	-	-	-	-	-	-	-
Stage 2	491	504	-	331	403	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	209.5	19.7	0.4	0.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	863	-	-	154	266	1041	-
HCM Lane V/C Ratio	0.023	-	-	1.242	0.078	0.019	-
HCM Control Delay (s)	9.3	0	-	209.5	19.7	8.5	0
HCM Lane LOS	A	A	-	F	C	A	A
HCM 95th %tile Q(veh)	0.1	-	-	11.1	0.2	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	760	556	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	826	604	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	604	0	-	0	1430	604
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	826	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	950	-	-	-	145	489
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	422	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	950	-	-	-	145	489
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	422	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	950	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	27	23	50	710	533	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	29	25	54	772	579	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1484	604	629	0	-	0
Stage 1	604	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	137	496	929	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	129	496	929	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	544	-	-	-	-	-
Stage 2	381	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	17.9	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	929	-	334	-	-
HCM Lane V/C Ratio	0.059	-	0.163	-	-
HCM Control Delay (s)	9.1	-	17.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Summer Peak Hour Analysis Results

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	34	101	14	368	84	357	52	390	524	439	366	24
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.90	1.00		0.93	1.00		0.98
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	1845	1900	1776	1776	1776	1776	1776	1776	1810	1810	1810
Adj Flow Rate, veh/h	37	110	15	400	91	388	57	424	570	477	398	26
Adj No. of Lanes	0	1	0	1	1	1	1	2	1	1	2	1
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, %	3	3	3	7	7	7	7	7	7	5	5	5
Cap, veh/h	61	180	25	388	408	694	72	620	605	435	1355	826
Arrive On Green	0.15	0.15	0.15	0.23	0.23	0.23	0.04	0.18	0.18	0.25	0.39	0.39
Sat Flow, veh/h	404	1201	164	1691	1776	1361	1691	3374	1407	1723	3438	1509
Grp Volume(v), veh/h	162	0	0	400	91	388	57	424	570	477	398	26
Grp Sat Flow(s),veh/h/ln	1769	0	0	1691	1776	1361	1691	1687	1407	1723	1719	1509
Q Serve(g_s), s	7.5	0.0	0.0	20.0	3.6	18.0	2.9	10.2	16.0	22.0	6.9	0.7
Cycle Q Clear(g_c), s	7.5	0.0	0.0	20.0	3.6	18.0	2.9	10.2	16.0	22.0	6.9	0.7
Prop In Lane	0.23		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	266	0	0	388	408	694	72	620	605	435	1355	826
V/C Ratio(X)	0.61	0.00	0.00	1.03	0.22	0.56	0.80	0.68	0.94	1.10	0.29	0.03
Avail Cap(c_a), veh/h	325	0	0	388	408	694	136	620	605	435	1355	826
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	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	0.0	0.0	33.5	27.2	16.3	41.3	33.2	19.7	32.5	18.1	9.2
Incr Delay (d2), s/veh	2.3	0.0	0.0	53.5	0.3	1.0	17.8	3.1	23.2	71.5	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.8	0.0	0.0	15.1	1.8	6.9	1.7	5.0	17.5	19.0	3.3	0.4
LnGrp Delay(d),s/veh	36.9	0.0	0.0	87.1	27.5	17.3	59.1	36.3	42.9	104.1	18.2	9.2
LnGrp LOS	D			F	C	B	E	D	D	F	B	A
Approach Vol, veh/h		162			879			1051			901	
Approach Delay, s/veh		36.9			50.1			41.1			63.4	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.0	26.0	20.0		17.1	7.7	38.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		20.0	22.0	16.0		16.0	7.0	31.0
Max Q Clear Time (g_c+I1), s		22.0	24.0	18.0		9.5	4.9	8.9
Green Ext Time (p_c), s		0.0	0.0	0.0		0.4	0.0	9.1

Intersection Summary	
HCM 2010 Ctrl Delay	50.2
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	21.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	42	0	40	8	0	21	31	864	13	19	706	24
Conflicting Peds, #/hr	75	0	75	75	0	75	75	0	75	75	0	75
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
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, %	3	3	3	3	3	3	5	5	5	5	5	5
Mvmt Flow	46	0	43	9	0	23	34	939	14	21	767	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1997	1993	930	2007	1999	1096	868	0	0	1028	0	0
Stage 1	897	897	-	1089	1089	-	-	-	-	-	-	-
Stage 2	1100	1096	-	918	910	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.15	-	-	4.15	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.245	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 45	60	323	44	60	258	763	-	-	664	-	-
Stage 1	333	357	-	260	290	-	-	-	-	-	-	-
Stage 2	256	288	-	324	352	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 33	49	284	31	49	227	715	-	-	623	-	-
Mov Cap-2 Maneuver	~ 33	49	-	31	49	-	-	-	-	-	-	-
Stage 1	297	323	-	232	259	-	-	-	-	-	-	-
Stage 2	206	257	-	249	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 427.6	72.8	0.4	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	715	-	-	83	58	623	-	-
HCM Lane V/C Ratio	0.047	-	-	0.38	1.537	0.033	-	-
HCM Control Delay (s)	10.3	-	-	72.8	$ 427.6	11	-	-
HCM Lane LOS	B	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.5	8	0.1	-	-

Notes

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

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection	
Int Delay, s/veh	16.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	78	31	6	780	885	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	25	25	7	7	7	7
Mvmt Flow	85	34	7	848	962	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1823	962	962	0	-	0
Stage 1	962	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Critical Hdwy	6.65	6.45	4.17	-	-	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.525	2.263	-	-	-
Pot Cap-1 Maneuver	~ 74	281	696	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 73	281	696	-	-	-
Mov Cap-2 Maneuver	~ 73	-	-	-	-	-
Stage 1	337	-	-	-	-	-
Stage 2	374	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	272.8	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	696	-	92	-	-
HCM Lane V/C Ratio	0.009	-	1.288	-	-
HCM Control Delay (s)	10.2	-	272.8	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0	-	8.5	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	12	826	3	15	1022
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	82	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	4	13	898	3	16	1111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2042	899	0	0	901	0
Stage 1	899	-	-	-	-	-
Stage 2	1143	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.17	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.263	-
Pot Cap-1 Maneuver	62	336	-	-	734	-
Stage 1	396	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	61	336	-	-	734	-
Mov Cap-2 Maneuver	61	-	-	-	-	-
Stage 1	396	-	-	-	-	-
Stage 2	296	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.6	0	0.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	158	734	-
HCM Lane V/C Ratio	-	-	0.11	0.022	-
HCM Control Delay (s)	-	-	30.6	10	-
HCM Lane LOS	-	-	D	B	-
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Int Delay, s/veh	147.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	171	3	56	6	2	17	23	599	4	23	866	96
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	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	7	7	7	7	7	7
Mvmt Flow	186	3	61	7	2	18	25	651	4	25	941	104

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1705	1696	941	1726	1694	653	941	0	0	655	0	0
Stage 1	991	991	-	703	703	-	-	-	-	-	-	-
Stage 2	714	705	-	1023	991	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.17	-	-	4.17	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.263	-	-	2.263	-	-
Pot Cap-1 Maneuver	~ 72	92	318	69	92	466	709	-	-	909	-	0
Stage 1	295	323	-	427	438	-	-	-	-	-	-	0
Stage 2	421	438	-	283	323	-	-	-	-	-	-	0
Platoon blocked, %								-	-		-	
Mov Cap-1 Maneuver	~ 62	82	318	50	82	466	709	-	-	909	-	-
Mov Cap-2 Maneuver	~ 62	82	-	50	82	-	-	-	-	-	-	-
Stage 1	279	304	-	404	414	-	-	-	-	-	-	-
Stage 2	380	414	-	213	304	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1126.4	37.4	0.4	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	709	-	-	77	138	909	-
HCM Lane V/C Ratio	0.035	-	-	3.247	0.197	0.028	-
HCM Control Delay (s)	10.3	0		$ 1126.4	37.4	9.1	0
HCM Lane LOS	B	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	25.3	0.7	0.1	-

Notes

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	0	1000	732	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	0	1087	796	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	796	0	-	0	1883	796
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	1087	-
Critical Hdwy	4.17	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.263	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	804	-	-	-	76	379
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	804	-	-	-	76	379
Mov Cap-2 Maneuver	-	-	-	-	76	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	316	-

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

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	804	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	SBL	SBR	NEL	NET	SWT	SWR
Vol, veh/h	35	30	65	935	702	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	7	7	7	7
Mvmt Flow	38	33	71	1016	763	66

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1954	796	829	0	-	0
Stage 1	796	-	-	-	-	-
Stage 2	1158	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.17	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.263	-	-	-
Pot Cap-1 Maneuver	70	385	781	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	64	385	781	-	-	-
Mov Cap-2 Maneuver	181	-	-	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	271	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	26.1	0.7	0
HCM LOS	D		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT	SWR
Capacity (veh/h)	781	-	240	-	-
HCM Lane V/C Ratio	0.09	-	0.294	-	-
HCM Control Delay (s)	10.1	-	26.1	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	-	-

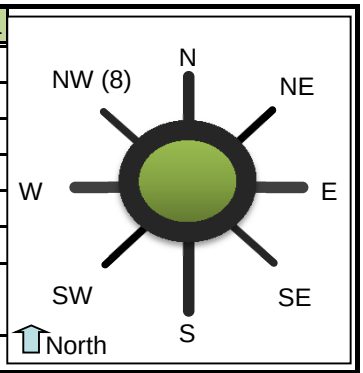
Design Year (2038) Operations: Alternative 6A

Average Annual Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Average Annual
County/District:	Placer County
Intersection:	Alt 6A Old Wye



Volumes

	Entry Legs (FROM)							
	N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO) N (1), vph								
NE (2), vph								
E (3), vph								
SE (4), vph								
S (5), vph					372			
SW (6), vph								
W (7), vph						278		
NW (8), vph								
Entry Volume, vph	0	0	0	0	372	278	0	0

	S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
N (1), vph								
NE (2), vph								
E (3), vph		303			316			
SE (4), vph								
S (5), vph						436		
SW (6), vph								
W (7), vph	312							
NW (8), vph								
Entry Volume, vph	312	303	0	0	316	436	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.988	1.000	0.941	1.000	0.982	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #								
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	352	0	368	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	425	0	0	0	507	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	317	0	363	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	742	0	715	0	875	0
Entry flow Lane 1, pcu/h	0	0	425	0	363	0	368	0
Entry flow Lane 2, pcu/h	0	0	317	0	352	0	507	0
Conflicting flow, pcu/h	0	0	363	0	368	0	425	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	810	825	754	768	754	770
Entry Flow Rates, veh/h	NA	NA	404	302	339	329	343	474
V/C ratio	#VALUE!	#VALUE!	**0.50**	**0.37**	**0.45**	**0.43**	**0.46**	**0.62**
Control Delay, s/veh	#VALUE!	#VALUE!	**11.3**	**8.7**	**10.9**	**10.3**	**11.0**	**14.9**
LOS	#VALUE!	#VALUE!	B	A	B	B	B	B
95th % Queue (ft)	#VALUE!	#VALUE!	**74**	**44**	**63**	**58**	**64**	**115**
Approach Delay, LOS	#VALUE!		10.2 sec, LOS B		10.6 sec, LOS B		13.3 sec, LOS B	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	910	982	846	913	838	908
Entry Flow Rates, veh/h	NA	NA	404	302	339	329	343	474
V/C ratio	#VALUE!	#VALUE!	**0.44**	**0.31**	**0.40**	**0.36**	**0.41**	**0.52**
Control Delay, s/veh	#VALUE!	#VALUE!	**9.3**	**6.8**	**9.1**	**7.9**	**9.3**	**10.8**
LOS	#VALUE!	#VALUE!	A	A	A	A	A	B
95th % Queue (ft)	#VALUE!	#VALUE!	**61**	**34**	**52**	**44**	**54**	**83**
Approach Delay, LOS	#VALUE!		8.2 sec, LOS A		8.5 sec, LOS A		10.2 sec, LOS B	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
******Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.***						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.2

Old Wye 2038 AA EF = 1.2
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: SR 89											
3	L2	339	7.0	0.388	12.5	LOS B	2.3	61.4	0.61	0.76	34.0
18	R2	329	7.0	0.380	5.9	LOS A	2.3	59.7	0.60	0.67	35.6
Approach		668	7.0	0.388	9.3	LOS A	2.3	61.4	0.61	0.71	34.8
East: SR 28											
1	L2	404	5.0	0.450	12.5	LOS B	2.8	72.4	0.62	0.77	34.0
6	T1	302	5.0	0.363	5.5	LOS A	2.0	53.1	0.58	0.54	36.9
Approach		707	5.0	0.450	9.5	LOS A	2.8	72.4	0.61	0.67	35.2
West: SR 89											
2	T1	343	7.0	0.449	6.7	LOS A	2.9	77.7	0.70	0.67	36.4
12	R2	474	7.0	0.559	7.8	LOS A	4.6	121.1	0.76	0.81	35.0
Approach		817	7.0	0.559	7.4	LOS A	4.6	121.1	0.73	0.75	35.6
All Vehicles		2192	6.4	0.559	8.6	LOS A	4.6	121.1	0.65	0.71	35.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2038 AA EF = 1.1

Old Wye 2038 AA EF = 1.1
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: SR 89											
3	L2	339	7.0	0.345	12.1	LOS B	2.1	54.4	0.57	0.73	34.1
18	R2	329	7.0	0.358	5.7	LOS A	2.1	55.8	0.59	0.65	35.7
Approach		668	7.0	0.358	9.0	LOS A	2.1	55.8	0.58	0.69	34.8
East: SR 28											
1	L2	404	5.0	0.401	12.1	LOS B	2.4	63.5	0.58	0.74	34.1
6	T1	302	5.0	0.337	5.2	LOS A	1.9	48.9	0.56	0.51	37.0
Approach		707	5.0	0.401	9.2	LOS A	2.4	63.5	0.57	0.64	35.3
West: SR 89											
2	T1	343	7.0	0.413	6.1	LOS A	2.6	69.0	0.67	0.60	36.5
12	R2	474	7.0	0.494	6.5	LOS A	3.6	95.4	0.70	0.73	35.4
Approach		817	7.0	0.494	6.3	LOS A	3.6	95.4	0.69	0.68	35.9
All Vehicles		2192	6.4	0.494	8.1	LOS A	3.6	95.4	0.62	0.67	35.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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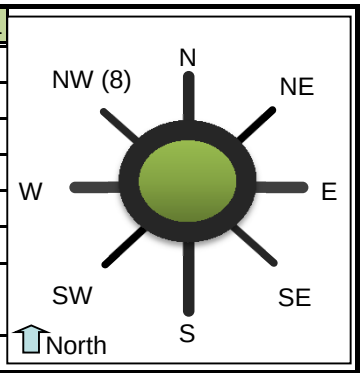
Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection:	Alt 6A Old Wye



Volumes

Entry Legs (FROM)

	N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO) N (1), vph								
NE (2), vph								
E (3), vph								
SE (4), vph								
S (5), vph					489			
SW (6), vph								
W (7), vph						366		
NW (8), vph								
Entry Volume, vph	0	0	0	0	489	366	0	0

	S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
N (1), vph								
NE (2), vph								
E (3), vph		399			415			
SE (4), vph								
S (5), vph						573		
SW (6), vph								
W (7), vph	410							
NW (8), vph								
Entry Volume, vph	410	399	0	0	415	573	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.990	1.000	0.951	1.000	0.986	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #								
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	464	0	483	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	558	0	0	0	666	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	418	0	477	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	976	0	941	0	1149	0
Entry flow Lane 1, pcu/h	0	0	558	0	477	0	483	0
Entry flow Lane 2, pcu/h	0	0	418	0	464	0	666	0
Conflicting flow, pcu/h	0	0	477	0	483	0	558	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	745	763	699	716	685	704
Entry Flow Rates, veh/h	NA	NA	532	398	446	434	451	623
V/C ratio	#VALUE!	#VALUE!	**0.71**	**0.52**	**0.64**	**0.61**	**0.66**	**0.88**
Control Delay, s/veh	#VALUE!	#VALUE!	**19.5**	**12.3**	**16.9**	**15.5**	**18.1**	**35.5**
LOS	#VALUE!	#VALUE!	C	B	C	C	C	E
95th % Queue (ft)	#VALUE!	#VALUE!	**160**	**80**	**123**	**110**	**132**	**294**
Approach Delay, LOS	#VALUE!		16.4 sec, LOS C		16.2 sec, LOS C		28.2 sec, LOS D	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	821	893	769	837	744	814
Entry Flow Rates, veh/h	NA	NA	532	398	446	434	451	623
V/C ratio	#VALUE!	#VALUE!	**0.65**	**0.45**	**0.58**	**0.52**	**0.61**	**0.76**
Control Delay, s/veh	#VALUE!	#VALUE!	**15.3**	**9.5**	**13.8**	**11.4**	**15.0**	**21.1**
LOS	#VALUE!	#VALUE!	C	A	B	B	C	C
95th % Queue (ft)	#VALUE!	#VALUE!	**128**	**61**	**101**	**81**	**111**	**199**
Approach Delay, LOS	#VALUE!		12.8 sec, LOS B		12.6 sec, LOS B		18.5 sec, LOS C	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
******Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.***						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

MOVEMENT SUMMARY

Site: Old Wye 2038 Summer EF = 1.2

Old Wye 2038 Summer EF = 1.2
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: SR 89											
3	L2	446	7.0	0.583	15.1	LOS C	4.9	129.9	0.81	0.93	33.2
18	R2	434	7.0	0.580	8.5	LOS A	4.8	127.5	0.81	0.89	34.6
Approach		879	7.0	0.583	11.9	LOS B	4.9	129.9	0.81	0.91	33.9
East: SR 28											
1	L2	532	5.0	0.669	16.2	LOS C	6.5	168.5	0.85	0.97	32.8
6	T1	398	5.0	0.546	7.8	LOS A	4.1	107.8	0.77	0.81	36.1
Approach		929	5.0	0.669	12.6	LOS B	6.5	168.5	0.82	0.91	34.1
West: SR 89											
2	T1	451	7.0	0.706	12.9	LOS B	7.4	195.3	0.94	1.09	33.8
12	R2	623	7.0	0.868	19.6	LOS C	14.2	375.5	1.00	1.29	29.5
Approach		1074	7.0	0.868	16.8	LOS C	14.2	375.5	0.97	1.20	31.2
All Vehicles		2883	6.4	0.868	14.0	LOS B	14.2	375.5	0.87	1.02	32.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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MOVEMENT SUMMARY

Site: Old Wye 2038 Summer EF = 1.1

Old Wye 2038 Summer EF = 1.1
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: SR 89											
3	L2	446	7.0	0.514	13.7	LOS B	4.0	104.7	0.76	0.85	33.6
18	R2	434	7.0	0.541	7.7	LOS A	4.3	113.2	0.78	0.84	35.0
Approach		879	7.0	0.541	10.7	LOS B	4.3	113.2	0.77	0.85	34.3
East: SR 28											
1	L2	532	5.0	0.589	14.3	LOS B	5.1	132.0	0.79	0.89	33.6
6	T1	398	5.0	0.502	6.9	LOS A	3.6	93.4	0.74	0.71	36.3
Approach		929	5.0	0.589	11.2	LOS B	5.1	132.0	0.77	0.81	34.7
West: SR 89											
2	T1	451	7.0	0.642	10.7	LOS B	6.2	163.0	0.89	0.99	35.0
12	R2	623	7.0	0.756	12.7	LOS B	9.7	255.8	0.97	1.09	32.5
Approach		1074	7.0	0.756	11.8	LOS B	9.7	255.8	0.94	1.05	33.5
All Vehicles		2883	6.4	0.756	11.3	LOS B	9.7	255.8	0.83	0.91	34.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: 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.

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Opening Day (2018) Operations

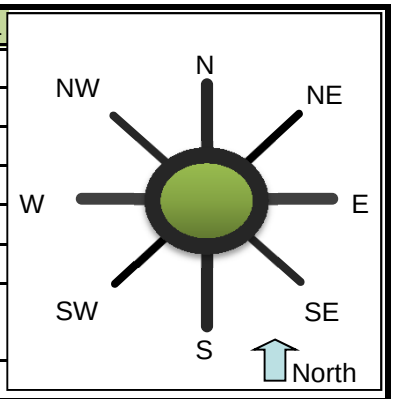
Opening Day (2018) 5th Peak Hour Operations: Alternative 2

Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							314	
	SE (4), vph								
	S (5), vph			363					
	SW (6), vph								
	W (7), vph			342		292			
	NW (8), vph								
Output	Total Vehicles	0	0	705	0	292	0	314	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	365	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	414	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	390	0	340	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	805	0	340	0	365	0
Conflicting flow, pcu/h	0	0	340	0	365	0	414	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	766	NA	733	NA	698	NA
Entry Flow Rates, vph	NA	NA	766	NA	317	NA	341	NA
V/C ratio			**1.00**		**0.43**		**0.49**	
Control Delay, s/veh			**56**		**11**		**12**	
LOS			F		B		B	
95th % Queue (ft)			**445**		**59**		**72**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	930	NA	889	NA	845	NA
Entry Flow Rates, vph	NA	NA	766	NA	317	NA	341	NA
V/C ratio			**0.87**		**0.38**		**0.43**	
Control Delay, sec/pcu			**27**		**8**		**10**	
LOS			D		A		A	
95th % Queue (ft)			**295**		**48**		**59**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**521**	**443**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	606	515				
Conflicting Flow, pcu/hr	414	365				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	845	889				
Flow Rates of Exiting Traffic, vph	566	482				
V/C ratio	**0.67**	**0.58**				
Control Delay, s/veh	**15.8**	**12.4**				
LOS	C	B				
95th % Queue (ft)	**141**	**102**				
Approach w/Bypass Delay, s/veh	***14.5***	***11.7***				
Approach w/Bypass LOS	*B*	*B*				

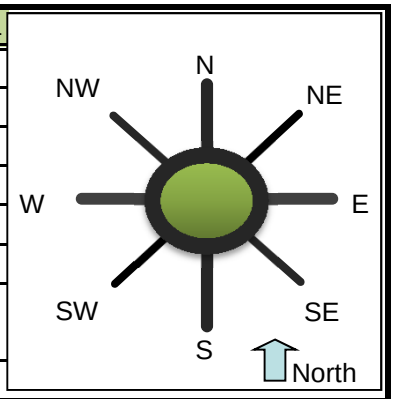
Opening Day (2018) 5th Peak Hour Operations: Alternative 3

Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2018, Summer
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							314	
	SE (4), vph								
	S (5), vph			353					
	SW (6), vph								
	W (7), vph			317		292			
	NW (8), vph								
Output	Total Vehicles	0	0	670	0	292	0	314	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	365	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	403	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	362	0	340	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	765	0	340	0	365	0
Conflicting flow, pcu/h	0	0	340	0	365	0	403	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	766	NA	733	NA	706	NA
Entry Flow Rates, vph	NA	NA	728	NA	317	NA	341	NA
V/C ratio			**0.95**		**0.43**		**0.48**	
Control Delay, s/veh			**44**		**11**		**12**	
LOS			E		B		B	
95th % Queue (ft)			**376**		**59**		**71**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	930	NA	889	NA	855	NA
Entry Flow Rates, vph	NA	NA	728	NA	317	NA	341	NA
V/C ratio			**0.82**		**0.38**		**0.43**	
Control Delay, sec/pcu			**23**		**8**		**9**	
LOS			C		A		A	
95th % Queue (ft)			**250**		**48**		**58**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

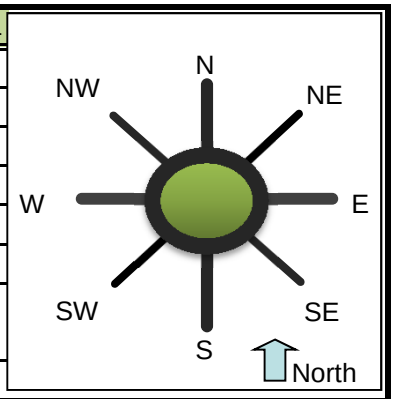
Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**521**	**424**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	606	493				
Conflicting Flow, pcu/hr	403	365				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	855	889				
Flow Rates of Exiting Traffic, vph	566	461				
V/C ratio	**0.66**	**0.55**				
Control Delay, s/veh	**15.4**	**11.8**				
LOS	C	B				
95th % Queue (ft)	**138**	**93**				
Approach w/Bypass Delay, s/veh	***14.2***	***11.4***				
Approach w/Bypass LOS	*B*	*B*				

Design Year (2038) Operations

Design Year (2038) 5th Peak Hour Operations: Alternative 1

Summer Peak Hour Analysis Results

General & Site Information	v2.1
Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					249		24	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	264						675	
	SW (6), vph								
	W (7), vph	42				475			
	NW (8), vph								
Output	Total Vehicles	306	0	0	0	724	0	699	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	290	0	28	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	301	0	0	0	0	0	785	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	48	0	0	0	552	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	349	0	0	0	842	0	813	0
Conflicting flow, pcu/h	552	0	0	0	28	0	301	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	619	NA	NA	NA	1027	NA	781	NA
Entry Flow Rates, vph	333	NA	NA	NA	787	NA	760	NA
V/C ratio	**0.54**				**0.77**		**0.97**	
Control Delay, s/veh	**15**				**18**		**49**	
LOS	C				C		E	
95th % Queue (ft)	**84**				**209**		**417**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	748	NA	NA	NA	1254	NA	948	NA
Entry Flow Rates, vph	333	NA	NA	NA	787	NA	760	NA
V/C ratio	**0.47**				**0.67**		**0.86**	
Control Delay, sec/pcu	**11**				**12**		**26**	
LOS	B				B		D	
95th % Queue (ft)	**66**				**148**		**293**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

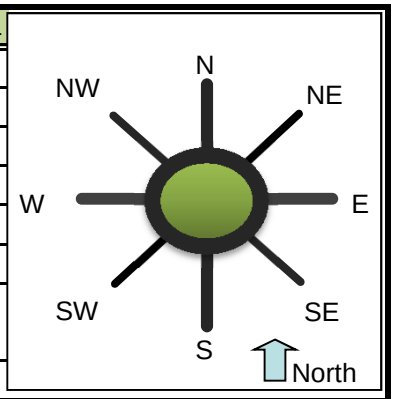
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 Old Wye



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			27		36		75	
	NE (2), vph								
	E (3), vph	41				172		497	
	SE (4), vph								
	S (5), vph	44		239				87	
	SW (6), vph								
	W (7), vph	54		495		100			
	NW (8), vph								
Output	Total Vehicles	139	0	761	0	308	0	659	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	97%	100%	95%	100%	95%	100%	95%	100%
% Heavy Vehicles	3%	0%	5%	0%	5%	0%	5%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	60	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.971	1.000	0.952	1.000	0.952	1.000	0.952	1.000
F_{ped}	1.000	1.000	0.998	1.000	0.990	1.000	0.997	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	31	0	41	0	86	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	46	0	0	0	196	0	567	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	49	0	273	0	0	0	99	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	60	0	565	0	114	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	156	0	869	0	352	0	752	0
Conflicting flow, pcu/h	952	0	241	0	699	0	368	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	424	NA	844	NA	530	NA	742	NA
Entry Flow Rates, vph	151	NA	827	NA	335	NA	716	NA
V/C ratio	**0.36**		**0.98**		**0.63**		**0.96**	
Control Delay, s/veh	**15**		**48**		**21**		**48**	
LOS	B		E		C		E	
95th % Queue (ft)	**41**		**435**		**115**		**390**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	507	NA	1026	NA	638	NA	900	NA
Entry Flow Rates, vph	151	NA	827	NA	335	NA	716	NA
V/C ratio	**0.31**		**0.85**		**0.55**		**0.84**	
Control Delay, sec/pcu	**12**		**24**		**15**		**25**	
LOS	B		C		C		C	
95th % Queue (ft)	**33**		**281**		**88**		**261**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

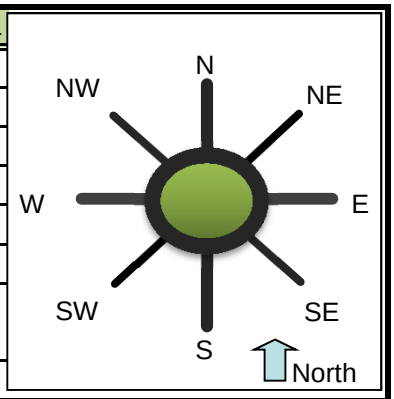
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 1 West Roundabout w/ EBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph					222		466	
	SE (4), vph								
	S (5), vph			245					
	SW (6), vph								
	W (7), vph			375		295			
	NW (8), vph								
Output	Total Vehicles	0	0	620	0	517	0	466	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	258	0	542	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	280	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	428	0	343	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	708	0	601	0	542	0
Conflicting flow, pcu/h	0	0	343	0	542	0	280	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	764	NA	614	NA	798	NA
Entry Flow Rates, vph	NA	NA	674	NA	562	NA	507	NA
V/C ratio			**0.88**		**0.91**		**0.63**	
Control Delay, s/veh			**33**		**44**		**15**	
LOS			D		E		C	
95th % Queue (ft)			**295**		**311**		**124**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	926	NA	742	NA	970	NA
Entry Flow Rates, vph	NA	NA	674	NA	562	NA	507	NA
V/C ratio			**0.76**		**0.81**		**0.56**	
Control Delay, sec/pcu			**19**		**26**		**11**	
LOS			C		D		B	
95th % Queue (ft)			**199**		**230**		**95**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

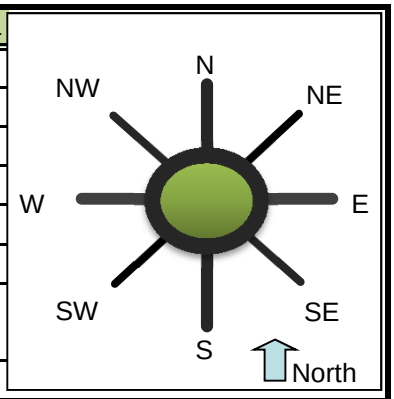
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**					
Select Exit Leg for Bypass (TO)	**S (5)**					
Does the bypass have a dedicated receiving lane?	**No**					
Volumes						
Right Turn Volume removed from Entry Leg	**454**					
Volume Characteristics (for entry leg)						
PHF	0.92					
F_{HV}	0.93					
F_{ped}	1.00					
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	528					
Conflicting Flow, pcu/hr	280					
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	970					
Flow Rates of Exiting Traffic, vph	493					
V/C ratio	**0.51**					
Control Delay, s/veh	**10.0**					
LOS	B					
95th % Queue (ft)	**79**					
Approach w/Bypass Delay, s/veh	***12.6***					
Approach w/Bypass LOS	*B*					

Design Year (2038) 5th Peak Hour Operations: Alternative 2

Summer Peak Hour Analysis Results

General & Site Information	v2.1
Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 2 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					8		67	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	33						912	
	SW (6), vph								
	W (7), vph	96				716			
	NW (8), vph								
Output	Total Vehicles	129	0	0	0	724	0	979	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	9	0	78	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	38	0	0	0	0	0	1061	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	110	0	0	0	833	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	147	0	0	0	842	0	1139	0
Conflicting flow, pcu/h	833	0	0	0	78	0	38	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	468	NA	NA	NA	977	NA	1017	NA
Entry Flow Rates, vph	140	NA	NA	NA	787	NA	1064	NA
V/C ratio	**0.30**				**0.81**		**1.05**	
Control Delay, s/veh	**12**				**21**		**61**	
LOS	B				C		F	
95th % Queue (ft)	**33**				**241**		**619**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	562	NA	NA	NA	1191	NA	1241	NA
Entry Flow Rates, vph	140	NA	NA	NA	787	NA	1064	NA
V/C ratio	**0.26**				**0.71**		**0.92**	
Control Delay, sec/pcu	**10**				**13**		**28**	
LOS	A				B		D	
95th % Queue (ft)	**27**				**169**		**407**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

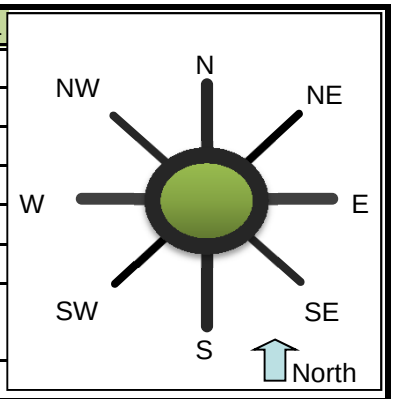
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 2 West Roundabout w/ EBR & NBR Bypass



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							347	
	SE (4), vph								
	S (5), vph			402					
	SW (6), vph								
	W (7), vph			378		322			
	NW (8), vph								
Output	Total Vehicles	0	0	780	0	322	0	347	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	404	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	459	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	431	0	375	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	890	0	375	0	404	0
Conflicting flow, pcu/h	0	0	375	0	404	0	459	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	740	NA	705	NA	667	NA
Entry Flow Rates, vph	NA	NA	848	NA	350	NA	377	NA
V/C ratio			**1.15**		**0.50**		**0.57**	
Control Delay, s/veh			**102**		**13**		**15**	
LOS			F		B		B	
95th % Queue (ft)			**677**		**74**		**95**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	897	NA	855	NA	808	NA
Entry Flow Rates, vph	NA	NA	848	NA	350	NA	377	NA
V/C ratio			**0.99**		**0.44**		**0.50**	
Control Delay, sec/pcu			**50**		**10**		**11**	
LOS			E		A		B	
95th % Queue (ft)			**469**		**60**		**76**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**575**	**489**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	669	569				
Conflicting Flow, pcu/hr	459	404				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	808	855				
Flow Rates of Exiting Traffic, vph	625	532				
V/C ratio	**0.77**	**0.67**				
Control Delay, s/veh	**21.8**	**15.5**				
LOS	C	C				
95th % Queue (ft)	**205**	**139**				
Approach w/Bypass Delay, s/veh	***19.2***	***14.3***				
Approach w/Bypass LOS	*C*	*B*				

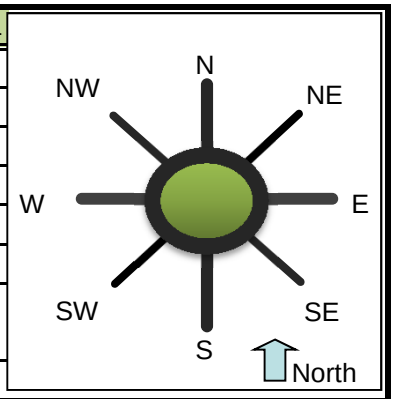
Design Year (2038) 5th Peak Hour Operations: Alternative 3

Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 3 East Roundabout



Volumes		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
	N (1), vph					5		32	
Exit	NE (2), vph								
Legs	E (3), vph								
(TO)	SE (4), vph								
	S (5), vph	28						934	
	SW (6), vph								
	W (7), vph	72				719			
	NW (8), vph								
Output	Total Vehicles	100	0	0	0	724	0	966	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	95%	100%	100%	100%	93%	100%	93%	100%
% Heavy Vehicles	5%	0%	0%	0%	7%	0%	7%	0%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	0.952	1.000	1.000	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	6	0	37	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	0	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	32	0	0	0	0	0	1086	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	82	0	0	0	836	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	114	0	0	0	842	0	1124	0
Conflicting flow, pcu/h	836	0	0	0	37	0	32	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	466	NA	NA	NA	1017	NA	1023	NA
Entry Flow Rates, vph	109	NA	NA	NA	787	NA	1050	NA
V/C ratio	**0.23**				**0.77**		**1.03**	
Control Delay, s/veh	**11**				**18**		**55**	
LOS	B				C		F	
95th % Queue (ft)	**23**				**214**		**578**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	560	NA	NA	NA	1242	NA	1248	NA
Entry Flow Rates, vph	109	NA	NA	NA	787	NA	1050	NA
V/C ratio	**0.20**				**0.68**		**0.90**	
Control Delay, sec/pcu	**9**				**12**		**26**	
LOS	A				B		D	
95th % Queue (ft)	**20**				**152**		**379**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

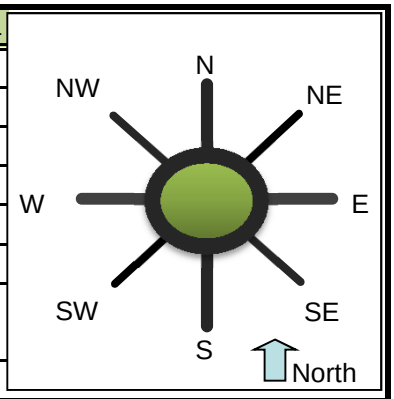
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	9/25/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection Name:	Alt 3 West Roundabout w/ EBR & NBR Bypass



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph							347	
	SE (4), vph								
	S (5), vph			390					
	SW (6), vph								
	W (7), vph			351		322			
	NW (8), vph								
Output	Total Vehicles	0	0	741	0	322	0	347	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycle	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{HV}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	0	0	0	0	0	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	0	0	0	0	0	0	404	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	0	0	445	0	0	0	0	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	0	0	401	0	375	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	0	0	846	0	375	0	404	0
Conflicting flow, pcu/h	0	0	375	0	404	0	445	0

Roundabout Type	Standard Single Lane or Urban Compact
Enter type here…	Standard Single Lane

Results: Approach Measures of Effectiveness

HCM 2010 Model (build)	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	NA	NA	740	NA	705	NA	677	NA
Entry Flow Rates, vph	NA	NA	805	NA	350	NA	377	NA
V/C ratio			**1.09**		**0.50**		**0.56**	
Control Delay, s/veh			**82**		**13**		**15**	
LOS			F		B		B	
95th % Queue (ft)			**576**		**74**		**93**	
Calibrated Model (future)	**N**	**NE**	**E**	**SE**	**S**	**SW**	**W**	**NW**
Entry Capacity, vph	NA	NA	897	NA	855	NA	819	NA
Entry Flow Rates, vph	NA	NA	805	NA	350	NA	377	NA
V/C ratio			**0.94**		**0.44**		**0.49**	
Control Delay, sec/pcu			**39**		**10**		**11**	
LOS			E		A		B	
95th % Queue (ft)			**391**		**60**		**74**	

Notes: v2.1

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)	**W (7)**	**S (5)**				
Select Exit Leg for Bypass (TO)	**S (5)**	**E (3)**				
Does the bypass have a dedicated receiving lane?	**No**	**No**				
Volumes						
Right Turn Volume removed from Entry Leg	**575**	**469**				
Volume Characteristics (for entry leg)						
PHF	0.92	0.92				
F_{HV}	0.93	0.93				
F_{ped}	1.00	1.00				
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr	669	545				
Conflicting Flow, pcu/hr	445	404				
Bypass Lane Results (HCM 2010 Model)						
Entry Capacity of Bypass, vph	819	855				
Flow Rates of Exiting Traffic, vph	625	510				
V/C ratio	**0.76**	**0.64**				
Control Delay, s/veh	**20.9**	**14.5**				
LOS	C	B				
95th % Queue (ft)	**198**	**126**				
Approach w/Bypass Delay, s/veh	***18.5***	***13.7***				
Approach w/Bypass LOS	*C*	*B*				

Design Year (2038) Operations

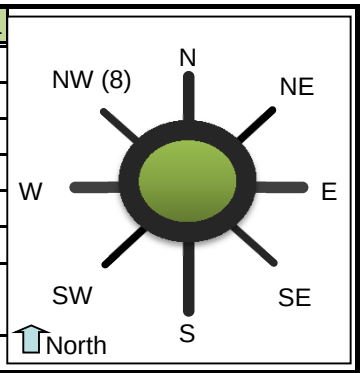
Design Year (2038) Operations: Alternative 2 Mitigation

Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	12/11/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection:	Alt 2 West Roundabout, 2-lane Roundabout



Volumes

		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph								
	SE (4), vph								
	S (5), vph					436			
	SW (6), vph								
	W (7), vph						411		
	NW (8), vph								
	Entry Volume, vph	0	0	0	0	436	411	0	0

		S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
	N (1), vph								
	NE (2), vph								
	E (3), vph		531			377			
	SE (4), vph								
	S (5), vph						625		
	SW (6), vph								
	W (7), vph	350							
	NW (8), vph								
	Entry Volume, vph	350	531	0	0	377	625	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.989	1.000	0.947	1.000	0.984	1.000

Entry/Conflicting Flows		N	NE	E	SE	S	SW	W	NW
Flow to	N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #									
	NE (2), pcu/h	0	0	0	0	0	0	0	0
	E (3), pcu/h	0	0	0	0	618	0	438	0
	SE (4), pcu/h	0	0	0	0	0	0	0	0
	S (5), pcu/h	0	0	498	0	0	0	727	0
	SW (6), pcu/h	0	0	0	0	0	0	0	0
	W (7), pcu/h	0	0	469	0	407	0	0	0
	NW (8), pcu/h	0	0	0	0	0	0	0	0
	Entry flow, pcu/h	0	0	967	0	1025	0	1165	0
	Entry flow Lane 1, pcu/h	0	0	498	0	407	0	438	0
	Entry flow Lane 2, pcu/h	0	0	469	0	618	0	727	0
	Conflicting flow, pcu/h	0	0	407	0	438	0	498	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	784	800	720	736	715	734
Entry Flow Rates, veh/h	NA	NA	474	447	380	577	410	679
V/C ratio	#VALUE!	#VALUE!	**0.60**	**0.56**	**0.53**	**0.78**	**0.57**	**0.93**
Control Delay, s/veh	#VALUE!	#VALUE!	**14.4**	**12.8**	**13.1**	**24.2**	**14.4**	**41.1**
LOS	#VALUE!	#VALUE!	B	B	B	C	B	E
95th % Queue (ft)	#VALUE!	#VALUE!	**109**	**92**	**84**	**210**	**98**	**346**
Approach Delay, LOS	#VALUE!		13.6 sec, LOS B		19.8 sec, LOS C		31.1 sec, LOS D	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	874	946	798	865	785	855
Entry Flow Rates, veh/h	NA	NA	474	447	380	577	410	679
V/C ratio	#VALUE!	#VALUE!	**0.54**	**0.47**	**0.48**	**0.67**	**0.52**	**0.79**
Control Delay, s/veh	#VALUE!	#VALUE!	**11.6**	**9.5**	**10.9**	**15.4**	**12.1**	**22.3**
LOS	#VALUE!	#VALUE!	B	A	B	C	B	C
95th % Queue (ft)	#VALUE!	#VALUE!	**87**	**68**	**70**	**140**	**82**	**224**
Approach Delay, LOS	#VALUE!		10.6 sec, LOS B		13.6 sec, LOS B		18.4 sec, LOS C	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

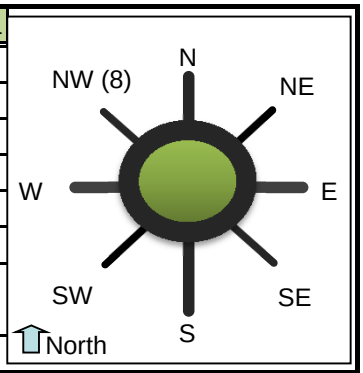
Design Year (2038) Operations: Alternative 3 Mitigation

Summer Peak Hour Analysis Results

General & Site Information

v2.1

Analyst:	Venu Parimi
Agency/Co:	CH2M HILL
Date:	12/11/2014
Project or PI#:	Truckee River Bridge
Year, Peak Hour:	2038, Summer
County/District:	Placer County
Intersection:	Alt 3 West Roundabout, 2-lane Roundabout



Volumes

		Entry Legs (FROM)							
		N1 (1)	N2 (1)	NE1 (2)	NE2 (2)	E1 (3)	E2 (3)	SE1 (4)	SE2 (4)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
Exit Legs (TO)	N (1), vph								
	NE (2), vph								
	E (3), vph								
	SE (4), vph								
	S (5), vph					424			
	SW (6), vph								
	W (7), vph						381		
	NW (8), vph								
	Entry Volume, vph	0	0	0	0	424	381	0	0

		S1 (5)	S2 (5)	SW1 (6)	SW2 (6)	W1 (7)	W2 (7)	NW1 (8)	NW2 (8)
Lane Designation		SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT
	N (1), vph								
	NE (2), vph								
	E (3), vph		509			377			
	SE (4), vph								
	S (5), vph						625		
	SW (6), vph								
	W (7), vph	350							
	NW (8), vph								
	Entry Volume, vph	350	509	0	0	377	625	0	0

	N	NE	E	SE	S	SW	W	NW
# of Entry Flow Lanes	0	0	2	0	2	0	2	0
# of Conflict Flow Lanes	2	2	2	2	2	2	2	2

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	98%	98%	95%	98%	93%	98%	93%	98%
% Heavy Vehicles	2%	2%	5%	2%	7%	2%	7%	2%
% Bicycles	0%	0%	0%	0%	0%	0%	0%	0%
# of Pedestrians **(ped/hr)**	0	0	15	0	75	0	25	0
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
F_{hv}	1.000	1.000	0.952	1.000	0.935	1.000	0.935	1.000
F_{ped}	1.000	1.000	0.989	1.000	0.947	1.000	0.984	1.000

Entry/Conflicting Flows		N	NE	E	SE	S	SW	W	NW
Flow to	N (1), pcu/h	0	0	0	0	0	0	0	0

Leg #									
	NE (2), pcu/h	0	0	0	0	0	0	0	0
	E (3), pcu/h	0	0	0	0	592	0	438	0
	SE (4), pcu/h	0	0	0	0	0	0	0	0
	S (5), pcu/h	0	0	484	0	0	0	727	0
	SW (6), pcu/h	0	0	0	0	0	0	0	0
	W (7), pcu/h	0	0	435	0	407	0	0	0
	NW (8), pcu/h	0	0	0	0	0	0	0	0
	Entry flow, pcu/h	0	0	919	0	999	0	1165	0
	Entry flow Lane 1, pcu/h	0	0	484	0	407	0	438	0
	Entry flow Lane 2, pcu/h	0	0	435	0	592	0	727	0
	Conflicting flow, pcu/h	0	0	407	0	438	0	484	0

Results: Approach Measures of Effectiveness

HCM 2010 Model *(build yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	784	800	720	736	723	740
Entry Flow Rates, veh/h	NA	NA	461	414	380	553	410	679
V/C ratio	#VALUE!	#VALUE!	**0.59**	**0.52**	**0.53**	**0.75**	**0.57**	**0.92**
Control Delay, s/veh	#VALUE!	#VALUE!	**13.9**	**11.8**	**13.1**	**21.9**	**14.1**	**39.4**
LOS	#VALUE!	#VALUE!	B	B	B	C	B	E
95th % Queue (ft)	#VALUE!	#VALUE!	**102**	**79**	**84**	**187**	**96**	**337**
Approach Delay, LOS	#VALUE!		12.9 sec, LOS B		18.3 sec, LOS C		29.9 sec, LOS D	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#VALUE!				#VALUE!	

Calibrated Model *(future yr)*	**N**		**E**		**S**		**W**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	874	946	798	865	795	865
Entry Flow Rates, veh/h	NA	NA	461	414	380	553	410	679
V/C ratio	#VALUE!	#VALUE!	**0.53**	**0.44**	**0.48**	**0.64**	**0.52**	**0.79**
Control Delay, s/veh	#VALUE!	#VALUE!	**11.3**	**8.9**	**10.9**	**14.4**	**11.8**	**21.5**
LOS	#VALUE!	#VALUE!	B	A	B	B	B	C
95th % Queue (ft)	#VALUE!	#VALUE!	**83**	**59**	**70**	**127**	**80**	**217**
Approach Delay, LOS	#VALUE!		10.1 sec, LOS B		13 sec, LOS B		17.8 sec, LOS C	
	NE		**SE**		**SW**		**NW**	
Lane Designations	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*	*Lane 1*	*Lane 2*
Entry Capacity, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
Entry Flow Rates, veh/h	NA	NA	NA	NA	NA	NA	NA	NA
V/C ratio			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Control Delay, sec/pcu			#VALUE!	#VALUE!			#VALUE!	#VALUE!
LOS			#VALUE!	#VALUE!			#VALUE!	#VALUE!
95th % Queue (ft)			#VALUE!	#VALUE!			#VALUE!	#VALUE!
Approach Delay, LOS			#N/A				#N/A	

v2.1

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
# of Conflicting Exit Flow Lanes	**2**	**2**	**2**	**2**	**2**	**2**
Volumes						
Entry Leg: Insert Right Turn Volume						
Exit Leg: ***(Select Input Method)***						
*Lane Flow in Exit Leg****						
Sum of inner circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
Sum of outer circulatory flow lane to exit leg (leg bypass merges into)	N/A	N/A	N/A	N/A	N/A	N/A
*Critical Lane Flow (Manual) in Exit Leg****						
Volume Characteristics						
PHF (Entry Leg)						
F_{HV} (Entry Leg)						
F_{ped}						
PHF (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
F_{HV} (Exit Leg)***	N/A	N/A	N/A	N/A	N/A	N/A
Volume Characteristics are already taken into account for Default method ONLY. Insert Values above if Manual method.						
Entry/Conflicting Flows						
Entry Flow						
Conflicting Critical Flow						
Bypass Lane Results						
Entry Capacity of Bypass, veh/h						
Flow Rates of Exiting Traffic, veh/h						
V/C ratio						
Control Delay, sec/pcu						
LOS						
95th % Queue (ft)						

Design Year (2038) Operations

Design Year (2038) Operations: Alternative 2 Mitigation

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	0.9	12.2	0.1	19	19	0.8
	10	0.4	7.0	0.0	23	23	0.4
	25	0.8	10.6	0.1	23	23	0.8
SR 89	3	5.0	17.5	0.1	20	21	4.4
Total		7.0	47.4	0.3	21	21	6.4

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	19	0.9	18	0.9	18	0.9	19
	23	0.4	23	0.4	23	0.4	23
	23	0.7	23	0.8	23	0.8	23
SR 89	21	4.7	18	7.3	20	5.0	22
Total	21	6.7	20	9.5	21	7.1	22

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.7	19	0.9
	0.4	23	0.4
	0.7	23	0.7
SR 89	3.5	21	4.2
Total	5.3	21	6.2

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	25	1.0	16.1	0.1	22	22	1.1
	10	0.6	10.4	0.1	23	23	0.5
	24	0.5	7.1	0.0	23	23	0.5
New SR 28	1	3.7	11.2	0.1	20	20	3.8
Total		5.7	44.7	0.3	22	22	5.9

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	0.9	22	1.0	23	0.9	21
	23	0.6	24	0.5	23	0.5	23
	23	0.5	23	0.4	23	0.4	23
New SR 28	21	3.6	20	4.0	21	3.2	20
Total	22	5.5	22	5.8	23	5.1	22

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	1.1	23	0.9
	0.6	23	0.6
	0.5	23	0.5
New SR 28	3.7	19	4.2
Total	5.9	22	6.2

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.3	7.5	0.1	26	26	0.4
	38	0.5	10.4	0.1	24	23	0.5
Twin Crag	37	0.7	11.3	0.1	25	25	0.7
	36	0.3	5.1	0.0	19	19	0.4
	35	0.6	8.7	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	23	22	0.7
	4	2.0	19.4	0.1	22	22	2.0
New SR 89	1	4.9	11.2	0.1	18	18	4.9
Total		11.5	98.6	0.6	23	22	11.7

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.3	26	0.3	26
	24	0.5	24	0.5	24	0.5	24
Twin Crag	25	0.7	25	0.6	25	0.7	26
	19	0.4	19	0.3	19	0.3	19
	23	0.7	23	0.6	23	0.6	23
	23	0.6	23	0.6	23	0.5	23
	23	0.9	23	0.9	23	0.8	23
	23	0.7	23	0.7	23	0.7	22
	22	2.0	22	2.0	22	1.9	22
New SR 89	18	4.6	17	5.1	18	4.6	18
Total	23	11.4	23	11.6	23	11.1	23

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.3	26	0.3
	0.4	24	0.5
Twin Crag	0.6	26	0.6
	0.3	19	0.3
	0.6	23	0.6
	0.6	23	0.5
	0.9	23	0.8
	0.7	23	0.7
	2.0	23	1.9
New SR 89	4.9	17	5.1
Total	11.5	23	11.5

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	0.5	13.4	0.1	15	15	0.5
	5	0.8	18.3	0.1	24	24	0.8
	14	0.4	7.5	0.0	23	23	0.4
	34	0.7	10.0	0.1	23	23	0.7
	35	0.5	7.0	0.0	23	23	0.5
	36	0.7	8.8	0.1	23	23	0.7
Twin Crag	37	0.4	4.2	0.0	23	23	0.4
	38	1.0	12.6	0.1	23	23	1.1
	39	0.9	10.8	0.1	23	23	1.0
Total		5.9	92.7	0.6	22	22	6.0

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	0.5	15	0.5	15	0.4	15
	24	0.9	24	0.7	24	0.9	24
	23	0.5	24	0.4	23	0.5	23
	23	0.7	23	0.6	23	0.7	23
	23	0.5	23	0.5	23	0.5	23
	23	0.7	23	0.7	23	0.7	23
Twin Crag	23	0.4	23	0.3	22	0.4	23
	23	1.1	23	1.0	23	1.1	23
	22	1.0	23	0.9	23	1.0	23
Total	22	6.3	22	5.7	22	6.1	22

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.6	15	0.4
	0.8	24	0.8
	0.4	23	0.4
	0.7	23	0.6
	0.5	23	0.5
	0.7	23	0.6
Twin Crag	0.4	23	0.3
	1.0	23	1.0
	0.9	23	0.9
Total	6.0	22	5.5

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.7	14.2	0.1	21	20	0.8
Fairway Dr	42	0.6	11.3	0.1	23	23	0.7
	16	1.0	16.4	0.1	24	24	1.2
Savemart Access	6	0.8	10.7	0.1	22	22	0.7
Total		3.1	52.5	0.3	23	22	3.4

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.7	21	0.7	21	0.7	21
Fairway Dr	23	0.6	23	0.5	23	0.5	24
	24	1.0	24	1.0	24	1.0	24
Savemart Access	22	0.8	22	0.7	22	0.9	22
Total	23	3.1	23	3.0	23	3.0	23

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.7	21	0.6
Fairway Dr	0.5	24	0.5
	1.0	24	1.0
Savemart Access	0.8	22	0.9
Total	3.0	23	3.0

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	1.4	11.4	0.1	21	21	1.4
Fairway Dr	42	1.6	16.6	0.1	24	23	1.6
	13	0.9	12.1	0.1	22	22	0.9
SR 89	1	4.3	14.5	0.1	20	21	4.1
Total		8.3	54.6	0.3	22	22	8.1

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.3	20	1.7	21	1.5	21
Fairway Dr	24	1.5	24	1.5	24	1.7	24
	22	0.9	22	1.0	22	0.9	22
SR 89	20	4.9	20	4.6	21	3.8	20
Total	22	8.6	22	8.8	22	7.9	22

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	1.6	21	1.3
Fairway Dr	1.5	23	1.7
	0.9	22	0.9
SR 89	4.7	21	3.9
Total	8.7	22	7.7

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	0.8	8.0	0.1	23	23	0.8
	9	1.0	16.6	0.1	23	23	1.1
Grove St	2	2.7	22.9	0.3	45	42	3.6
	17	0.8	8.4	0.1	23	22	0.9
	18	0.6	9.8	0.1	23	23	0.6
Total		6.0	65.6	0.6	31	30	7.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	0.8	23	0.8	24	0.8	23
	23	1.0	23	1.1	24	0.9	23
Grove St	46	2.2	46	2.8	45	2.5	45
	23	0.7	23	0.8	22	0.8	23
	23	0.6	23	0.6	23	0.6	23
Total	31	5.3	31	6.1	31	5.7	31

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.8	23	1.0
	1.0	24	1.0
Grove St	2.2	44	2.9
	0.7	23	0.8
	0.6	23	0.6
Total	5.5	31	6.3

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	2.2	9.7	0.1	19	20	1.8
	9	2.8	42.9	0.3	23	23	3.0
	8	1.3	16.9	0.1	23	23	1.3
Savemart Access	6	1.0	7.8	0.1	24	25	0.8
Total		8.0	97.4	0.6	23	23	7.6

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.3	24	0.4	24	0.4	24
Grove St	19	2.2	19	2.2	18	3.0	20
	23	2.7	23	3.0	23	3.0	23
	23	1.2	23	1.3	23	1.3	23
Savemart Access	25	0.8	23	1.1	24	1.0	24
Total	23	7.5	23	8.4	23	9.1	23

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.3	26	0.3
	0.3	24	0.3
Grove St	1.7	19	2.3
	2.6	23	2.8
	1.2	23	1.2
Savemart Access	1.1	24	1.0
Total	7.3	23	7.9

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.2	15.5	0.0	11	12	0.2
	45	0.0	7.7	0.1	25	25	0.0
	11	0.0	10.5	0.1	24	25	0.0
	22	0.0	8.1	0.1	25	25	0.0
Total		0.2	41.8	0.2	20	21	0.4

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	12	0.0	15	0.0	12	0.2	12
	26	0.0	25	0.0	25	0.0	25
	25	0.0	25	0.0	24	0.0	24
	25	0.0	25	0.1	25	0.0	25
Total	21	0.0	22	0.2	20	0.2	20

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
64 Acres Access	0.4	13	0.0
	0.0	25	0.0
	0.1	26	0.0
	0.1	25	0.0
Total	0.5	21	0.0

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	8.1	0.1	25	26	0.0
	45	0.0	10.6	0.1	24	25	0.0
64 Acres Access	20	0.1	7.9	0.1	25	25	0.1
New SR 89	3	4.3	8.5	0.0	21	19	6.7
Total		4.4	34.9	0.2	24	23	6.8

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.0	25	0.0	26	0.0	25
	25	0.0	25	0.1	25	0.0	24
64 Acres Access	25	0.0	25	0.1	25	0.2	24
New SR 89	19	4.6	18	4.8	22	3.9	31
Total	24	4.6	23	5.0	24	4.0	26

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.0	24	0.0
	0.0	24	0.0
64 Acres Access	0.2	25	0.0
New SR 89	1.8	19	4.4
Total	2.0	23	4.4

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	1.6	12.9	0.1	17	18	1.4
	10	1.4	9.2	0.1	21	23	0.6
	25	3.9	14.0	0.1	18	20	2.5
SR 89	3	11.0	22.0	0.1	15	16	9.6
Total		17.8	58.1	0.3	17	18	14.1

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	1.4	18	1.5	17	1.7	16
	23	0.8	23	0.7	20	1.9	17
	20	2.5	21	1.7	16	5.4	14
SR 89	14	11.5	16	8.4	16	9.4	12
Total	17	16.2	19	12.3	17	18.4	14

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	2.4	18	1.3
	3.3	23	0.8
	8.4	20	2.7
SR 89	16.4	15	10.4
Total	30.5	18	15.2

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	25	1.1	15.0	0.1	21	22	1.1
	10	0.6	10.7	0.1	23	23	0.6
	24	0.6	8.4	0.1	23	23	0.6
New SR 28	1	4.8	12.2	0.1	19	18	5.2
Total		7.2	46.4	0.3	21	21	7.5

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	1.1	21	1.0	21	1.1	22
	23	0.7	24	0.6	23	0.6	23
	23	0.7	23	0.6	23	0.6	23
New SR 28	18	5.3	19	4.5	19	4.7	19
Total	21	7.8	21	6.7	21	7.1	22

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	1.2	21	1.2
	0.6	23	0.6
	0.6	23	0.6
New SR 28	4.3	19	4.7
Total	6.6	21	7.3

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.2	0.1	26	26	0.5
	38	0.7	10.6	0.1	23	23	0.7
Twin Crag	37	0.9	11.5	0.1	25	25	0.9
	36	0.5	5.2	0.0	18	18	0.5
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	22	22	0.7
	14	1.1	10.4	0.1	22	22	1.1
	5	0.8	7.9	0.0	22	22	0.8
	4	2.9	20.3	0.1	21	21	3.4
New SR 89	1	8.2	14.5	0.1	14	13	8.6
Total		17.1	104.6	0.6	21	21	18.1

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.5	25	0.5	26
	23	0.7	23	0.7	23	0.7	23
Twin Crag	25	0.9	25	0.9	25	0.9	25
	18	0.4	18	0.4	18	0.5	18
	23	0.8	23	0.8	23	0.8	23
	23	0.7	22	0.7	22	0.7	22
	22	1.0	22	1.1	22	1.1	22
	22	0.8	22	0.8	22	0.9	22
	22	2.4	22	2.4	22	2.7	20
New SR 89	16	6.2	16	6.5	14	8.3	11
Total	22	14.5	22	14.8	21	17.0	20

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.5	26	0.5
	0.7	23	0.7
Twin Crag	1.0	25	0.9
	0.5	18	0.4
	0.9	23	0.8
	0.7	22	0.7
	1.1	22	1.0
	0.9	22	0.8
	4.1	22	2.3
New SR 89	12.6	15	6.5
Total	23.0	22	14.7

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	0.7	13.5	0.1	15	15	0.8
	5	0.9	18.3	0.1	24	24	1.1
	14	0.5	7.6	0.0	23	23	0.5
	34	0.8	10.1	0.1	23	23	0.8
	35	0.6	7.1	0.0	23	23	0.6
	36	0.8	8.9	0.1	23	23	0.9
Twin Crag	37	0.4	4.3	0.0	22	22	0.4
	38	1.2	12.7	0.1	23	23	1.2
	39	1.1	10.9	0.1	22	22	1.1
Total		6.9	93.2	0.6	22	22	7.5

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	0.7	15	0.6	15	0.6	15
	24	1.0	24	0.8	24	0.9	24
	23	0.5	23	0.5	23	0.5	23
	23	0.8	23	0.7	23	0.7	23
	23	0.6	23	0.5	23	0.6	23
	23	0.8	23	0.7	23	0.8	23
Twin Crag	22	0.4	23	0.4	22	0.4	22
	23	1.2	23	1.1	23	1.2	23
	22	1.1	23	1.0	22	1.1	22
Total	22	7.1	22	6.3	22	6.7	22

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.7	15	0.7
	0.9	24	1.0
	0.5	23	0.5
	0.7	23	0.8
	0.5	23	0.6
	0.7	23	0.8
Twin Crag	0.4	22	0.4
	1.1	23	1.2
	1.0	23	1.1
Total	6.3	22	7.1

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.9	14.4	0.1	20	20	0.9
Fairway Dr	42	0.6	11.4	0.1	23	23	0.7
	16	1.2	16.5	0.1	24	24	1.2
Savemart Access	6	1.1	11.0	0.1	22	22	0.9
Total		3.8	53.3	0.3	22	22	3.7

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	1.0	20	1.0	21	0.8	21
Fairway Dr	23	0.6	23	0.7	23	0.6	23
	24	1.2	24	1.2	24	1.1	24
Savemart Access	22	0.8	21	1.2	21	1.2	21
Total	22	3.5	22	4.1	22	3.8	22

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.8	20	0.9
Fairway Dr	0.6	23	0.6
	1.2	24	1.1
Savemart Access	1.2	21	1.3
Total	3.8	22	4.0

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	2.0	11.9	0.1	20	20	1.9
Fairway Dr	42	2.0	17.0	0.1	23	23	1.9
	13	1.1	12.2	0.1	22	22	1.1
SR 89	1	6.4	16.4	0.1	18	18	6.3
Total		11.4	57.6	0.3	21	21	11.3

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	20	2.0	20	2.1	20	1.9	20
Fairway Dr	23	2.2	23	2.2	23	1.8	23
	22	1.1	22	1.1	22	1.0	21
SR 89	18	6.5	18	6.5	20	4.9	17
Total	21	11.8	20	11.9	21	9.6	20

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	1.8	20	2.0
Fairway Dr	2.0	23	1.9
	1.1	21	1.1
SR 89	7.4	18	6.7
Total	12.3	21	11.6

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	1.1	8.3	0.1	23	23	1.0
	9	1.2	16.7	0.1	23	23	1.3
Grove St	2	4.0	24.5	0.3	43	43	3.4
	17	1.0	8.6	0.1	22	22	1.0
	18	0.7	9.9	0.1	23	23	0.7
Total		8.1	68.1	0.6	30	30	7.4

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	23	1.0	22	1.3	23	1.1	22
	23	1.2	23	1.3	23	1.1	23
Grove St	44	3.4	42	4.8	44	3.7	39
	22	1.0	22	1.1	22	1.0	22
	23	0.7	23	0.7	23	0.7	23
Total	30	7.4	29	9.0	30	7.5	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	1.2	22	1.1
	1.3	23	1.1
Grove St	5.2	44	3.6
	1.2	22	1.0
	0.7	23	0.7
Total	9.5	30	7.6

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	11.0	0.1	25	25	0.5
	17	0.6	9.8	0.1	23	23	0.6
Grove St	2	3.5	11.0	0.1	17	17	3.4
	9	3.6	43.5	0.3	23	23	3.5
	8	1.5	17.1	0.1	23	23	1.5
Savemart Access	6	1.2	8.0	0.1	23	23	1.3
Total		10.9	100.4	0.6	23	23	10.7

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.6	25	0.5	25	0.5	25
	23	0.7	24	0.5	23	0.6	23
Grove St	17	3.9	18	2.9	18	3.0	17
	23	3.9	23	3.6	23	3.6	23
	23	1.6	23	1.5	23	1.5	23
Savemart Access	24	1.0	23	1.3	23	1.2	23
Total	23	11.6	23	10.3	23	10.4	23

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.5	25	0.5
	0.6	23	0.7
Grove St	3.3	16	4.4
	3.3	23	4.0
	1.4	22	1.6
Savemart Access	1.1	23	1.3
Total	10.2	22	12.4

Arterial Level of Service: NB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
64 Acres Access	20	0.4	13.5	0.0	13	12	0.8
	45	0.0	7.7	0.1	25	26	0.0
	11	0.0	10.5	0.1	24	25	0.0
	22	0.0	7.8	0.1	26	26	0.0
Total		0.5	39.5	0.2	21	21	0.9

Arterial Level of Service: NB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
64 Acres Access	13	0.2	13	0.4	15	0.2	13
	25	0.0	25	0.0	25	0.1	26
	24	0.0	24	0.0	25	0.1	25
	25	0.0	26	0.0	25	0.1	26
Total	21	0.3	21	0.4	22	0.5	21

Arterial Level of Service: NB Old SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	Alt 2 12132014	Alt 2 12132014	
64 Acres Access	0.3	13	0.5
	0.0	26	0.0
	0.0	25	0.0
	0.1	26	0.0
Total	0.4	21	0.5

Arterial Level of Service: SB Old SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	11	0.0	7.8	0.1	26	25	0.0
	45	0.0	10.2	0.1	25	25	0.1
64 Acres Access	20	0.2	7.7	0.1	25	26	0.2
New SR 89	3	5.7	9.5	0.0	19	20	5.0
Total		5.9	35.2	0.2	24	24	5.3

Arterial Level of Service: SB Old SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.0	26	0.0	25	0.0	25
	25	0.0	26	0.0	25	0.0	25
64 Acres Access	25	0.1	26	0.1	25	0.1	25
New SR 89	14	9.3	26	3.1	24	4.4	17
Total	21	9.4	26	3.2	25	4.6	23

Arterial Level of Service: SB Old SR 89

Cross Street	Run 5 Delay	Alt 2 12132014 Speed	Alt 2 12132014 Delay
	0.0	26	0.0
	0.0	26	0.0
64 Acres Access	0.1	26	0.2
New SR 89	6.2	19	6.0
Total	6.3	24	6.2

Design Year (2038) Operations: Alternative 3 Mitigation

Average Annual Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	0.9	12.2	0.1	19	19	0.9
	44	0.7	11.5	0.1	23	23	0.7
	25	1.2	12.2	0.1	22	22	1.2
SR 89	3	4.3	11.4	0.1	19	19	4.6
Total		7.0	47.3	0.3	21	21	7.4

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	0.9	18	0.8	19	1.0	19
	23	0.7	23	0.7	23	0.6	23
	22	1.4	22	1.2	23	1.1	23
SR 89	21	3.5	21	3.1	18	5.0	21
Total	21	6.5	21	5.8	21	7.8	21

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.7	19	0.8
	0.6	23	0.6
	1.0	22	1.2
SR 89	3.4	17	6.4
Total	5.8	20	9.0

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	25	0.8	11.0	0.1	20	20	0.8
	44	0.5	11.5	0.1	24	24	0.5
	24	0.7	11.6	0.1	23	23	0.7
New SR 28	1	3.7	11.2	0.1	20	21	3.6
Total		5.8	45.2	0.3	22	22	5.7

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.9	19	1.0	20	0.9	20
	24	0.5	24	0.5	24	0.6	24
	23	0.8	23	0.7	23	0.8	23
New SR 28	20	3.7	20	3.7	19	4.5	21
Total	22	5.8	22	6.0	21	6.7	22

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.7	20	0.7
	0.5	24	0.5
	0.7	23	0.7
New SR 28	3.4	21	3.6
Total	5.3	22	5.5

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.4	7.7	0.1	26	26	0.4
	38	0.5	10.4	0.1	24	24	0.6
Twin Crag	37	0.7	11.3	0.1	25	25	0.7
	36	0.4	5.1	0.0	19	19	0.4
	35	0.7	8.7	0.1	23	23	0.7
	34	0.6	7.1	0.0	23	23	0.6
	14	0.9	10.2	0.1	23	23	0.9
	5	0.7	7.8	0.0	23	23	0.7
	4	2.0	19.3	0.1	22	22	2.0
New SR 89	1	4.5	10.8	0.1	18	18	4.6
Total		11.2	98.4	0.6	23	23	11.6

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.4	26	0.4	26	0.3	26
	24	0.5	24	0.5	24	0.5	23
Twin Crag	25	0.7	26	0.7	26	0.7	25
	19	0.3	19	0.3	19	0.3	18
	23	0.6	23	0.6	23	0.6	23
	23	0.6	23	0.5	23	0.5	23
	23	0.9	23	0.8	23	0.8	23
	23	0.7	23	0.7	23	0.7	22
	22	2.0	23	2.0	23	1.9	22
New SR 89	17	5.3	18	4.9	19	4.0	20
Total	23	12.0	23	11.4	23	10.4	23

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.4	26	0.3
	0.6	24	0.5
Twin Crag	0.7	25	0.7
	0.4	19	0.4
	0.7	23	0.7
	0.6	23	0.6
	0.9	23	0.9
	0.7	22	0.7
	1.9	22	2.0
New SR 89	3.7	18	4.4
Total	10.6	23	11.2

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	0.5	13.3	0.1	15	15	0.5
	5	0.7	18.1	0.1	24	24	0.7
	14	0.4	7.5	0.0	23	23	0.4
	34	0.6	10.0	0.1	23	23	0.6
	35	0.5	7.0	0.0	23	23	0.5
	36	0.6	8.8	0.1	23	23	0.6
Twin Crag	37	0.3	4.2	0.0	23	23	0.3
	38	1.0	12.5	0.1	23	23	1.0
	39	0.9	10.7	0.1	23	23	0.9
Total		5.6	92.1	0.6	22	22	5.6

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	0.5	15	0.5	15	0.5	15
	24	0.7	24	0.7	24	0.7	24
	24	0.4	23	0.4	23	0.4	24
	23	0.7	23	0.6	23	0.6	23
	23	0.5	23	0.5	23	0.5	23
	23	0.7	23	0.6	23	0.6	23
Twin Crag	23	0.4	23	0.3	23	0.3	23
	23	1.0	23	0.9	23	0.9	23
	23	0.9	23	0.8	23	0.9	23
Total	22	5.8	22	5.4	22	5.4	22

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.4	15	0.5
	0.7	24	0.9
	0.4	23	0.5
	0.6	23	0.7
	0.5	23	0.5
	0.6	23	0.7
Twin Crag	0.3	23	0.3
	0.9	23	1.0
	0.9	23	0.9
Total	5.2	22	6.0

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.7	14.3	0.1	21	21	0.7
Fairway Dr	42	0.5	11.2	0.1	23	23	0.5
	16	1.0	16.3	0.1	24	24	1.0
Old SR 89	6	6.8	16.0	0.1	15	15	6.4
Total		9.0	57.8	0.3	21	21	8.7

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.7	21	0.8	21	0.7	21
Fairway Dr	24	0.5	24	0.5	23	0.6	23
	24	0.9	24	1.0	24	1.0	24
Old SR 89	15	6.5	15	7.0	15	6.1	14
Total	21	8.5	21	9.3	21	8.5	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.7	21	0.7
Fairway Dr	0.5	24	0.5
	0.9	24	1.0
Old SR 89	7.6	14	7.3
Total	9.6	20	9.5

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	4.0	13.8	0.1	17	18	3.7
Fairway Dr	42	1.8	16.9	0.1	23	23	1.7
	13	0.9	12.1	0.1	22	22	0.9
SR 89	1	4.6	14.7	0.1	20	21	4.3
Total		11.3	57.5	0.3	21	21	10.6

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	4.1	17	4.3	18	3.7	17
Fairway Dr	23	1.9	23	2.1	23	1.7	24
	22	1.0	22	1.0	22	0.9	22
SR 89	19	5.1	19	5.0	20	4.6	21
Total	20	12.1	20	12.4	21	10.9	21

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	3.8	17	4.3
Fairway Dr	1.6	23	1.9
	0.8	22	0.9
SR 89	3.7	20	4.8
Total	9.9	21	11.9

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	2.9	10.7	0.1	18	18	2.7
	9	1.2	16.7	0.1	23	23	1.1
Grove St	2	2.6	22.9	0.3	45	46	2.7
	17	0.8	8.4	0.1	22	22	0.8
	18	0.6	9.8	0.1	23	23	0.5
Total		8.0	68.5	0.6	29	30	7.8

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	2.9	17	3.2	18	2.4	17
	23	1.2	24	1.1	23	1.2	23
Grove St	45	2.6	44	2.5	44	2.6	44
	23	0.8	23	0.8	22	0.8	22
	23	0.6	23	0.6	23	0.6	23
Total	29	8.1	29	8.1	29	7.7	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	3.0	17	3.0
	1.3	23	1.3
Grove St	2.6	45	2.5
	0.9	22	0.8
	0.6	23	0.6
Total	8.4	29	8.2

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.3	10.5	0.1	26	26	0.3
	17	0.4	9.5	0.1	24	24	0.4
Grove St	2	2.5	10.0	0.1	19	17	3.7
	9	2.8	42.8	0.3	23	23	3.0
	8	1.3	16.9	0.1	23	23	1.3
Savemart Access	6	9.8	16.9	0.1	11	11	9.5
Total		17.1	106.7	0.6	21	21	18.3

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.3	26	0.3	26	0.3	26
	24	0.4	24	0.4	24	0.3	24
Grove St	19	2.6	19	2.6	19	2.4	20
	24	2.8	23	3.0	24	2.9	23
	23	1.3	23	1.3	23	1.3	23
Savemart Access	11	9.3	10	10.7	12	8.8	11
Total	21	16.8	21	18.4	22	15.9	21

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.3	26	0.3
	0.4	24	0.4
Grove St	1.8	20	1.9
	2.7	24	2.6
	1.2	23	1.2
Savemart Access	9.4	10	10.7
Total	15.8	21	17.0

Summer Peak Hour Analysis Results

Arterial Level of Service: EB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	24	1.6	13.0	0.1	17	17	1.7
	25	1.2	8.4	0.0	21	22	0.8
	44	4.0	14.4	0.1	18	19	3.1
SR 89	3	10.7	22.2	0.1	15	18	7.0
Total		17.4	58.0	0.3	17	19	12.6

Arterial Level of Service: EB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	18	1.6	18	1.2	17	1.8	18
	23	0.7	23	0.6	20	1.7	23
	19	3.5	19	2.9	18	3.6	21
SR 89	13	14.5	15	11.2	18	7.3	15
Total	16	20.3	18	16.0	18	14.3	18

Arterial Level of Service: EB New SR 89

Cross Street	Run 5 Delay	Run 5 Speed	Run 5 Delay
	1.4	17	1.9
	0.6	18	2.9
	2.0	14	8.7
SR 89	10.3	12	14.5
Total	14.3	14	28.0

Arterial Level of Service: WB New SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	44	1.0	14.9	0.1	22	21	1.1
	25	0.7	11.1	0.1	23	23	0.7
	24	0.6	7.8	0.0	23	23	0.6
New SR 28	1	4.9	12.3	0.1	18	19	4.4
Total		7.2	46.1	0.3	22	21	6.8

Arterial Level of Service: WB New SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	22	0.8	23	1.0	22	0.9	22
	23	0.6	24	0.7	23	0.6	23
	23	0.6	23	0.6	23	0.6	23
New SR 28	19	4.6	19	4.5	17	6.0	17
Total	22	6.7	22	6.7	21	8.1	21

Arterial Level of Service: WB New SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	1.0	22	1.3
	0.7	23	0.7
	0.6	23	0.6
New SR 28	5.9	20	4.0
Total	8.2	22	6.7

Arterial Level of Service: EB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	39	0.5	8.2	0.1	26	26	0.5
	38	0.7	10.5	0.1	23	23	0.6
Twin Crag	37	0.9	11.5	0.1	25	25	0.8
	36	0.4	5.2	0.0	18	18	0.4
	35	0.8	8.9	0.1	23	23	0.8
	34	0.7	7.2	0.0	23	22	0.7
	14	1.0	10.3	0.1	22	22	1.0
	5	0.8	7.9	0.0	22	22	0.8
	4	2.5	19.9	0.1	22	22	2.4
New SR 89	1	8.9	15.2	0.1	13	13	8.5
Total		17.1	104.8	0.6	21	21	16.6

Arterial Level of Service: EB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	26	0.5	26	0.4	26	0.5	25
	23	0.7	23	0.6	23	0.7	23
Twin Crag	25	0.9	25	0.8	25	0.9	25
	18	0.5	19	0.4	18	0.4	18
	23	0.8	23	0.7	23	0.8	23
	22	0.7	23	0.6	23	0.7	22
	22	1.1	23	0.9	22	1.0	22
	22	0.8	22	0.8	22	0.8	22
	22	2.6	22	2.4	22	2.5	21
New SR 89	12	9.7	14	8.1	13	8.5	13
Total	21	18.4	22	15.8	21	16.8	21

Arterial Level of Service: EB SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.6	26	0.5
	0.7	23	0.6
Twin Crag	1.0	25	0.8
	0.5	19	0.4
	0.9	23	0.7
	0.7	23	0.6
	1.1	23	0.9
	0.9	22	0.7
	3.1	22	2.3
New SR 89	9.2	13	9.0
Total	18.5	21	16.5

Arterial Level of Service: WB SR 89

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	4	0.6	13.4	0.1	15	15	0.6
	5	0.8	18.2	0.1	24	24	0.9
	14	0.5	7.5	0.0	23	23	0.5
	34	0.7	10.0	0.1	23	23	0.8
	35	0.5	7.1	0.0	23	23	0.6
	36	0.7	8.9	0.1	23	23	0.8
Twin Crag	37	0.4	4.2	0.0	23	22	0.4
	38	1.1	12.6	0.1	23	23	1.2
	39	1.0	10.9	0.1	23	22	1.1
Total		6.4	92.7	0.6	22	22	6.9

Arterial Level of Service: WB SR 89

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	0.6	15	0.5	15	0.5	15
	24	0.8	24	0.7	24	0.8	24
	23	0.4	23	0.4	23	0.5	23
	23	0.7	23	0.6	23	0.7	23
	23	0.5	23	0.5	23	0.5	23
	23	0.7	23	0.7	23	0.7	23
Twin Crag	23	0.4	23	0.4	23	0.4	22
	23	1.1	23	1.0	23	1.1	23
	23	1.0	23	1.0	23	1.0	22
Total	22	6.1	22	5.8	22	6.3	22

Arterial Level of Service: WB SR 89

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	0.6	15	0.6
	0.9	24	0.9
	0.5	23	0.5
	0.7	23	0.7
	0.6	23	0.6
	0.7	23	0.8
Twin Crag	0.4	23	0.4
	1.1	23	1.1
	1.0	23	1.0
Total	6.4	22	6.6

Arterial Level of Service: NE New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	13	0.9	14.4	0.1	20	20	0.9
Fairway Dr	42	0.7	11.3	0.1	23	23	0.6
	16	1.2	16.5	0.1	24	24	1.1
Old SR 89	6	7.2	16.3	0.1	15	15	7.1
Total		9.9	58.6	0.3	20	20	9.8

Arterial Level of Service: NE New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	21	0.8	21	0.8	20	1.0	20
Fairway Dr	23	0.6	24	0.6	23	0.7	23
	23	1.2	24	1.2	24	1.2	24
Old SR 89	15	6.6	15	7.2	14	8.0	14
Total	20	9.2	20	9.7	20	10.8	20

Arterial Level of Service: NE New SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	1.0	20	1.1
Fairway Dr	0.6	23	0.7
	1.1	24	1.2
Old SR 89	7.4	15	6.7
Total	10.1	20	9.8

Arterial Level of Service: SW New SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	16	5.5	15.3	0.1	15	15	5.9
Fairway Dr	42	2.4	17.5	0.1	22	22	2.5
	13	1.1	12.2	0.1	22	21	1.1
SR 89	1	6.9	17.0	0.1	17	17	7.5
Total		16.0	62.1	0.3	19	19	17.0

Arterial Level of Service: SW New SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	15	5.6	16	5.2	15	5.7	16
Fairway Dr	22	2.5	22	2.3	22	2.7	23
	21	1.1	21	1.1	22	1.1	22
SR 89	17	7.1	18	6.7	17	7.3	17
Total	19	16.2	19	15.2	19	16.9	19

Arterial Level of Service: SW New SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	5.3	16	5.5
Fairway Dr	2.2	23	2.3
	1.1	21	1.1
SR 89	7.2	19	5.9
Total	15.8	20	14.8

Arterial Level of Service: NE SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	8	3.5	11.2	0.1	17	17	3.4
	9	1.4	17.0	0.1	23	23	1.3
Grove St	2	3.9	24.4	0.3	43	42	4.3
	17	1.1	8.6	0.1	22	22	1.2
	18	0.7	9.9	0.1	23	23	0.8
Total		10.5	71.1	0.6	28	28	11.0

Arterial Level of Service: NE SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	17	3.0	17	3.4	16	3.7	16
	23	1.3	23	1.5	23	1.4	23
Grove St	45	3.5	42	4.2	44	3.1	43
	22	1.1	22	1.0	22	0.9	22
	23	0.7	23	0.7	23	0.7	23
Total	29	9.6	28	10.8	29	9.9	29

Arterial Level of Service: NE SR 28

Cross Street	Run 5 Delay	Alt 3 12132014 Speed	Alt 3 12132014 Delay
	3.6	16	3.7
	1.4	23	1.4
Grove St	3.7	41	4.6
	1.0	22	1.2
	0.7	23	0.7
Total	10.4	28	11.5

Arterial Level of Service: SW SR 28

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	18	0.5	10.9	0.1	25	25	0.6
	17	0.8	9.9	0.1	23	21	1.4
Grove St	2	4.5	12.0	0.1	16	14	6.2
	9	3.6	43.6	0.3	23	23	3.7
	8	1.6	17.2	0.1	23	23	1.6
Savemart Access	6	11.3	18.5	0.1	10	10	11.0
Total		22.3	112.1	0.6	20	20	24.4

Arterial Level of Service: SW SR 28

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	25	0.5	25	0.5	26	0.5	26
	23	0.8	23	0.6	23	0.6	24
Grove St	15	5.0	17	3.8	17	3.8	17
	23	3.7	23	3.6	23	3.5	23
	23	1.6	23	1.6	23	1.6	23
Savemart Access	10	11.8	11	10.1	10	12.1	10
Total	20	23.3	21	20.2	20	22.1	20

Arterial Level of Service: SW SR 28

Cross Street	Run 5 Delay	Run 5 Speed	Alt 3 12132014 Delay
	0.4	26	0.5
	0.5	23	0.7
Grove St	3.8	16	4.3
	3.5	23	3.5
	1.6	23	1.6
Savemart Access	11.4	10	11.8
Total	21.2	20	22.4