June 21, 2022

Rosa Clark
Department of Transportation, District 8
464 W. 4th Street, 6th Floor
San Bernardino, CA 92401

SIERRA INDUSTRIAL CALTRANS SAFETY EVALUATION

Rosa Clark,

Urban Crossroads, Inc. is pleased to provide the following Caltrans Safety Evaluation for the Sierra Industrial development (Project), which is located east of Sierra Avenue and south of Duncan Canyon Road in the City of Fontana. The purpose of this work effort is to provide a safety evaluation for the proposed Project based on the Caltrans Interim Local Development Intergovernmental Review (LDIGR) Safety Review Practitioners Guidance (dated December 18, 2020) (**Caltrans Guidelines**).

PROPOSED PROJECT

The Project is proposed to consist of 2 project sites with a Project total of 585,042 square feet.

1. Acacia Site (see Exhibit 1) - consisting of two buildings: a 296,297 square foot warehouse building (Building 1) and a smaller 88,746 square foot warehouse building (Building 2) for a total of 385,043 square feet.
2. Shea Site (see Exhibit 2) - consisting of a single a 199,999 square foot warehouse building.

Exhibit 3 shows the preliminary site plans of the Acacia and Shea sites. It is anticipated that the Project would be developed in a single phase with an anticipated Opening Year of 2024. For the purposes of this analysis, the following driveways will be assumed to provide access to the Project site:

- Driveway 1 on Sierra Avenue – Right-in/Right-out access (passenger cars and trucks)
- Driveway 2 on Sierra Avenue – Right-in/Right-out access (passenger cars and trucks)
- Driveway 3 on Sierra Avenue – Right-in/Right-out access (passenger cars only)
- Driveway 4 on Sierra Avenue – Right-in/Right-out access (passenger cars and trucks)
- Driveway 5 on Duncan Canyon Road – Full access (passenger cars only)

Regional access to the Project site is available from the I-15 Freeway via Sierra Avenue and the I-210 Freeway via Sierra Avenue to the south.

EXHIBIT 1: LOCATION MAP (ACACIA SITE)

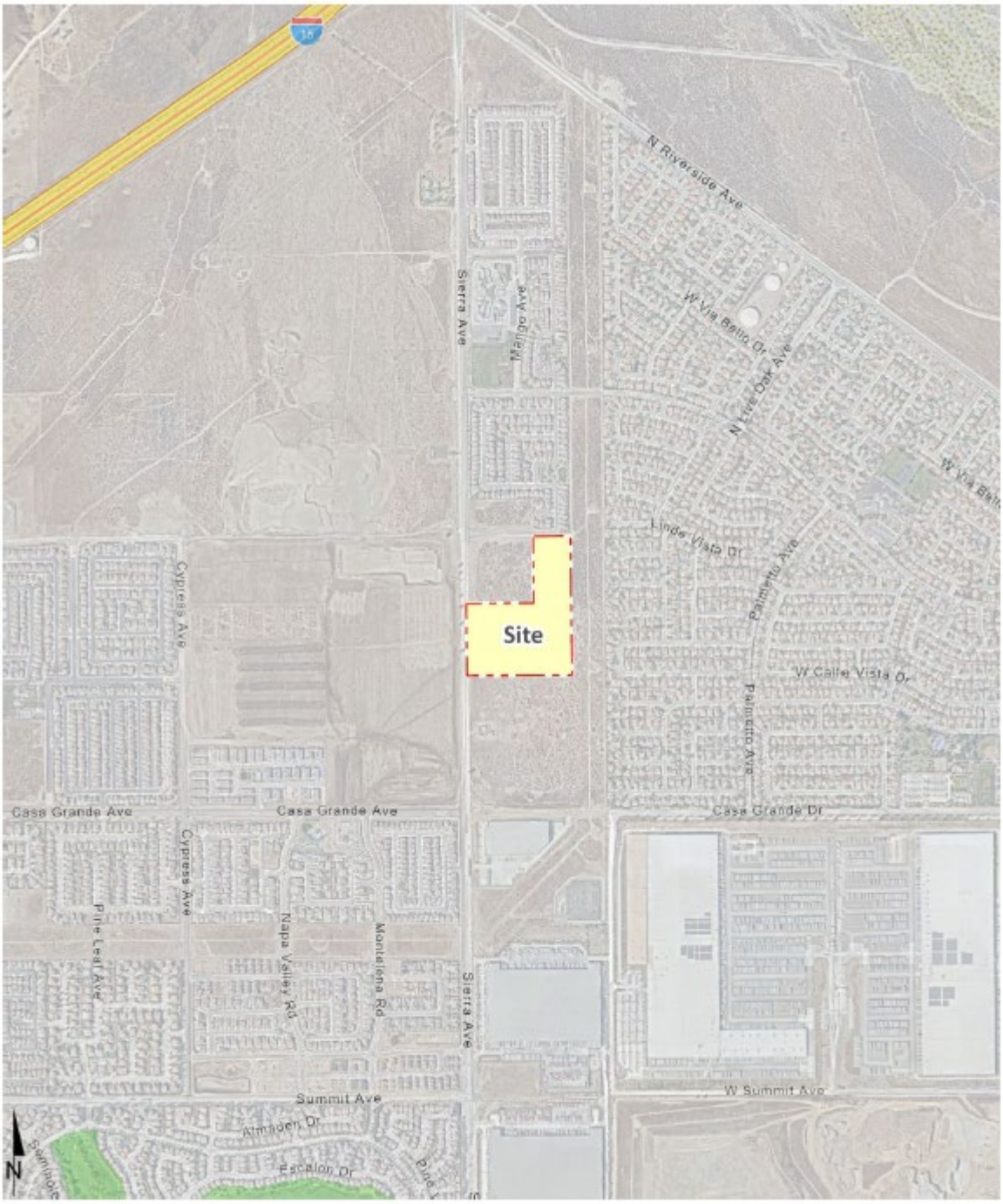


EXHIBIT 2: LOCATION MAP (SHEA SITE)

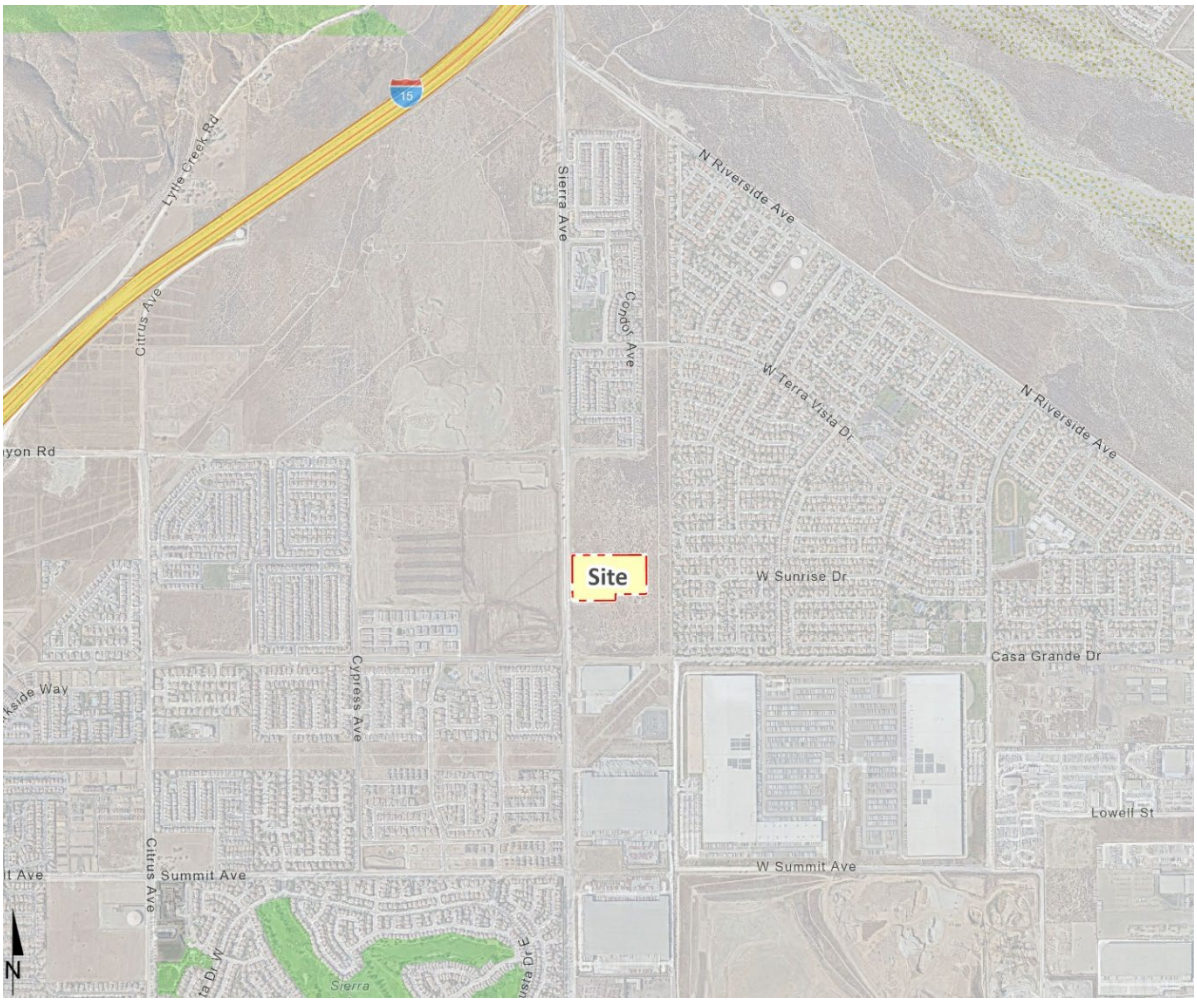
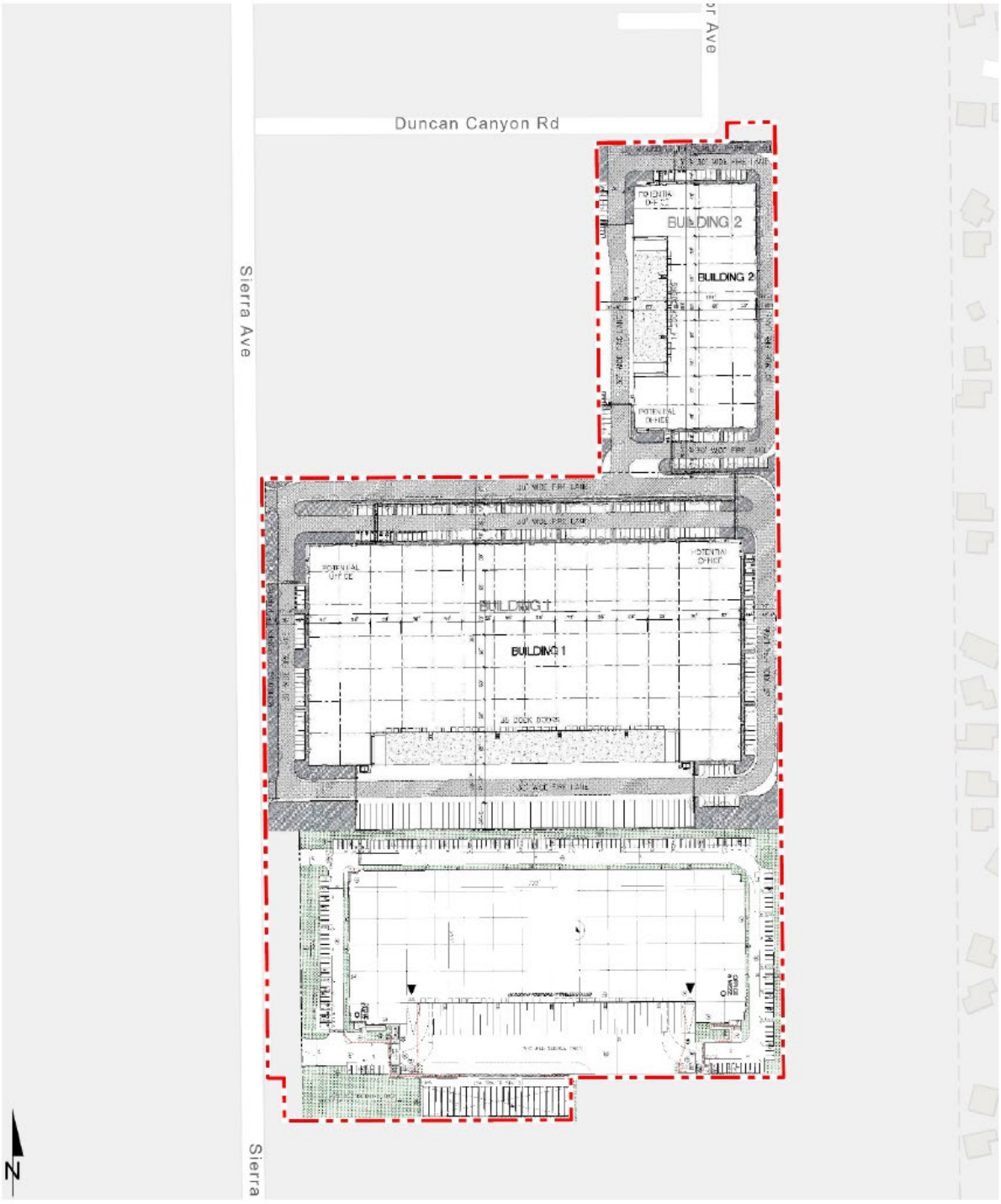


EXHIBIT 3: PRELIMINARY SITE PLAN



VEHICLE MILES TRAVELED (VMT)

The VMT Screening Evaluation was previously prepared under the Sierra Industrial Vehicle Miles Traveled (VMT) Analysis (Urban Crossroads, June 2022). Based on the results of this analysis the following findings are made:

- The Project's was evaluated against screening criteria as outlined in the City of Fontana Traffic Impact Analysis Guidelines for Vehicle Miles Traveled and Level of Service Assessment. The Project was not found to meet any available screening criteria, and a model based VMT analysis was performed.
- The Project's VMT analysis found the Project to exceed the City's VMT per employee threshold by 33.49% in baseline conditions and 12.79% in cumulative conditions. The Project is determined to have a potentially significant transportation impact.
- Since the future tenants are unknown at this time, implementation of the feasible TDM measures discussed in the VMT analysis cannot be guaranteed to reduce the Project generated VMT per employee; the Project's VMT impact is considered significant and unavoidable.

Implementation of potential TDM measures are not anticipated to significantly affect elements of the safety review.

SAFETY REVIEW METHODOLOGY

The Interim Land Development and Intergovernmental Review (LDIGR) practitioner guidance for safety review was utilized to determine methodology for the safety review. The safety assessment completed for this project included the following elements:

- Review of available systemic safety plans
- Review of available collision data
- Review of potential increase presence of pedestrians and bicyclist
- Degradation of the walking and bicycling environment and experience.
- New pedestrian and bicyclist connection desires
- Multimodal conflict points, especially at intersections and project access locations.
- Change in traffic mix such as an increase in bicyclists or pedestrians where features such as shoulders or sidewalks may not exist or are inconsistent with facility design (sidewalks, bike and multi-user paths, multimodal roadways, etc.)
- Increased vehicular speeds
- Transition between free flow and metered flow
- Increased traffic volumes
- Queuing at off-ramps resulting in slow or stopped traffic on mainline, or speed differentials between adjacent lanes
- Queuing exceeding turn pocket that impedes through-traffic
- Site access management (i.e., driveway sight distance, driveway or intersection spacing, project access queuing, multimodal conflict points, incomplete pedestrian and bicycle connections)

PROPOSED PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development.

In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021) for the following land uses has been utilized:

- Warehousing (ITE Land Use Code 150)
- High-Cube Cold Storage Warehouse (ITE Land Use Code 157)
- High-Cube Fulfillment Center Warehouse (ITE Land Use Code 155)

Additional details on the proposed Project trip generation can be found under the North Fontana Industrial Complex (Shea & Acacia) Trip Generation Evaluation (Urban Crossroads, June 2022).

PROPOSED PROJECT TRIP GENERATION

The proposed Project consists of the development of both the Shea site the Acacia site. The proposed Project (Shea site) is to consist of a 203,000 square foot warehouse building (this includes a 3,000 square foot mezzanine). The proposed Project (Acacia Site) includes the development of two buildings: a 296,297 square foot warehouse building (Building 1) and a smaller 88,746 square foot warehouse building (Building 2). Table 1 provides the trip generation rates utilized for both sites while Table 2 provides the combined trip generation summary for the proposed Project in actual vehicles. As shown in Table 2, the proposed Project (Shea site) is anticipated to generate a total of 1,082 two-way trips per day with 87 AM peak hour trips and 90 PM peak hour trips.

TABLE 1: PROPOSED PROJECT TRIP GENERATION RATES

Land Use[1]	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Warehousing[3]	TSF	150	0.131	0.039	0.170	0.050	0.130	0.180	1.710
Passenger Cars			0.116	0.034	0.150	0.042	0.108	0.150	1.110
2-Axle Trucks			0.002	0.001	0.003	0.003	0.002	0.005	0.100
3-Axle Trucks			0.002	0.002	0.004	0.003	0.003	0.006	0.124
4+-Axle Trucks			0.007	0.006	0.013	0.010	0.009	0.019	0.376
High-Cube Fulfillment Center (Non-Sort)[3]	TSF	155	0.122	0.028	0.150	0.062	0.098	0.160	1.810
Passenger Cars			0.105	0.025	0.130	0.059	0.091	0.150	1.580
2-Axle Trucks			0.002	0.001	0.003	0.001	0.001	0.002	0.038
3-Axle Trucks			0.002	0.002	0.004	0.001	0.001	0.002	0.048
4+-Axle Trucks			0.006	0.007	0.013	0.003	0.003	0.006	0.144
High-Cube Cold Storage Warehouse[3]	TSF	157	0.085	0.025	0.110	0.034	0.086	0.120	2.120
Passenger Cars			0.062	0.018	0.080	0.025	0.065	0.090	1.665
2-Axle Trucks			0.003	0.007	0.010	0.005	0.005	0.010	0.260
3-Axle Trucks			0.001	0.002	0.003	0.002	0.001	0.003	0.083
4+-Axle Trucks			0.005	0.011	0.016	0.008	0.008	0.016	0.113

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).

[2] TSF = thousand square feet

[3] Truck Mix: South Coast Air Quality Management District's (SCAQMD) recommended truck mix, by axle type.
Normalized % - Without Cold Storage: 16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks.
Normalized % - With Cold Storage: 34.7% 2-Axle trucks, 11.0% 3-Axle trucks, 54.3% 4-Axle trucks.

TABLE 2: PROPOSED PROJECT TRIP GENERATION SUMMARY (ACTUAL VEHICLES)

Land Use	Quantity Units[1]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Warehousing (Building 2 Only)	88.746 TSF							
Passenger Cars:		10	3	13	4	10	14	100
2-axle Trucks:		0	0	0	0	0	0	10
3-axle Trucks:		0	0	0	0	0	0	12
4+-axle Trucks:		1	0	1	1	1	2	34
Total Truck Trips (Actual Vehicles):		1	0	1	1	1	2	56
Total Trips (Actual Vehicles)[2]		11	3	14	5	11	16	156
High-Cube Cold Storage (10% Building 1 & Shea Site)	49.930 TSF							
Passenger Cars:		3	1	4	1	3	4	84
2-axle Trucks:		0	0	0	0	0	0	14
3-axle Trucks:		0	0	0	0	0	0	4
4+-axle Trucks:		0	1	1	0	0	0	6
Total Truck Trips (Actual Vehicles):		0	1	1	0	0	0	24
Total Trips (Actual Vehicles)[2]		3	2	5	1	3	4	108
High-Cube Fulfillment (Non-Sort) (90% Building 1 & Shea Site)	449.367 TSF							
Passenger Cars:		47	11	58	27	41	68	712
2-axle Trucks:		1	1	2	0	0	0	18
3-axle Trucks:		1	1	2	0	0	0	22
4+-axle Trucks:		3	3	6	1	1	2	66
Total Truck Trips (Actual Vehicles):		5	5	10	1	1	2	106
Total Trips (Actual Vehicles)[2]		52	16	68	28	42	70	818
Passenger Cars:		**60**	**15**	**75**	**32**	**54**	**86**	**896**
Total Truck Trips (Actual Vehicles):		**6**	**6**	**12**	**2**	**2**	**4**	**186**
Total Project Trips (Actual Vehicles)[2]		**66**	**21**	**87**	**34**	**56**	**90**	**1,082**

[1] TSF = thousand square feet

[2] Total Trips = Passenger Cars + Truck Trips.

SYSTEMIC SAFETY PLANS

The City of Fontana prepared a Systemic Safety Analysis Report (SSAR) and published the Final Systemic Safety Analysis Report (prepared by KOA, January 2020). The purpose of the SSAR is to identify safety projects through an inventory of existing roadway system elements and a data-driven step-by-step. The SSAR report identified safety projects for 35 intersections and five roadway segments. The SSAR report does not include any of the study area intersections under the list of priority zones for improvements.

COLLISION DATA

The collision data analysis is based on the collision data received from Caltrans during a five-year period (see Attachment A). The five-years of collision data from Caltrans' Traffic Accident Surveillance and Analysis System (TASAS) includes the Sierra Avenue and I-15 Interchange (Post Mile (PM) 12.614 to PM 13.050) and the Sierra Avenue and SR-210 Interchange (PM 14.668 to PM 15.182). For both interchange locations, only a three- year period was provided (a five-year period was requested). Table 3 presents a summary of the TASAS Table B data provided by Caltrans and Table 4 presents a summary of the collision type.

Analysis of the TASAS Table B records shows a total of 22 crashes within the Sierra Avenue and I-15 Interchange and a total of 38 crashes within the Sierra Avenue and SR-210 Interchange. The TASAS Table B shows a comparison between actual collision rates of the facility to the average rate of similar facilities statewide.[1] The following facilities had a higher actual collision rate than the state average:

- I-15 PM 12.614 (NB OFF TO SIERRA/LYTLE) – fatal plus injury related collisions
- SR-210 PM 14.668 (EB OFF TO SIERRA AVE) – fatal plus injury related collisions and total rate of collisions
- SR-210 PM 15.106 (EB ON FROM NB SIERRA AVE) – fatal plus injury related collisions and total rate of collisions
- SR-210 PM 15.182 (WB OFF TO SIERRA AVE) – fatal plus injury related collisions and total rate of collisions

Table 4 provides a summary of the type of collision by area. Type of collision data was not provided for the Sierra Avenue and I-15 Interchange. It is not anticipated that the addition of the proposed Project will result in a significant change in collisions due to the number of trips generated or vehicle type (e.g. trucks).

[1] Based on a review of the 2018 Crash Data on California State Highways (Caltrans, October 2020). Latest available edition at the time of preparation of this study.

TABLE 3: COLLISION RATES (# OF COLLISIONS/MILLION VEHICLE, MV) SUMMARY

Location	Actual Collision Rates (MV)			Average Collision Rates (MV)		
	Fatal	Fat+Inj	Total	Fatal	Fat+Inj	Total
I-15 PM 12.614 (NB OFF TO SIERRA/LYTLE)	0.000	**0.39**	0.59	0.003	0.38	1.04
I-15 PM 12.709 (SB ON FR SIERRA/LYTLE)	0.000	0.00	0.26	0.002	0.23	0.63
I-15 PM 13.027 (NB ON FR SIERRA/LYTLE)	0.000	0.12	0.24	0.002	0.23	0.63
I-15 PM 13.050 (SB OFF TO SIERRA/LYTLE)	0.000	0.13	0.53	0.009	0.48	1.31
SR-210 PM 14.668 (EB OFF TO SIERRA AVE)	0.000	**0.62**	**1.51**	0.003	0.38	1.04
SR-210 PM 14.748 (WB ON FROM SB SIERRA AVE)	0.000	0.00	0.19	0.002	0.23	0.63
SR-210 PM 14.881 (EB ON FROM SB SIERRA AVE)	0.000	0.00	0.00	0.002	0.23	0.77
SR-210 PM 14.904 (WB ON FROM NB SIERRA AVE)	0.000	0.00	0.42	0.002	0.23	0.77
SR-210 PM 15.106 (EB ON FROM NB SIERRA AVE)	0.000	**0.41**	**1.01**	0.002	0.23	0.63
SR-210 PM 15.182 (WB OFF TO SIERRA AVE)	0.000	**2.73**	**10.94**	0.003	0.38	1.04

BOLD = Actual collision rates are above the average for similar facilities statewide

TABLE 4: TYPE OF COLLISIONS SUMMARY

Head-On	Sideswipe	Rear-End	Broadside	Hit-Object	Overturn	Auto-Ped	Other	Not Stated
SR-210 PM 14.668 (EB OFF TO SIERRA AVE) (Total: 17 Collisions)								
1 (5.9%)	1 (5.9%)	5 (29.4%)	9 (52.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5.9%)	0 (0.0%)
SR-210 PM 14.748 (WB ON FROM SB SIERRA AVE) (Total: 1 Collision)								
0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
SR-210 PM 14.881 (EB ON FROM SB SIERRA AVE) (Total: 0 Collisions)								
0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
SR-210 PM 14.904 (WB ON FROM NB SIERRA AVE) (Total: 3 Collisions)								
0 (0.0%)	0 (0.0%)	2 (66.7%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
SR-210 PM 15.106 (EB ON FROM NB SIERRA AVE) (Total: 5 Collisions)								
0 (0.0%)	0 (0.0%)	5 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
SR-210 PM 15.182 (WB OFF TO SIERRA AVE) (Total: 12 Collisions)								
0 (0.0%)	1 (8.3%)	5 (41.7%)	3 (25.0%)	2 (16.7%)	0 (0.0%)	1 (8.3%)	0 (0.0%)	0 (0.0%)

BICYCLE & PEDESTRIAN FACILITIES

In an effort to promote alternative modes of transportation, the City of Fontana has several existing and planned bicycle routes. There is a planned Class II bicycle route along Sierra Avenue. However, there are currently no existing bike lanes along Sierra Avenue.

Pedestrian facilities do not currently exist along the Project frontage. There are limited pedestrian ramps and crosswalks along the Sierra Avenue and I-15 Interchange and Sierra Avenue and SR-210 Interchange. The Project driveways shall comply with ADA standards and City of Fontana standards prior to occupancy. Existing count data indicates that there are nominal pedestrian and bicyclist activity in the study area. It is not anticipated that the addition of the proposed Project will significantly increase pedestrian and bicyclist activity.

VEHICULAR SPEEDS

Project to construct Sierra Avenue at its ultimate half-width (east side) as a Major Highway (132-foot right-of-way) from the southern Project boundary to the northern Project boundary consistent with the City's standards. This includes the construction of a raised median which will be used to physically prohibit left turns into and out of the Project at the two driveways proposed on Sierra Avenue. The City of Fontana should conduct speed surveys to evaluate 85th percentile speeds along Sierra Avenue once the roadway widening is constructed. Roadway construction shall comply with applicable CA MUTCD or Highway Design Manual standards.

QUEUING ANALYSIS

A queuing analysis was performed for the following intersections to assess vehicle queues that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections or may potentially "spill back" and affect traffic operations:

- Sierra Av. & I-15 SB Ramps (#1)
- Sierra Av. & I-15 NB Ramps (#2)
- Sierra Av. & SR-210 WB Ramps (#3)
- Sierra Av. & SR-210 EB Ramps (#4)

Queuing analysis findings are presented in Table 5. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown in Table 5, the following movements are currently experiencing queuing issues during the weekday AM or weekday PM peak 95th percentile Existing (2021) traffic flows:

- Sierra Av. & I-15 SB Ramps (#1) – northbound left turn movement

Consistent with Existing (2021) traffic conditions, there are no additional movements anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile EAP (2024), Opening Year Cumulative (2024) Without Project and With Project traffic flows. The addition of the proposed Project is not anticipated to significantly increase traffic queues. Worksheets for queuing analysis, by scenario, are provided in Appendix B.

TABLE 5: QUEUING ANALYSIS

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2021) 95th Percentile Queue (Feet) AM Peak Hour	Existing (2021) 95th Percentile Queue (Feet) PM Peak Hour	Existing (2021) Acceptable? [1] AM	Existing (2021) Acceptable? [1] PM	EAP 95th Percentile Queue (Feet) AM Peak Hour	EAP 95th Percentile Queue (Feet) PM Peak Hour	EAP Acceptable? [1] AM	EAP Acceptable? [1] PM
Sierra Av. & I-15 SB Ramps	NBL	250	291 [2]	174 [2]	**No**	Yes	317 [2]	196 [2]	**No**	Yes
	SBR	230	64	41	Yes	Yes	113	42	Yes	Yes
	WBL	190	189 [2]	160	Yes	Yes	221 [2,3]	169	Yes	Yes
	WBL/T	1,125	190 [2]	160	Yes	Yes	221 [2]	171	Yes	Yes
	WBR	190	27	23	Yes	Yes	31	25	Yes	Yes
Sierra Av. & I-15 NB Ramps	NBR	250	48	54	Yes	Yes	49	66	Yes	Yes
	SBL	240	63	83	Yes	Yes	64	83	Yes	Yes
	EBL	365	106	372 [2,3]	Yes	Yes	113	402 [2,3]	Yes	Yes
	EBT	1,410	94	403 [2]	Yes	Yes	103	435 [2]	Yes	Yes
	EBR	365	42	126	Yes	Yes	44	121	Yes	Yes
Sierra Av. & SR-210 WB Ramps	WBL	810	126	114	Yes	Yes	133	124	Yes	Yes
	WBL/R	1,600	126	136	Yes	Yes	133	151	Yes	Yes
	WBR	450	109	136	Yes	Yes	130	151	Yes	Yes
Sierra Av. & SR-210 EB Ramps	EBL	960	87	90	Yes	Yes	96	95	Yes	Yes
	EBL/R	1,640	148	120	Yes	Yes	158	126	Yes	Yes
	EBR	960	148	120	Yes	Yes	158	126	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-15 Freeway mainline.

Intersection	Movement	Available Stacking Distance (Feet)	OYC (2024) Without Project 95th Percentile Queue (Feet) AM Peak	OYC (2024) Without Project 95th Percentile Queue (Feet) PM Peak	OYC (2024) Without Project Acceptable? [1] AM	OYC (2024) Without Project Acceptable? [1] PM	OYC (2024) With Project 95th Percentile Queue (Feet) AM Peak	OYC (2024) With Project 95th Percentile Queue (Feet) PM Peak	OYC (2024) With Project Acceptable? [1] AM	OYC (2024) With Project Acceptable? [1] PM
Sierra Av. & I-15 SB Ramps	NBL	250	374 [2]	202 [2]	**No**	Yes	381 [2]	219 [2]	**No**	Yes
	SBR	230	155	44	Yes	Yes	155	44	Yes	Yes
	WBL	190	240 [2,3]	236 [2,3]	Yes	Yes	244 [2,3]	237 [2,3]	Yes	Yes
	WBL/T	1,125	241 [2]	240 [2]	Yes	Yes	245 [2]	241 [2]	Yes	Yes
	WBR	190	42	51	Yes	Yes	42	51	Yes	Yes
Sierra Av. & I-15 NB Ramps	NBR	250	55	93	Yes	Yes	55	90	Yes	Yes
	SBL	240	77	88	Yes	Yes	78	91	Yes	Yes
	EBL	365	140	454 [2,3]	Yes	Yes	140	466 [2,3]	Yes	Yes
	EBT	1,410	131	493 [2]	Yes	Yes	131	505 [2]	Yes	Yes
	EBR	365	68	217 [2]	Yes	Yes	68	221 [2]	Yes	Yes
Sierra Av. & SR-210 WB Ramps	WBL	810	149	147	Yes	Yes	154	149	Yes	Yes
	WBL/R	1,600	172	181	Yes	Yes	180	185	Yes	Yes
	WBR	450	172	181	Yes	Yes	180	185	Yes	Yes
Sierra Av. & SR-210 EB Ramps	EBL	960	125	112	Yes	Yes	129	112	Yes	Yes
	EBL/R	1,640	158	132	Yes	Yes	162	135	Yes	Yes
	EBR	960	158	132	Yes	Yes	162	135	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

[2] Maximum queue length for the approach reported.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-15 Freeway mainline.

SITE ACCESS

The Project is to construct the following improvements as design features in conjunction with development of the site:

- Project to construct four driveways on Sierra Avenue with stop controls for egress traffic from the Project with free flow traffic along Sierra Avenue. These driveways will be restricted to right-in/right-out access only.
- Project to construct driveway on Duncan Canyon Road with stop controls for egress traffic from the Project with free flow traffic along Duncan Canyon Road. This driveway is proposed to have full access (no turn restrictions).
- Project to construct Sierra Avenue at its ultimate half-width (east side) as a Major Highway (132-foot right-of-way) from the southern Project boundary to the northern Project boundary consistent with the City's standards. This includes the construction of a raised median which will be used to physically prohibit left turns into and out of the Project at the two driveways proposed on Sierra Avenue.

It is recommended that the proposed Project coordinate with City staff to meet City of Fontana driveway and sight distance standards.

CONCLUSION

Based on the Project's VMT analysis, the Project's VMT impact is considered significant and unavoidable. The Project is anticipated to generate fewer than 50 peak hour trips (actual and PCE based) to any off-site study area intersection. It is anticipated that a large majority of Project-related truck traffic will occur outside of AM and PM peak hours. The proposed Project is anticipated to contribute to existing queuing deficiencies along Sierra Avenue; however, Project-related traffic is not anticipated to cause additional queuing deficiencies. It is recommended that the proposed Project coordinate with City staff to meet City of Fontana driveway and sight distance standards.

If you have any questions or comments, I can be reached at (714) 336-1982.

Respectfully submitted,

URBAN CROSSROADS, INC.

Jose Alire, P.E.
Senior Traffic Engineer

Robert Vu, P.E.
Transportation Engineer

ATTACHMENT A

CALTRANS COLLISION DATA

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Making Conservation a California Way of Life.

To: ROBERT VU
Transportation Engineer
Urban Crossroads, Inc.

Date: June 2, 2022

File: 08-SBD-15,
PM 12.863

From: MARY PADRES MP
Office Chief
District 8 Traffic Operations
Surveillance Region C

Subject: **CRASH DATA FOR TRAFFIC SAFETY REVIEW AT THE I-15 AND SIERRA AVENUE NORTHBOUND/SOUTHBOUND RAMPS IN THE COUNTY OF SAN BERNARDINO**

"The information released here is protected by 23 U.S.C. § 409, and the data shall not be subject to discovery nor admitted as evidence in any applicable legal proceeding against the State of California. The State of California does not, by allowing use of this Database, waive any rights it has under 23 U.S.C. § 409."

This Traffic Accident Surveillance and Analysis System (TASAS) covers the ramp segments of I-15 in San Bernardino County from Post Mile 12.614 to Post Mile 13.050.

CRASH DATA:

Caltrans Traffic Accident Surveillance & Analysis System (TASAS) Table B and TSAR indicate the following summaries for the ramp segments of I-15 in San Bernardino County from Post Mile 12.614 to Post Mile 13.050 during the three-year period between July 1, 2018, to June 30, 2021. Data Retrieved 6/1/2022.

Collision Rates

Collision Rates (# of Collisions/Million Vehicle, MV)									
Location I-15	# of Collisions			Actual Collision Rates (MV)			Average Collision Rates (MV)		
	Fatal	Injury	Total	Fatal	Fat+Inj	Total	Fatal	Fat+Inj	Total
PM 12.614 (NBOFF TO SIERRA/ LYTLE)	0	4	6	0.000	0.39	0.59	0.003	0.38	1.04
PM 12.709 (SB ON FR SIERRA/ LYTLE)	0	0	6	0.000	0.00	0.59	0.002	0.23	0.63

Collision Rates

Collision Rates (# of Collisions/Million Vehicle, MV)									
Location I-15	# of Collisions			Actual Collision Rates (MV)			Average Collision Rates (MV)		
	Fatal	Injury	Total	Fatal	Fat+Inj	Total	Fatal	Fat+Inj	Total
PM 13.027 (NB ON FR SIERRA/ LYTLE)	0	1	2	0.000	0.12	0.24	0.002	0.23	0.63
PM 13.050 (SB OFF TO SIERRA/ LYTLE)	0	2	8	0.000	0.13	0.53	0.009	0.48	1.31

Analysis of the TASAS Table B record shows a total of six crashes within the ramp segment of I-15 in San Bernardino County at Post Mile 12.614 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is above the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

Analysis of the TASAS Table B record shows a total of six crashes within the ramp segment of I-15 in San Bernardino County at Post Mile 12.709 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is below the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

Analysis of the TASAS Table B record shows a total of two crashes within the ramp segment of I-15 in San Bernardino County at Post Mile 13.027 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is below the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

Analysis of the TASAS Table B record shows a total of eight crashes within the ramp segment of I-15 in San Bernardino County at Post Mile 13.050 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is below the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

If you have any questions, please call me at 909-226-0913 or contact my staff via email at D8.TrafficOps.SurvC@dot.ca.gov.

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Making Conservation a California Way of Life.

To: ROBERT VU
Transportation Engineer
Urban Crossroads, Inc.

Date: June 9, 2022

File: 08-SBD-210, PM 14.929

From: for MARY PADRES
Office Chief
District 8 Traffic Operations
Surveillance Region C

Subject: **CRASH DATA FOR TRAFFIC SAFETY REVIEW AT THE SR-210 AND SIERRA AVENUE EASTBOUND/WESTBOUND RAMPS IN THE COUNTY OF SAN BERNARDINO**

"The information released here is protected by 23 U.S.C. § 409, and the data shall not be subject to discovery nor admitted as evidence in any applicable legal proceeding against the State of California. The State of California does not, by allowing use of this Database, waive any rights it has under 23 U.S.C. § 409."

This Traffic Accident Surveillance and Analysis System (TASAS) covers the ramp segments of SR-210 in San Bernardino County from Post Mile 14.668 to Post Mile 15.182.

CRASH DATA:

Caltrans Traffic Accident Surveillance & Analysis System (TASAS) Table B and TSAR indicate the following summaries for the ramp segments of SR-210 in San Bernardino County from Post Mile 14.668 to Post Mile 15.182 during the three-year period between July 1, 2018, to June 30, 2021. Data Retrieved 6/2/2022.

Collision Rates

Collision Rates (# of Collisions/Million Vehicle, MV)									
Location SR-210	# of Collisions			Actual Collision Rates (MV)			Average Collision Rates (MV)		
	Fatal	Injury	Total	Fatal	Fat+Inj	Total	Fatal	Fat+Inj	Total
PM 14.668 (EB OFF TO SIERRA AVE)	0	7	17	0.000	0.62	1.51	0.003	0.38	1.04
PM 14.748 (WB ON FROM SB SIERRA AVE)	0	0	1	0.000	0.00	0.19	0.002	0.23	0.63
PM 14.881 (EB ON FROM SB SIERRA AVE)	0	0	0	0.000	0.00	0.00	0.002	0.23	0.77

Collision Rates

Collision Rates (# of Collisions/Million Vehicle, MV)									
Location SR-210	# of Collisions			Actual Collision Rates (MV)			Average Collision Rates (MV)		
	Fatal	Injury	Total	Fatal	Fat+Inj	Total	Fatal	Fat+Inj	Total
PM 14.904 (WB ON FROM NB SIERRA AVE)	0	0	3	0.000	0.00	0.42	0.002	0.23	0.77
PM 15.106 (EB ON FROM NB SIERRA AVE)	0	2	5	0.000	0.41	1.01	0.002	0.23	0.63
PM 15.182 (WB OFF TO SIERRA AVE)	0	3	12	0.000	2.73	10.94	0.003	0.38	1.04

Analysis of the TASAS Table B record shows a total of seventeen crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 14.668 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is above the average for similar facilities statewide; and a total rate of collisions that is above the average for similar facilities statewide.

Detailed analysis of the types of reported collisions shows that:

- 1 (5.9%) crash was head-on;
- 1 (5.9%) crash was sideswipe;
- 5 (29.4%) crashes were rear end;
- 9 (52.9%) crashes were broadside; and
- 1 (5.9%) crash was other.

The primary crash factors were:

- 1 (5.9%) due to failure to yield;
- 1 (5.9%) due to improper turn;
- 6 (35.3%) due to speeding;
- 8 (47.1%) due to other violations; and
- 1 (5.9%) due to other than driver.

Analysis of the TASAS Table B record shows a total of seventeen crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 14.748 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is below

the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

Detailed analysis of the types of reported collisions shows that:

- 1 (100.0%) crash was rear end.

The primary crash factors were:

- 1 (100.0%) due to speeding.

Analysis of the TASAS Table B record shows a total of zero crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 14.881 and study period summarized above.

Analysis of the TASAS Table B record shows a total of three crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 14.904 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is below the average for similar facilities statewide; and a total rate of collisions that is below the average for similar facilities statewide.

Detailed analysis of the types of reported collisions shows that:

- 2 (66.7 %) crashes were rear end; and
- 1 (33.3 %) crash was hit object.

The primary crash factors were:

- 1 (33.3 %) due to improper turn; and
- 2 (66.7 %) due to speeding.

Analysis of the TASAS Table B record shows a total of five crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 15.106 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is above the average for similar facilities statewide; and a total rate of collisions that is above the average for similar facilities statewide.

Detailed analysis of the types of reported collisions shows that:

- 5 (100.0%) crashes were rear end.

The primary crash factors were:

- 1 (100.0%) due to speeding.

Analysis of the TASAS Table B record shows a total of twelve crashes within the ramp segment of SR-210 in San Bernardino County at Post Mile 15.182 and study period summarized above; with a total rate of fatal related collisions that is below the average for similar facilities statewide; a total rate of fatal plus injury related collisions that is above the average for similar facilities statewide; and a total rate of collisions that is above the average for similar facilities statewide.

Detailed analysis of the types of reported collisions shows that:

- 1 (8.3%) crash was sideswipe;
- 5 (41.7%) crashes were rear end;
- 3 (25.0%) crashes were broadside;
- 2 (16.7%) crashes were hit object; and
- 1 (8.3%) crash was auto-pedestrian.

The primary crash factors were:

- 2 (16.7%) due to failure to yield;
- 3 (25.0%) due to improper turn;
- 3 (25.0%) due to speeding; and
- 4 (33.3%) due to other violations.

If you have any questions, please call me at 909-226-0913 or contact my staff via email at D8.TrafficOps.SurvC@dot.ca.gov.

ATTACHMENT B

QUEUING ANALYSIS WORKSHEETS

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	260	261	105	256	488	402	849
v/c Ratio	0.62	0.62	0.21	0.62	0.24	0.42	0.82
Control Delay	30.1	30.2	4.6	38.9	4.0	21.0	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	30.2	4.6	38.9	4.0	21.0	8.9
Queue Length 50th (ft)	98	98	0	108	39	77	4
Queue Length 95th (ft)	#189	#190	27	#291	2	82	64
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	445	446	511	414	2144	1587	1171
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.59	0.21	0.62	0.23	0.25	0.73

Intersection Summary

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	137	134	125	513	416	73	840
v/c Ratio	0.49	0.47	0.35	0.28	0.41	0.39	0.36
Control Delay	32.2	25.3	8.3	11.9	3.0	42.0	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	25.3	8.3	11.9	3.0	42.0	6.2
Queue Length 50th (ft)	56	43	0	66	0	34	91
Queue Length 95th (ft)	106	94	42	113	48	m63	109
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	338	339	402	1817	1015	445	2349
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.40	0.31	0.28	0.41	0.16	0.36

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	574	258	751	1150
v/c Ratio	0.55	0.51	0.28	0.43
Control Delay	21.5	14.9	6.7	11.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.5	14.9	6.7	11.6
Queue Length 50th (ft)	103	58	40	102
Queue Length 95th (ft)	126	109	46	165
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1423	654	2686	2686
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.40	0.39	0.28	0.43

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	406	262	1074	1313
v/c Ratio	0.43	0.61	0.39	0.48
Control Delay	19.6	25.0	11.2	8.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.6	25.0	11.2	8.3
Queue Length 50th (ft)	69	98	92	91
Queue Length 95th (ft)	87	148	155	118
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1337	605	2719	2719
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.30	0.43	0.39	0.48

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	224	226	96	188	1456	366	348
v/c Ratio	0.60	0.61	0.21	0.63	0.68	0.28	0.43
Control Delay	31.6	31.7	4.1	45.3	10.6	15.5	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	31.7	4.1	45.3	10.6	15.5	3.4
Queue Length 50th (ft)	87	88	0	68	287	59	0
Queue Length 95th (ft)	160	160	23	m#174	m67	74	41
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	406	407	477	299	2168	1587	901
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.56	0.20	0.63	0.67	0.23	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	426	428	290	825	389	100	715
v/c Ratio	0.96	1.00	0.53	0.58	0.45	0.47	0.36
Control Delay	62.6	73.2	10.8	19.6	4.0	39.2	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.6	73.2	10.8	19.6	4.0	39.2	11.8
Queue Length 50th (ft)	191	~210	27	146	0	33	82
Queue Length 95th (ft)	#372	#403	96	222	54	m83	103
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	444	428	549	1421	868	442	2022
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	1.00	0.53	0.58	0.45	0.23	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	539	249	1253	1264
v/c Ratio	0.54	0.56	0.46	0.47
Control Delay	21.1	23.2	7.8	12.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.1	23.2	7.8	12.0
Queue Length 50th (ft)	97	92	72	110
Queue Length 95th (ft)	114	136	82	191
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1380	607	2700	2700
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.39	0.41	0.46	0.47

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	388	204	1587	1169
v/c Ratio	0.47	0.55	0.54	0.39
Control Delay	22.1	24.7	10.6	6.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	22.1	24.7	10.6	6.3
Queue Length 50th (ft)	69	74	133	56
Queue Length 95th (ft)	90	120	225	97
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1361	611	2960	2960
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.33	0.54	0.39

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	279	280	112	277	518	426	901
v/c Ratio	0.66	0.66	0.23	0.75	0.25	0.41	0.85
Control Delay	32.4	32.3	5.2	48.0	4.4	19.6	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	32.3	5.2	48.0	4.4	19.6	11.2
Queue Length 50th (ft)	105	105	0	121	62	81	22
Queue Length 95th (ft)	#221	#221	31	#317	6	86	113
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	440	442	507	370	2132	1587	1170
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.63	0.22	0.75	0.24	0.27	0.77

Intersection Summary

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	145	142	132	550	444	77	897
v/c Ratio	0.52	0.50	0.37	0.30	0.43	0.40	0.38
Control Delay	33.1	26.6	8.4	12.1	3.0	41.0	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	26.6	8.4	12.1	3.0	41.0	6.1
Queue Length 50th (ft)	60	47	0	73	0	36	96
Queue Length 95th (ft)	113	103	44	119	49	m64	113
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	321	322	393	1809	1026	442	2362
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.44	0.34	0.30	0.43	0.17	0.38

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	625	281	833	1198
v/c Ratio	0.57	0.55	0.32	0.46
Control Delay	20.8	17.6	7.3	12.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.8	17.6	7.3	12.6
Queue Length 50th (ft)	111	78	45	111
Queue Length 95th (ft)	133	130	54	179
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1423	640	2599	2599
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.44	0.32	0.46

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	454	278	1152	1395
v/c Ratio	0.46	0.62	0.43	0.52
Control Delay	19.7	25.4	12.0	9.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.7	25.4	12.0	9.1
Queue Length 50th (ft)	77	106	104	99
Queue Length 95th (ft)	96	158	171	136
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1340	603	2665	2665
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.46	0.43	0.52

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	239	242	101	216	1544	388	369
v/c Ratio	0.64	0.64	0.22	0.70	0.72	0.31	0.46
Control Delay	32.7	32.9	4.6	48.1	10.8	15.7	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	32.9	4.6	48.1	10.8	15.7	3.5
Queue Length 50th (ft)	92	94	0	~120	272	56	0
Queue Length 95th (ft)	169	171	25	m#196	m68	78	42
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	407	408	478	309	2159	1587	913
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.59	0.21	0.70	0.72	0.24	0.40

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	451	454	307	892	419	105	761
v/c Ratio	1.04	1.09	0.59	0.62	0.48	0.49	0.38
Control Delay	84.4	99.4	14.1	20.4	4.8	41.4	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.4	99.4	14.1	20.4	4.8	41.4	13.0
Queue Length 50th (ft)	~227	~246	42	163	7	45	87
Queue Length 95th (ft)	#402	#435	121	246	66	m83	109
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	432	416	523	1438	876	442	2022
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	1.09	0.59	0.62	0.48	0.24	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	577	271	1348	1354
v/c Ratio	0.55	0.59	0.51	0.52
Control Delay	20.8	23.7	9.1	13.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.8	23.7	9.1	13.1
Queue Length 50th (ft)	102	101	80	131
Queue Length 95th (ft)	124	151	114	209
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1375	604	2619	2619
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.42	0.45	0.51	0.52

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	423	216	1690	1245
v/c Ratio	0.49	0.55	0.59	0.43
Control Delay	21.9	24.8	11.9	7.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.9	24.8	11.9	7.1
Queue Length 50th (ft)	76	81	152	58
Queue Length 95th (ft)	95	126	260	114
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1359	607	2879	2879
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.36	0.59	0.43

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	295	297	161	325	646	489	934
v/c Ratio	0.70	0.70	0.31	1.01	0.32	0.43	0.87
Control Delay	34.7	34.8	6.0	88.9	4.3	18.6	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	34.8	6.0	88.9	4.3	18.6	12.5
Queue Length 50th (ft)	108	109	0	~192	42	89	32
Queue Length 95th (ft)	#240	#241	42	#374	6	99	155
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	437	438	530	323	2125	1587	1170
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.68	0.30	1.01	0.30	0.31	0.80

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	185	184	169	644	510	99	1038
v/c Ratio	0.61	0.60	0.45	0.37	0.49	0.47	0.45
Control Delay	35.3	30.6	12.7	13.8	3.4	41.5	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	30.6	12.7	13.8	3.4	41.5	8.4
Queue Length 50th (ft)	74	64	16	97	0	42	120
Queue Length 95th (ft)	140	131	68	150	55	m77	141
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	339	339	402	1722	1032	442	2300
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.54	0.42	0.37	0.49	0.22	0.45

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	705	320	1013	1327
v/c Ratio	0.60	0.61	0.41	0.54
Control Delay	19.4	21.2	8.5	14.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.4	21.2	8.5	14.4
Queue Length 50th (ft)	117	105	61	140
Queue Length 95th (ft)	149	172	81	204
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1420	621	2469	2469
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.50	0.52	0.41	0.54

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	575	278	1213	1438
v/c Ratio	0.55	0.60	0.47	0.56
Control Delay	20.6	24.0	12.8	9.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	24.0	12.8	9.7
Queue Length 50th (ft)	101	105	115	97
Queue Length 95th (ft)	125	158	182	150
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1358	602	2587	2587
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.42	0.46	0.47	0.56

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	292	295	151	244	1673	452	402
v/c Ratio	0.74	0.75	0.32	1.07	0.79	0.32	0.46
Control Delay	38.5	38.8	8.7	97.6	10.9	14.6	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	38.8	8.7	97.6	10.9	14.6	3.4
Queue Length 50th (ft)	123	124	9	~164	246	61	0
Queue Length 95th (ft)	#236	#240	51	m#202	m61	92	44
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	408	409	478	228	2126	1587	931
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.72	0.32	1.07	0.79	0.28	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	489	494	350	976	482	127	908
v/c Ratio	1.20	1.26	0.75	0.67	0.54	0.54	0.44
Control Delay	138.7	163.4	26.4	21.9	5.9	44.8	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	138.7	163.4	26.4	21.9	5.9	44.8	11.2
Queue Length 50th (ft)	~274	~301	86	184	17	60	96
Queue Length 95th (ft)	#454	#493	#217	#308	93	m88	124
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	408	392	467	1450	896	442	2072
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.26	0.75	0.67	0.54	0.29	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	666	310	1541	1471
v/c Ratio	0.59	0.62	0.63	0.60
Control Delay	20.3	23.7	11.1	15.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.3	23.7	11.1	15.4
Queue Length 50th (ft)	116	115	85	161
Queue Length 95th (ft)	147	181	169	233
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1359	600	2456	2456
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.52	0.63	0.60

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	524	242	1754	1284
v/c Ratio	0.54	0.56	0.64	0.47
Control Delay	21.3	23.5	14.1	8.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.3	23.5	14.1	8.9
Queue Length 50th (ft)	95	91	176	69
Queue Length 95th (ft)	112	132	297	129
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1380	606	2726	2726
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.38	0.40	0.64	0.47

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	298	300	161	332	646	489	934
v/c Ratio	0.70	0.71	0.31	1.03	0.32	0.43	0.87
Control Delay	34.9	35.0	6.0	95.3	4.3	18.6	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	35.0	6.0	95.3	4.3	18.6	12.5
Queue Length 50th (ft)	109	110	0	~199	45	89	32
Queue Length 95th (ft)	#244	#245	42	#381	6	99	155
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	437	439	531	321	2124	1587	1170
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.68	0.30	1.03	0.30	0.31	0.80

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	185	184	169	650	514	99	1044
v/c Ratio	0.61	0.60	0.45	0.38	0.50	0.47	0.46
Control Delay	35.3	30.6	12.7	13.9	3.4	41.6	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	30.6	12.7	13.9	3.4	41.6	8.4
Queue Length 50th (ft)	74	64	16	98	0	41	120
Queue Length 95th (ft)	140	131	68	152	55	m78	141
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	339	339	402	1722	1034	442	2300
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.54	0.42	0.38	0.50	0.22	0.45

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	722	328	1049	1331
v/c Ratio	0.60	0.62	0.43	0.55
Control Delay	19.5	21.6	8.8	14.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.5	21.6	8.8	14.8
Queue Length 50th (ft)	120	109	64	143
Queue Length 95th (ft)	154	180	87	205
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1415	618	2439	2439
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.51	0.53	0.43	0.55

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	594	284	1225	1440
v/c Ratio	0.56	0.60	0.48	0.56
Control Delay	20.6	23.9	13.1	9.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	23.9	13.1	9.9
Queue Length 50th (ft)	105	107	117	98
Queue Length 95th (ft)	129	162	184	150
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1362	602	2564	2564
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.47	0.48	0.56

Intersection Summary

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	294	296	151	261	1673	452	402
v/c Ratio	0.75	0.75	0.32	1.15	0.79	0.32	0.46
Control Delay	38.8	38.9	8.7	120.9	10.8	14.6	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	38.9	8.7	120.9	10.8	14.6	3.4
Queue Length 50th (ft)	123	124	9	~179	238	61	0
Queue Length 95th (ft)	#237	#241	51	m#219	m50	92	44
Internal Link Dist (ft)		1211			567	1206	
Turn Bay Length (ft)	185		190	215			200
Base Capacity (vph)	408	409	478	227	2125	1587	931
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.72	0.32	1.15	0.79	0.28	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	489	494	350	993	488	127	912
v/c Ratio	1.27	1.34	0.77	0.66	0.53	0.54	0.43
Control Delay	169.6	195.0	28.1	20.8	5.7	44.9	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	169.6	195.0	28.1	20.8	5.7	44.9	10.6
Queue Length 50th (ft)	~286	~313	84	183	16	59	94
Queue Length 95th (ft)	#466	#505	#221	#305	90	m91	122
Internal Link Dist (ft)		1462		661			567
Turn Bay Length (ft)	365		360		135	200	
Base Capacity (vph)	384	370	453	1501	917	442	2123
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.27	1.34	0.77	0.66	0.53	0.29	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	WBL	WBR	NBT	SBT
Lane Group Flow (vph)	672	316	1559	1484
v/c Ratio	0.59	0.63	0.64	0.61
Control Delay	20.2	23.8	11.5	15.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.2	23.8	11.5	15.6
Queue Length 50th (ft)	117	117	86	165
Queue Length 95th (ft)	149	185	173	236
Internal Link Dist (ft)	1764		962	603
Turn Bay Length (ft)	810	450		
Base Capacity (vph)	1358	600	2445	2445
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.53	0.64	0.61

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	531	247	1760	1289
v/c Ratio	0.53	0.56	0.65	0.48
Control Delay	21.1	23.4	14.5	9.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.1	23.4	14.5	9.3
Queue Length 50th (ft)	96	92	178	70
Queue Length 95th (ft)	112	135	301	131
Internal Link Dist (ft)	1873		427	962
Turn Bay Length (ft)	960	960		
Base Capacity (vph)	1383	606	2705	2705
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.38	0.41	0.65	0.48

Intersection Summary