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SILVERADO
TRAFFIC IMPACT STUDY

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Date: September 2022

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Introduction

This report presents the findings of the Traffic Impact Study (TIS) performed for the Silverado development in Santa Clara, Utah. This report addresses the impacts based on Level of Service (LOS) values calculated by delay per vehicle for selected study intersections.

In this report, the potential traffic impact of the Silverado development is addressed as proposed by Method Studios. The study horizon will be for the year of its completion and five years after completion.

Proposed Development

The proposed development at Silverado is planned to be built in four phases. The anticipated build-out year is 2024. Figure 1 shows the location of the development. The development is planned to include 96 apartment units, approximately 33,000 square feet (sq. ft.) of retail space, a convenience store with 8 fueling stations, 28 “man-cave” storage units, 23 indoor pickleball courts, 10 outdoor pickleball courts, and 16,000 sq. ft. of restaurant space.

The phasing for the project is planned to be as follows:

- Phase 1
    - 28 “Man Cave” Toy Garages, approximately 18,620 Sq. Ft. total
        - 14 have a bedroom in a loft area
- Phase 2
    - 96 Apartment Units
        - Three-story buildings
- Phase 3
    - 23 Indoor pickleball Courts
    - 10 Outdoor pickleball Courts
    - 16,000 sq. ft. Restaurant
- Phase 4
    - 33,020 sq. ft Retail Space
    - Convenience Store/Gas Station
        - 8 Fueling Stations

Figure 1-Location of Silverado Santa Clara

The accesses to the development are planned to connect to Rachel Drive and Pioneer Parkway. There is one access planned on Rachel Drive and four accesses planned on Pioneer Parkway. One of the accesses on Pioneer Parkway is an extension of Red Mountain Drive at its intersection with Pioneer Parkway. There is additional access onto Pioneer Parkway through the existing Harmons access. A full site plan is shown in Figure 2 and included in the Appendix.

For the purposes of this report, the accesses are labelled as shown in Figure 2.

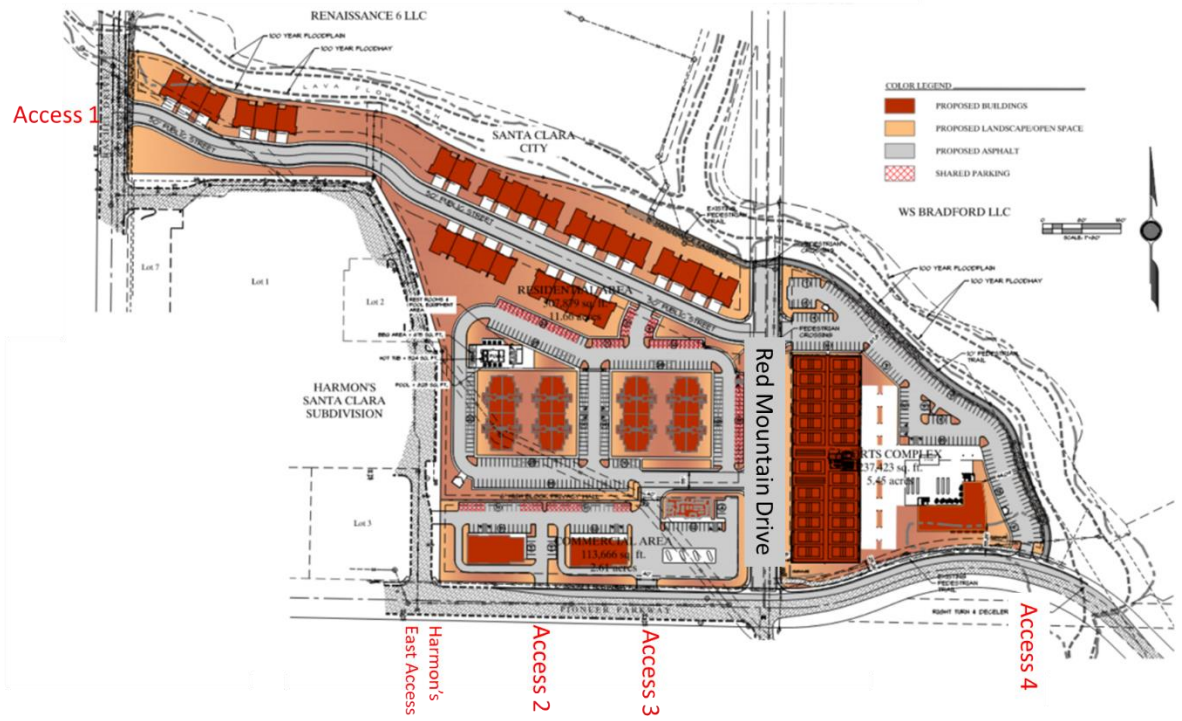


Figure 2-Access Locations

Study Area Conditions

The Silverado development is located on the northeast corner of Rachel Drive and Pioneer Parkway, east of the existing Harmons grocery store. The surrounding area south of the project is residential. The area from Harmons grocery store to Pioneer Parkway is commercial.

ROADWAY CHARACTERISTICS

RACHEL DRIVE

Rachel Drive is a Minor Collector three-lane road that runs north/south on the west side of the subject property. The speed limit is 25 miles-per-hour (mph) in the project area. Rachel Drive has a two-way left-turn lane (TWLTL).

PIONEER PARKWAY

Pioneer Parkway is an Arterial three-lane road that runs east/west on the south side of the project area. On the south edge of the proposed Silverado development, east of the southeast Harmons access, Pioneer Parkway is a two-lane roadway and does not have curb and gutter on the north side. East of Red Mountain Drive, there is no curb and gutter. The speed limit is 35 mph. It is planned to eventually be a five-lane roadway, though there is no year planned for the widening to occur.

RED MOUNTAIN ROAD

Red Mountain Road south of Pioneer Parkway is a Local Collector to the neighborhoods in Santa Clara. By the build out of the Silverado Development, it is expected to extend from Pioneer Parkway to the north, where it will connect to the future Western Corridor as a collector road. It is assumed that the speed limit will be 30 mph.

CRASH HISTORY

Current crash data in the study area were reported from Numetric Crash Query. The Numetric data includes crashes from the last 3 years, between August 2018 and June 2022. In that period, there were 21 crashes reported in the study area. A full crash data report is included in the Appendix.

Figure 3 shows a map of the crash locations in the study area. The blue markers indicate a property damage only (PDO) crash, and the yellow, orange, and dark orange indicate a crash with injuries. There were no fatal crashes within this area in this period.

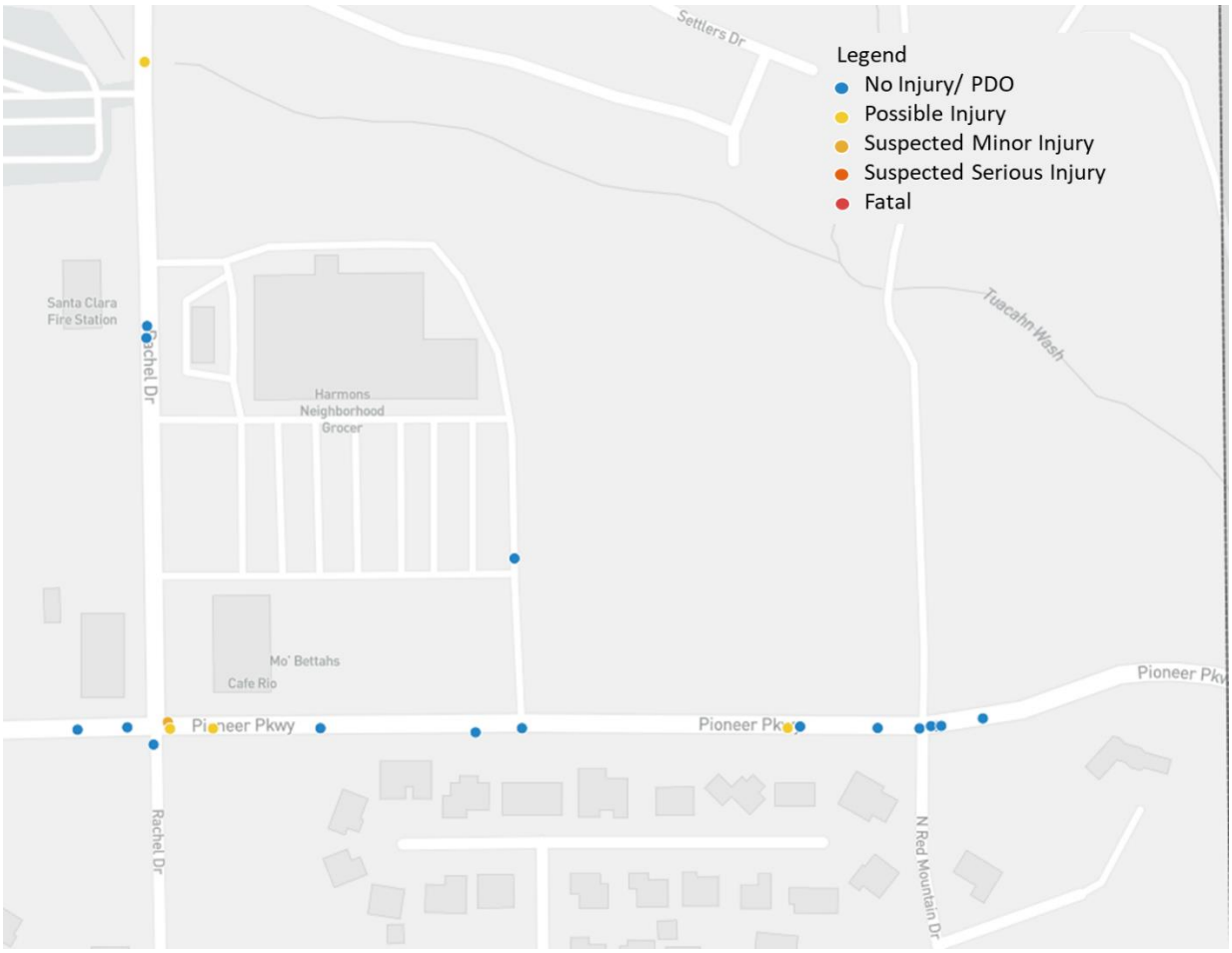


Figure 3-Crash History

Of the 21 crashes, 16 (76%) were property damage only (PDO). Four had possible injuries, and one had a suspected minor injury. One third of the crashes were front-to-rear crashes, which are common at signalized intersections. Six of the crashes were due to turning errors made by drivers.

With the addition of new accesses in this area, it is recommended that dedicated left and right turn lanes be installed to prevent further front-to-rear crashes and provide safe areas to turn into the proposed accesses.

EXISTING TRAFFIC CONDITIONS

Weekday AM and PM turning movement counts were performed at the following intersections:

- Rachel Drive & Harmons fuel station (North) access
- Rachel Drive & Harmons front door (Center) access
- Rachel Drive & Café Rio (South) access
- Rachel Drive & Pioneer Parkway
- Pioneer Parkway & Harmons southeast (East) access
- Pioneer Parkway & Red Mountain Drive

Existing intersection geometry, control, and turn pocket lengths were obtained by field review and entered with the turning movement volumes into PTV Vistro 2022 for analysis. Future traffic data was forecasted for the AM and PM peak hours using historic traffic counts.

Turning movement counts were used to establish a base condition for the analysis and provide a comparison for new traffic around the proposed development. The existing turning movement counts are shown in Figure 4.

In order to quantify the traffic conditions currently exhibited in the study area, the roadway geometries and traffic data were entered in the PTV Vistro 2022 software package. Using the 6th edition of Highway Capacity Manual (HCM) method of calculating intersection delay, a Level of Service (LOS) grade was assigned to the intersection for both the AM and PM peak hours.

Level of Service (LOS) is a term used by the HCM to describe the traffic operations of an intersection, based on congestion and delay. LOS ranges from A (almost no congestion or delay) to F (traffic demand exceeds capacity and intersection experiences long queues and delay). In Santa Clara, LOS D is the threshold when the intersection exceeds an acceptable standard and intersection improvements are required. In discussions with the City of Santa Clara, all intersections should be mitigated to LOS C. The delay criteria used to assign a letter grade to an intersection for signalized and unsignalized intersections is shown below in Table 1. The full Vistro reports are included in the Appendix.

Table 1-Intersection Level of Service

Level of Service	Average Control Delay (sec/veh)	
	Signalized	Un-signalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

Table 2 shows the existing LOS conditions at the study intersections.

Table 2-Existing LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Rachel Drive & Harmon's North Access (TWSC)	9.8	A	11.1	B
Rachel Drive & Harmon's Center Access (TWSC)	10.0	A	11.4	B
Rachel Drive & Harmon's South Access (TWSC)	9.9	A	12.7	B
Rachel Drive & Pioneer Parkway (Signalized)	9.0	A	10.0	A
Pioneer Parkway & Harmon's East Access (TWSC)	12.3	B	15.3	C
Pioneer Parkway & Red Mountain Drive (TWSC)	13.4	B	18.5	C

All of the study intersections are currently operating at an acceptable LOS C or better.

Figure 4-Existing Turning Movement Counts AM

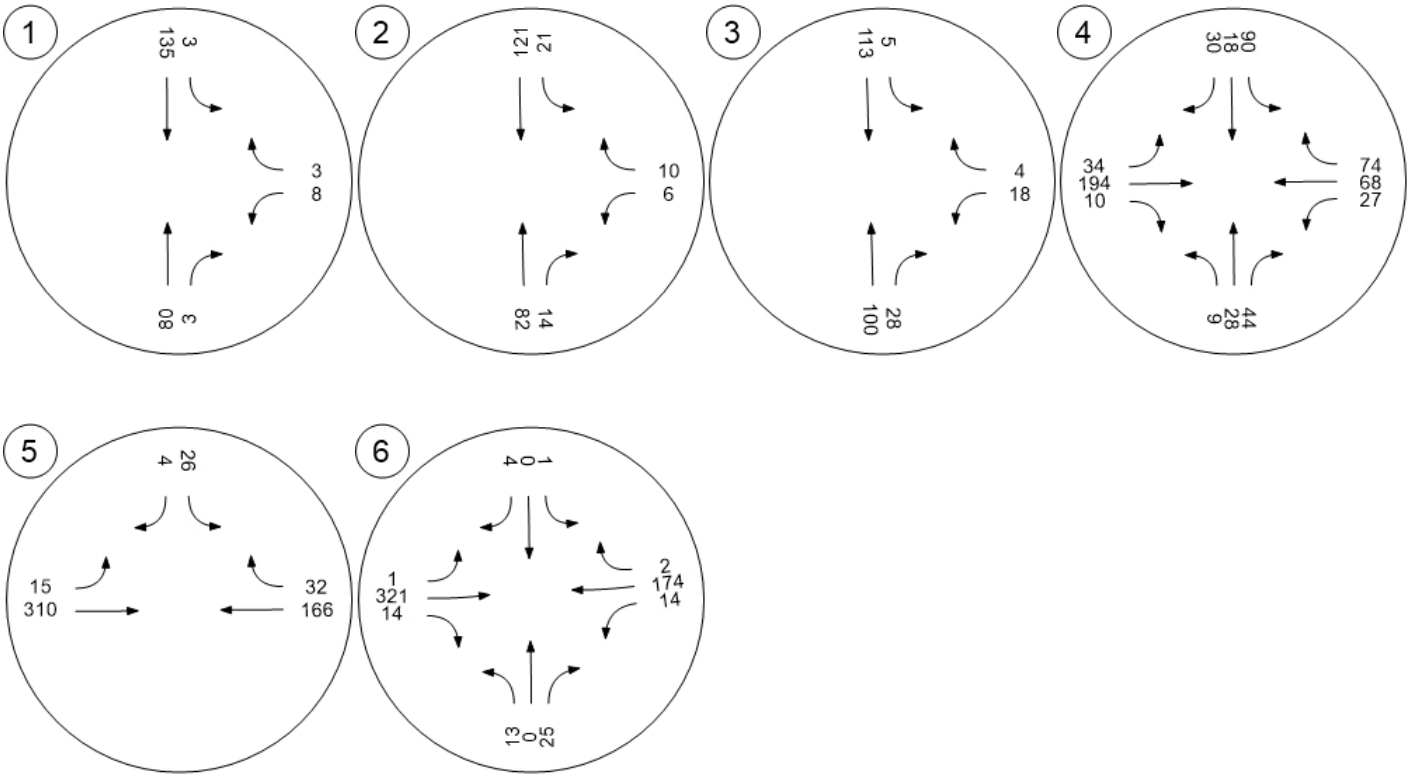
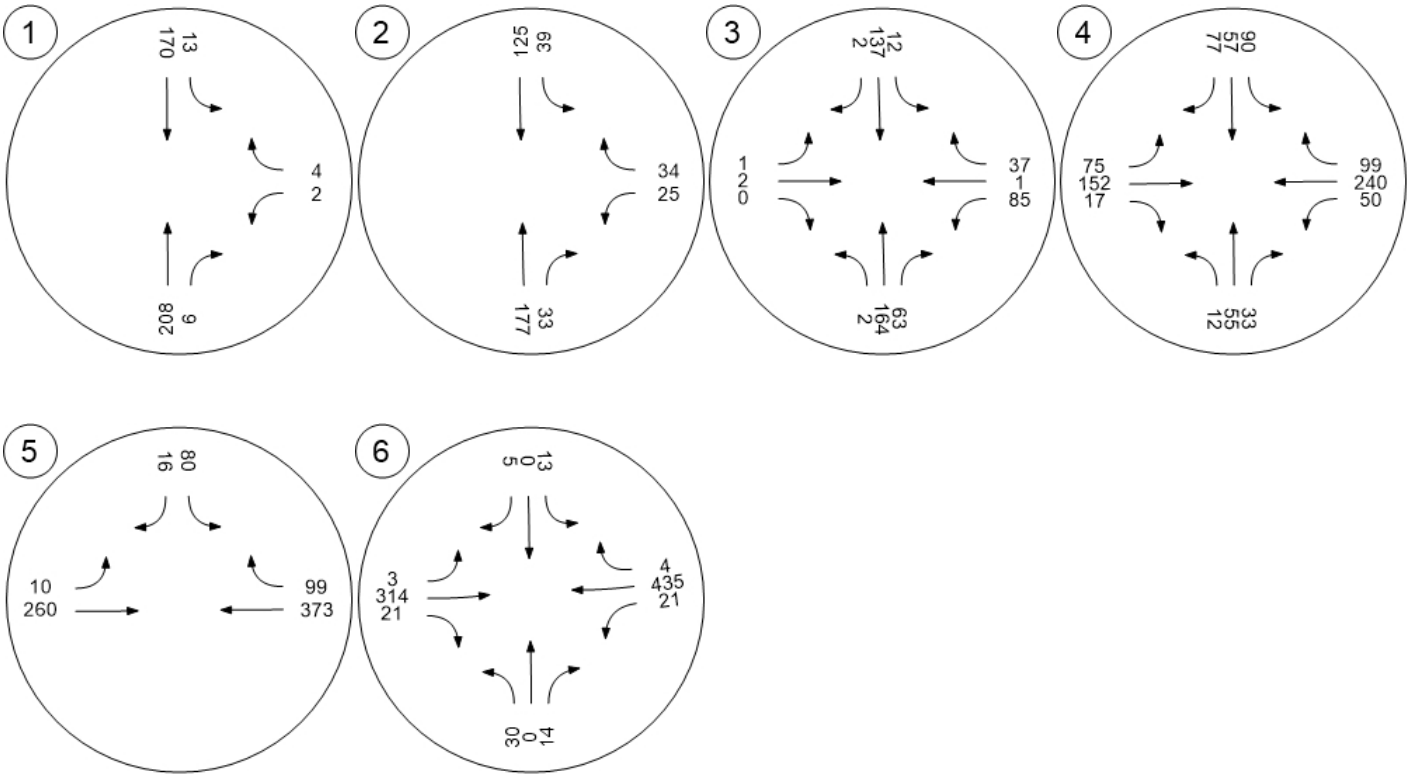


Figure 4-Existing Turning Movements Counts PM



Projected Traffic

In order to successfully analyze traffic conditions for future scenarios, existing traffic is grown based on the projected growth in the surrounding area. To find an appropriate growth rate, historic average annual daily traffic (AADT) counts from the Utah Department of Transportation (UDOT) were analyzed for roadways surrounding the project area. UDOT has AADT data up to 2019.

Table 3 shows the AADT for the roadways around the Silverado development. Growth per year from 2017 to 2019 for the area has generally been about 3 percent. Pioneer Parkway has shown higher growth (44% average per year) in the last three years. In discussions with Santa Clara City, 8 percent growth is being used to plan for impact fees. For this traffic study, traffic from developments to the north of Silverado are included in the background traffic, so 5 percent growth per year will be used to estimate future traffic around the development in addition to the developments to the north.

Table 3-Average Growth from Historic Data

Roadway	3 Year	5 Year	10 Year	2019 AADT	2018 AADT	2017 AADT	2016 AADT	2015 AADT	2014 AADT	2013 AADT	2012 AADT	2011 AADT	2010 AADT	2009 AADT	2008 AADT
Rachel Drive (North of Pioneer Parkway)	0.00%			500	500	500									
				0.00%	0.00%	0.00%									
Rachel Drive (South of Pioneer Parkway)	0.00%			500	500	500									
				0.00%	0.00%	0.00%									
Pioneer Parkway (West of Rachel Drive)	43.64%	28.47%	13.18%	4,500	4,400	4,300	1,900	1,800	1,700	1,700	1,700	1,700	1,900	1,900	--
				2.27%	2.33%	126.32%	5.56%	5.88%	0.00%	0.00%	0.00%	-10.53%	0.00%	--	
Pioneer Parkway (East of Rachel Drive)	3.40%	43.15%	21.05%	6,300	6,200	6,000	5,700	5,400	1,800	1,800	1,800	1,900	1,900	1,900	--
				1.61%	3.33%	5.26%	5.56%	200.00%	0.00%	0.00%	-5.26%	0.00%	0.00%	--	
Average	11.76%	35.81%	17.12%												

TRIP GENERATION

The estimated number of vehicle trips to be generated by the development was calculated using the methodology found in the Institute of Transportation Engineers (ITE) Trip Generation Manual 11th edition. The following ITE Land Uses were used for this development:

221: Multifamily Housing (Low-Rise)

821: Shopping Plaza (40-150k sq.ft., no supermarket)

945: Convenience Store/Gas Station (8 VFP)

151: Mini-Warehouse

490: Tennis Courts

932: High-Turnover Sit-Down Restaurant

Multifamily housing is used to estimate the trips for the apartment complex. The apartments are low-rise because they are less than four stories high. Shopping Plaza is used to estimate the number of trips to the retail buildings. Mini-Warehouse is used to represent the man-cave storage units, and tennis courts are used to represent pickleball courts. The convenience store/gas station and restaurant have their own land uses. A description for each of these land uses can be found in the Appendix. Table 4 shows the estimated trip generation of the development.

Table 4-Trip Generation for the Proposed Development

Silverado Development: Build-Out 2024											
ITE Land Use	Units		AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
221: Multifamily Housing (Low-Rise)	96	units	8	27	36	23	15	37	218	218	436
821: Shopping Plaza (40-150k sq.ft., no supermarket)	33	1000 sq.ft.	35	22	57	84	87	171	1114	1114	2228
945: Convenience Store/Gas Station (2-8 VFP)	8	pump stations	64	64	128	74	74	147	1060	1060	2121
151: Mini-Warehouse	28	units	1	1	3	2	2	4	20	20	41
490: Tennis Courts	33	courts	n/a	n/a	n/a	92	47	139	500	500	1001
932: High-Turnover Sit-Down Restaurant	16	1000 sq. ft.	84	69	153	88	56	145	858	858	1715
Total:			194	183	377	362	282	644	3771	3771	7541

Trip Distribution

The new trips estimated to be generated from the proposed development were distributed onto the roadway network based on the proposed site access locations, existing turning movements, existing traffic patterns, and proximity to major roadways. Figure 5 shows the AM peak hour trip distribution to and from the development and the surrounding areas. In the AM peak hour, Pioneer Parkway has more vehicles traveling to the east than to the west. Figure 6 shows the trip distribution for the PM peak hour. In the PM peak hour, there is similar traffic going both directions.

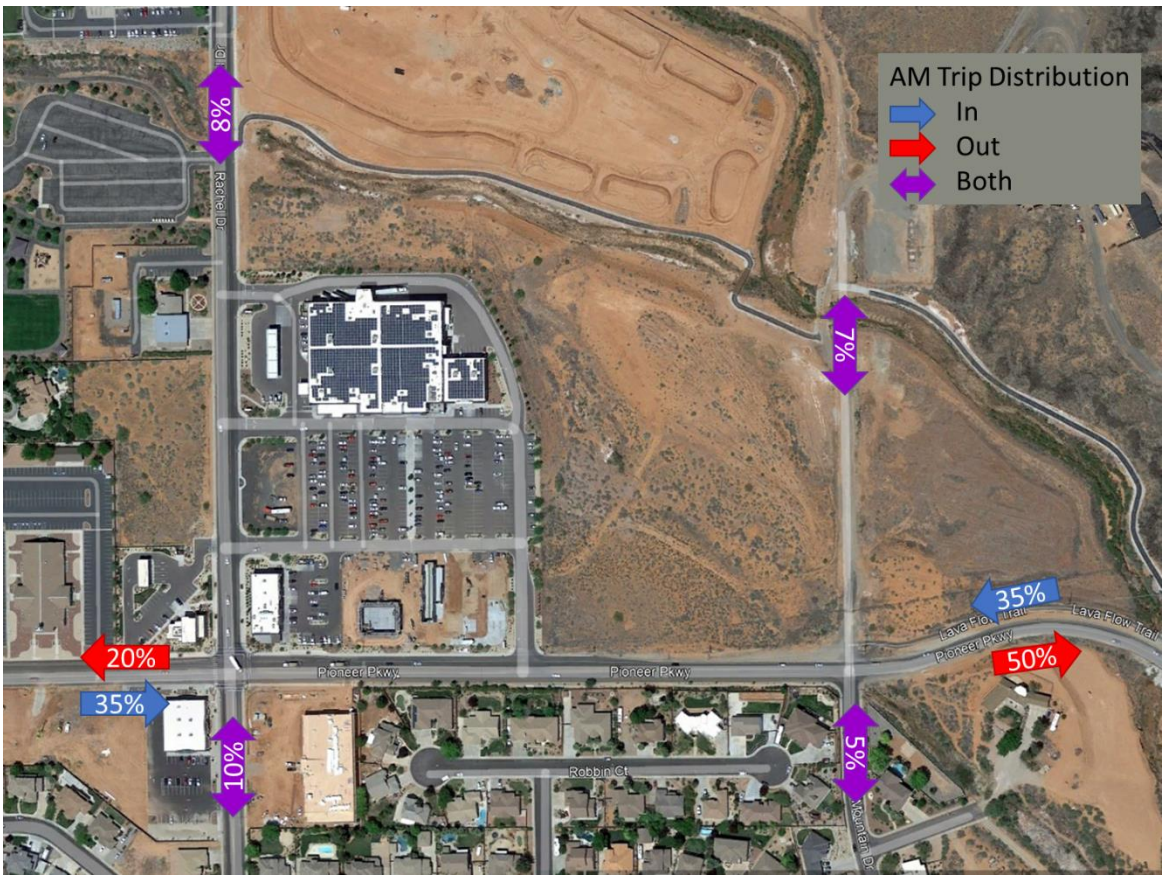


Figure 5-AM Trip Distribution for the Silverado Development

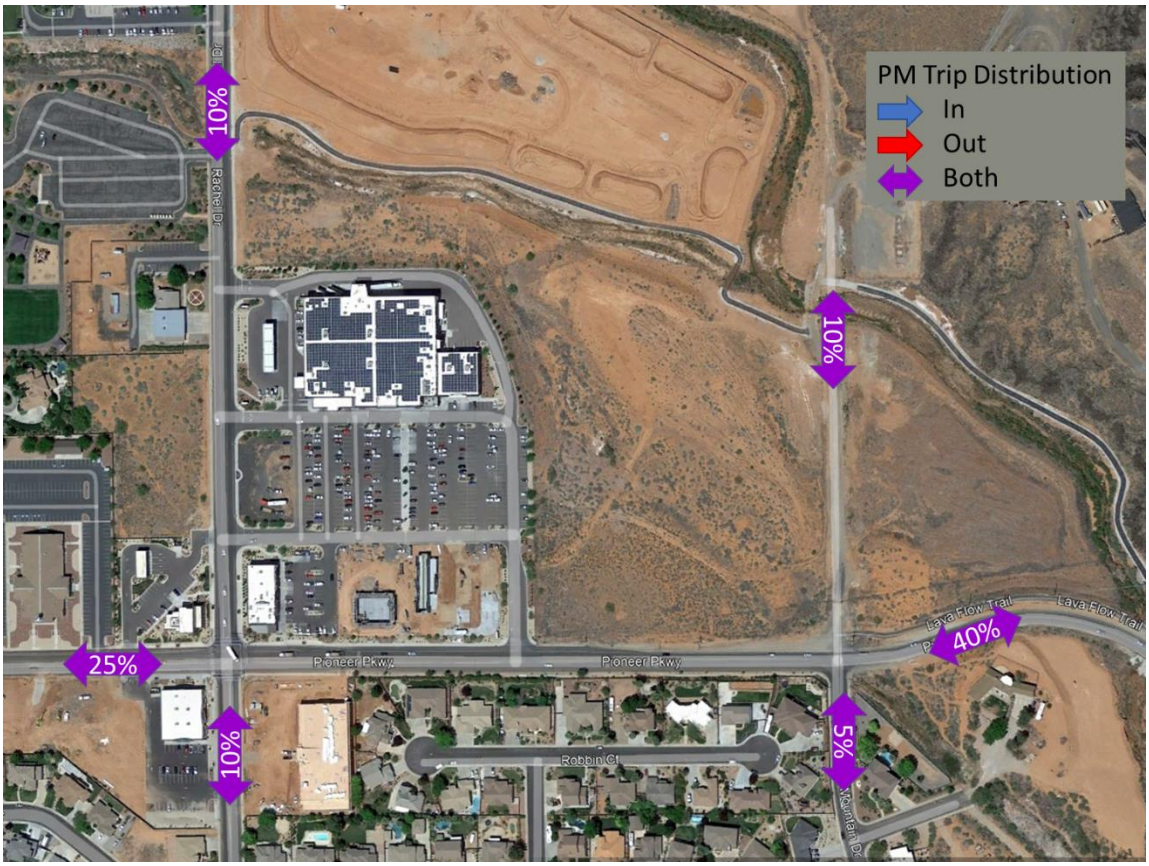


Figure 6-PM Trip Distribution for the Silverado Development

Traffic Analysis

Future traffic was analyzed by projecting the existing 2022 traffic based on the historical data and growth rate discussed previously. The development traffic was then added to the background traffic to estimate the total future traffic. The AM and PM peak hours were analyzed for the future development scenarios.

2024 BACKGROUND TRAFFIC

For the 2024 background traffic analysis, it was assumed that the existing roadway configuration (lanes, intersection control, etc.) will be used in 2024. It was also assumed that two developments to the north of Silverado will be built by 2024. A traffic study completed by Avenue Consultants in March 2021 provided the proposed trip generation for the Solace and Regal Living developments directly north of Silverado on Red Mountain Drive. The traffic generated by these two developments was included in the background traffic. The full study is also included in the Appendix. The 2024 turning movement counts without the Silverado development traffic are shown in Figure 7. Table 5 shows the LOS analysis for the 2024 traffic.

Table 5-2024 LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Rachel Drive & Harmon's North Access (TWSC)	10.1	B	11.6	B
Rachel Drive & Harmon's Center Access (TWSC)	10.4	B	12.0	B
Rachel Drive & Harmon's South Access (TWSC)	10.3	B	13.6	B
Rachel Drive & Pioneer Parkway (Signalized)	9.5	A	10.3	B
Pioneer Parkway & Harmon's East Access (TWSC)	12.9	B	16.8	C
Pioneer Parkway & Red Mountain Drive (TWSC)	16.6	C	38.8	E

In 2024, all of the study intersections are expected to operate at LOS C or better except for the intersection of Pioneer Parkway and Red Mountain Drive. As a two-way stop-controlled (TWSC) intersection, it is expected to operate at LOS E in the PM peak hour. Table 6 shows the LOS of Pioneer Parkway and Red Mountain Drive as an all-way stop-controlled intersection.

Table 6-2024 Background Traffic Mitigation LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Pioneer Parkway & Red Mountain Drive (AWSC)	12.1	B	20.5	C

As an AWSC intersection, Pioneer Parkway and Red Mountain Drive is expected to operate at LOS C in the PM peak hour. The 2021 traffic study by Avenue Consultants proposed a traffic signal at this intersection by the buildout of all three developments; Silverado, Solace, and Regal Living. An AWSC intersection may be an interim mitigation for a traffic signal.

2024 TRAFFIC WITH DEVELOPMENT

2024 traffic with the addition of the proposed Silverado traffic at buildout was estimated by adding the distributed development traffic to the 2024 background traffic. It is assumed that the mitigations recommended in the background scenario are applied in this scenario as well. The estimated turning movement counts are shown in Figure 8.

Table 7 shows the LOS analysis for the background 2024 traffic with the Silverado development traffic.

Table 7-2024 with Development Traffic LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Rachel Drive & Silverado Access 1 (TWSC)	10.1	B	11.8	B
Rachel Drive & Harmon's North Access (TWSC)	10.1	B	12.0	B
Rachel Drive & Harmon's Center Access (TWSC)	10.4	B	12.4	B
Rachel Drive & Harmon's South Access (TWSC)	10.3	B	14.3	B
Rachel Drive & Pioneer Parkway (Signalized)	9.8	A	10.9	B
Pioneer Parkway & Harmon's East Access (TWSC)	15.3	C	25.9	D
Pioneer Parkway & Silverado Access 2 (TWSC)	14.6	B	22.7	C
Pioneer Parkway & Silverado Access 3 (TWSC)	14.7	B	22.6	C
Pioneer Parkway & Red Mountain Drive (AWSC)	15.7	C	70.8	F
Pioneer Parkway & Access 4 (TWSC)	15.3	C	23.6	C

With the addition of the Silverado traffic, the intersection of Pioneer Parkway and Harmon's East Access is expected to operate at LOS D. The critical movement is the left turn onto Pioneer Parkway. As the Harmon's access gets busier it is expected that many vehicles will reroute to Rachel Drive to use the signal at Rachel Drive and Pioneer Parkway to turn left. It is up to the determination of the City to restrict this access to improve the LOS.

The intersection of Pioneer Parkway and Red Mountain Drive is expected to operate at LOS F as an AWSC intersection with the addition of the Silverado traffic. Table 8 shows the LOS analysis for the intersection as a signalized intersection.

Table 8-2024 Traffic Mitigation LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Pioneer Parkway & Red Mountain Drive (Signalized)	8.8	A	9.8	A

As a signalized intersection, Pioneer Parkway and Red Mountain Drive is expected to operate at LOS A in the AM and PM peak hours, which supports the finding from the 2021 traffic study by Avenue Consultants that a traffic signal will be needed at this intersection.

Figure 7- 2024 Background Turning Movement Counts AM

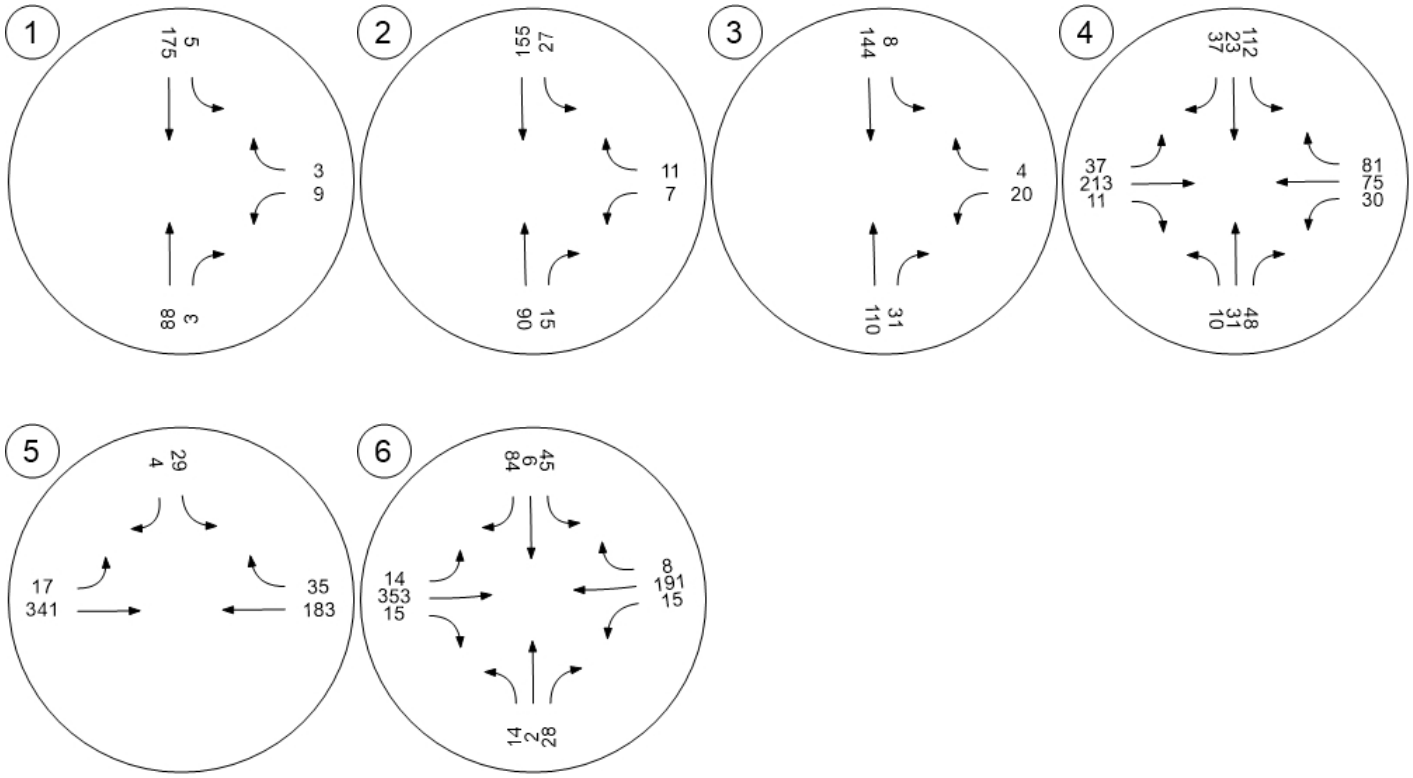


Figure 7- 2024 Background Turning Movement Counts PM

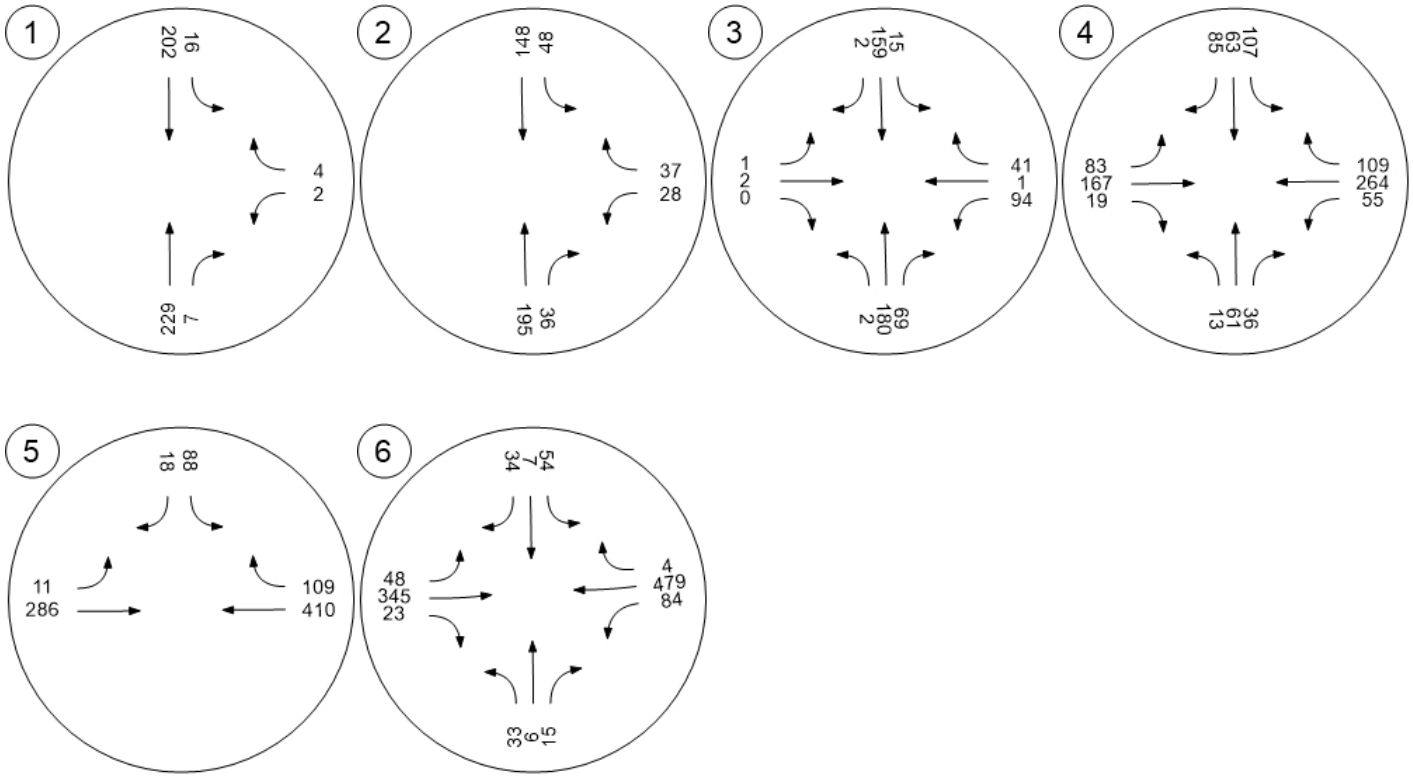


Figure 8-2024 Background Turning Movement Counts with Development Traffic AM

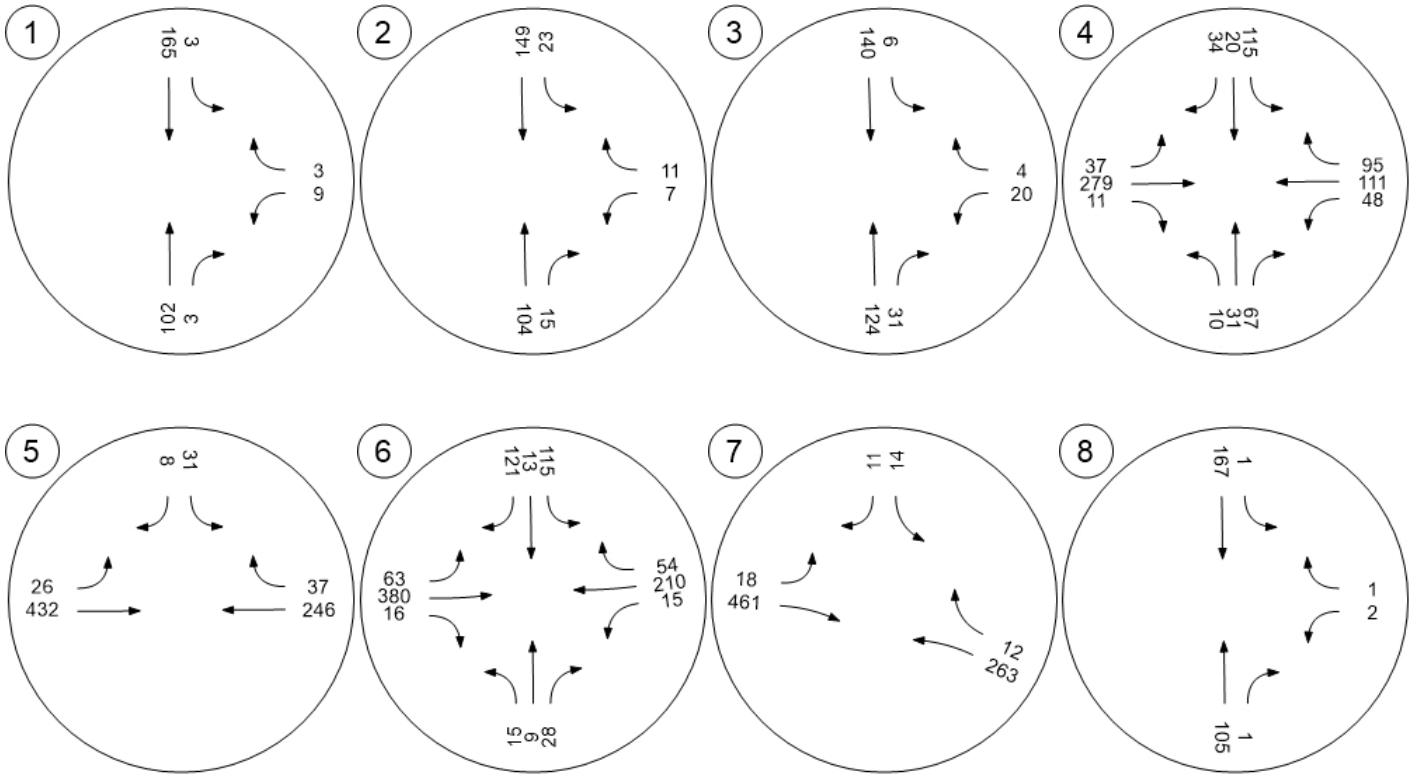


Figure 8-2024 Background Turning Movement Counts with Development Traffic AM

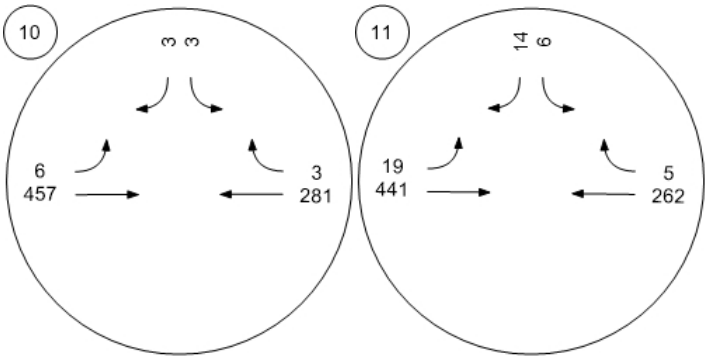


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Figure 8-2024 Background Turning Movement Counts with Development Traffic PM

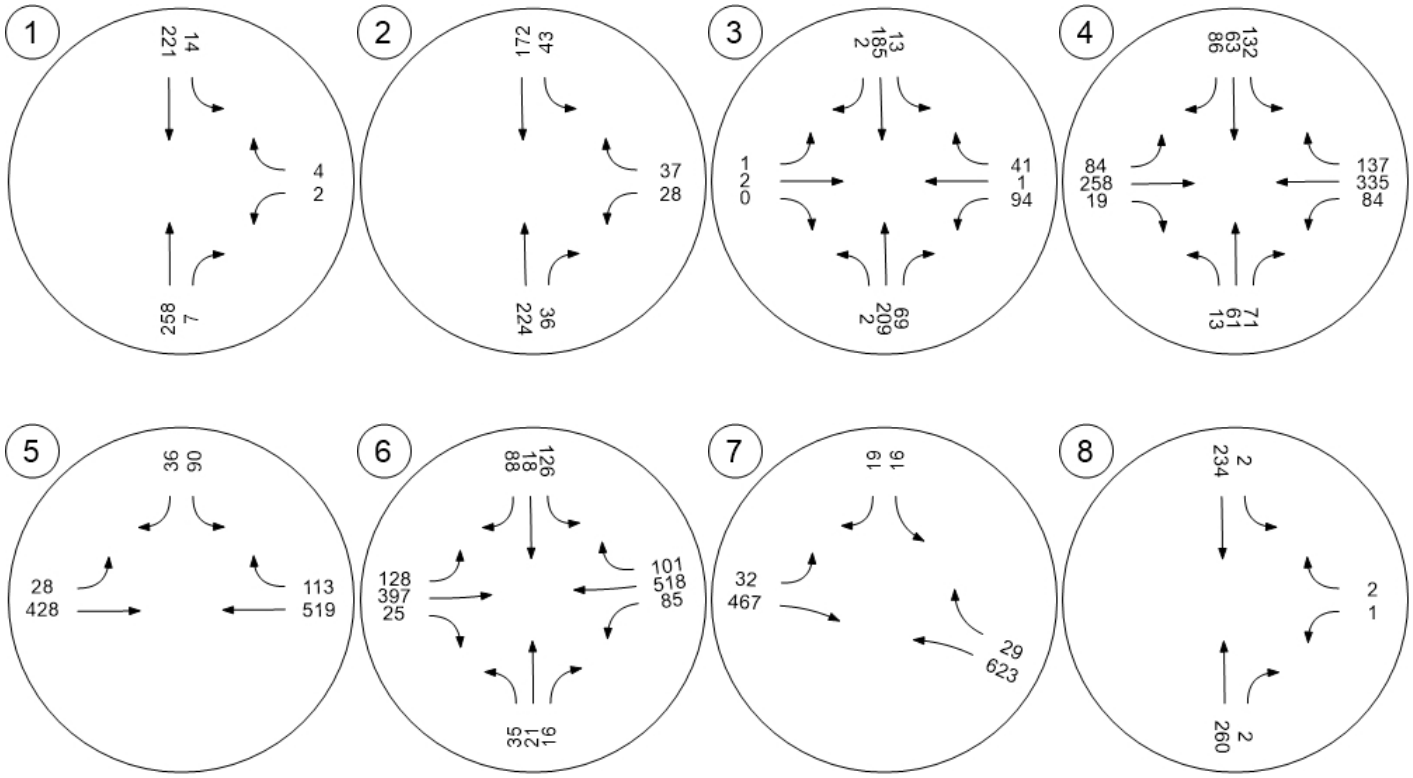
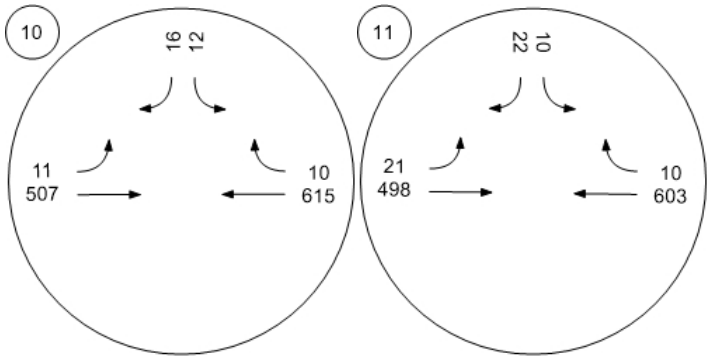


Figure 8-2024 Background Turning Movement Counts with Development Traffic PM



2024 WITH DEVELOPMENT TRAFFIC QUEUE LENGTH ANALYSIS

Table 9 shows the queue length analysis for the 2024 traffic with the addition of the project traffic at each of the Silverado accesses. The table shows the maximum queue length required at each access and at which movement or approach the maximum queue length occurs.

Table 9-2024 Queue Length Analysis with Development Traffic

Intersection	AM Peak Hour		PM Peak Hour	
	95th Percentile Queue Length (ft/ln)	Movement	95th Percentile Queue Length (ft/ln)	Movement
Rachel Drive & Silverado Access 1 (TWSC)	0.29	WBLR	0.34	WBLR
Pioneer Parkway & Silverado Access 2 (TWSC)	0.90	SBLR	6.47	SBLR
Pioneer Parkway & Silverado Access 3 (TWSC)	2.63	SBLR	6.44	SBLR
Pioneer Parkway & Red Mountain Drive (Signalized)	60.27	EBT	122.80	WBTR
Pioneer Parkway & Access 4 (TWSC)	4.17	SBLR	9.65	SBLR

Where the queue lengths are less than 20 feet, there is expected to be no queuing at the intersection. At these intersections, there should be enough storage for at least one vehicle at each approach.

At the intersections with queues greater than 20 feet, sufficient storage length should be provided for the 95th percentile queue length at each approach.

2029 BACKGROUND TRAFFIC

For the 2029 background traffic analysis, it was assumed that the existing roadway configuration (lanes, intersection control, etc.) will be used in 2029. The same assumptions that were used for the 2024 background traffic were also used for 2029. The 2029 turning movement counts without the development traffic are shown in Figure 9. Table 10Table 5 shows the LOS analysis for the 2029 traffic.

Table 10-2029 Background Traffic LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Rachel Drive & Harmon's North Access (TWSC)	10.4	B	12.6	B
Rachel Drive & Harmon's Center Access (TWSC)	10.8	B	13.3	B
Rachel Drive & Harmon's South Access (TWSC)	10.7	B	16.2	C
Rachel Drive & Pioneer Parkway (Signalized)	10.0	A	11.0	B
Pioneer Parkway & Harmon's East Access (TWSC)	15.1	C	24.5	C
Pioneer Parkway & Red Mountain Drive (AWSC)	16.0	C	54.2	F

In the 2029 background conditions, the intersection of Pioneer Parkway and Red Mountain Drive is expected to operate at LOS F in the PM peak hour as an AWSC intersection. As a signalized intersection, it is expected to operate at LOS A in the AM and PM peak hours.

Table 11-2029 Background Traffic Mitigation LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Pioneer Parkway & Red Mountain Drive (Signalized)	7.5	A	8.4	A

2029 TRAFFIC WITH DEVELOPMENT

2029 traffic with the addition of the proposed development traffic at buildout was estimated by adding the distributed development traffic to the projected 2029 traffic. It is assumed that the mitigations recommended in the background scenario are applied in this scenario as well. The estimated turning movement counts are shown in Figure 10.

Table 12 shows the LOS analysis for the projected 2029 traffic with the Silverado development traffic.

Table 12-2029 with Development Traffic LOS Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Average Delay (sec/veh)	Level of Service	Average Delay (sec/veh)	Level of Service
Rachel Drive & Silverado Access 1 (TWSC)	10.5	B	13.0	B
Rachel Drive & Harmon's North Access (TWSC)	10.6	B	13.3	B
Rachel Drive & Harmon's Center Access (TWSC)	11.0	B	14.1	B
Rachel Drive & Harmon's South Access (TWSC)	10.9	B	23.7	C
Rachel Drive & Pioneer Parkway (Signalized)	10.5	B	11.9	B
Pioneer Parkway & Harmon's East Access (TWSC)	18.4	C	34.5	D
Pioneer Parkway & Silverado Access 2 (TWSC)	17.1	C	32.8	D
Pioneer Parkway & Silverado Access 3 (TWSC)	17.2	C	32.5	D
Pioneer Parkway & Red Mountain Drive (Signalized)	11.3	B	13.4	B
Pioneer Parkway & Access 4 (TWSC)	17.8	C	24.8	C

In 2029, all of the study intersections are expected to operate at LOS D or better. LOS D is considered acceptable at the concurrence of the City of Santa Clara. As it becomes difficult to turn left onto Pioneer Parkway from the Silverado development, traffic will reroute to the signals at Rachel Drive and Pioneer Parkway and Red Mountain Drive and Pioneer Parkway. The Silverado accesses onto Pioneer Parkway should be monitored in the future and may be restricted to right turns only if necessary to improve the operations. It is up to the determination of the City to restrict these accesses to improve the LOS.

Figure 9-2029 Background Turning Movement Counts AM

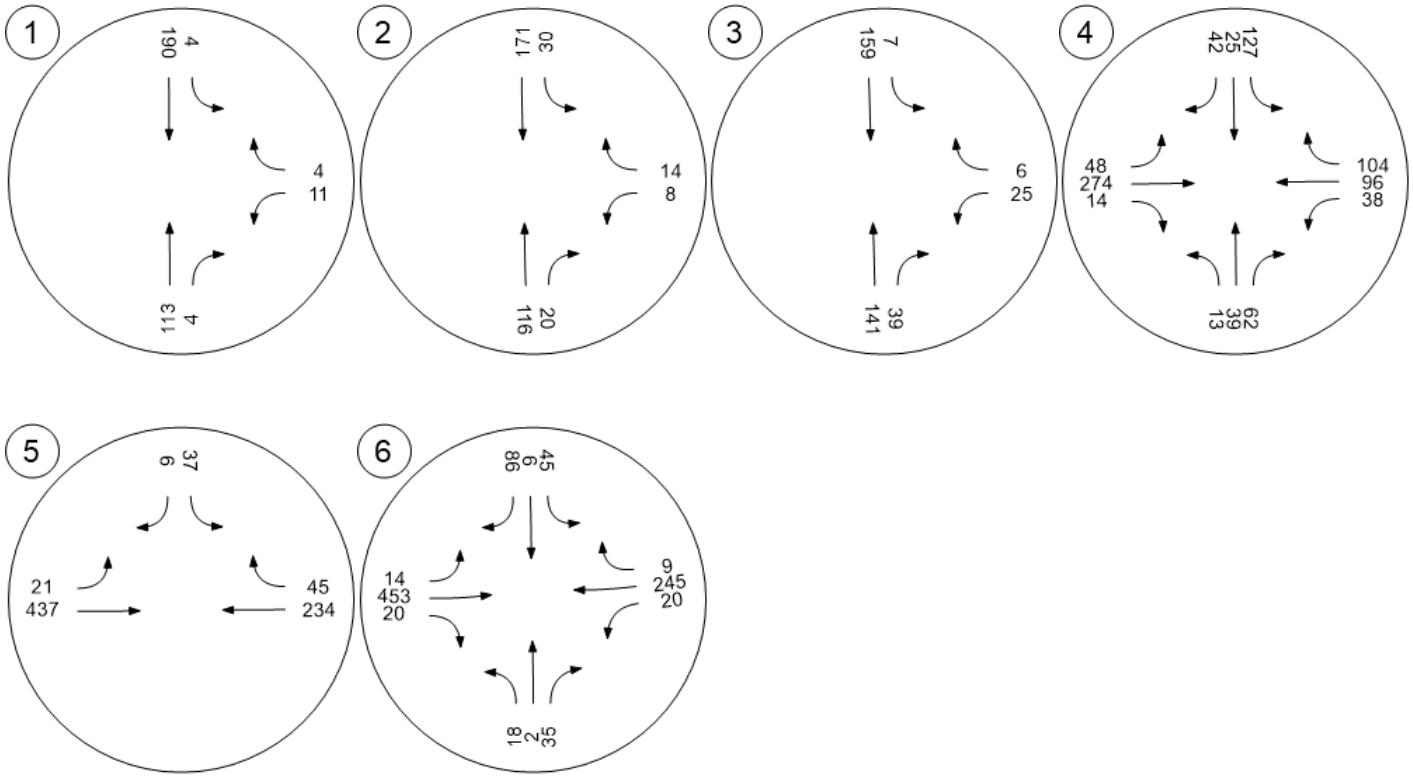


Figure 9-2029 Background Turning Movement Counts PM

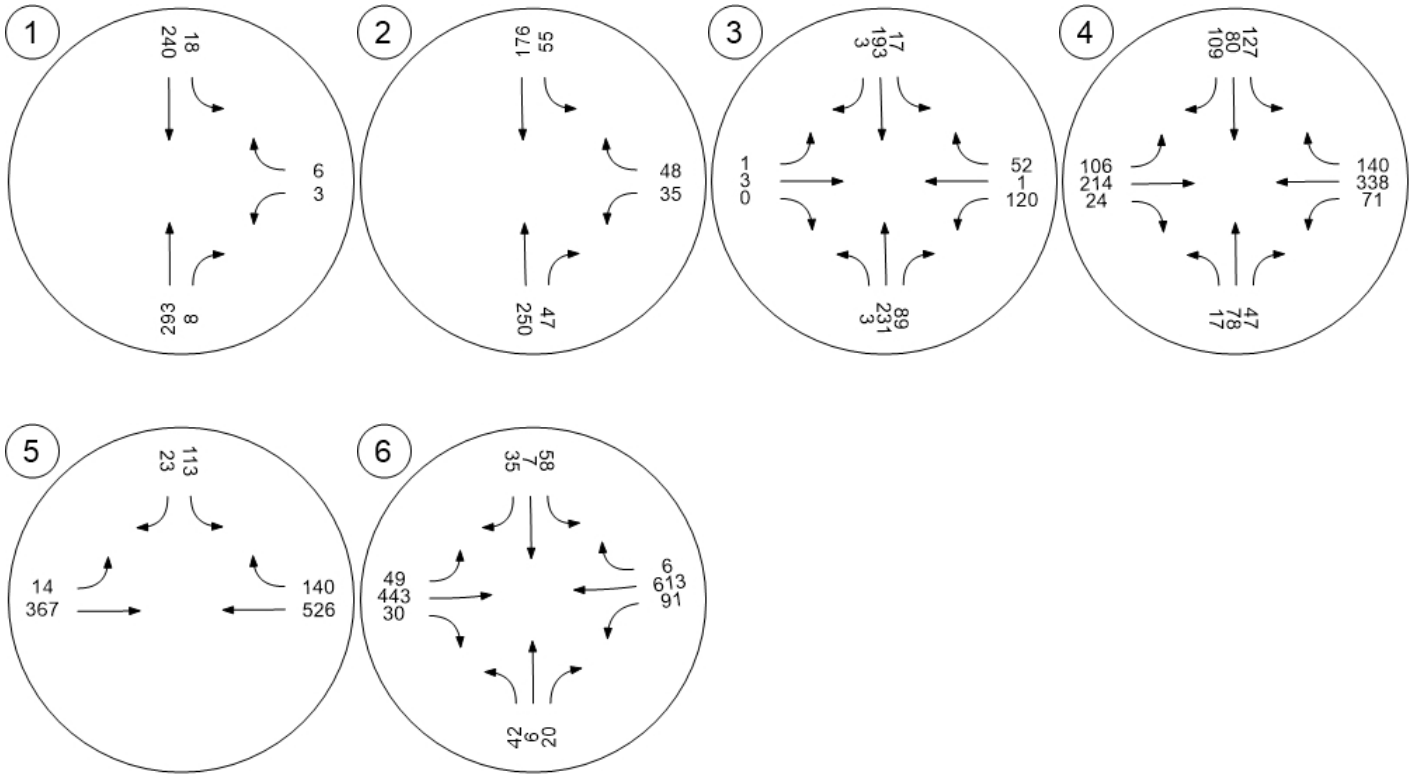


Figure 10- 2029 Turning Movement Counts with Development Traffic AM

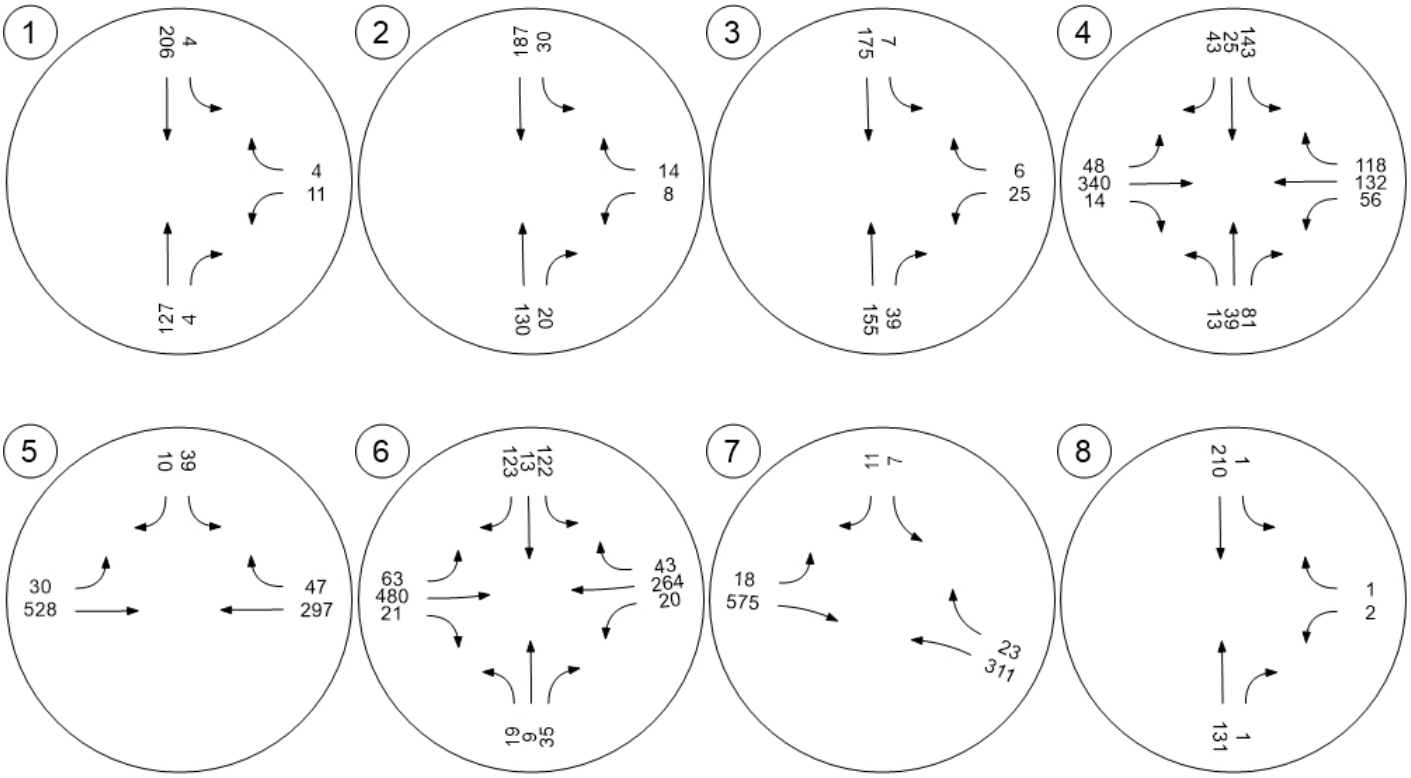


Figure 10- 2029 Turning Movement Counts with Development Traffic AM

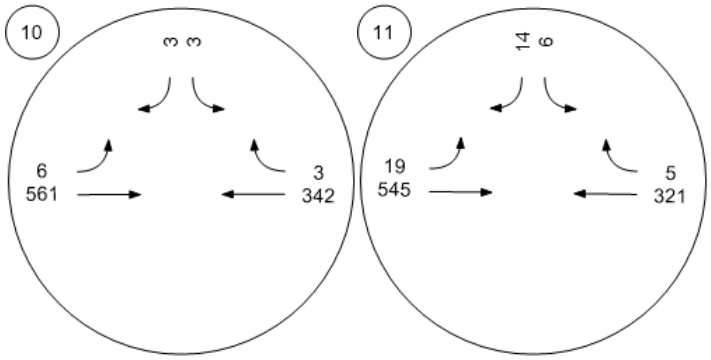


Figure 10- 2029 Turning Movement Counts with Development Traffic PM

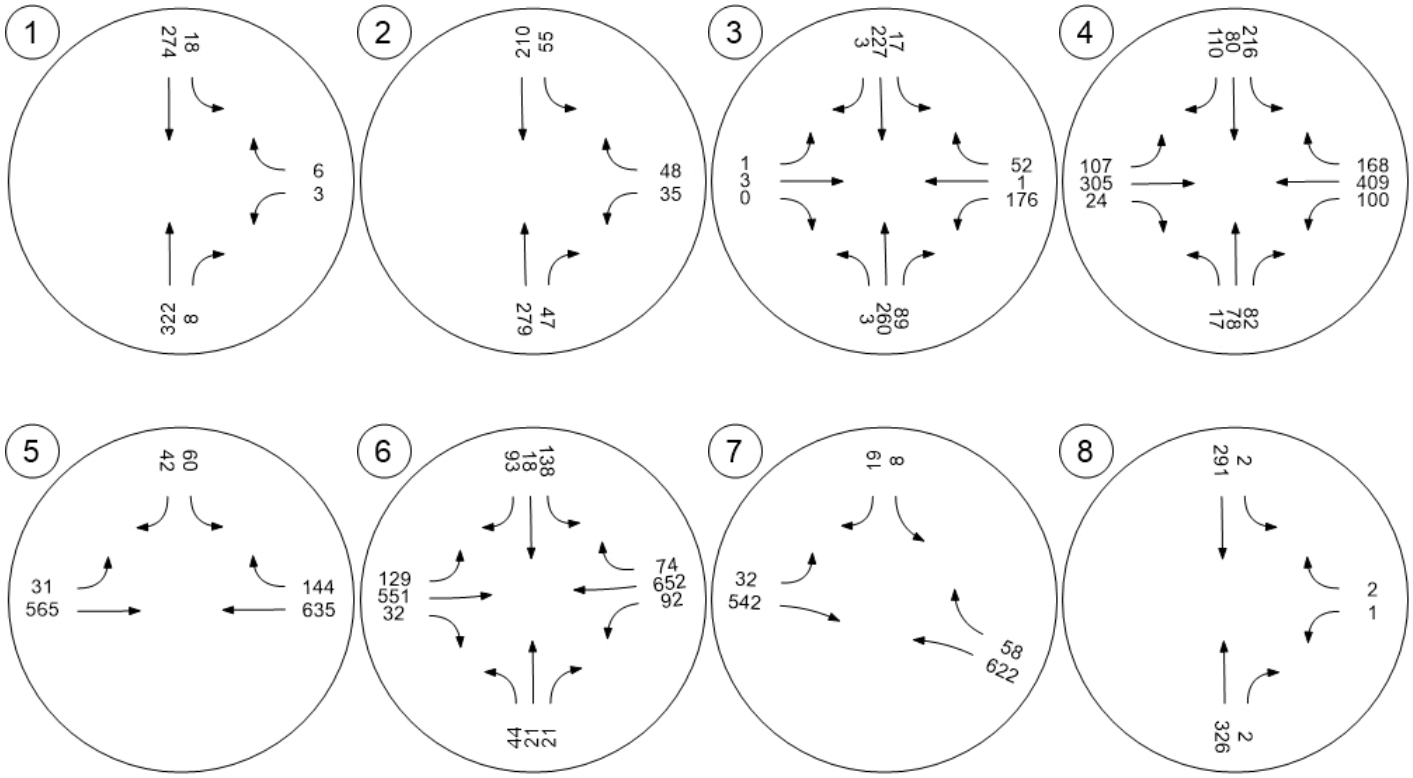
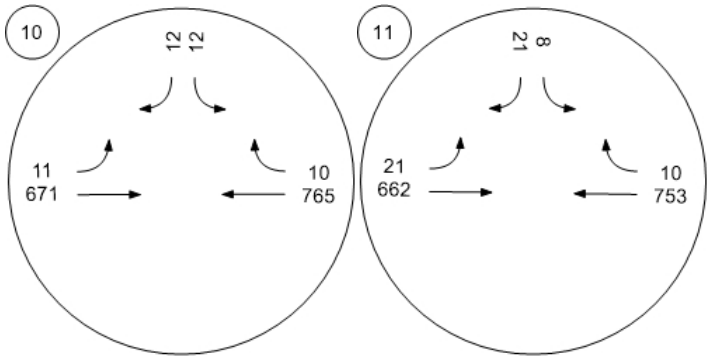


Figure 10- 2029 Turning Movement Counts with Development Traffic PM



2029 WITH DEVELOPMENT TRAFFIC QUEUE LENGTH ANALYSIS

Table 13 shows the queue length analysis for the 2029 traffic with the addition of the project traffic. The table shows the maximum queue length required at each intersection and at which movement or approach the maximum queue length occurs.

Table 13-2029 Queue Length Analysis with Development Traffic

Intersection	AM Peak Hour		PM Peak Hour	
	95th Percentile Queue Length (ft/ln)	Movement	95th Percentile Queue Length (ft/ln)	Movement
Rachel Drive & Silverado Access 1 (TWSC)	0.31	WBLR	0.38	WBLR
Pioneer Parkway & Silverado Access 2 (TWSC)	1.08	SBLR	9.59	SBLR
Pioneer Parkway & Silverado Access 3 (TWSC)	3.06	SBLR	9.04	SBLR
Pioneer Parkway & Red Mountain Drive (Signalized)	145.50	EBT	275.06	WBTR
Pioneer Parkway & Access 4 (TWSC)	5.09	SBLR	7.04	SBL

Where the queue lengths are less than 20 feet, there is expected to be no queuing at the intersection. At these intersections, there should be enough storage for at least one vehicle at each approach.

At the intersections with queues greater than 20 feet, sufficient storage length should be provided for the 95th percentile queue length at each approach.

Recommendations

The following is a summary of the recommendations to mitigate traffic from the Silverado Development based on the findings in this report.

There were 21 crashes in the project area in the last three years. The majority of the crashes were front-to-rear crashes or crashes due to turning errors. Dedicated left and right turn lanes are recommended on Pioneer Parkway to protect the turning vehicles and reduce the number of crashes of this nature.

In the background conditions without construction of the Silverado development, it is expected that a signal will be needed at the intersection of Red Mountain Drive and Pioneer Parkway by 2029. With traffic from Silverado and developments to the north, it is expected that a signal will need to be installed by the buildout of the Silverado development. A four-way stop may be an interim traffic control measure that could be implemented if delay needs to be mitigated before then.

Within five years after the buildout of the Silverado development, the accesses on Pioneer Parkway are expected to operate at LOS D or better. As delay increases at these accesses, vehicles are expected to reroute to the signals on Rachel Drive and Red Mountain Drive to improve the LOS. The accesses should be monitored into the future and may be restricted to right-turns only as traffic increases on Pioneer Parkway. It is up to the determination of the City to restrict this access to improve the LOS.

Sufficient vehicle storage at each access to the Silverado development should be provided for the 95th percentile queue length at each approach. The 95th percentile queue lengths are included in the Vistro Reports in the Appendix.