



Traffic Engineering, Transportation Planning, & Forensic Services

July 6, 2018

Ms. Lucia Maloney
Transportation Manager
Carson City
Public Works Department
3505 Butti Way
Carson City, NV 89701

LATE MATERIAL

MEETING DATE 9/6/18

ITEM # 11C

South Carson Street Intersection Alternatives Evaluation

Dear Ms. Maloney,

At Carson City's request, Traffic Works has completed an objective assessment of intersection control alternatives for South Carson Street generally between US 50/I-580 and 5th Street, with particular emphasis on the Sonoma Street and Stewart Street intersections. The primary purposes of this study are to:

- determine if a roundabout is significantly advantageous at Sonoma Street, or not
- review prior studies and provide input on the appropriateness of locations considered for roundabouts
- identify the best options for traffic management, business access, and future intersection improvements

EVALUATION OF A ROUNDABOUT AT SONOMA STREET

We understand a two-lane roundabout has been proposed at the Sonoma Street/S. Carson Street intersection (see **Attachment A**) based on a notion that it is too difficult for drivers to turn left from Sonoma Street onto S. Carson Street and therefore drivers are avoiding the intersection. This reasoning assumes that drivers are forced out of direction or disrupted in some fashion and that a roundabout would resolve the perceived issues by making side-street movements easier. The following sections present current traffic volumes, future volume projections, operations analysis, and other relevant points to determine whether or not there is justification for a roundabout at Sonoma Street based on travel demand or other factors.

Observed Demand for Left-turn Movements from Sonoma Street

Review of the roadway network and existing development pattern indicates there are multiple options for neighborhood residents east of S. Carson Street, surrounding Sonoma Street, to make westbound to southbound left-turn movements to South Carson Street. The existing options are Colorado Street, Sonoma Street, and Koontz Lane which is signalized. The existing roadway network and current intersection controls are shown on **Figures 1 and 2**, attached.

New intersection turning movement counts were conducted at the Colorado Street, Sonoma Street, and Koontz Lane intersections with S. Carson Street on Wednesday, January 10, 2018, approximately five months after completion and opening of the Carson Freeway. Public schools were in regular session during the data collection. These traffic volumes are believed to reflect the new normalized traffic conditions in the study area. The existing turn movement count data and recently collected daily traffic volumes (by NDOT) are also shown on **Figures 1 and 2**, attached.

It is important to note that the westbound to southbound left-turn volumes at Colorado Street and Sonoma Street are essentially the same and that both locations have left-turn volumes that are not tremendously lower than those at Koontz Lane. The count data demonstrates there is not any notable diversion of traffic away from the Sonoma Street/S. Carson Street intersection to either Colorado Street or Koontz Lane.

Planning Analysis Demand for Left-turn Movements from Sonoma Street

A planning level trip assignment analysis was performed as a second check to determine whether or not drivers significantly avoid the westbound to southbound left-turn movement at Sonoma Street/South Carson Street. This method considers the number of homes in the adjacent neighborhood that would likely use the Sonoma Street intersection to/from the south because it is the shortest or fastest travel route. **Figure 3** illustrates the neighborhood area that would be expected to make a left-turn from Sonoma Street.



Figure 3. Area Contributing to Demand for Left-turns at Sonoma Street

The contributing area includes approximately 403 single family homes, 36 quadruplex apartment units, and 21,500 square feet of general office space. The number of trips to/from this area were estimated using standard ITE trip generation rates and are shown in **Table 1**.

Table 1. Trip Generation for Contributing Area

Land Use	AM Peak Hour Trips			PM Peak Hour Trips		
	Entry	Exit	Total	Entry	Exit	Total
403 Units Single Family	76	226	302	256	151	407
36 Units Quadruplex Apartments	4	14	18	14	8	22
21,500 Sq. Ft. General Office	29	4	33	5	27	32
TOTAL	109	244	353	275	186	461

It is estimated that 70% of the traffic from the contributing area would use S. Carson Street and the 30% remainder would travel north/east to/from Fairview Drive. Traffic patterns along S. Carson Street show that 60% of trips are to/from the north from the study area and 40% of trips are to/from the south during both the AM and PM peak hours. The three most probable paths for trips from the neighborhood to the south are:

- Sonoma Street to Carson Street (estimated at 20%)
- Silver Sage Drive to Koontz Street to Carson Street (estimated at 10%)
- Baker Drive to Koontz Street to Carson Street (estimated at 10%)

The AM peak hour has the highest number of exiting trips (244) and therefore presents the scenario that would have the highest volumes. Theoretical left-turn demand from Sonoma Street to S. Carson Street from the contributing area is calculated as follows:

$$244 \text{ exiting trips} \times 70\% \text{ to S. Carson St.} \times 20\% \text{ to the south via Sonoma} = 34 \text{ left-turn movements}$$

The existing AM left-turn volume from Sonoma Street, determined through the January turn movement counts, is 11 movements which is not considerably different than the theoretical demand. It is important to note that Koontz Lane has only 51 westbound to southbound left-turn movements at S. Carson Street in the AM peak hour.

The theoretical planning analysis indicates there is not likely any notable diversion of traffic from Sonoma Street to either Colorado Street or Koontz Lane.

Operational Factors of Left-turn Movements from Sonoma Street

Level of service (LOS) analysis was performed for the Sonoma Street/South Carson Street intersection to gauge whether or not left turn movements from Sonoma Street are difficult to make during the peak traffic periods. Based on the January intersection volumes, the westbound approach on Sonoma Street currently

operates at LOS C with 17.5 seconds of delay in the AM peak hour and LOS C with 19.5 seconds of delay during the PM peak hour. The calculations are provided in the Attachments.

At level of service C during the peak traffic conditions, there is no reason to believe a significant number of drivers avoid this intersection. Capacity improvements are typically not justified under these operating conditions.

Demand for Northbound to Southbound U-turn Movements

We understand that a roundabout was also considered as a way to ease U-turn movements on S. Carson Street for better access to adjacent businesses. However, the preferred concept includes a two-way left-turn lane on S. Carson Street throughout the majority of the project limits, including in the Sonoma Street vicinity. There would be no real demand for U-turn movements at Sonoma Street with a two-way left-turn lane provided throughout the corridor, since drivers could directly access the business driveways from the center lane.

Bicycle & Pedestrian Movements at Sonoma Street

The concept of a roundabout has been presented as an option for improving bicycle and pedestrian access in the Sonoma Street portion of the corridor, including introducing pedestrian movements across S. Carson Street.

Overall, this is a poor justification for a roundabout since multi-lane roundabouts are not the best intersection type for bicycle travel. Pedestrian crossings at multi-lane approaches and departures at roundabouts require Rectangular Rapid Flashing Beacons (RRFB), edge-lit signs, or signalization to accommodate the sight impaired. Pedestrian and bicycle volumes are currently low in the study area as a whole, including at Sonoma Street. The land uses on the west side of S. Carson Street in this immediate area are primarily auto dealerships. It is difficult to describe why a very high cost pedestrian crossing treatment (roundabout) would be needed at Sonoma Street in particular when that location will likely continue to have low pedestrian crossing demand. A multi-lane roundabout is not advisable for the purposes of improving pedestrian and bicycle movements at the Sonoma Street/Carson Street intersection.

Future Traffic Operations

It is important to consider whether or not a roundabout, or other intersection improvements, may be needed at the Sonoma Street/S. Carson Street intersection in the future due to regional traffic volume increases.

Future (2040) traffic volumes were obtained from the Carson Area Metropolitan Planning Organization (CAMPO) region travel demand model. The model shows essentially no growth on S. Carson Street through the 2040 horizon year. However, to provide a conservative analysis, future year intersection operations were performed using a 10% total growth over the existing traffic volumes. Calculations were performed to compare a roundabout, traffic signal, and side-street STOP control with a center turn lane that would enable 2-stage left-turn maneuvers from Sonoma Street, and the results are presented in **Table 2**. The detailed calculation sheets are provided in the **Attachments**.

Table 2. 2040 Intersection Level of Service Comparison

2040 FUTURE CONDITIONS

	CARSON ST.		CARSON ST.		DRIVEWAY		SONOMA ST.		Overall	
	Northbound		Southbound		Eastbound		Westbound			
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.14	A	0.63	A	20.22	C	18.02	C	-	-
Roundabout	9	A	6.9	A	5.5	A	10.9	B	8.4	A
Traffic Signal	4.94	A	4.18	A	6.98	A	7.87	A	4.9	A

	CARSON ST.		CARSON ST.		DRIVEWAY		SONOMA ST.		Overall	
	Northbound		Southbound		Eastbound		Westbound			
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.04	A	0.59	A	46.72	E	18.89	C	-	-
Roundabout	12.1	B	16.4	B	11.1	B	9.1	A	14.3	B
Traffic Signal	7.1	A	7.3	A	14.19	B	15.49	B	7.6	A

The operations analysis shows that side-street STOP control will provide LOS C operations on the Sonoma Street approach during the AM and PM peak hours for the foreseeable future. A roundabout or traffic signal would provide LOS A or B operations overall but neither are justified when the side street functions at LOS C. A roundabout is not justified at Sonoma Street since side-street STOP control will provide acceptable operations in the future.

Consideration of Future Development Access in the Immediate Area

The portion of Carson City east of South Carson Street, south of Fairview Drive, north of Koontz Lane, and west of I-580 (“the study area”) is essentially fully developed. The one notable exception is a large vacant property on the east side of South Carson Street extending south from Colorado Street nearly to Sonoma Street. This property is referred to as the “Armory Site” and is owned by the Nevada Division of State Lands. While the parcel appears ideal for a commercial or mixed-use development, there are no official development plans for the property at this time and the ultimate use(s) are undefined. It should be noted that redevelopment of this property is not included in the land use assumptions within the CAMPO travel demand model.

Two relevant points can be made with regard to future development activity in the study area:

- Traffic volumes are not likely to increase on Sonoma Street in any substantial way as the contributing area is already built out, therefore Sonoma Street would not serve future development/redevelopment
- Traffic volumes are most likely to increase in association with the Armory Site (opposite Rhodes Street) and to a lesser extent in the area west of South Carson Street also served by Rhodes Street

Both points suggest that the Rhodes Street/ South Carson Street will be a key intersection related to serving future development/redevelopment efforts. Investment in the Rhodes Street intersection, which serves both the east and west sides of South Carson Street, would present significantly greater benefits to redevelopment and overall access and circulation than improvements at Sonoma Street.

The City should anticipate and plan for major intersection improvements at the Rhodes Street intersection.

Planning Level Costs

In general, construction costs for multilane roundabouts retrofit into an existing street environment are estimated at \$1.5M to \$2.0M, not including right-of-way acquisition. Total roundabout costs could potentially reach \$2.5M at the Sonoma Street/S. Carson Street location given the adjacent commercial properties, some of which could potentially be impacted.

In comparison, new traffic signal systems typically cost on the order of \$500,000. The distance that interconnect communication must be run to the nearest adjacent signal or tie-in point can, however, significantly increase this cost. The all-in cost of a traffic signal would not likely exceed \$750,000.

Summary of Pros & Cons of a Roundabout at Sonoma Street

Following is a simple summary of the overarching benefits and detractors to installing a roundabout at Sonoma Street:

Pros

- Excellent streetscape feature
- One of the safest intersection treatments available
- Most efficient intersection type during off-peak time periods

Cons

- Multi-lane roundabouts are not the best intersection type for bicycle and pedestrian movements
- Roundabouts break traffic progression and disrupt flow in coordinated signal corridors
- A roundabout at Sonoma Street would further divide the frontage road and complicate access and circulation on the east side of South Carson Street
- Large footprint and expensive intersection type
- Does not serve redevelopment efforts or future development access needs
- The high cost is not justified as no significant need or benefit can be demonstrated for this location
- The current project funding may not be sufficient to cover all costs associated with the roundabout

EVALUATION OF ROUNDABOUTS AT OTHER INTERSECTIONS ON SOUTH CARSON STREET

City staff asked that we review other key intersections along the S. Carson Street corridor and determine if any locations would be good alternate candidates for a roundabout. The City is particularly interested in locations that would serve a long-term purpose while at a reasonable cost with low property impacts. Following is a list of the locations considered and key findings associated with each location:

- 5th Street – This location could be selected to construct the smallest and perhaps lowest cost roundabout compared to other locations. A single-lane configuration may be feasible here. However, the intersection is tightly constrained by existing buildings, including a historical building in the northwest quadrant (former Jack's Bar). It is listed in the National Register of Historic Places. The existing building constraints and anticipated right-of-way impacts render the 5th street location not appropriate. Furthermore, the cost of a roundabout may not be justified given a traffic signal is already in place.

- 6th, 7th, 8th, 9th, & 10th Streets – No need for a roundabout and not appropriate due to insufficient cross-street traffic volumes. Each location would have notable right-of-way constraints.
- S. Stewart Street – This location presents a unique opportunity to create a new gateway feature, and potentially improve overall circulation patterns if a connection could be made to Curry Street. An expanded discussion of the S. Stewart Street intersection is provided later in this report.
- Fairview Drive – This location has an existing traffic signal that adequately manages existing and anticipated future traffic volumes. The cost of a roundabout would not be justified at this location given a traffic signal is already in place and there are no other significant justification points supporting a roundabout at this intersection.
- Colorado Street & Sonoma Street – The recently completed traffic counts demonstrate there is no need for a roundabout at either Colorado Street or Sonoma Street. Most of the points outlined above for the Sonoma Street intersection would also apply to the Colorado Street location.
- Rhodes Street – It is our opinion that Rhodes Street and a future Armory Site access intersection should be improved in the future. To maintain traffic progression through the signalized corridor, a traffic signal would be more appropriate and cost effective than a roundabout. However, if a roundabout is ultimately desired in the corridor, the Rhodes Street intersection may be appropriate, particularly with future redevelopment of the Armory Site.
- Moses Street – The Moses Street intersection is located only 600 feet from the signalized Koontz Lane intersection. This is inadequate separation from Koontz Lane for new major street controls.
- Koontz Lane, Eagle Station Lane & Clearview Drive – These locations have existing traffic signals that will adequately manage existing and anticipated future traffic volumes. The cost of a roundabout would not be justified given a traffic signal is already in place and there is no other significant justification for a roundabout at these locations.
- Roventini Way & Overland St/Snyder Ave – These intersections are located less than 650 feet from the signalized Clearview Drive intersection. This is inadequate separation from Clearview Drive for new major street controls.
- Appion Way – Long-term intersection improvements have been considered for the realignment of Snyder Avenue to West Appion Way to gain separation of Snyder Avenue from Clearview Drive. A roundabout could potentially be constructed with any realignment in the future, but would not be appropriate until then, given the extremely low traffic volumes on West Appion Way and the uncertainty of the Snyder Avenue realignment geometrics. A roundabout at Appion Way would break the traffic progression / signal coordination between Hwy 50/I-580 and Clearview Drive which could adversely impact peak traffic flows on S. Carson Street in a high volume segment.
- Roland Street – Roland Street is approximately 750 feet from the Interstate 580/Hwy 50 intersection. This is inadequate separation from a major highway intersection for major street controls (signal or roundabout).

It is worth noting that crash history was reviewed for the corridor and no particular intersection within the study limits stood out as having a much higher number of crashes than any other location. We did not identify any location that would indicate a roundabout is needed to resolve existing safety issues.

We also considered the potential impacts of a roundabout on the Nevada Day Parade. Locations at Stewart Street, and north thereof, could potentially restrict the parade route width and thereby affect parade operations. This would be less of an issue with a multi-lane roundabout at Stewart Street compared to single lane configurations that would likely be utilized at intersections north of Stewart Street.

In summary, only the S. Stewart Street and Rhodes Street intersections would offer very good opportunities and reasonable justification for the installation of a roundabout.

SOUTH STEWART STREET INTERSECTION

The S. Stewart Street/S. Carson Street intersection is unique within the corridor in that 1) it has a very large existing right-of-way footprint, 2) is at an ideal location to create a gateway feature and gateway sign, and 3) is proximate to a long and unconnected segment of S. Curry Street which could potentially be connected to a roundabout at this location in the future. Additionally, a roundabout at S. Stewart Street would fit better within the overall coordinated signal system in that it would be outside the more auto-centric development pattern south of Fairview Drive. A roundabout at one end of a coordinated corridor is less disruptive to traffic progression than one located in the middle of a signalized corridor.

These aspects, in combination, create a situation where reconstruction of the intersection to ultimately create a link to Curry Street, via roundabout(s), could be beneficial even though the intersection is already signalized. With the existing right-of-way available, and few adjacent driveways, S. Stewart Street would likely be one of the easiest and most cost effective intersections for roundabout installation. A new roadway extension to Curry Street has been desired for a long time, and if deemed feasible, would serve many of the same overall connectivity purposes as an improved connection at Rhodes Street.

Under this line of reasoning, S. Carson Street could have a different feel north of Stewart Street, with a roundabout effectively being the gateway feature. The coordinated signal corridor would then be Fairview Drive to US 50 and significant traffic capacity would be maintained on S. Carson Street for any freeway bypass needs under emergency situations. All aspects considered, the S. Stewart Street intersection is most reasonable for a roundabout at this time.

CONCLUSIONS

There is no real evidence of drivers not being able to make westbound to southbound left-turn movements from Sonoma Street, or a need to significantly improve that movement. The data and analysis indicates that STOP control is a reasonable control method for the foreseeable future. We suspect that the perception of difficult left turns from Sonoma Street was a function of the prior traffic volumes (before the freeway extension was complete) and that the condition is now significantly different and improved.

Construction of a roundabout at Sonoma Street is not recommended for the following reasons:

- No demonstrated need or significant benefit that supports the high construction cost
- Would not support development/redevelopment
- Would break traffic signal coordination and vehicle progression on S. Carson Street
- A multi-lane roundabout is not a particularly good fit for bicycle travel or pedestrian crossings
- Divides the frontage road again and therefore negatively impacts business access and circulation
- Would be a poor use of available funds relative to other investment options

Roundabouts have been considered at other locations along S. Carson Street in this evaluation. It is our opinion that investment at either S. Stewart Street (for gateway benefits and potential future connection to Curry Street) or Rhodes Street (for long-term redevelopment benefits) would have significantly greater value than intersection reconstruction work at Sonoma Street.

The S. Stewart Street intersection appears to be the most reasonable for a roundabout at this particular time as it would fit well considering existing right-of-way, support future connection to S. Curry Street, serve as a gateway feature to the revitalized downtown area, and be a good location relative to the coordinated signal system (which would become the segment of Fairview Drive and south thereof).

The City should continue planning long-term intersection improvements at Rhodes Street. Rhodes Street will be a key access location for the Armory Site and will additionally serve future development/redevelopment on the west side of S. Carson Street.

We sincerely appreciate this opportunity to assist Carson City with this important project and look forward to working with you again in the future. Please do not hesitate to contact me at 775.322.4300 with any questions or concerns.

Sincerely,
TRAFFIC WORKS, LLC

Loren E. Chilson, PE
Principal



Attachments:

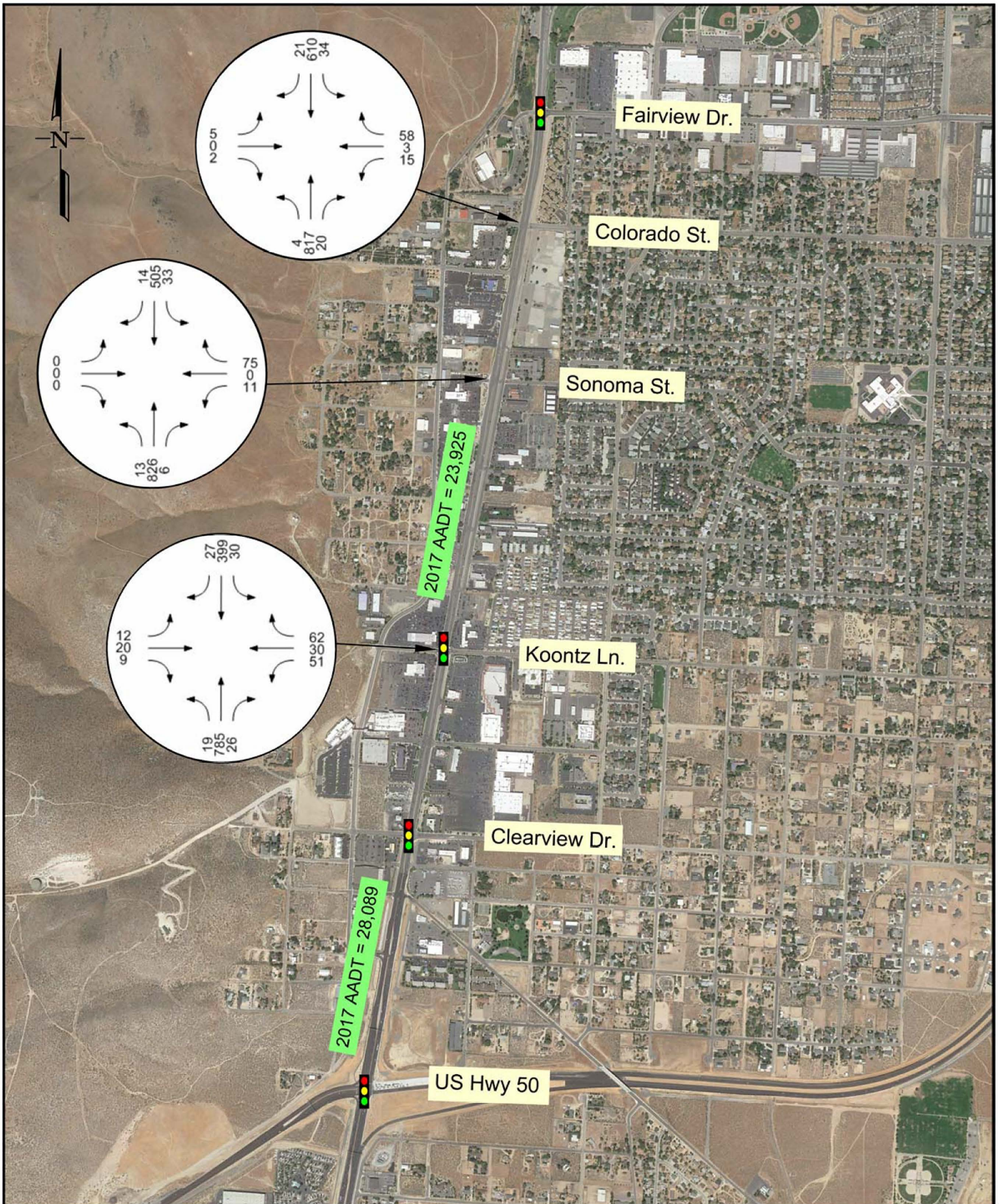
Attachment A – AM Peak Hour Existing Volumes, Roadway Network, and Current Intersection Controls

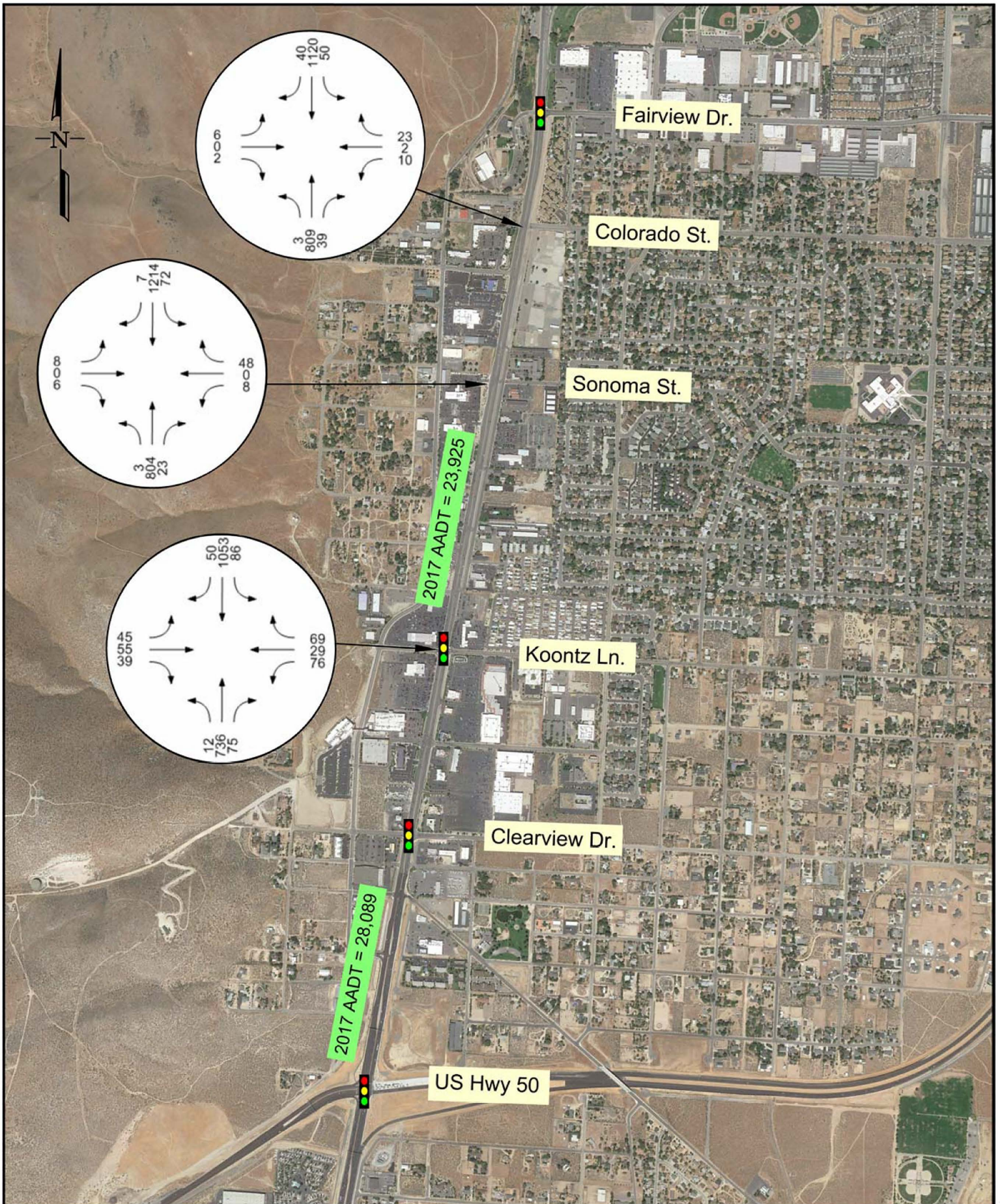
Attachment B – PM Peak Hour Existing Volumes, Roadway Network, and Current Intersection Controls

Attachment C - Sonoma Street Roundabout Concept

Attachment D - Existing Conditions Level of Service Calculations

Attachment E - 2040 Future Conditions Level of Service Calculations



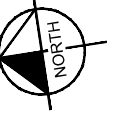


Attachment C:

S. Carson St / Sonoma St

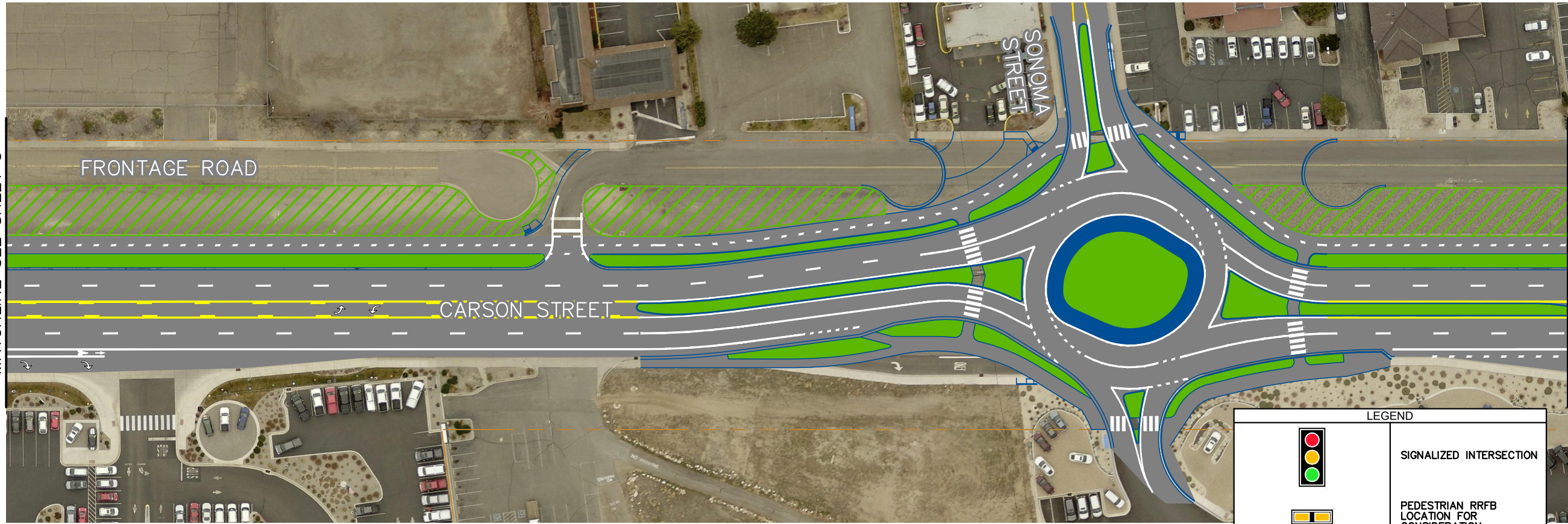
Roundabout Concept

(From Carson Street Complete Street Study)



MATCHLINE SEE SHEET 3

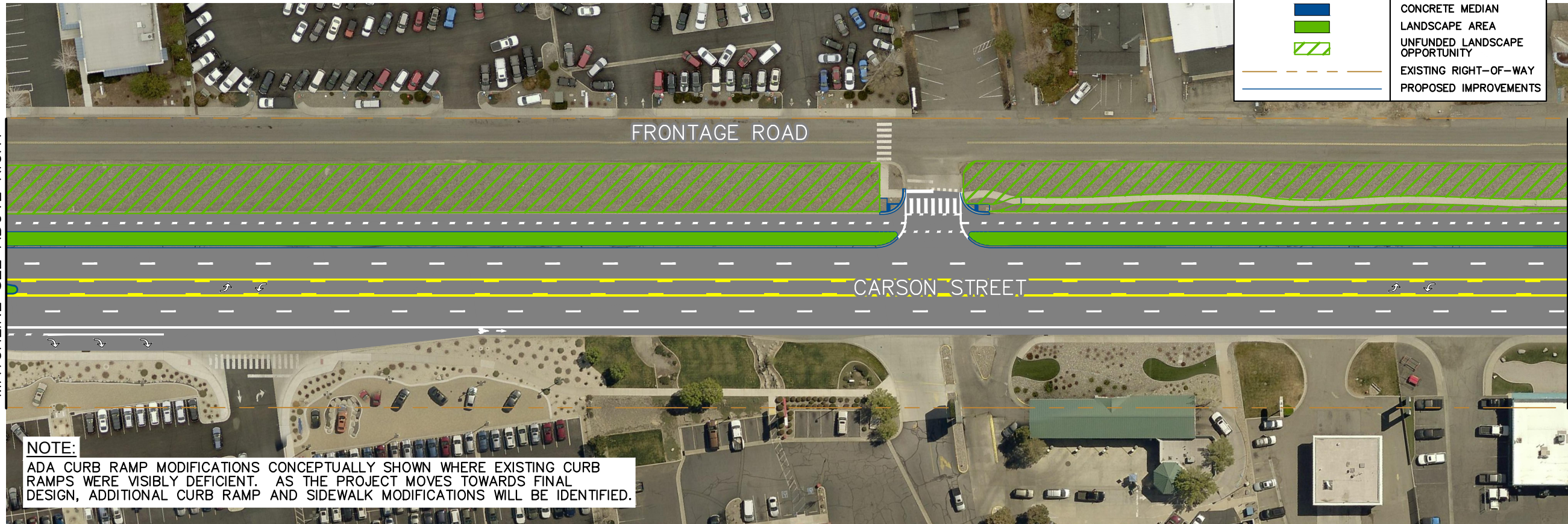
MATCHLINE SEE BELOW LEFT



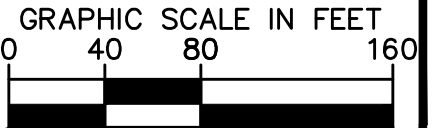
LEGEND	
	SIGNALIZED INTERSECTION
	PEDESTRIAN RRFB LOCATION FOR CONSIDERATION
	CONCRETE MEDIAN
	LANDSCAPE AREA
	UNFUNDED LANDSCAPE OPPORTUNITY
	EXISTING RIGHT-OF-WAY
	PROPOSED IMPROVEMENTS

MATCHLINE SEE ABOVE RIGHT

MATCHLINE SEE SHEET 5



NOTE:
 ADA CURB RAMP MODIFICATIONS CONCEPTUALLY SHOWN WHERE EXISTING CURB RAMP
 RAMPS WERE VISIBLY DEFICIENT. AS THE PROJECT MOVES TOWARDS FINAL
 DESIGN, ADDITIONAL CURB RAMP AND SIDEWALK MODIFICATIONS WILL BE IDENTIFIED.



PRELIMINARY CONCEPT - NOT FOR DESIGN

CARSON STREET COMPLETE STREET STUDY



Attachment D:
Existing Condition
Level of Service Calculations

LEVEL OF SERVICE SUMMARY

EXISTING CONDITIONS

	CARSON ST.		CARSON ST.		DRIVEWAY		SONOMA ST.	
	Northbound		Southbound		Eastbound		Westbound	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
AM Peak								
6 Lane Side Street Stop	0.16	A	0.86	A	26.03	D	17.56	C
4 Lane Side Street Stop	0.13	A	0.61	A	28.46	D	18.84	C
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.13	A	0.61	A	18.21	C	15.25	C

	Northbound		Southbound		Eastbound		Westbound	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	PM Peak							
6 Lane Side Street Stop	0.02	A	0.82	A	37.07	E	19.54	C
4 Lane Side Street Stop	0.04	A	0.57	A	68.73	F	28.53	D
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.04	A	0.57	A	29.42	D	16.01	C

2040 FUTURE CONDITIONS

	CARSON ST.		CARSON ST.		DRIVEWAY		SONOMA ST.		Overall	
	Northbound		Southbound		Eastbound		Westbound		Delay (s)	LOS
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
AM Peak										
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.14	A	0.63	A	20.22	C	18.02	C	-	-
Roundabout	9	A	6.9	A	5.5	A	10.9	B	8.4	A
Traffic Signal	4.94	A	4.18	A	6.98	A	7.87	A	4.9	A

	Northbound		Southbound		Eastbound		Westbound		Overall	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
	PM Peak									
4 Lane Side Street Stop w/ 2 Stage Left Turn	0.04	A	0.59	A	46.72	E	18.89	C	-	-
Roundabout	12.1	B	16.4	B	11.1	B	9.1	A	14.3	B
Traffic Signal	7.1	A	7.3	A	14.19	B	15.49	B	7.6	A

**Intersection Level Of Service Report
Intersection 2: Carson / Sonoma**

Control Type: Two-way stop
 Analysis Method: HCM 2010
 Analysis Period: 15 minutes

Delay (sec / veh): 24.6
 Level Of Service: C
 Volume to Capacity (v/c): 0.058

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	13	826	6	33	505	14	1	1	1	11	1	75
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	826	6	33	505	14	1	1	1	11	1	75
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	229	2	9	140	4	0	0	0	3	0	21
Total Analysis Volume [veh/h]	14	918	7	37	561	16	1	1	1	12	1	83
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.05	0.01	0.00	0.00	0.01	0.00	0.06	0.00	0.15
d_M, Delay for Movement [s/veh]	8.68	0.00	0.00	10.16	0.00	0.00	21.12	23.35	10.17	24.60	24.50	13.78
Movement LOS	A	A	A	B	A	A	C	C	B	C	C	B
95th-Percentile Queue Length [veh]	0.04	0.00	0.00	0.16	0.00	0.00	0.03	0.03	0.03	0.81	0.81	0.81
95th-Percentile Queue Length [ft]	1.07	0.00	0.00	3.97	0.00	0.00	0.82	0.82	0.82	20.15	20.15	20.15
d_A, Approach Delay [s/veh]	0.13			0.61			18.21			15.25		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	1.22											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: New Intersection

Control Type: Two-way stop
 Analysis Method: HCM 2010
 Analysis Period: 15 minutes

Delay (sec / veh): 45.3
 Level Of Service: E
 Volume to Capacity (v/c): 0.010

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	13	826	6	33	505	14	1	1	1	11	1	75
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	826	6	33	505	14	1	1	1	11	1	75
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	229	2	9	140	4	0	0	0	3	0	21
Total Analysis Volume [veh/h]	14	918	7	37	561	16	1	1	1	12	1	83
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.05	0.01	0.00	0.01	0.01	0.00	0.11	0.01	0.15
d_M, Delay for Movement [s/veh]	8.68	0.00	0.00	10.16	0.00	0.00	33.47	41.44	10.47	41.13	45.34	15.30
Movement LOS	A	A	A	B	A	A	D	E	B	E	E	C
95th-Percentile Queue Length [veh]	0.04	0.00	0.00	0.16	0.00	0.00	0.06	0.06	0.06	1.08	1.08	1.08
95th-Percentile Queue Length [ft]	1.07	0.00	0.00	3.97	0.00	0.00	1.46	1.46	1.46	26.88	26.88	26.88
d_A, Approach Delay [s/veh]	0.13			0.61			28.46			18.84		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	1.45											
Intersection LOS	E											

**Intersection Level Of Service Report
Intersection 2: New Intersection**

Control Type: Two-way stop
 Analysis Method: HCM 2010
 Analysis Period: 15 minutes

Delay (sec / veh): 46.5
 Level Of Service: E
 Volume to Capacity (v/c): 0.000

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵ ↑ ↵			↵ ↑ ↵			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	13	826	6	33	505	14	0	0	0	11	0	75
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	826	6	33	505	14	0	0	0	11	0	75
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	229	2	9	140	4	0	0	0	3	0	21
Total Analysis Volume [veh/h]	14	918	7	37	561	16	0	0	0	12	0	83
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.07	0.00	0.18
d_M, Delay for Movement [s/veh]	10.91	0.00	0.00	14.27	0.00	0.00	24.44	42.75	10.89	29.62	46.54	15.82
Movement LOS	B	A	A	B	A	A	C	E	B	D	E	C
95th-Percentile Queue Length [veh]	0.07	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.97	0.97	0.97
95th-Percentile Queue Length [ft]	1.72	0.00	0.00	7.10	0.00	0.00	0.00	0.00	0.00	24.26	24.26	24.26
d_A, Approach Delay [s/veh]	0.16			0.86			26.03			17.56		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	1.43											
Intersection LOS	E											

Intersection Level Of Service Report
Intersection 2: Carson / Sonoma

Control Type:	Two-way stop	Delay (sec / veh):	47.5
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.067

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↵↵			↵↵↵			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	3	804	23	72	1214	7	6	1	8	8	1	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	804	23	72	1214	7	6	1	8	8	1	48
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	214	6	19	323	2	2	0	2	2	0	13
Total Analysis Volume [veh/h]	3	855	24	77	1291	7	6	1	9	9	1	51
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.10	0.01	0.00	0.07	0.01	0.02	0.06	0.01	0.09
d_M, Delay for Movement [s/veh]	11.84	0.00	0.00	10.24	0.00	0.00	47.49	41.22	16.06	30.06	38.22	13.09
Movement LOS	B	A	A	B	A	A	E	E	C	D	E	B
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.33	0.00	0.00	0.32	0.32	0.32	0.55	0.55	0.55
95th-Percentile Queue Length [ft]	0.43	0.00	0.00	8.37	0.00	0.00	8.01	8.01	8.01	13.81	13.81	13.81
d_A, Approach Delay [s/veh]	0.04			0.57			29.42			16.01		
Approach LOS	A			A			D			C		
d_I, Intersection Delay [s/veh]	0.97											
Intersection LOS	E											

**Intersection Level Of Service Report
Intersection 2: New Intersection**

Control Type:	Two-way stop	Delay (sec / veh):	130.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↵↵			↵↵↵			⊕			⊕		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	3	804	23	72	1214	7	6	1	8	8	1	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	804	23	72	1214	7	6	1	8	8	1	48
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	214	6	19	323	2	2	0	2	2	0	13
Total Analysis Volume [veh/h]	3	855	24	77	1291	7	6	1	9	9	1	51
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.10	0.01	0.00	0.17	0.03	0.02	0.17	0.03	0.09
d_M, Delay for Movement [s/veh]	11.84	0.00	0.00	10.24	0.00	0.00	120.46	130.13	27.42	77.74	122.20	18.00
Movement LOS	B	A	A	B	A	A	F	F	D	F	F	C
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.33	0.00	0.00	0.77	0.77	0.77	1.14	1.14	1.14
95th-Percentile Queue Length [ft]	0.43	0.00	0.00	8.37	0.00	0.00	19.30	19.30	19.30	28.38	28.38	28.38
d_A, Approach Delay [s/veh]	0.04			0.57			68.73			28.53		
Approach LOS	A			A			F			D		
d_I, Intersection Delay [s/veh]	1.57											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: New Intersection

Control Type:	Two-way stop	Delay (sec / veh):	131.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	3	804	23	72	1214	7	6	0	8	8	0	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	804	23	72	1214	7	6	0	8	8	0	48
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	214	6	19	323	2	2	0	2	2	0	13
Total Analysis Volume [veh/h]	3	855	24	77	1291	7	6	0	9	9	0	51
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.17	0.01	0.00	0.09	0.00	0.03	0.09	0.00	0.11
d_M, Delay for Movement [s/veh]	17.98	0.00	0.00	14.71	0.00	0.00	64.36	131.43	18.88	43.74	129.60	15.27
Movement LOS	C	A	A	B	A	A	F	F	C	E	F	C
95th-Percentile Queue Length [veh]	0.03	0.00	0.00	0.62	0.00	0.00	0.39	0.39	0.39	0.71	0.71	0.71
95th-Percentile Queue Length [ft]	0.81	0.00	0.00	15.38	0.00	0.00	9.76	9.76	9.76	17.79	17.79	17.79
d_A, Approach Delay [s/veh]	0.06			0.82			37.07			19.54		
Approach LOS	A			A			E			C		
d_I, Intersection Delay [s/veh]	1.25											
Intersection LOS	F											

Attachment E:
2040 Future Condition
Level of Service Calculations

Intersection Level Of Service Report
Intersection 2: Carson / Sonoma

Control Type:	Two-way stop	Delay (sec / veh):	28.9
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.101

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	14	909	7	36	556	15	1	1	1	16	1	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	909	7	36	556	15	1	1	1	16	1	83
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	253	2	10	154	4	0	0	0	4	0	23
Total Analysis Volume [veh/h]	16	1010	8	40	618	17	1	1	1	18	1	92
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.00	0.06	0.01	0.00	0.01	0.01	0.00	0.10	0.01	0.18
d_M, Delay for Movement [s/veh]	8.88	0.00	0.00	10.65	0.00	0.00	23.92	26.32	10.43	28.92	28.47	15.78
Movement LOS	A	A	A	B	A	A	C	D	B	D	D	C
95th-Percentile Queue Length [veh]	0.05	0.00	0.00	0.19	0.00	0.00	0.04	0.04	0.04	1.17	1.17	1.17
95th-Percentile Queue Length [ft]	1.29	0.00	0.00	4.70	0.00	0.00	0.95	0.95	0.95	29.23	29.23	29.23
d_A, Approach Delay [s/veh]	0.14			0.63			20.22			18.02		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	1.44											
Intersection LOS	D											

MOVEMENT SUMMARY

 Site: S. Carson / Sonoma - AM Peak

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: S. Carson Street											
3	L2	15	3.0	0.481	9.0	LOS A	2.8	72.7	0.22	0.09	33.3
8	T1	988	3.0	0.481	9.0	LOS A	2.8	72.7	0.22	0.09	33.2
18	R2	8	3.0	0.481	9.0	LOS A	2.8	72.7	0.22	0.09	32.2
Approach		1011	3.0	0.481	9.0	LOS A	2.8	72.7	0.22	0.09	33.2
East: Sonoma St.											
1	L2	61	3.0	0.286	10.9	LOS B	0.8	20.7	0.60	0.61	31.4
6	T1	1	3.0	0.286	10.9	LOS B	0.8	20.7	0.60	0.61	31.3
16	R2	90	3.0	0.286	10.9	LOS B	0.8	20.7	0.60	0.61	30.5
Approach		152	3.0	0.286	10.9	LOS B	0.8	20.7	0.60	0.61	30.9
North: S. Carson St.											
7	L2	39	3.0	0.326	6.9	LOS A	1.5	38.3	0.25	0.13	34.1
4	T1	604	3.0	0.326	6.9	LOS A	1.5	38.3	0.25	0.13	34.1
14	R2	16	3.0	0.326	6.9	LOS A	1.5	38.3	0.25	0.13	33.2
Approach		660	3.0	0.326	6.9	LOS A	1.5	38.3	0.25	0.13	34.1
West: Driveway											
5	L2	1	3.0	0.005	5.5	LOS A	0.0	0.3	0.42	0.32	34.1
2	T1	1	3.0	0.005	5.5	LOS A	0.0	0.3	0.42	0.32	34.0
12	R2	1	3.0	0.005	5.5	LOS A	0.0	0.3	0.42	0.32	33.0
Approach		3	3.0	0.005	5.5	LOS A	0.0	0.3	0.42	0.32	33.7
All Vehicles		1826	3.0	0.481	8.4	LOS A	2.8	72.7	0.26	0.15	33.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Intersection Level Of Service Report
Intersection 2: Carson / Sonoma**

Control Type:	Signalized	Delay (sec / veh):	4.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.347

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵			↵			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	14	909	7	36	556	15	1	1	1	56	1	83
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	909	7	36	556	15	1	1	1	56	1	83
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	242	2	10	148	4	0	0	0	15	0	22
Total Analysis Volume [veh/h]	15	967	7	38	591	16	1	1	1	60	1	88
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	5	2	0	1	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	40	74	0	95	74	0	0	46	0	0	46	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
L, Total Lost Time per Cycle [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	0.00	2.00	2.00	0.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	0	8	8	0	8	8	3	3
g / C, Green / Cycle	0.00	0.43	0.43	0.00	0.43	0.43	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.02	0.26	0.26	0.07	0.17	0.01	0.00	0.09
s, saturation flow rate [veh/h]	756	1863	1858	528	3547	1583	1825	1745
c, Capacity [veh/h]	376	810	808	376	1543	689	519	521
d1, Uniform Delay [s]	9.58	4.14	4.14	9.58	3.67	3.09	6.98	7.57
k, delay calibration	0.50	0.11	0.11	0.50	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.20	0.72	0.72	0.54	0.16	0.01	0.00	0.30
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

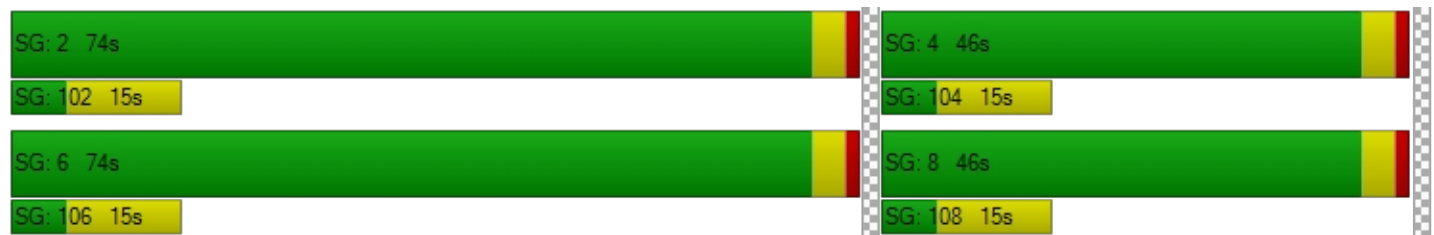
X, volume / capacity	0.04	0.60	0.60	0.10	0.38	0.02	0.01	0.29
d, Delay for Lane Group [s/veh]	9.77	4.86	4.86	10.11	3.82	3.10	6.98	7.87
Lane Group LOS	A	A	A	B	A	A	A	A
Critical Lane Group	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh]	0.06	0.24	0.23	0.15	0.07	0.00	0.01	0.31
50th-Percentile Queue Length [ft]	1.44	5.88	5.87	3.87	1.81	0.11	0.14	7.70
95th-Percentile Queue Length [veh]	0.10	0.42	0.42	0.28	0.13	0.01	0.01	0.55
95th-Percentile Queue Length [ft]	2.59	10.58	10.57	6.96	3.26	0.20	0.25	13.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.77	4.86	4.86	10.11	3.82	3.10	6.98	6.98	6.98	7.87	7.87	7.87
Movement LOS	A	A	A	B	A	A	A	A	A	A	A	A
d_A, Approach Delay [s/veh]	4.94			4.18			6.98			7.87		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.91											
Intersection LOS	A											
Intersection V/C	0.347											

Sequence

Ring 1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Intersection Level Of Service Report
Intersection 2: Carson / Sonoma**

Control Type: Two-way stop
 Analysis Method: HCM 2010
 Analysis Period: 15 minutes

Delay (sec / veh): 63.6
 Level Of Service: F
 Volume to Capacity (v/c): 0.143

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵↵↵			↵↵↵			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Pocket Length [ft]	300.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00			45.00			25.00			25.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	3	864	25	79	1335	8	9	1	7	12	1	53
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	864	25	79	1335	8	9	1	7	12	1	53
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	230	7	21	355	2	2	0	2	3	0	14
Total Analysis Volume [veh/h]	3	919	27	84	1420	9	10	1	7	13	1	56
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	1	1

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.12	0.01	0.00	0.14	0.01	0.02	0.10	0.01	0.10
d_M, Delay for Movement [s/veh]	12.68	0.00	0.00	10.65	0.00	0.00	63.56	53.62	21.68	35.12	45.97	14.63
Movement LOS	B	A	A	B	A	A	F	F	C	E	E	B
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.39	0.00	0.00	0.59	0.59	0.59	0.79	0.79	0.79
95th-Percentile Queue Length [ft]	0.48	0.00	0.00	9.84	0.00	0.00	14.87	14.87	14.87	19.80	19.80	19.80
d_A, Approach Delay [s/veh]	0.04			0.59			46.72			18.89		
Approach LOS	A			A			E			C		
d_I, Intersection Delay [s/veh]	1.21											
Intersection LOS	F											

MOVEMENT SUMMARY

 Site: S. Carson / Sonoma - PM Peak

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: S. Carson Street											
3	L2	3	3.0	0.609	12.1	LOS B	4.3	108.9	0.43	0.26	31.9
8	T1	961	3.0	0.609	12.1	LOS B	4.3	108.9	0.43	0.26	31.7
18	R2	245	3.0	0.609	12.1	LOS B	4.3	108.9	0.43	0.26	30.8
Approach		1209	3.0	0.609	12.1	LOS B	4.3	108.9	0.43	0.26	31.5
East: Sonoma St.											
1	L2	46	3.0	0.192	9.1	LOS A	0.5	12.9	0.56	0.56	32.1
6	T1	1	3.0	0.192	9.1	LOS A	0.5	12.9	0.56	0.56	32.0
16	R2	58	3.0	0.192	9.1	LOS A	0.5	12.9	0.56	0.56	31.1
Approach		104	3.0	0.192	9.1	LOS A	0.5	12.9	0.56	0.56	31.6
North: S. Carson St.											
7	L2	86	3.0	0.742	16.4	LOS C	7.7	195.9	0.43	0.21	29.9
4	T1	1451	3.0	0.742	16.4	LOS C	7.7	195.9	0.43	0.21	29.9
14	R2	9	3.0	0.742	16.4	LOS C	7.7	195.9	0.43	0.21	29.2
Approach		1546	3.0	0.742	16.4	LOS C	7.7	195.9	0.43	0.21	29.9
West: Driveway											
5	L2	10	3.0	0.053	11.1	LOS B	0.1	3.2	0.69	0.69	31.0
2	T1	1	3.0	0.053	11.1	LOS B	0.1	3.2	0.69	0.69	31.0
12	R2	8	3.0	0.053	11.1	LOS B	0.1	3.2	0.69	0.69	30.1
Approach		18	3.0	0.053	11.1	LOS B	0.1	3.2	0.69	0.69	30.7
All Vehicles		2877	3.0	0.742	14.3	LOS B	7.7	195.9	0.44	0.25	30.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

**Intersection Level Of Service Report
Intersection 2: Carson / Sonoma**

Control Type:	Signalized	Delay (sec / veh):	7.6
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.482

Intersection Setup

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↵			↵			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Carson Street			Carson Street			Driveway			Sonoma Street		
Base Volume Input [veh/h]	3	864	25	79	1335	8	9	1	7	42	1	53
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	864	25	79	1335	8	9	1	7	42	1	53
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	216	6	20	334	2	2	0	2	11	0	13
Total Analysis Volume [veh/h]	3	864	25	79	1335	8	9	1	7	42	1	53
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	5	2	0	1	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	5	0	5	5	0	0	5	0	0	5	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	9	60	0	20	71	0	0	40	0	0	40	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	0	16	16	3	18	18	3	3
g / C, Green / Cycle	0.00	0.47	0.47	0.08	0.55	0.55	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.00	0.27	0.27	0.05	0.42	0.01	0.01	0.06
s, saturation flow rate [veh/h]	1597	1676	1660	1597	3192	1425	1543	1552
c, Capacity [veh/h]	7	797	789	126	1755	783	302	293
d1, Uniform Delay [s]	16.72	6.33	6.33	15.03	5.87	3.43	14.11	14.84
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	35.60	0.62	0.63	5.01	0.70	0.01	0.08	0.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.42	0.56	0.56	0.63	0.76	0.01	0.06	0.33
d, Delay for Lane Group [s/veh]	52.32	6.95	6.95	20.03	6.57	3.44	14.19	15.49
Lane Group LOS	D	A	A	C	A	A	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.09	1.36	1.35	0.65	1.68	0.01	0.10	0.62
50th-Percentile Queue Length [ft]	2.23	34.07	33.77	16.24	42.12	0.29	2.57	15.62
95th-Percentile Queue Length [veh]	0.16	2.45	2.43	1.17	3.03	0.02	0.19	1.12
95th-Percentile Queue Length [ft]	4.01	61.33	60.79	29.24	75.82	0.53	4.63	28.12

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	52.32	6.95	6.95	20.03	6.57	3.44	14.19	14.19	14.19	15.49	15.49	15.49
Movement LOS	D	A	A	C	A	A	B	B	B	B	B	B
d_A, Approach Delay [s/veh]	7.10			7.30			14.19			15.49		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	7.60											
Intersection LOS	A											
Intersection V/C	0.482											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

