



Memorandum

scot @ calgolddevelopment.com

To: City of Redding	Date: May 11, 2016
Attn: Zach Bonnin	Project: South Bonnyview/Churn Creek Retail Development
From: Russ Wenham, P.E., T.E. Kamesh Vedula, P.E., T.E.	
Re: Application of Pass-By in the traffic study	Job No.: 45-1795-01
	File No.: C2057MEM003.DOCX

CC:

- Total PM peak hour project trips after discounting for internal trip capture – 743 trips
- Total PM peak hour pass-by trips – 251 trips
- Percentage of trip reduction applied to the entire street system with the exception of Churn Creek/Bonnyview intersection– 34% (251/743)
- By applying the uniform 34% pass-by to the entire system it may be deemed as an understatement of trips and fair share to the I-5 ramp intersections. For instance by applying the uniform 34% pass-by percentage, the project adds 48 trips to the NB off-ramp. By splitting the difference (between 0 and 34%), the project will add 8 more trips to the NB off ramp (48×0.17). From both the operations and fair share perspective, 8 trips appear to be insignificant and not change the outcome and/or mitigations presented in the traffic study.
- The study assigned 25% of the trips to the north on I-5 and 19% of the trips to the south on I-5 (resulting in assignment of 44% to the freeways) for the entire project including the fast foods and coffee shop. The fast foods/coffee shops typically have 50 percent of trips that are either pass-by/diverted link type. These reductions are typically applied to the freeway/major roadways. However, for this project, 44% of the trips were assigned to/from the freeway to capture these travel patterns.

- Churncreek/Bonnyview segment in the immediate vicinity of the project area carries about 1,650 vph in the PM peak period. As such, the majority of the pass-by trips were applied to Churncreek/Bonnyview intersection.
- If the project trip reductions were to be applied differently, this will include:
 - Assigning about 80% of the fast foods and coffee shop trips to the ramp intersections as diverted link trips
 - Assigning about 20% of the fast foods and coffee shop trips to the Churncreek/Bonnyview intersection as pass-by trips
 - Adjusting the trip distribution to reassign 44% of trips originally assigned to I-5 to local streets
 - The shopping center component's trip distribution is not expected to change, with about 44% still being assigned to/from I-5. Due to assignment of 44% of traffic to I-5 and the high volume of traffic on Churncreek/Bonnyview segment, the 30% pass-by for the shopping center (SC) is expected to occur at the Churncreek/Bonnyview intersection. From a numbers perspective, the 30% pass by SC trips equate to 180 trips, which represents about 11% of traffic on Churncreek/Bonnyview segment (180/1,650).
 - After discounting for internal trip capture and pass-by trips, the shopping center will add 42 trips to the NB off-ramp. Of the 32 inbound pass-by trips, 80% can be expected from the freeway, with about 40% from the north and 40% from south on I-5. This results in 13 trips being added to the NB off-ramp (40% of 32) for a total of 55 trips (42 + 13), which is about 7 more trips than what was originally added to the NB off-ramp.



- Regardless of the approach and/or the methodologies, the number of trips added to the freeway system in the traffic study is appropriate and no changes are deemed necessary.



- 5.1 ksf retail #3B
- 6.0 ksf retail #4
- 9.0 ksf retail #5
- 14.8 ksf retail #6
- 5.76 ksf retail #7
- 5.1 ksf restaurant
- 3.0 ksf fast food ✓

2143,225

West of Churn Creek Road:

- 4.335 ksf fast food
- 1.85 ksf coffee

6.185

The total land use quantity is 149.4 ksf. ✓

149.41

Project Trip Generation

Table 1 shows the project trip generation as presented in Table 8B "Full Buildout Project Trip Generation" of the *South Bonnyview/Churn Creek Retail Center Traffic Impact Analysis Report*, May 2016, Omni-Means. The calculation used in the May 2016 report rounded up the proposed land uses to present a conservative analysis. ✓

Table 1
UP-2016-00219 Project Trip Generation

Land Use Category (ITE Code)	Unit ¹	Daily Trip Rate/Unit ²	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Shopping Center (820)	ksf	59.63	1.35	52%	48%	5.30	50%	50%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Coffee/Donut Shop w/ Drive-Thru (937)	ksf	818.58	100.58	51%	49%	42.80	50%	50%
Project Name	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			Total	In	Out	Total	In	Out
Grocery, Retail, Pharmacy, Office, Restaurant	145.0	8,646	196	102	94	768	384	384
To Fast Food				-9	-13		-20	-28
To Fast Food				-15	-13		-34	-47
To Coffee Shop				-13	-13		-17	-24
Fast Food	3.0	1,488	136	69	67	98	51	47
To Shopping Center				-13	-9		-28	-20
To Fast Food				-5	-3		-4	-2
To Coffee Shop				-5	-3		-2	-2
Fast Food	5.0	2,481	227	116	111	163	85	78
To Shopping Center				-13	-15		-47	-34
To Fast Food				-3	-5		-2	-4
To Coffee Shop				-5	-5		-2	-4
Coffee Shop	2.0	1,637	201	103	99	86	43	43
To Shopping Center				-13	-15		-24	-17
To Fast Food				-3	-5		-2	-2
To Fast Food				-5	-5		-2	-4
Project Trips		14,252	554	288	266	743	379	364
Shopping Center Pass-by (15% for Daily and AM, 30% for PM reduction)		-1,297	-18	-10	-8	-180	-94	-86
Fast Food Pass-by (49% reduction)		-729	-48	-23	-25	-20	-8	-11
Fast Food Pass-by (49% reduction)		-1,215	-89	-46	-42	-34	-17	-18
Coffee Shop Pass-by (49% reduction)		-802	-76	-40	-36	-17	-7	-10
Net New Trips		10,208	323	169	155	493	253	240

Notes:

1. 1 ksf = 1,000 square feet

2. Trip rates based on ITE Trip Generation Manual 9th edition fitted-curve equations or average rates

148.0
7.0



As noted in **Table 1**, the total land use quantity sums to 155 ksf, which is greater than the 149.4 ksf included in the actual Use Permit approval. *ok*

Parcel Map Amendment No. 1 Project Trip Generation

The PM Amendment application has the following land uses:

East of Churn Creek Road:

- 140.2 ksf shopping center uses
- 3.0 ksf fast food *✓* $\Sigma 143.2$

West of Churn Creek Road:

- 2.217 ksf fast food
 - 3.028 ksf fast food
 - 1.069 ksf coffee
- } 6.314*

The total land use quantity is 149.51 ksf.

Net increase of 0.1, but less than 155 used in the Table Impact Analysis.

Project Trip Generation

Table 2 shows the project trip generation for the actual approved land uses on the east side of Churn Creek Road and the proposed changes for the west side of Churn Creek Road. For the purposes of this memorandum, the proposed land use quantities are rounded to the nearest 0.1 ksf.



Table 2
Parcel Map Amendment No. 1 Project Trip Generation

Land Use Category (ITE Code)	Unit ¹	Daily Trip Rate/Unit ²	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Shopping Center (820)	ksf	60.34	1.37	52%	48%	5.36	50%	50%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Coffee/Donut Shop w/ Drive-Thru (937)	ksf	818.58	100.58	51%	49%	42.80	50%	50%
Project Name	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			Total	In	Out	Total	In	Out
Grocery, Retail, Pharmacy, Office, Restaurant	140.2	8,459 ✓	192 ✓	100	92	751 ✓	376	376
<i>To Fast Food</i>				-9	-13		-20	-28
<i>To Fast Food</i>				-15	-13		-34	-47
<i>To Coffee Shop</i>				-13	-13		-17	-24
Fast Food (East of Churn Creek Road)	3.0	1,488 ✓	136 ✓	69	67	98 ✓	51	47
<i>To Shopping Center</i>				-13	-9		-28	-20
<i>To Fast Food</i>				-5	-3		-4	-2
<i>To Coffee Shop</i>				-5	-3		-2	-2
Fast Food (West of Churn Creek Road)	5.2	2,580 ✓	236 ✓	120	116	170 ✓	88	81
<i>To Shopping Center</i>				-13	-15		-47	-34
<i>To Fast Food</i>				-3	-5		-2	-4
<i>To Coffee Shop</i>				-5	-5		-2	-4
Coffee Shop	1.1	900 ✓	111 ✓	56	54	47 ✓	24	24
<i>To Shopping Center</i>				-13	-15		-24	-17
<i>To Fast Food</i>				-3	-5		-2	-2
<i>To Fast Food</i>				-5	-5		-2	-4
Project Trips		13,428 ✓	469 ✓	244	225	694 ✓	354	340
<i>Shopping Center Pass-by (15% for Daily and AM, 30% for PM reduction)</i>		-1,269	-17	-9	-8	-174	-91	-83
<i>Fast Food Pass-by (49% reduction)</i>		-729	-48	-23	-25	-20	-8	-11
<i>Fast Food Pass-by (49% reduction)</i>		-1,264	-93	-49	-44	-38	-18	-19
<i>Coffee Shop Pass-by (49% reduction)</i>		-441	-32	-17	-14	2	2	0
Net New Trips		9,724	278	146	133	464	239	226
Notes:		10,204	323	169	155	493	253	240

1. 1 ksf = 1,000 square feet
2. Trip rates based on ITE Trip Generation Manual 9th edition fitted-curve equations or average rates

As noted in Table 2, the total land use quantity sums to 149.5 ksf, which is less than the 155 ksf used in Table 1.

Conclusions

The traffic generation for the Parcel Map Amendment development proposal will be less than the amount considered in the CEQA approval for the original Use Permit (UP-2016-00219). The Parcel Map Amendment will not result in new transportation impacts.

OK

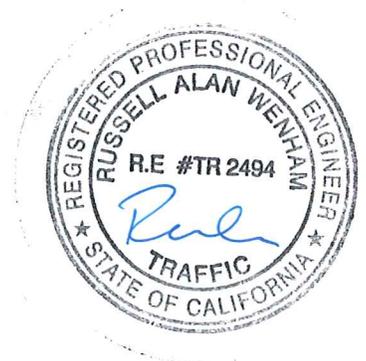


South Bonnyview/Churn Creek Retail Center Traffic Impact Analysis Report

Prepared for:

California Gold
Development Corporation

Prepared by:



**SOUTH BONNYVIEW/CHURCH CREEK RETAIL CENTER
TRAFFIC IMPACT ANALYSIS**

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MAY 2016

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Executive Summary

This report has been prepared to present the results of a Traffic Impact Analysis Report (TIAR) performed by Omni-Means for the proposed redevelopment of the previous Redding Kenworth Company site and adjacent parcels, located in the City of Redding, in Shasta County, northeast of the I-5 and Churn Creek Road Interchange.

The proposed project will be completed in two phases. The term "project" for phase 1, as used in this report, refers to the development as follows:

- Location - 14 +/- acres east of Churn Creek Road, from Bonnyview Road to Arizona Street
 - East of Churn Creek Road
 - ± 76,365 sq. ft General Commercial Retail
- Access to the project will be via three proposed driveways along Churn Creek Road
 - Two full access driveways
 - One right-in-right-out (RIRO) driveway

The term "project" for phase 2, as used in this report, refers to the development as follows:

- Location - 4.25 +/- acres east and 2.6 +/- acres west of Churn Creek Road, from Bonnyview Road to Arizona Street
 - East of Churn Creek Road
 - ± 58,760 additional sq. ft General Commercial Retail
 - ± 3,000 sq. ft. Fast Food
 - ± 5,100 sq. ft. Restaurant
 - West of Churn Creek Road
 - ± 4,335 sq. ft. Fast Food
 - ± 1,850 sq. ft. Coffee Shop
- Access to the project will be via two existing driveways and two proposed driveways along Churn Creek Road
 - Two full access driveways
 - Two right-in-right-out (RIRO) driveways

With completion of the proposed project, the southern full-access driveway will become signalized.

Phase one of the proposed project will generate approximately 116 AM peak hour trips and 361 PM peak hour trips. Phase two of the proposed project will generate approximately 323 AM peak hour trips and 493 PM peak hour trips.

The traffic analysis considered potential impacts (selected in coordination with City staff) along the following corridors:

- S. Bonnyview Road/Churn Creek Road corridor between Bechelli Lane and Rancho Road
- Rancho Road corridor between Churn Creek Road and Airport Road
- Churn Creek Road between S. Bonnyview Road and Hartnell Avenue

Consistent with the January 2009 City of Redding TIA Guidelines, the following traffic scenarios were analyzed as a part of this TIAR:

- Existing Conditions
- Existing Plus Project Conditions
- Year 2035 No Project Conditions
- Year 2035 Plus Project Conditions

The traffic analysis determined that all project impacts will be mitigated through either the payment of a Fair-Share or construction of the recommended mitigation.

The following is a summary of the required mitigations:

Intersections

Intersection 2 - S. Bonnyview Road & Interstate 5 Southbound Ramps

- **Existing Plus Project conditions**
 - Construct an additional (4th) eastbound through lane that transitions into an additional left turn lane at the intersection of S. Bonnyview Road & Interstate 5 Northbound Ramps
- **Year 2035 Plus Project conditions**
 - Provide improvements recommended under *Existing Plus Project* conditions

Under *Existing Plus Project* conditions, the project does not create a significant impact.

Under *Cumulative Plus Project* conditions, the project creates a **significant** impact at this intersection due to the projected eastbound right queue increase (from approximately 12 vehicles to 20 vehicles). The available storage is for 10 vehicles.

The project's Fair-Share is 29 percent.

The mitigation improvement is eligible for TIF credit/reimbursement.

Intersection 3 - S. Bonnyview Road & Interstate 5 Northbound Ramps

- **Existing Plus Project conditions**
 - Construct an additional eastbound left turn lane
 - Widen on-ramp to accommodate dual lefts from S. Bonnyview Road
- **Year 2035 Plus Project conditions**
 - Provide improvements recommended under *Existing Plus Project* conditions

Under *Existing Plus Project* conditions, the project creates a **significant** impact at this intersection due to the projected westbound right queue increase (from approximately 4 vehicles to 9 vehicles). The available storage is for 4 vehicles.

Under *Cumulative Plus Project* conditions, the project creates a **significant** impact at this intersection due to the projected northbound right queue increase (from approximately 4 vehicles to 13 vehicles). The available storage is for 12 vehicles.

The project's Fair-Share is 42 percent.

Intersection 4 - S. Bonnyview Road & Churn Creek Road

- **Existing Plus Project conditions**

- Provided permitted overlap-phasing for southbound right turn movement
- **Year 2035 Plus Project conditions**
 - Provide improvements recommended under *Existing Plus Project* conditions

Under *Existing Plus Project* conditions, the project creates a **significant** impact at this intersection due to the projected eastbound left queue increase (from approximately 6 vehicles to 10 vehicles). The available storage is for 5 vehicles.

Under *Cumulative Plus Project* conditions, the proposed project creates a **significant** impact by increasing delay by more than 5 seconds at an intersection operating at unacceptable LOS in the “no project” condition.

The project’s Fair-Share is 58 percent.

The mitigation improvement is eligible for TIF credit/reimbursement.

Intersection 5 - Churn Creek Road & Alrose Lane

- **Year 2035 Plus Project conditions**
 - Construct an eastbound left turn lane
 - Reconstruct the eastbound approach to accommodate a through lane and a through-right

Under *Cumulative Plus Project* conditions, the proposed project creates a **significant** impact by increasing delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition.

The project’s Fair-Share is 19 percent.

Payment of an ad hoc fee will mitigate the significant impact.

Intersection 6 - Churn Creek Road & Hartmeyer Lane

- **Year 2035 Plus Project conditions**
 - Reconstruct intersection to eliminate westbound left turn movements, a receiving lane for northbound lefts and a northbound right turn pocket

Under *Cumulative Plus Project* conditions, consistent with the Shasta County significance thresholds the proposed project creates a **significant** impact by causing the LOS to deteriorate from acceptable to unacceptable conditions.

The project’s Fair-Share is 26 percent.

Payment of an ad hoc fee will mitigate the significant impact.

Intersection 8 - Churn Creek Road & Victor Lane

- **Year 2035 Plus Project conditions**
 - Construct the intersections of Churn Creek Road/Victor Lane and Churn Creek Road/Rancho Road into a roundabout

Under *Cumulative Plus Project* conditions, the proposed project creates a **significant** impact by increasing delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition.

The project’s Fair-Share is 18 percent.

Payment of City-wide TIF will mitigate the significant impact.

Intersection 9 - Churn Creek Road & Rancho Road

- **Year 2035 Plus Project conditions**
 - Construct the intersections of Churn Creek Road/Victor Lane and Churn Creek Road/Rancho Road into a roundabout

Under *Cumulative Plus Project* conditions, the proposed project creates a **significant** impact by increasing delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition.

The project’s Fair-Share is 15 percent.

Payment of City-wide TIF will mitigate significant impact.

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway

- **Existing Plus Project conditions**
 - Construct a traffic signal
- **Year 2035 Plus Project conditions**
 - Provide improvements recommended under *Year 2035 No Project* conditions

Under *Existing Plus Project* conditions, the proposed project creates a **significant** impact as it causes the worst-case movement’s acceptable LOS to decline to an unacceptable LOS and meeting the peak hour volume signal warrant.

Under *Cumulative Plus Project* conditions, the proposed project creates a **significant** impact as it causes the worst-case movement’s acceptable LOS to decline to an unacceptable LOS and meeting the peak hour volume signal warrant.

The project’s Fair-Share is 67 percent.

EXECUTIVE SUMMARY TABLE 1
 BONNYVIEW RETAIL CENTER TRAFFIC IMPACT STUDY
 SUMMARY OF INTERSECTION OPERATIONS

SUMMARY OF INTERSECTION OPERATIONS	10 Rancho Rd/Alta Mesa Dr		11 Rancho Rd/Shasta View Dr		12 Rancho Rd/Airport Rd		13 Chum Creek Rd/Arizona St		14 Chum Creek Rd/Hartnell Ave		15 Chum Creek Rd/Loma Vista Dr		16 Chum Creek Access Driveway		17 Chum Creek Rd/Southern Full-Access Driveway	
	Control Type	TWSC	TWSC	Signal	TWSC	Signal	TWSC	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal
Target LOS	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
AM PEAK HOUR	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%
Existing	B 12.1 -	B 14.2 -	C 20.1 -	B 10.9 -	C 33.1 -	B 17.7 -	B 11.6 -	B 17.7 -	B 11.6 -	B 17.7 -	B 11.6 -	B 17.7 -	B 11.6 -	B 17.7 -	B 11.6 -	B 17.7 -
Existing Plus Project	B 12.2 -	B 14.4 -	C 20.6 -	B 11.1 -	C 33.5 -	B 17.9 -	B 12.9 -	B 17.9 -	B 12.9 -	B 17.9 -	B 12.9 -	B 17.9 -	B 12.9 -	B 17.9 -	B 12.9 -	B 17.9 -
Delay Increase Due to Project	0.1	0.2	0.5	0.2	0.4	0.2	1.3	0.2	0.2	0.2	1.3	0.2	0.2	0.2	0.2	0.2
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Year 2035 Base No Project	B 14.9 -	D 32.2 Not Ok	B 19.3 -	B 12.4 -	D 40.6 Not Ok	B 18.2 -	B 12.9 -	B 18.2 -	B 12.9 -	B 18.2 -	B 12.9 -	B 18.2 -	B 12.9 -	B 18.2 -	B 12.9 -	B 18.2 -
Year 2035 Base Plus Project	C 15.3 -	E 35.9 Not Ok	B 19.5 -	B 13.0 -	D 42.4 Not Ok	B 18.7 -	B 12.6 -	B 18.7 -	B 12.6 -	B 18.7 -	B 12.6 -	B 18.7 -	B 12.6 -	B 18.7 -	B 12.6 -	B 18.7 -
Delay Increase Due to Project	0.4	3.7	0.2	0.6	1.8	0.5	-0.3	0.5	-0.3	0.5	-0.3	0.5	-0.3	0.5	-0.3	0.5
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
PM PEAK HOUR	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%
Existing	B 12.1 -	B 12.6 -	B 17.6 -	B 10.2 -	D 35.9 Not Ok	B 13.0 -	B 10.6 -	B 17.6 -	D 35.9 Not Ok	B 13.0 -	B 10.6 -	B 17.6 -	D 35.9 Not Ok	B 13.0 -	B 10.6 -	B 17.6 -
Existing Plus Project	B 12.3 -	B 13.0 -	B 18.3 -	B 10.8 -	D 37.5 Not Ok	B 13.5 -	B 17.3 -	B 18.3 -	D 37.5 Not Ok	B 13.5 -	B 17.3 -	B 18.3 -	D 37.5 Not Ok	B 13.5 -	B 17.3 -	B 18.3 -
Delay Increase Due to Project	0.2	0.4	0.7	0.6	1.6	0.5	6.7	0.7	1.6	0.5	6.7	0.7	1.6	0.5	6.7	10.3
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Year 2035 Base No Project	B 14.3 -	E 40.3 Not Ok	B 19.8 -	B 11.0 -	D 51.5 Not Ok	B 15.5 -	B 13.7 -	B 19.8 -	D 51.5 Not Ok	B 15.5 -	B 13.7 -	B 19.8 -	D 51.5 Not Ok	B 15.5 -	B 13.7 -	B 19.8 -
Year 2035 Base Plus Project	B 14.8 -	F 54.6 Not Ok	C 21.0 -	B 11.9 -	D 53.9 Not Ok	B 16.8 -	C 19.1 -	C 21.0 -	D 53.9 Not Ok	B 16.8 -	C 19.1 -	C 21.0 -	D 53.9 Not Ok	B 16.8 -	C 19.1 -	C 21.0 -
Delay Increase Due to Project	0.5	14.3	1.2	0.9	2.4	1.3	5.4	1.2	2.4	1.3	5.4	1.2	2.4	1.3	5.4	5.4
Significant Impact?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Fair Share	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	67%

Notes:
 LOS - Level of Service
 TWSC - Two Way Stop Control

EXISTING PLUS PROJECT CONDITIONS MITIGATION

Intersection 3 - S. Bonnyview Road & Interstate 5 NB Ramps:

- Construct an additional eastbound left turn lane and
- Widen on-ramp to accommodate dual lefts

Intersection 4 - S. Bonnyview Road & Churn Creek Road:

- Provided permitted overlap-phasing for southbound right turn movement

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway:

- Construct a traffic signal

CUMULATIVE PLUS PROJECT CONDITIONS MITIGATION

Intersection 2 - S. Bonnyview Road & Interstate 5 SB Ramps (2/2/2)*:

- Construct an additional (4th) westbound thru lane that transitions into a trap left lane at the intersection of S. Bonnyview Road & Interstate 5 NB Ramps

Intersection 3 - S. Bonnyview Road & Interstate 5 NB Ramps (4/2/2)*:

- Construct an additional eastbound left turn lane and
- Widen on-ramp to accommodate dual lefts

Intersection 4 - S. Bonnyview Road & Churn Creek Road (6/8/6)*:

- Provided permitted overlap-phasing for southbound right turn movement

Intersection 5 - Churn Creek Road & Aloose Lane (1/9/9)*:

- Extended Two-Way Left Turn Lane approximately 50 feet easterly and
- Widen Churn Creek Road, east of Aloose Lane, to accommodate the Two-Way Left Turn Lane extension

Intersection 6 - Churn Creek Road & Hartmeyer Lane (2/6/6)*:

- Reconstruct intersection and restrict northbound to right turns only

Intersection 8 - Churn Creek Road & Victor Lane (1/8/9):

- Construct the intersections of Churn Creek Road/Victor Road and Churn Creek Road/Rancho Road to install a single/multi-lane modern roundabout

Intersection 9 - Churn Creek Road & Rancho Road (1/5/6):

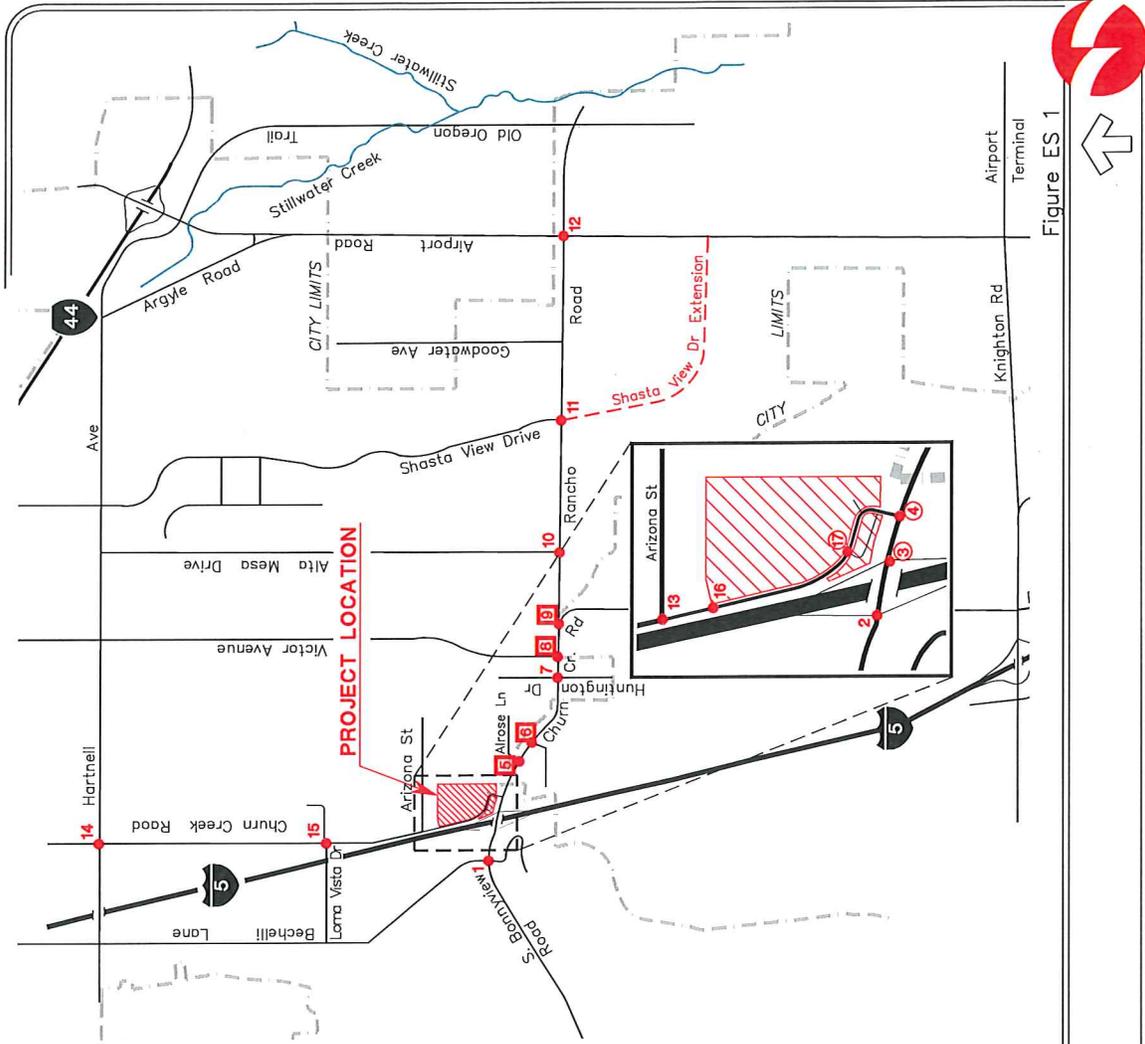
- Construct the intersections of Churn Creek Road/Victor Road and Churn Creek Road/Rancho Road to install a single/multi-lane modern roundabout

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway (6/7/6)*:

- Construct a traffic signal

Legend:

- Existing Plus Project Mitigation
- Cumulative Plus Project Mitigation
- * Year 2035 Plus Project Mitigation is the same as Existing Plus Project
- - - City Limits



S. Bonnyview/Churn Creek Retail Center TIAR

Intersections Requiring Improvements

Introduction

California Gold Development Corporation has retained Omni-Means to complete a Traffic Impact Analysis Report (TIAR) for the proposed South Bonnyview/Churn Creek Retail Center on Churn Creek Road in the City of Redding, in Shasta County. The term “project” as used in this report refers to the proposed Retail Center development. Figure 1 shows the project vicinity map.

Consistent with the January 2009 City of Redding TIA Guidelines, the following traffic scenarios are analyzed in this TIAR:

- Existing Conditions
- Existing Plus Project Conditions
- Year 2035 No Project Conditions
- Year 2035 Plus Project Conditions

Existing conditions quantify the current traffic operations at the study locations.

The Existing Plus Project condition is an analysis scenario in which traffic impacts with phase one of the proposed project are investigated in comparison to the Existing conditions scenario. Within this scenario, the project generated peak hour traffic volumes have been added to the Existing conditions volumes to obtain the Existing Plus Project volumes.

The January 2009 City of Redding TIA Guidelines defines the following as Cumulative conditions:

Either:

Existing + Approved/Pending Project List, and

Existing + Approved/Pending Project List + Proposed Project

Or:

2030 Shasta County Travel Demand Model (SCTDM) without Proposed Project, and

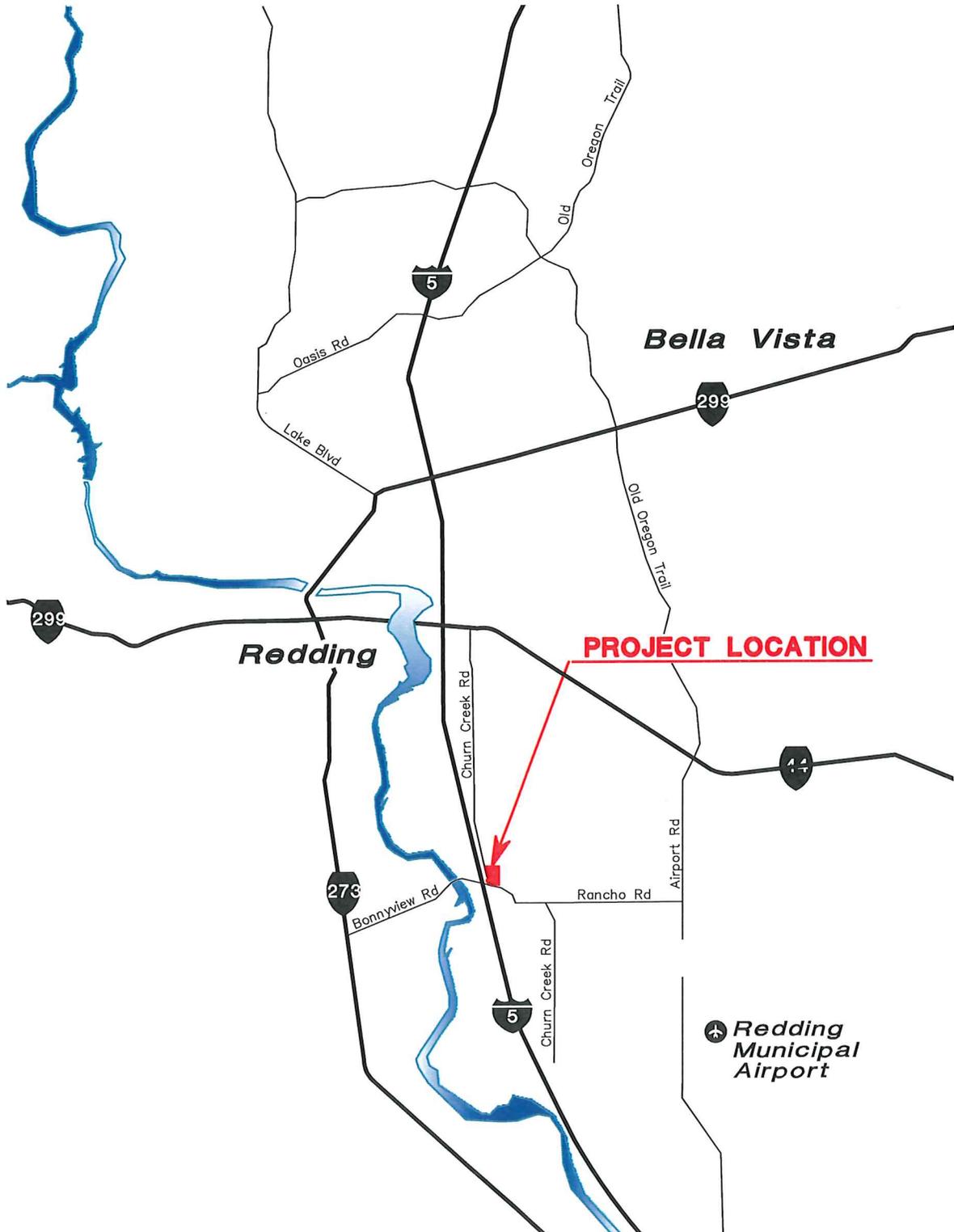
2030 SCTDM + Proposed Project

For the proposed project, City staff concurred that the Year 2035 forecasts from the SCTDM will be appropriate for Cumulative conditions.

Year 2035 No Project conditions refer to analysis scenarios that would exist following approximately twenty years of development in the City of Redding and Shasta County. The Year 2035 No Project conditions scenarios were forecasted using the SCTDM.

Year 2035 Plus Project condition is the analysis scenario in which traffic impacts associated with the project are investigated in comparison to the Year 2035 No Project conditions scenario.

The above traffic scenarios are described in further detail and evaluated in subsequent sections of this report.



S. Bonnyview/Churn Creek Retail Center TIAR

Figure 1

Project Vicinity Map



Project Setting

The City of Redding is the largest city in Shasta County, California, covering approximately 60 square miles. The US Census Bureau reports that in 2011, the population in Redding was approximately 90,100.

Transportation System

Roadways that provide primary circulation in the vicinity of the project site are as follows:

Interstate 5 (I-5) is a major interstate freeway facility that traverses in the north-south direction through the State of California. In northern California, I-5 serves as the primary inter-regional auto and truck travel route that connects the northern counties with the Sacramento Valley. Within Shasta County, I-5 serves as a major commuter and truck route linking the Cities of Anderson, Redding, and Shasta Lake.

Churn Creek Road is a two to four-lane, north-south arterial that runs between Airport Road to College View Drive. Churn Creek Road runs in the east-west direction between South Bonnyview Road and Rancho Road.

South Bonnyview Road is a four-lane, east-west arterial that runs between State Route 273 and Churn Creek Road.

Rancho Road is a two-lane, east-west arterial that runs between Churn Creek Road to Old Oregon Trail.

Hartnell Avenue is a two to four-lane east-west arterial that runs between East Cypress Avenue, its southern terminus, and Airport Road.

Bechelli Lane is a two to four-lane, north-south arterial that runs between south of South Bonnyview Road to its northern terminus, approximately one mile to the north of East Cypress Avenue.

Arizona Street is a two-lane, east-west local street that runs from Churn Creek Road to its terminus location approximately 0.44 miles to the east.

Study Intersections and Roadway Segments

Intersections

The following list of critical study intersections were selected in coordination with City of Redding staff for analysis within this study for weekday AM and PM peak hour conditions:

1. South Bonnyview Road & Bechelli Lane
2. South Bonnyview Road & I-5 SB Ramps
3. South Bonnyview Road & I-5 NB Ramps
4. South Bonnyview Road & Churn Creek Road
5. Churn Creek Road & Alrose Lane
6. Churn Creek Road & Hartmeyer Lane
7. Churn Creek Road & Huntington Drive
8. Churn Creek Road & Victor Ave

9. Churn Creek Road & Rancho Road
10. Rancho Road & Alta Mesa Drive
11. Rancho Road & Shasta View Drive
12. Rancho Road & Airport Road
13. Churn Creek Road & Arizona Street
14. Churn Creek Road & Hartnell Avenue
15. Churn Creek Road & Loma Vista Drive
16. Churn Creek Road & Northern Full-Access Driveway (Project Only)
17. Churn Creek Road & Southern Full-Access Driveway

The AM peak hour is defined as one-hour of peak traffic flow counted between 7:00 am and 9:00 am. The PM peak hour is defined as one-hour of peak traffic flow counted between 4:00 pm and 6:00 pm.

AM and PM peak hour intersection turn movement traffic counts were collected at all study intersections by Omni-Means in November 2015.

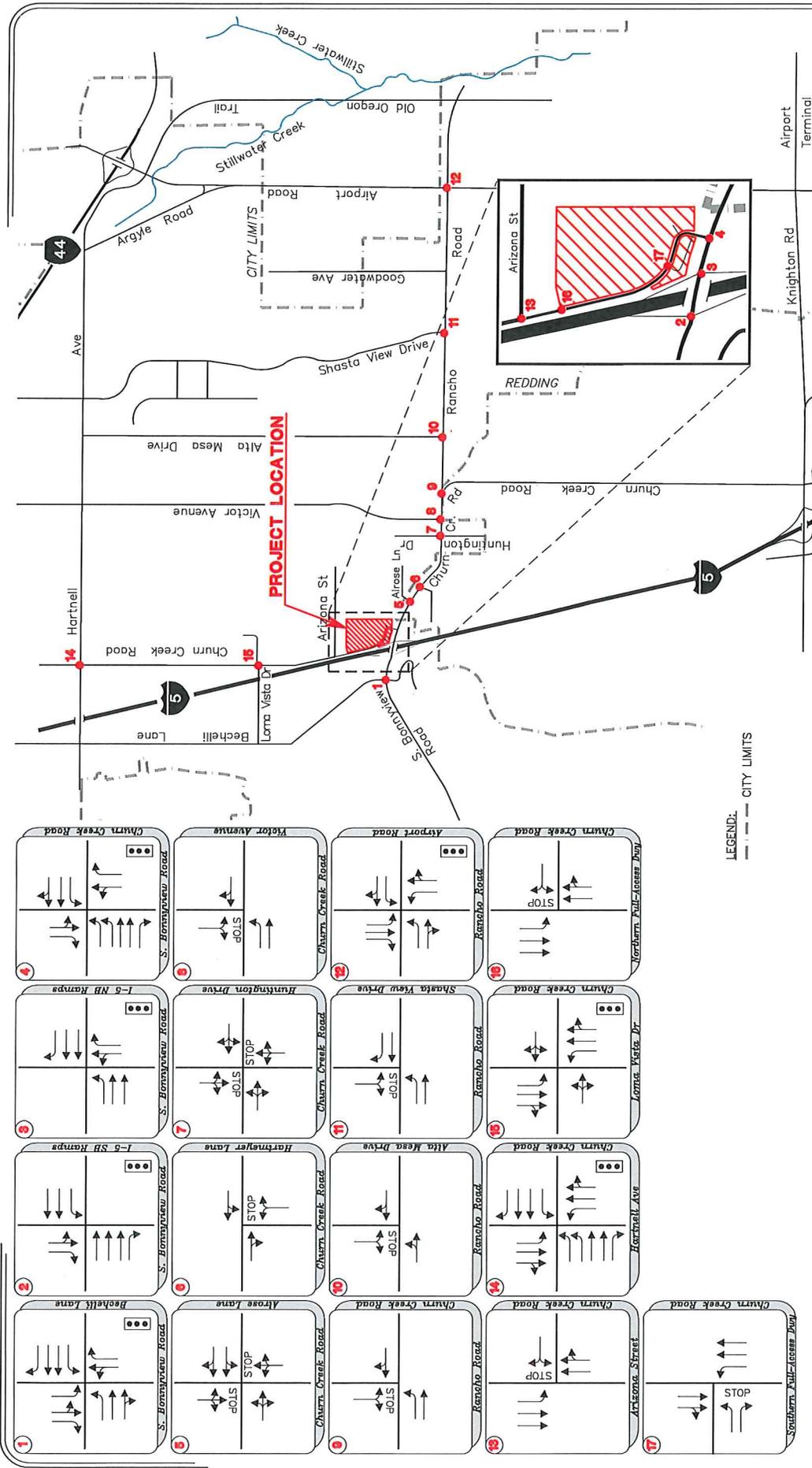
Figure 2 shows the intersection lane geometrics and traffic controls. Figure 3 shows the Existing conditions traffic volumes for all study intersections.

Ramps

The following ramps were selected in coordination with the City of Redding staff and Caltrans for analysis within this study for Existing and Year 2035 conditions with and without the proposed project:

1. I-5 Northbound Off Ramp at S Bonnyview Road
2. I-5 Northbound On Ramp at S Bonnyview Road
3. I-5 Southbound Off Ramp at S Bonnyview Road
4. I-5 Southbound On Ramp at S Bonnyview Road

Ramp traffic volumes were obtained from the existing intersection counts at the intersections of South Bonnyview Road & I-5 SB Ramps and South Bonnyview Road & I-5 NB Ramps. Mainline traffic volumes were obtained from the 2014 published Caltrans data for the I-5 mainline segment.



S. Bonnyview/Churn Creek Retail Center TIAR

Existing Lane Geometrics and Control

Figure 2



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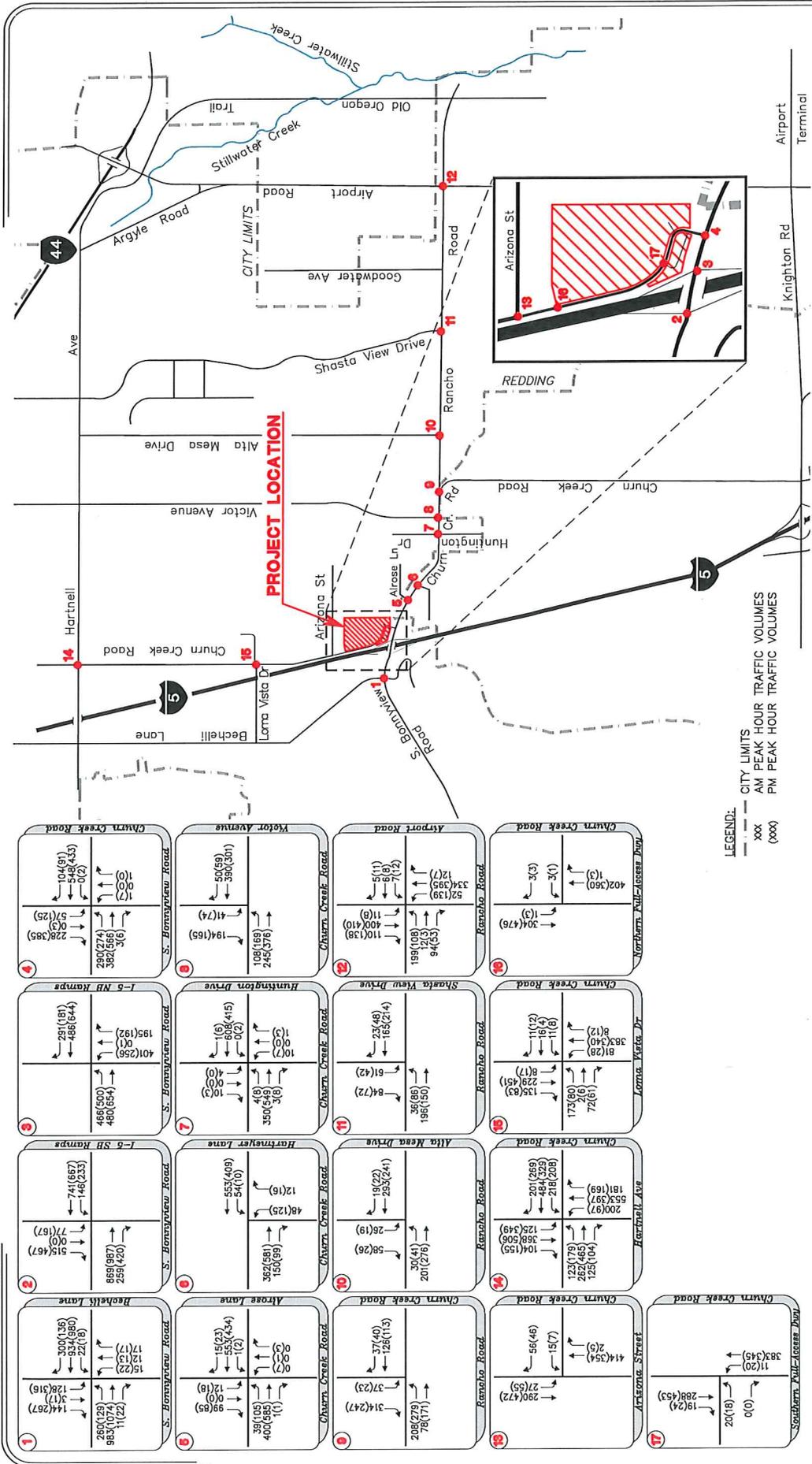


Figure 3



S. Bonnyview/Churn Creek Retail Center TIAR

Existing Peak Hour Traffic Volumes

Level of Service Methodologies and Guidelines

General LOS Methodologies

Intersection and ramp level of services (LOS) have been calculated for all control types using the methods documented in the Transportation Research Board publications *Highway Capacity Manual 2000 and 2010*. LOS determinations are presented on a letter grade scale from "A" to "F", whereby LOS "A" represents "free-flow" conditions and LOS "F" represents over capacity conditions.

Ramp LOS Methodologies

Ramp LOS is calculated using *HCS 2010* software by McTrans. LOS has been calculated on a density basis in passenger cars per mile per lane (pc/mi/ln). Table 1 presents the LOS thresholds for ramps in the study area.

TABLE 1
LEVEL OF SERVICE (LOS) CRITERIA FOR RAMPS

RAMP MERGE AND DIVERGE AREAS	
LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10 - 20
C	> 20 - 28
D	> 28 - 35
E	> 35
F	Demand exceeds capacity

Intersection LOS Methodologies

Intersection LOS is calculated for all control types using the *Synchro 9* software by Trafficware, implementing the methods documented in the HCM 2010, except for intersection 1, 2, 3, and 4. These intersections were calculated using HCM 2000 methodologies due to complications with the HCM 2010 software. Table 2 presents the LOS definitions for different types of intersection controls.

**TABLE 2
LEVEL OF SERVICE (LOS) CRITERIA FOR INTERSECTIONS**

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle		
				Signalized	Un signalized	All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	< 10.0	< 10.0	< 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0 and < 20.0	>10.0 and < 15.0	>10.0 and < 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and < 35.0	>15.0 and < 25.0	>15.0 and < 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and < 55.0	>25.0 and < 35.0	>25.0 and < 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and < 80.0	>35.0 and < 50.0	>35.0 and < 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0	> 50.0	> 50.0

References: 2000 Highway Capacity Manual

General Plan Circulation Element Information and Policies

City of Redding LOS Guidelines

The City of Redding currently maintains its General Plan Transportation Element that is accessible via the following internet site: <http://www.cityofredding.org/home/showdocument?id=5513>. The Transportation Element contains the following information of particular interest to this study:

Policy T1A: Establish the following peak-hour LOS standards for transportation planning and project review. They reflect the special circumstances of various areas of the community:

- Use LOS "C" – for most arterial streets and their intersections.
- Use LOS "D" – for the Downtown area where vitality, activity, and pedestrian and transit use are primary goals.
- Use LOS "D" – for streets within the State highway system and interchanges.
- Use LOS "D" – for river-crossing street corridors whose capacity is affected by adjacent intersections.

Shasta County

Shasta County's General Plan Circulation Element contains the following policy pertaining to LOS standards in the County:

C-6I New development which may result in exceeding LOS E on existing facilities shall demonstrate that all feasible methods of reducing travel demand have been attempted to reach LOS C. New development shall not be approved unless traffic impacts are adequately mitigated. Such mitigation may take the form of, but not limited to the following:

- Provision of capacity improvements to the specific road link to be impacted, the transit system, or any reasonable combination;
- Provision of demand reduction measures included as part of the project design or project operation or any feasible combination.

Caltrans LOS Guidelines

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

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

Consistent with the agencies' policies, this study will consider LOS "C" as the standard acceptable threshold for all intersections in the jurisdiction of the City of Redding, LOS "E" as the standard acceptable threshold for all intersections in the jurisdiction of Shasta County, and LOS "D" as the standard acceptable threshold for all intersections in the jurisdiction of Caltrans. Table 3 displays the intersection, jurisdiction, and LOS threshold for each of the study intersections.

**TABLE 3
INTERSECTION LEVEL OF SERVICE THRESHOLD AND JURISDICTION**

#	Intersection	Jurisdiction	Target LOS
1	S. Bonnyview Rd/Bechelli Lane	City of Redding	C
2	S. Bonnyview Rd/I-5 SB Ramps	Caltrans	D
3	S. Bonnyview Rd/I-5 NB Ramps	Caltrans	D
4	S. Bonnyview Rd/Churn Creek Rd	City of Redding	C
5	Churn Creek Rd/Alose Lane	City of Redding	C
6	Churn Creek Rd/Hartmeyer Lane	Shasta County	E
7	Churn Creek Rd/Huntington Dr	City of Redding	C
8	Churn Creek Rd/Victor Ave	City of Redding	C
9	Churn Creek Rd/Rancho Rd	City of Redding	C
10	Rancho Rd/Alta Mesa Dr	City of Redding	C
11	Rancho Rd/Shasta View Dr	City of Redding	C
12	Rancho Rd/Airport Rd	City of Redding	C
13	Churn Creek Rd/Arizona St	City of Redding	C
14	Churn Creek Rd/Hartnell Ave	City of Redding	C
15	Churn Creek Rd/Loma Vista Dr	City of Redding	C
16	Churn Creek Rd/Northern Full-Access Driveway	City of Redding	C
17	Churn Creek Rd/Southern Full-Access Driveway	City of Redding	C

Significance Thresholds

In accordance with the January 2009 City of Redding TIA Guidelines, the following thresholds of significance are used to determine if the proposed project causes a significant impact and requires mitigation:

Signalized Intersections

- The project causes an acceptable LOS to decline to an unacceptable LOS, or
- The project increases the overall average delay by more than 5 seconds per vehicle at an intersection having an unacceptable LOS without project traffic.

Two-Way Stop Intersections

- The project causes the following to occur for the worst-case movement:
 - The LOS declines to an unacceptable LOS, and
 - The volume to capacity ratio exceeds 0.75, and
 - The 95th percentile queue exceeds 75 feet (3 vehicles), or
- The project causes the worst-case movement's acceptable LOS to decline to an unacceptable LOS and the peak hour volume signal warrant is met, or
- The project increases the average delay for the worst-case movement by more than 5 seconds per vehicle at an intersection that has an unacceptable LOS without the project and the intersection also meets the peak hour volume signal warrant

Mitigations and Fee

In accordance with the January 2009 City of Redding TIA Guidelines, the following guidelines apply if a proposed project causes a significant impact and requires a payment into the Traffic Impact Fee program:

Impacts in Existing plus Project Conditions

It is the project's responsibility to install the project's recommended improvements at the time of development in order to mitigate impacts to a less-than-significant level.

Impacts in Cumulative Conditions

- If the project's fair share of a cumulative impact is 25 percent or more, then the recommended improvements should be considered for installation at the time of development, subject to a reimbursement agreement. If the recommended improvement is included in the current list of Traffic Impact Fee (TIF) projects, reimbursement will be in the form of either TIF credit or payment from the TIF.
- If the project's fair share of a cumulative impact is less than 25 percent, then the project should be required to pay its fair share of the cost of the improvements to be constructed later by others. If the recommended improvement is included in the current list of TIF projects, then payment of the project's TIF fee will be considered mitigation for the impact.

Technical Analysis Parameters

This TIAR provides a "preliminary operational level" evaluation of traffic operating conditions. The following technical analysis parameters have been used for this study are presented in Table 4.

**TABLE 4
INTERSECTION TECHNICAL ANALYSIS PARAMETERS**

1	Analysis Period - 15 Minutes
2	Peak Hour Factor (PHF)- from counts for Existing conditions, 0.92 or higher for Year 2035 conditions. PHF greater than 0.92 due to Existing counts showing PHF higher.
3	% Trucks: weekday peak hour analysis - from counts
4	25 ft. assumed vehicle length for stacking and queues
5	Cycle Length - 80 sec min, 150 sec max (optimize signal timing)
6	Coordinated Cycle Length - obtained from City and Caltrans (optimize signal timing for Year 2035 conditions)
7	Total Lost Time Per Signal Phase - 4 seconds (24 sec max for 8-phase signal)
8	Pedestrian Speed - 3.5 ft/s and 10 mph for bicycles

Source: Figure 4.5 City of Redding TIA Guideline January 2009, modified as appropriate

Warrant Analysis

A supplemental traffic signal "warrant" analysis will be completed for unsignalized intersections determined to be operating at unacceptable LOS. The term "signal warrant" refers to the list of established criteria used by public agencies to quantitatively justify or ascertain the need for installation of a traffic signal at an unsignalized intersection. This study has employed the signal warrant criteria presented in the latest edition of the California Manual on Uniform Traffic Control Devices (MUTCD) for all unsignalized study intersection.

The California MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Specifically, this study utilizes the peak hour volume-based Warrant 3 as one representative type of traffic signal warrant analysis. It should be noted that the Peak Hour Volume Warrant was only applied when the intersection was found to be operating at unacceptable LOS. Therefore, there may be instances when the unsignalized intersection operates at acceptable LOS conditions but still meets the Peak Hour Volume Warrant.

Existing Conditions

The *Existing* condition is the analysis scenario in which current operations at study locations are analyzed and establishes the baseline traffic conditions.

Intersection Operations

Existing Weekday AM and PM peak hour intersection traffic operations were quantified utilizing the existing traffic volumes and existing intersection lane geometrics and control. Table 5 provides a summary of the Existing study intersections LOS.

**TABLE 5
EXISTING INTERSECTION LEVEL OF SERVICE**

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	S. Bonnyview Rd/Bechelli Lane	Signal	C	17.2	B	-	22.4	C	-
2	S. Bonnyview Rd/I-5 SB Ramps	Signal	D	28.4	C	-	27.3	C	-
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	32.5	C	-	29.8	C	-
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	17.2	B	-	22.4	C	-
5	Churn Creek Rd/Alrose Lane	TWSC	C	13.6	B	-	26.9	D	No
6	Churn Creek Rd/Hartmeyer Lane	TWSC	E	26.2	D	-	29.8	D	-
7	Churn Creek Rd/Huntington Dr	TWSC	C	24.5	C	-	21.5	C	-
8	Churn Creek Rd/Victor Ave	TWSC	C	22.8	C	-	28.0	D	No
9	Churn Creek Rd/Rancho Rd	TWSC	C	15.0	C	-	13.2	B	-
10	Rancho Rd/Alta Mesa Dr	TWSC	C	12.1	B	-	12.1	B	-
11	Rancho Rd/Shasta View Dr	TWSC	C	14.2	B	-	12.6	B	-
12	Rancho Rd/Airport Rd	Signal	C	20.1	C	-	17.6	B	-
13	Churn Creek Rd/Arizona St	TWSC	C	10.9	B	-	10.2	B	-
14	Churn Creek Rd/Hartnell Ave	Signal	C	33.1	C	-	35.9	D	-
15	Churn Creek Rd/Loma Vista Dr	Signal	C	17.7	B	-	13.0	B	-
16	Churn Creek Rd/Northern Full-Access Driveway	TWSC	C	11.6	B	-	10.6	B	-
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	14.2	B	-	17.7	C	-

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

4. Bold font denotes unacceptable LOS

As shown in Table 5, all study intersections, except the intersections listed below, are currently found to operate at or above the threshold LOS:

- Churn Creek Road & Alrose Lane
- Churn Creek Road & Victor Avenue
- Churn Creek Road & Hartnell Avenue

Queues

Tables 6A and 6B present the *Existing* queues for the S. Bonnyview Road and Churn Creek Road corridor and the intersection of Churn Creek Road and Hartnell Avenue.

**TABLE 6A
EXISTING 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
1	S. Bonnyview Rd/Bechelli Lane		--	--	--
	Eastbound Left	Signal	251	145	200
	Eastbound Thru		241	228	
	Eastbound Thru/Right		149	170	
	Westbound Left		49	43	145
	Westbound Thru		199	214	
	Westbound Right		98	51	200
	Northbound Left/Thru		69	74	
	Northbound Right		57	52	30
	Southbound Left		139	216	
	Southbound Left/Thru		87	189	
	Southbound Right		100	155	190
2	S. Bonnyview Rd/I-5 SB Ramps		--	--	--
	Eastbound Thru	Signal	255	269	250
	Eastbound Right		92	140	250
	Westbound Left		155	228	
	Westbound Thru		131	181	
	Southbound Left/Thru		113	192	175
	Southbound Right		309	253	
3	S. Bonnyview Rd/I-5 NB Ramps		--	--	--
	Eastbound Left	Signal	463	418	
	Eastbound Thru		189	216	
	Westbound Thru		164	222	
	Westbound Right		121	102	110
	Northbound Left/Thru		341	227	
	Northbound Right		87	96	285

**TABLE 6B
EXISTING 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		
			AM Peak Hour	PM Peak Hour	Available Storage
4	S. Bonnyview Rd/Churn Creek Rd		--	--	--
	Eastbound Left	Signal	168	147	130
	Eastbound Thru		76	167	
	Westbound Left		-	8	
	Westbound Thru		91	11	
	Westbound Thru/Right		161	97	
	Northbound Left/Thru		5	111	
	Northbound Right		12	25	
	Southbound Left/Thru		80	159	
	Southbound Right		99	176	
5	Churn Creek Rd/Alrose Lane		--	--	--
	Eastbound Left/Thru/Right	Signal	90	153	
	Westbound Left/Thru		-	7	
	Westbound Thru/Right		-	4	
	Northbound Left/Thru/Right		-	34	
	Southbound Left		31	37	
	Southbound Right		68	62	
14	Churn Creek Rd/Hartnell Ave		--	--	--
	Eastbound Left	Signal	166	199	110
	Eastbound Thru		207	258	
	Eastbound Right		65	64	75
	Westbound Left		237	198	175
	Westbound Thru		278	190	
	Westbound Right		111	135	145
	Northbound Left		196	155	115
	Northbound Thru		315	172	
	Northbound Thru/Right		300	174	
	Southbound Left		170	178	110
	Southbound Thru		235	340	
	Southbound Thru/Right		200	259	

Ramp Operations

Table 7 provides a summary of the *Existing* ramp merge and diverge operations.

**TABLE 7
EXISTING RAMP LEVEL OF SERVICE**

Interchange Location	Target LOS	Segment Type	No. of Lanes	AM Peak Hour			PM Peak Hour		
				Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
<i>I-5 at S Bonnyview Rd/Churn Creek Rd</i>									
I-5 NB Off Ramp	D	Diverge	1	596	16.9	B	449	13.9	B
I-5 NB On Ramp	D	Merge	1	757	18.1	B	681	17.6	B
I-5 SB Off Ramp	D	Diverge	1	592	11.1	B	634	19.0	B
I-5 SB On Ramp	D	Merge	1	405	11.4	B	653	19.4	B

As presented in Table 7, all ramps are currently operating at acceptable LOS.

Figure 4 shows the Existing conditions ramp volumes for the I-5 interchange at S. Bonnyview Road/Churn Creek Road.

Project Description

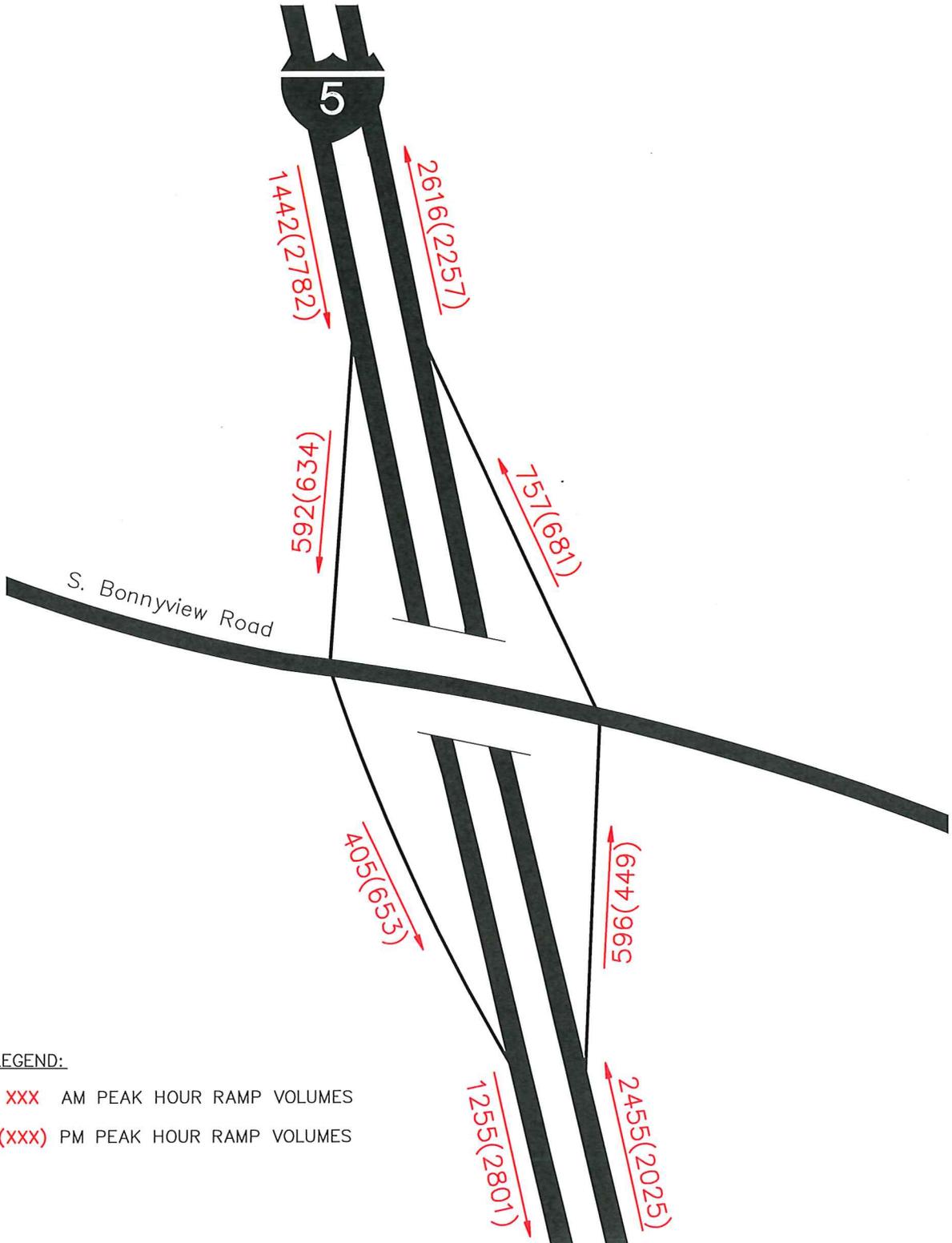
The proposed project will be completed in two phases. The term “project” for phase 1, as used in this report, refers to the development as follows:

- Location - 14 +/- acres east of Churn Creek Road, from Bonnyview Road to Arizona Street
 - East of Churn Creek Road
 - ± 76,365 sq. ft General Commercial Retail
- Access to the project will be via three proposed driveways along Churn Creek Road
 - Two full access driveways
 - One right-in-right-out (RIRO) driveway

The term “project” for phase 2, as used in this report, refers to the development as follows:

- Location - 4.25 +/- acres east and 2.6 +/- acres west of Churn Creek Road, from Bonnyview Road to Arizona Street
 - East of Churn Creek Road
 - ± 58,760 additional sq. ft General Commercial Retail
 - ± 3,000 sq. ft. Fast Food
 - ± 5,100 sq. ft. Restaurant
 - West of Churn Creek Road
 - ± 4,335 sq. ft. Fast Food
 - ± 1,850 sq. ft. Coffee Shop
- Access to the project will be via two existing driveways and two proposed driveways along Churn Creek Road
 - Two full access driveways
 - Two right-in-right-out (RIRO) driveways

Figure 5 shows the project site plan and the project access locations.



LEGEND:

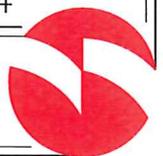
XXX AM PEAK HOUR RAMP VOLUMES

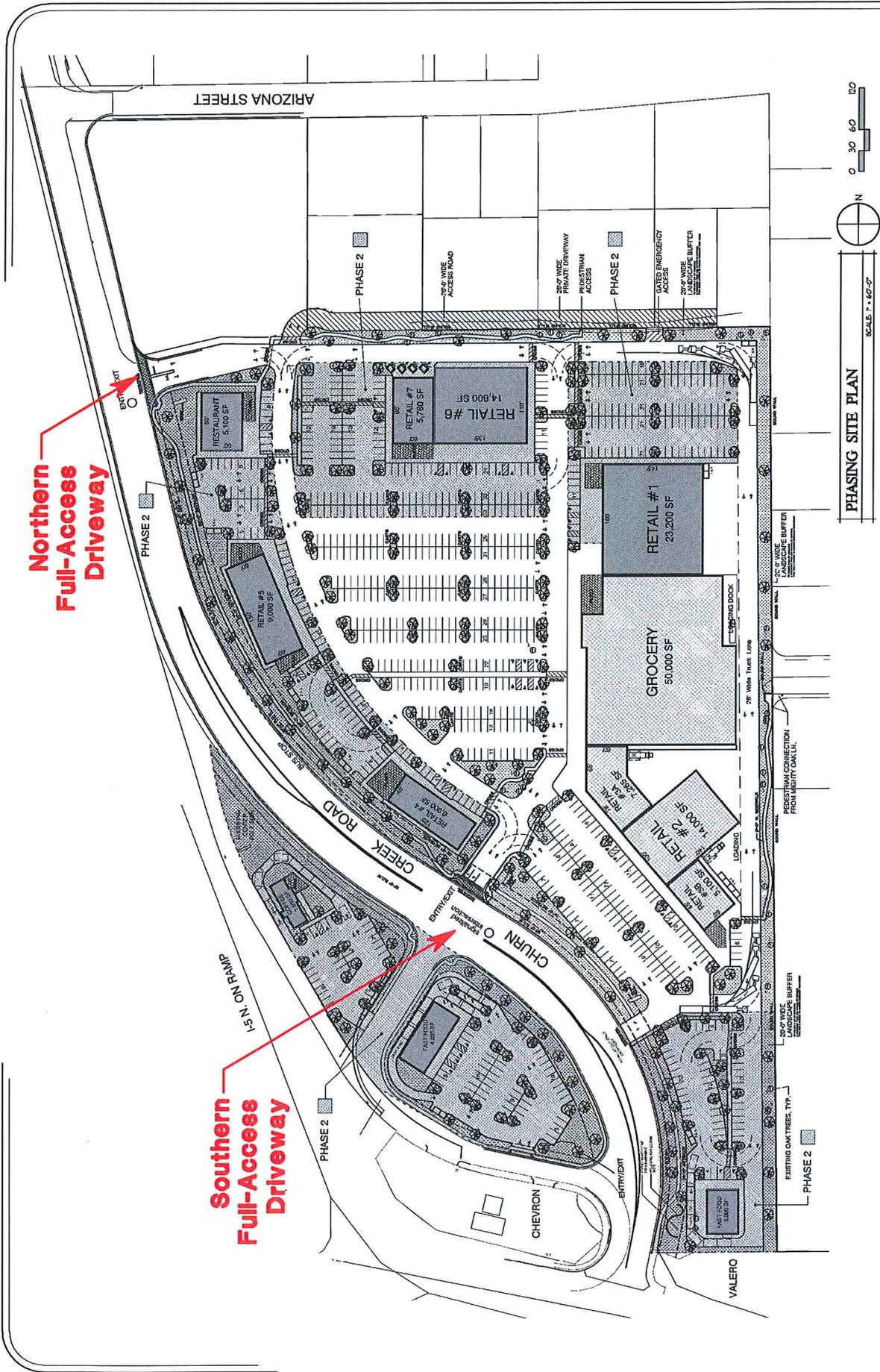
(XXX) PM PEAK HOUR RAMP VOLUMES

S. Bonnyview/Churn Creek Retail Center TIAR

Figure 4

Existing Ramp Volumes





S. Bonnyview/Churn Creek Retail Center TIAR

Project Site Plan

Figure 5



Project Trip Generation

Trip generation was developed using the Institute of Transportation Engineers *Trip Generation Manual 9th Edition*. Internal trip capture and pass by rates were used based on the *Trip Generation Handbook 3rd Edition* by the Institute of Transportation Engineers. Table 8A and 8B provides a summary of the land use, quantities, ITE land use codes, and trip generation rates for AM and PM peak hours for phase one and full buildout of the proposed project.

**TABLE 8A
PHASE ONE PROJECT TRIP GENERATION**

Land Use Category (ITE Code)	Unit ¹	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
		Total	In %	Out %	Total	In %	Out %
Shopping Center (820)	ksf	1.70	52%	48%	6.45	50%	50%
Project Name	Quantity (Units)	AM Peak Hour Trips			PM Peak Hour Trips		
Grocery, Retail	80.0	136	71	65	516	258	258
Project Trips		136	71	65	516	258	258
<i>Shopping Center Pass-by (6% for Daily and AM, 30% for PM reduction)</i>		-20	-11	-10	-155	-77	-77
Net New Trips		116	60	56	361	181	181

Notes:

1. 1 ksf = 1,000 square feet
2. Trip rates based on ITE Trip Generation Manual 9th edition fitted-curve equations

As shown in Table 8A, phase one of the proposed project is projected to generate approximately 116 AM peak hour trips and 361 PM peak hour trips.

**TABLE 8B
FULL BUILDOUT PROJECT TRIP GENERATION**

Land Use Category (ITE Code)	Unit ¹	Daily Trip Rate/Unit ²	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Shopping Center (820)	ksf	59.63	1.35	52%	48%	5.30	50%	50%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Fast-Food Restaurant w/ Drive-Thru (934)	ksf	496.12	45.42	51%	49%	32.65	52%	48%
Coffee/Donut Shop w/ Drive-Thru (937)	ksf	818.58	100.58	51%	49%	42.80	50%	50%
Project Name	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
Grocery, Retail, Pharmacy, Office, Restaurant	145.0	8,646	196	102	94	768	384	384
<i>To Fast Food</i>				-9	-13		-20	-28
<i>To Fast Food</i>				-15	-13		-34	-47
<i>To Coffee Shop</i>				-13	-13		-17	-24
Fast Food	3.0	1,488	136	69	67	98	51	47
<i>To Shopping Center</i>				-13	-9		-28	-20
<i>To Fast Food</i>				-5	-3		-4	-2
<i>To Coffee Shop</i>				-5	-3		-2	-2
Fast Food	5.0	2,481	227	116	111	163	85	78
<i>To Shopping Center</i>				-13	-15		-47	-34
<i>To Fast Food</i>				-3	-5		-2	-4
<i>To Coffee Shop</i>				-5	-5		-2	-4
Coffee Shop	2.0	1,637	201	103	99	86	43	43
<i>To Shopping Center</i>				-13	-15		-24	-17
<i>To Fast Food</i>				-3	-5		-2	-2
<i>To Fast Food</i>				-5	-5		-2	-4
Project Trips		14,252	554	288	266	743	379	364
<i>Shopping Center Pass-by (5% for Daily and AM, 30% for PM reduction)</i>		-1,297	-18	-10	-8	-180	-94	-86
<i>Fast Food Pass-by (49% reduction)</i>		-729	-48	-23	-25	-20	-8	-11
<i>Fast Food Pass-by (49% reduction)</i>		-1,215	-89	-46	-42	-34	-17	-18
<i>Coffee Shop Pass-by (49% reduction)</i>		-802	-76	-40	-36	-17	-7	-10
Net New Trips		10,208	323	169	155	493	253	240

Notes:

1. 1 ksf = 1,000 square feet

2. Trip rates based on ITE Trip Generation Manual 9th edition fitted-curve equations or average rates

As shown in Table 8B, the proposed project is projected to generate approximately 323 AM peak hour trips and 493 PM peak hour trips.

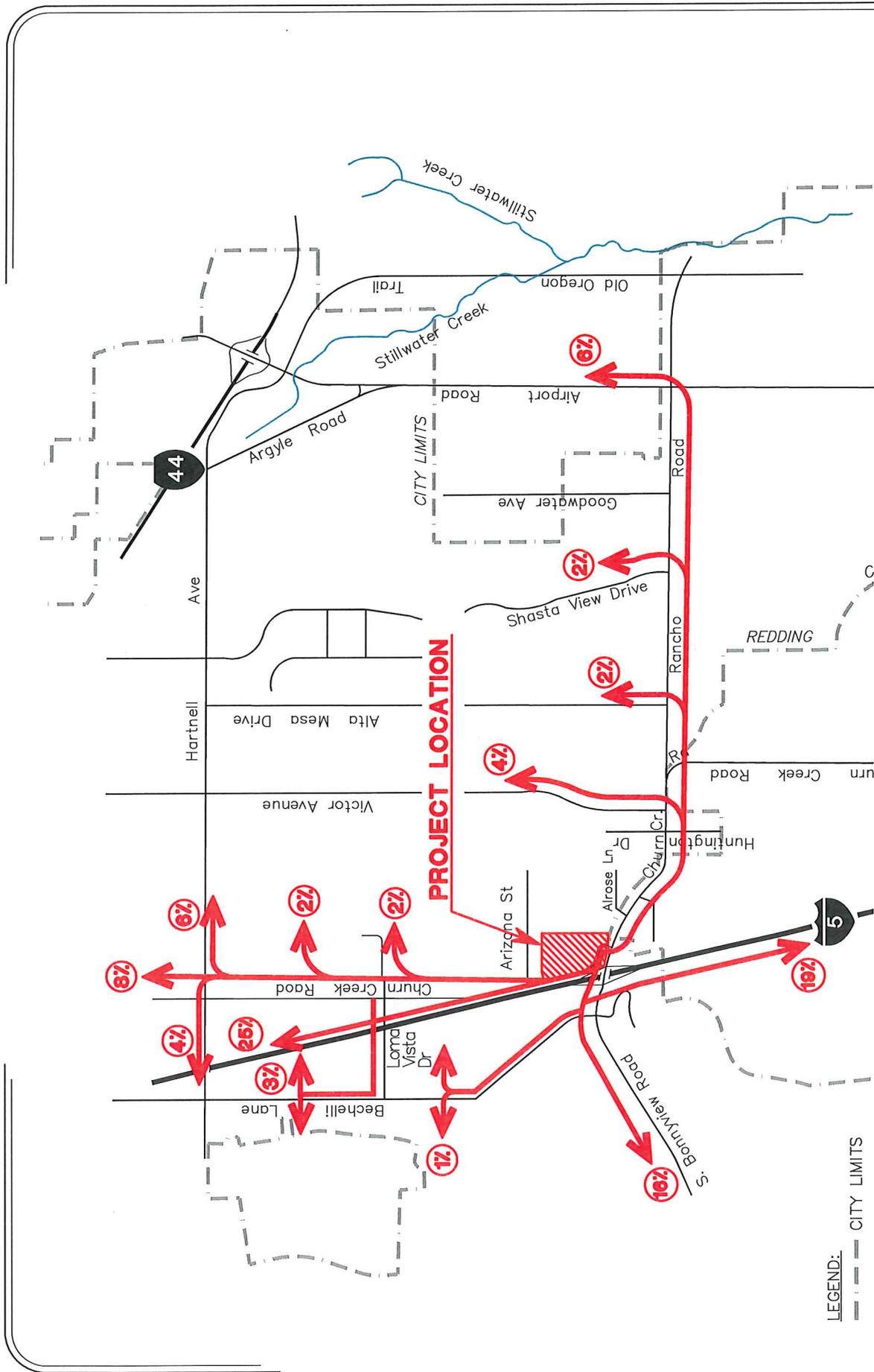
Project Access Driveways

The project site can be accessed through two full access driveways and two right-in right-out driveways off of Churn Creek Road between S. Bonnyview Road and Arizona Street. The project will construct a signal at the Southern Full-Access Driveway as part of the project. The project access driveway design will conform to City of Redding's Construction Standards.

Project Trip Distribution

Omni-Means used the Shasta County Regional Traffic Model to determine an approximate distribution of trips that can be expected from the project.

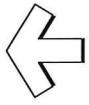
Figure 6 depicts the trip distribution based on the current roadway circulation system for the S. Bonnyview/Churn Creek Retail Center. Figures 7A and 7B show the pass-by and peak hour project only volumes for phase one and full buildout at study intersection locations for the current roadway configuration.

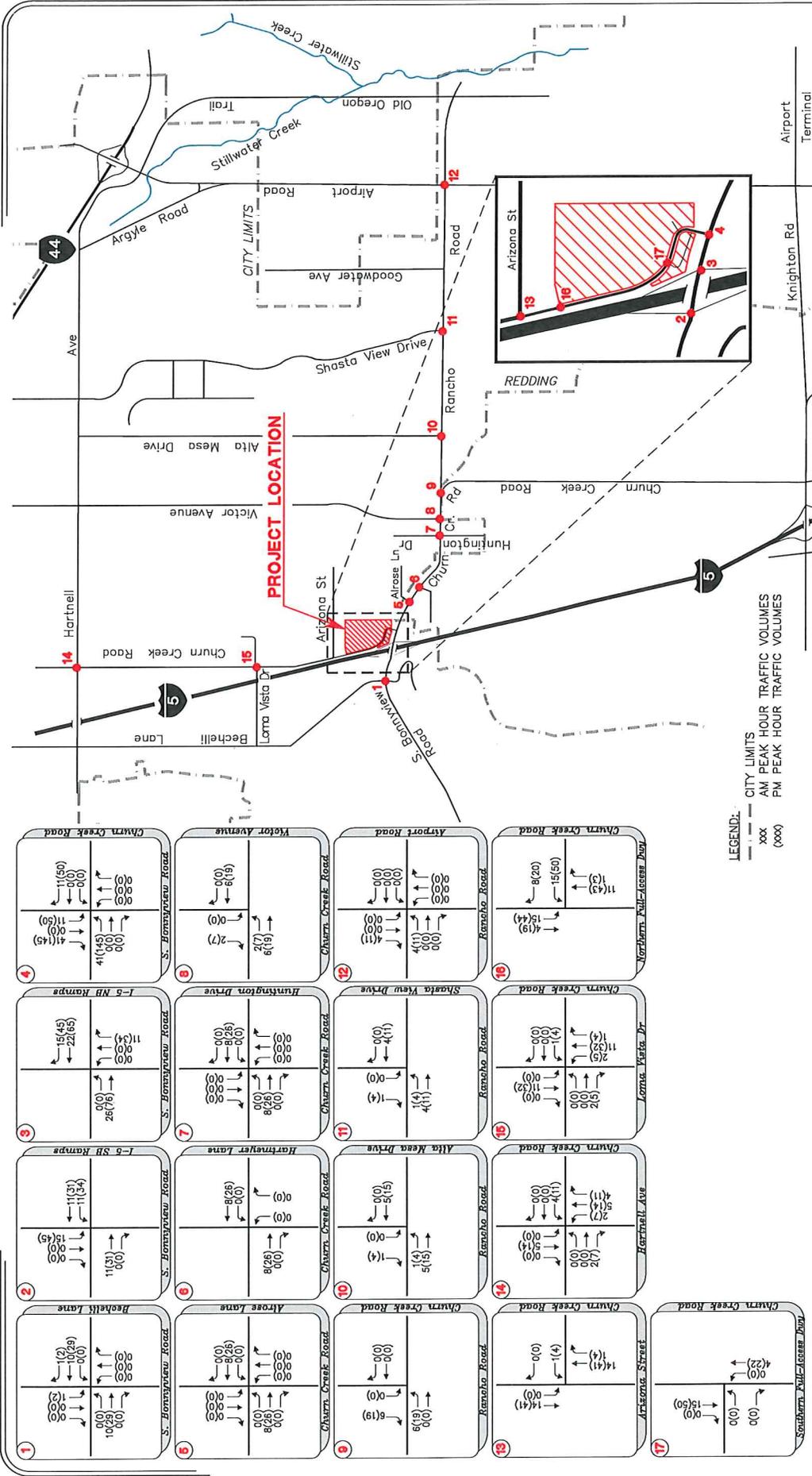


S. Bonnyview/Churn Creek Retail Center TIAR

Figure 6

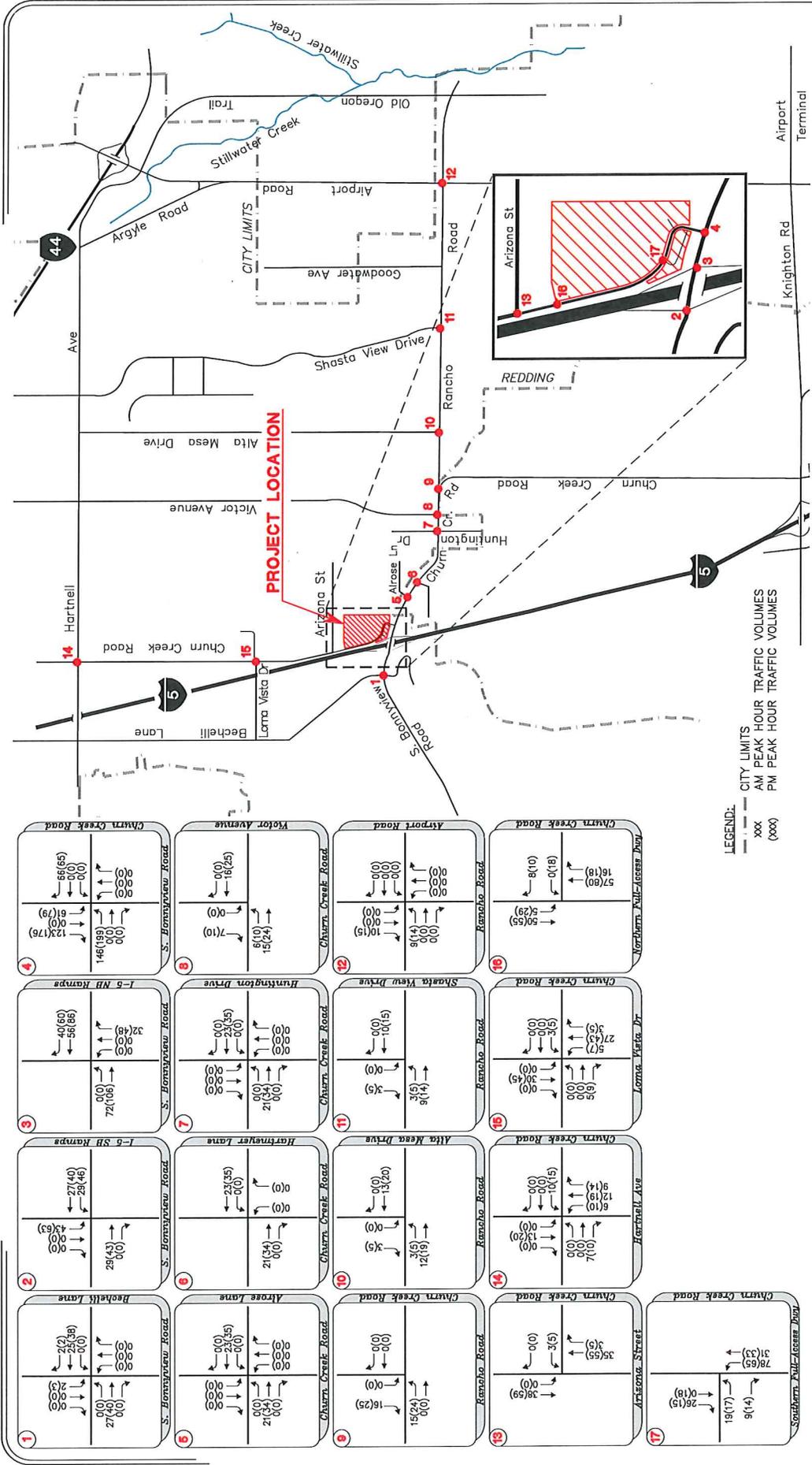
Project Trip Distribution





S. Bonnyview/Churn Creek Retail Center TIAR

Phase 1 - Project and Pass-by Peak Hour Traffic Volumes



S. Bonnyview/Churn Creek Retail Center TIAR

Phase 1 - Project and Passby Full Buildout Peak Hour Traffic Volumes

Figure 7B



Alternative Transportation Modes

Pedestrian Facilities

Churn Creek Road, from S. Bonnyview Road to Arizona Street, does not have sidewalks on the easterly side of the roadway. Sidewalks exist on the westerly side of the roadway and connect to a sidewalk network and pedestrian crossings at the S. Bonnyview Road/Churn Creek Road intersection and interchange area. Currently, pedestrian activity is very light on stated roadways due to lack of any heavy commercial or employment centers in the immediate project vicinity. With the development of the proposed project, the pedestrian traffic is expected to increase slightly due to its commercial and retail components located within close proximity to surrounding residential developments.

Off-Site

The project will add sidewalks along the easterly side segment of Churn Creek Road along the project frontage.

On-Site

Pedestrian sidewalks, crosswalks, and accessible paths of travel should be provided within the project area as follows:

- Within the developed core to allow easy access to each building, plaza and crosswalk
- Where feasible, configure sidewalks to channel pedestrians to crosswalks
- Between public streets and the developed core

Bicycle Facilities

Within the City of Redding and Shasta County the goals for bicycle and trail facilities are contained in the *Bikeway Action Plan 2010-2015* (<http://healthyshasta.org/downloads/biking/ReddingBikePlan2010.pdf>), and the *Shasta County 2010 Bicycle Transportation Plan* (http://www.co.shasta.ca.us/docs/Public_Works/docs/2010-sc-bike-plan.pdf?sfvrsn=2).

As related to the projects' study area, the plans identify the following existing and future bicycle facilities:

- Class II: Churn Creek Road from Knighton Road to SR 299 (Existing/Upgrade/Proposed)
- Class II: Rancho Road from Churn Creek Road to Venture Parkway (Upgrade/Proposed)
- Class II: S. Bonnyview Road from SR 273 to Churn Creek Road (Existing)

The California Streets and Highways Code defines the various classes of bicycle facilities as follows:

(a) Bike paths or shared use paths, also referred to as "Class I bikeways," which provide a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with cross-flows by motorists minimized.

(b) Bike lanes, also referred to as "Class II bikeways," which provide a restricted right-of-way designated for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and cross-flows by pedestrians and motorists permitted.

(c) Bike routes, also referred to as "Class III bikeways," which provide a right-of-way on-street or off-street, designated by signs or permanent markings and shared with pedestrians and motorists.

(d) Cycle tracks or separated bikeways, also referred to as "Class IV bikeways," which promote active transportation and provide a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are separated from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

Under existing conditions, the study roadways have very light bicycle use. With the development of the proposed project, the bicycle traffic is expected to increase slightly due to its commercial and retail components located within close proximity to surrounding residential developments.

Off-Site

All off-site roadway improvements should be designed to accommodate bicycle traffic consistent with City and County adopted plans.

On-Site

The implementation of the City's development standards will satisfy the transportation needs of bicyclists.

Transit Services

Existing transit service is provided primarily by the Redding Area Bus Authority (RABA). RABA provides fixed route services, express route services and demand response services to the general public within the urbanized area of the Shasta County. RABA operates 15 fixed routes within the Cities of Redding, Shasta Lake and Anderson with the route maps available at: <http://www.rabaride.com/stops.html>.

Route 4 is a north-south direction service on Churn Creek Road from the Mount Shasta Mall south along Churn Creek Road to Loma Vista and up Bechelli Lane looping back to Mount Shasta Mall. Currently, RABA does not provide service along Churn Creek Road at the project location. The nearest Route 4 bus stops are approximately 0.5 mile from the proposed project.

The proposed project is expected to generate moderate demand for transit service.

Off-Site

The project will add a bus stop along the project's frontage to accommodate future bus service.

On-Site

Accessible paths of travel should be provided between the project's buildings and public right of way.

Existing Plus Project Conditions

The *Existing Plus Project* condition is the analysis scenario in which traffic impacts associated with phase one of the proposed project are investigated in comparison to the *Existing* condition scenario.

Existing Plus Project Intersection Operations

Existing Plus Project AM and PM peak hour intersection traffic operations were quantified by superimposing traffic generated by phase one of the proposed project onto *Existing* conditions. Figure 8 (page 38) presents the *Existing Plus Project* traffic volumes. Figure 9 (page 39) presents the *Existing Plus Project* ramp volumes.

Table 9 contains a summary of the *Existing Plus Project* study intersection LOS conditions.

TABLE 9
EXISTING PLUS PROJECT INTERSECTION LEVEL OF SERVICE

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	S. Bonnyview Rd/Bechelli Lane	Signal	C	17.2	B	-	20.0	B	-
2	S. Bonnyview Rd/I-5 SB Ramps	Signal	D	30.1	C	-	30.2	C	-
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	33.8	C	-	32.9	C	-
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	18.4	B	-	26.1	C	-
5	Churn Creek Rd/Alrose Lane	TWSC	C	13.8	B	-	28.8	D	No
6	Churn Creek Rd/Hartmeyer Lane	TWSC	E	26.7	D	-	33.2	D	-
7	Churn Creek Rd/Huntington Dr	TWSC	C	25.0	C	-	23.2	C	-
8	Churn Creek Rd/Victor Ave	TWSC	C	23.6	C	-	32.2	D	Yes
9	Churn Creek Rd/Rancho Rd	TWSC	C	15.2	C	-	13.7	B	-
10	Rancho Rd/Alta Mesa Dr	TWSC	C	12.2	B	-	12.3	B	-
11	Rancho Rd/Shasta View Dr	TWSC	C	14.4	B	-	13.0	B	-
12	Rancho Rd/Airport Rd	Signal	C	20.6	C	-	18.3	B	-
13	Churn Creek Rd/Arizona St	TWSC	C	11.1	B	-	10.8	B	-
14	Churn Creek Rd/Hartnell Ave	Signal	C	33.5	C	-	37.5	D	-
15	Churn Creek Rd/Loma Vista Dr	Signal	C	17.9	B	-	13.5	B	-
16	Churn Creek Rd/Northern Full-Access Driveway	TWSC	C	12.9	B	-	17.3	C	-
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	13.8	B	-	28.0	D	Yes

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

4. Bold font denotes unacceptable LOS

As shown in Table 9, all study intersections, except the intersections listed below, are currently found to operate at or above the threshold LOS:

- Churn Creek Road/Alrose Lane
- Churn Creek Road/Huntington Drive
- Churn Creek Road/Victor Avenue
- Churn Creek Road/Hartnell Avenue
- Churn Creek Road/Southern Full-Access Driveway

Existing Plus Project Queues

Tables 10A and 10B present a comparison of the *Existing* and *Existing Plus Project* queues for the S. Bonnyview Road and Churn Creek Road corridor and the intersection of Churn Creek Road and Hartnell Avenue.

**TABLE 10A
EXISTING PLUS PROJECT 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		Existing Plus Project 95th Percentile Queue		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1	S. Bonnyview Rd/Bechelli Lane		--	--	--	--	--
	Eastbound Left	Signal	251	145	232	145	500
	Eastbound Thru		241	228	226	249	
	Eastbound Thru/Right		149	170	113	195	
	Westbound Left		49	43	49	45	145
	Westbound Thru		199	214	191	215	
	Westbound Right		98	51	97	49	200
	Northbound Left/Thru		69	74	59	64	
	Northbound Right		57	52	43	50	30
	Southbound Left		139	216	122	230	
	Southbound Left/Thru		87	189	85	196	
	Southbound Right	100	155	96	168	190	
2	S. Bonnyview Rd/I-5 SB Ramps		--	--	--	--	--
	Eastbound Thru	Signal	255	269	236	446	250
	Eastbound Right		92	140	90	185	250
	Westbound Left		155	228	160	269	
	Westbound Thru		131	181	132	150	
	Southbound Left/Thru		113	192	151	197	175
	Southbound Right		309	253	330	214	
3	S. Bonnyview Rd/I-5 NB Ramps		--	--	--	--	--
	Eastbound Left	Signal	463	418	475	402	
	Eastbound Thru		189	216	213	322	
	Westbound Thru		164	222	173	284	
	Westbound Right		121	102	128	234	110
	Northbound Left/Thru		341	227	386	221	
	Northbound Right		87	96	136	130	285

**TABLE 10B
EXISTING PLUS PROJECT 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		Existing Plus Project 95th Percentile Queue		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
4	S. Bonnyview Rd/Churn Creek Rd		--	--	--	--	--
	Eastbound Left	Signal	168	147	180	254	130
	Eastbound Thru		76	167	100	313	
	Westbound Left		-	8	-	29	
	Westbound Thru		91	11	99	10	
	Westbound Thru/Right		161	97	148	174	
	Northbound Left/Thru		5	111	4	321	
	Northbound Right		12	25	12	29	
	Southbound Left/Thru		80	159	103	171	
	Southbound Right		99	176	123	326	
5	Churn Creek Rd/Alrose Lane		--	--	--	--	--
	Eastbound Left/Thru/Right	Signal	90	153	85	261	
	Westbound Left/Thru		-	7	8	10	
	Westbound Thru/Right		-	4	-	33	
	Northbound Left/Thru/Right		-	34	-	32	
	Southbound Left		31	37	34	48	
	Southbound Right		68	62	69	67	
14	Churn Creek Rd/Hartnell Ave		--	--	--	--	--
	Eastbound Left	Signal	166	199	177	210	110
	Eastbound Thru		207	258	188	294	
	Eastbound Right		65	64	68	84	75
	Westbound Left		237	198	239	212	175
	Westbound Thru		278	190	254	196	
	Westbound Right		111	135	96	120	145
	Northbound Left		196	155	208	170	115
	Northbound Thru		315	172	354	238	
	Northbound Thru/Right		300	174	291	254	
	Southbound Left		170	178	170	183	110
	Southbound Thru		235	340	248	336	
	Southbound Thru/Right		200	259	199	267	

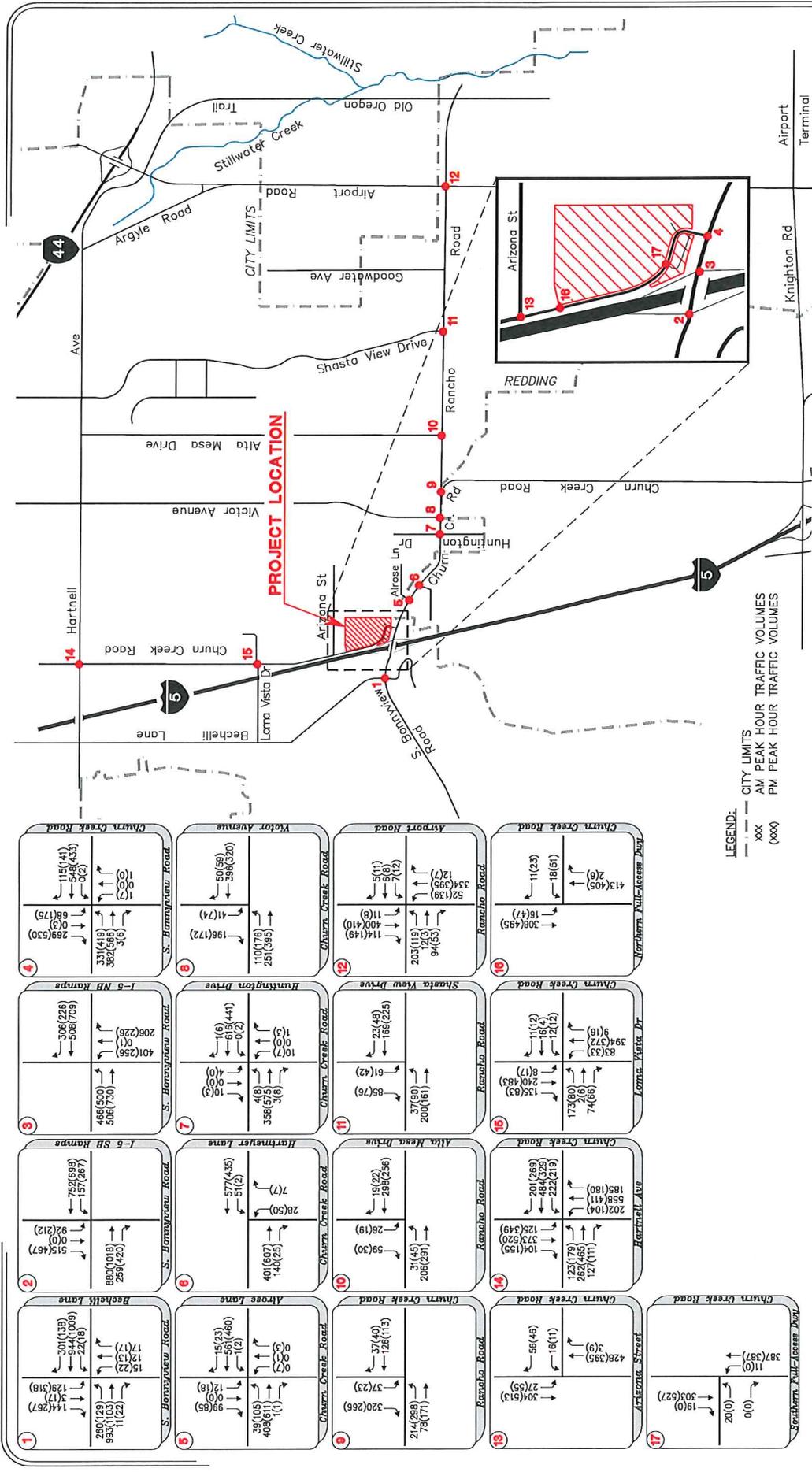
Existing Plus Project Ramp Operations

Table 11 provides a summary of the *Existing Plus Project* ramp merge and diverge operations.

TABLE 11
EXISTING PLUS PROJECT RAMPS LEVEL OF SERVICE

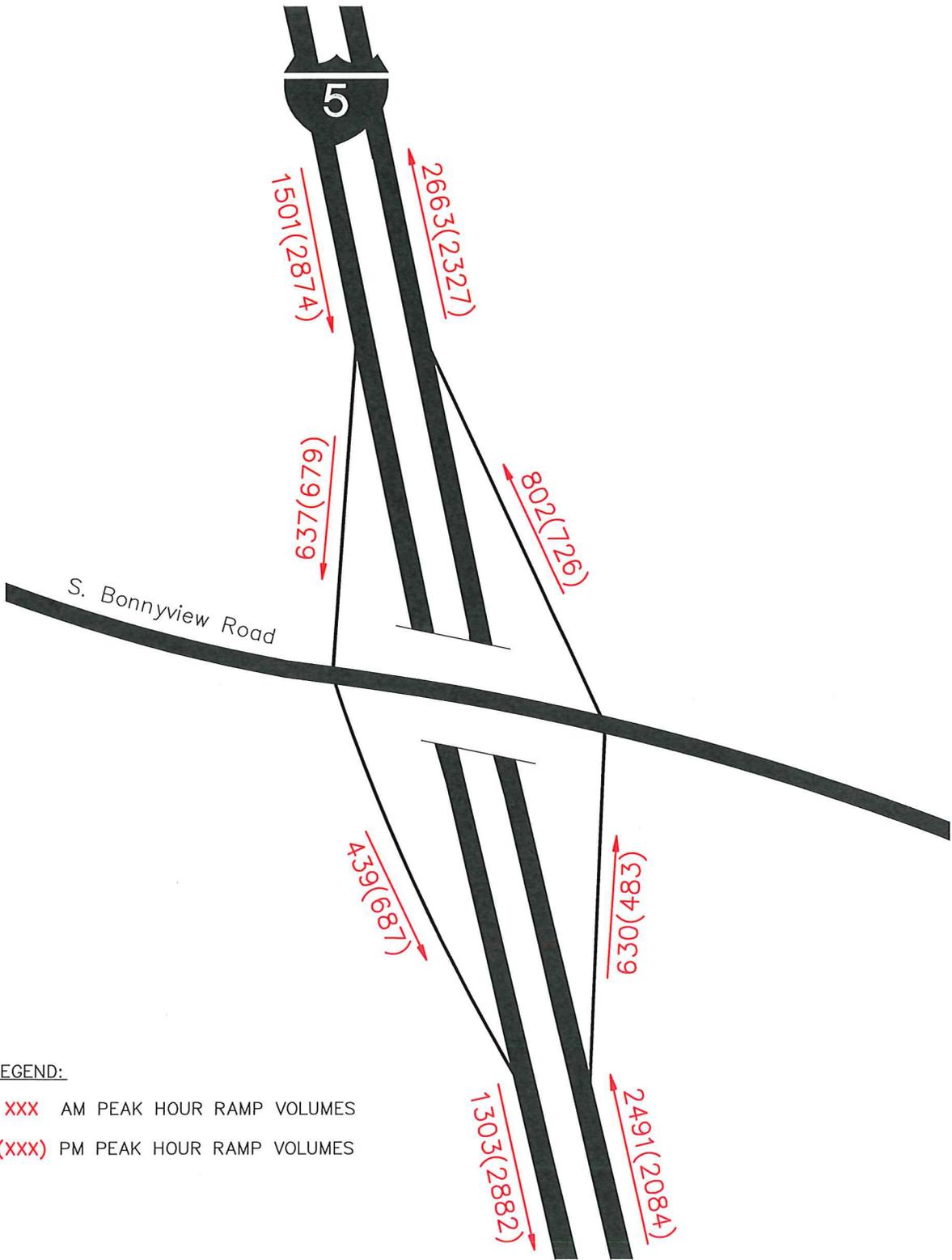
Interchange Location	Target LOS	Segment Type	No. of Lanes	AM Peak Hour			PM Peak Hour		
				Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
<i>I-5 at S Bonnyview Rd/Churn Creek Rd</i>									
I-5 NB Off Ramp	D	Diverge	1	630	17.2	B	483	14.3	B
I-5 NB On Ramp	D	Merge	1	802	18.5	B	726	15.8	B
I-5 SB Off Ramp	D	Diverge	1	637	11.6	B	679	19.7	B
I-5 SB On Ramp	D	Merge	1	439	11.8	B	687	20.0	C

As presented in Table 11, all ramps are projected to operate at acceptable LOS under *Existing Plus Project* conditions.



S. Bonnyview/Churn Creek Retail Center TIAR

Phase 1 - Existing Plus Project Peak Hour Traffic Volumes



LEGEND:

XXX AM PEAK HOUR RAMP VOLUMES

((XXX)) PM PEAK HOUR RAMP VOLUMES

S. Bonnyview/Churn Creek Retail Center TIAR

Figure 9

Existing Plus Project Ramp Volumes



Cumulative (Year 2035) Conditions

The long-term future year traffic forecasts for this study have been developed using the Shasta County Regional Travel Demand Model. Figure 10 (page 45) presents the Year 2035 lane geometrics and control. Figure 11 (page 46) presents the Year 2035 No Project intersection traffic volumes. Figure 12 (page 47) presents the Year 2035 No Project ramp volumes.

Year 2035 No Project conditions refer to a cumulative “No Project” condition where the proposed development remains undeveloped through Year 2035, and Year 2035 model land uses are assumed elsewhere.

Roadway Improvements

Shastina Ranch is an approved project that will require extension of Shasta View Drive from Rancho Road to Airport Road. Therefore, the Shasta View Drive extension is represented in the Year 2035 conditions.

Year 2035 No Project Conditions

The Year 2035 No Project condition is the analysis scenario in which future operations at study locations, assuming no project development, are analyzed.

Year 2035 No Project Intersection Operations

Table 12 contains a summary of the Year 2035 No Project study intersection LOS conditions.

TABLE 12
YEAR 2035 NO PROJECT ROADWAY LEVEL OF SERVICE

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	S. Bonnyview Rd/Bechelli Lane	Signal	C	20.4	C	-	27.1	C	-
2	S. Bonnyview Rd/I-5 SB Ramps	Signal	D	22.8	C	-	28.1	C	-
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	42.1	D	-	32.1	C	-
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	19.9	B	-	21.7	C	-
5	Churn Creek Rd/Alrose Lane	TWSC	C	16.7	C	-	44.4	E	Yes
6	Churn Creek Rd/Hartmeyer Lane	TWSC	E	41.4	E	-	47.9	E	-
7	Churn Creek Rd/Huntington Dr	TWSC	C	31.4	D	No	27.4	D	No
8	Churn Creek Rd/Victor Ave	TWSC	C	35.9	E	Yes	133.0	F	Yes
9	Churn Creek Rd/Rancho Rd	TWSC	C	22.2	C	-	29.9	D	Yes
10	Rancho Rd/Alta Mesa Dr	TWSC	C	14.9	B	-	14.3	B	-
11	Rancho Rd/Shasta View Dr	TWSC	C	32.2	D	No	40.3	E	No
12	Rancho Rd/Airport Rd	Signal	C	19.3	B	-	19.8	B	-
13	Churn Creek Rd/Arizona St	TWSC	C	12.4	B	-	11.0	B	-
14	Churn Creek Rd/Hartnell Ave	Signal	C	40.6	D	-	51.5	D	-
15	Churn Creek Rd/Loma Vista Dr	Signal	C	18.2	B	-	15.5	B	-
16	Churn Creek Rd/Northern Full-Access Driveway	TWSC	C	12.9	B	-	13.7	B	-
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	17.9	C	-	28.5	D	No

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

4. Bold font denotes unacceptable LOS

As shown in Table 12, all study intersections, except the intersections listed below, are projected to operate at or above the threshold LOS:

- Churn Creek Road/Alrose Lane
- Churn Creek Road/Hartmeyer Lane
- Churn Creek Road/Huntington Drive
- Churn Creek Road/Victor Avenue
- Churn Creek Road/Rancho Road
- Rancho Road/Shasta View Drive
- Churn Creek Road/Hartnell Avenue
- Churn Creek Road/Southern Full-Access Driveway

Year 2035 No Project Queues

Tables 13A and 13B present the *Cumulative* queues for the S. Bonnyview Road and Churn Creek Road corridor and the intersection of Churn Creek Road and Hartnell Avenue.

TABLE 13A
YEAR 2035 NO PROJECT 95TH PERCENTILE QUEUE LENGTH

Int. #	Intersection/Approach	Control Type	Cumulative 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
1	S. Bonnyview Rd/Bechelli Lane		--	--	--
	Eastbound Left	Signal	153	305	500
	Eastbound Thru		257	435	
	Eastbound Thru/Right		238	328	
	Westbound Left		69	59	145
	Westbound Thru		270	266	
	Westbound Right		45	122	200
	Northbound Left/Thru		95	71	
	Northbound Right		64	59	30
	Southbound Left		281	148	
	Southbound Left/Thru		267	94	
	Southbound Right		200	112	190
2	S. Bonnyview Rd/I-5 SB Ramps			--	--
	Eastbound Thru	Signal	545	624	250
	Eastbound Right		303	144	250
	Westbound Left		255	198	
	Westbound Thru		118	116	
	Southbound Left/Thru		239	239	175
	Southbound Right		275	458	
3	S. Bonnyview Rd/I-5 NB Ramps		--	--	--
	Eastbound Left	Signal	451	451	
	Eastbound Thru		237	246	
	Westbound Thru		268	261	
	Westbound Right		191	244	110
	Northbound Left/Thru		278	433	
	Northbound Right		109	133	285

**TABLE 13B
YEAR 2035 NO PROJECT 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Cumulative 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
4	S. Bonnyview Rd/Churn Creek Rd		--	--	--
	Eastbound Left	Signal	172	224	130
	Eastbound Thru		201	230	
	Eastbound Right		5	11	
	Westbound Left		15	29	
	Westbound Thru		168	144	
	Westbound Thru/Right		175	236	
	Northbound Left/Thru		39	33	
	Northbound Right		21	18	
	Southbound Left/Thru		181	122	
	Southbound Right		204	171	
5	Churn Creek Rd/Alrose Lane		--	--	--
	Eastbound Left/Thru/Right	Signal	202	140	
	Westbound Left/Thru		20	11	
	Westbound Thru/Right		5	8	
	Northbound Left/Thru/Right		50	-	
	Southbound Left		49	38	
	Southbound Right		68	6	
14	Churn Creek Rd/Hartnell Ave		--	--	--
	Eastbound Left	Signal	205	175	110
	Eastbound Thru		302	216	
	Eastbound Right		152	73	75
	Westbound Left		276	249	175
	Westbound Thru		378	285	
	Westbound Right		131	110	145
	Northbound Left		198	187	115
	Northbound Thru		298	334	
	Northbound Thru/Right		272	336	
	Southbound Left		160	182	110
	Southbound Thru		302	289	
	Southbound Thru/Right		330	233	

Year 2035 No Project Ramp Operations

Table 14 provides a summary of the *Year 2035 No Project* ramp merge and diverge operations.

TABLE 14
YEAR 2035 NO PROJECT RAMPS LEVEL OF SERVICE

Interchange Location	Target LOS	Segment Type	No. of Lanes	AM Peak Hour			PM Peak Hour		
				Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
<i>I-5 at S Bonnyview Rd/Churn Creek Rd</i>									
I-5 NB Off Ramp	D	Diverge	1	800	23.2	C	510	18.7	B
I-5 NB On Ramp	D	Merge	1	925	23.5	C	820	20.2	C
I-5 SB Off Ramp	D	Diverge	1	715	14.7	B	735	25.1	C
I-5 SB On Ramp	D	Merge	1	475	13.8	B	830	26.0	C

As presented in Table 14, all ramps are projected to operate at acceptable LOS under *Year 2035 No Project* conditions.

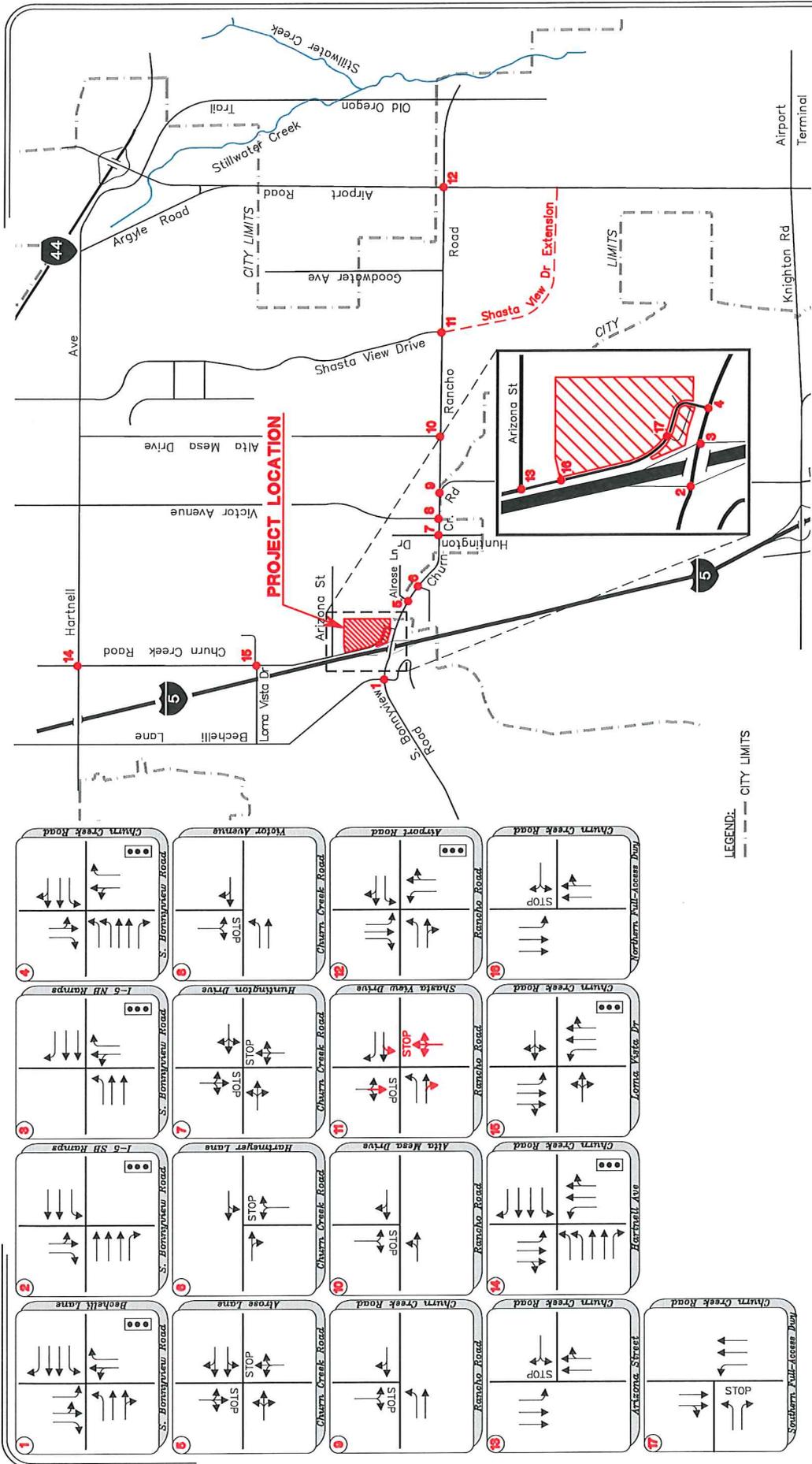
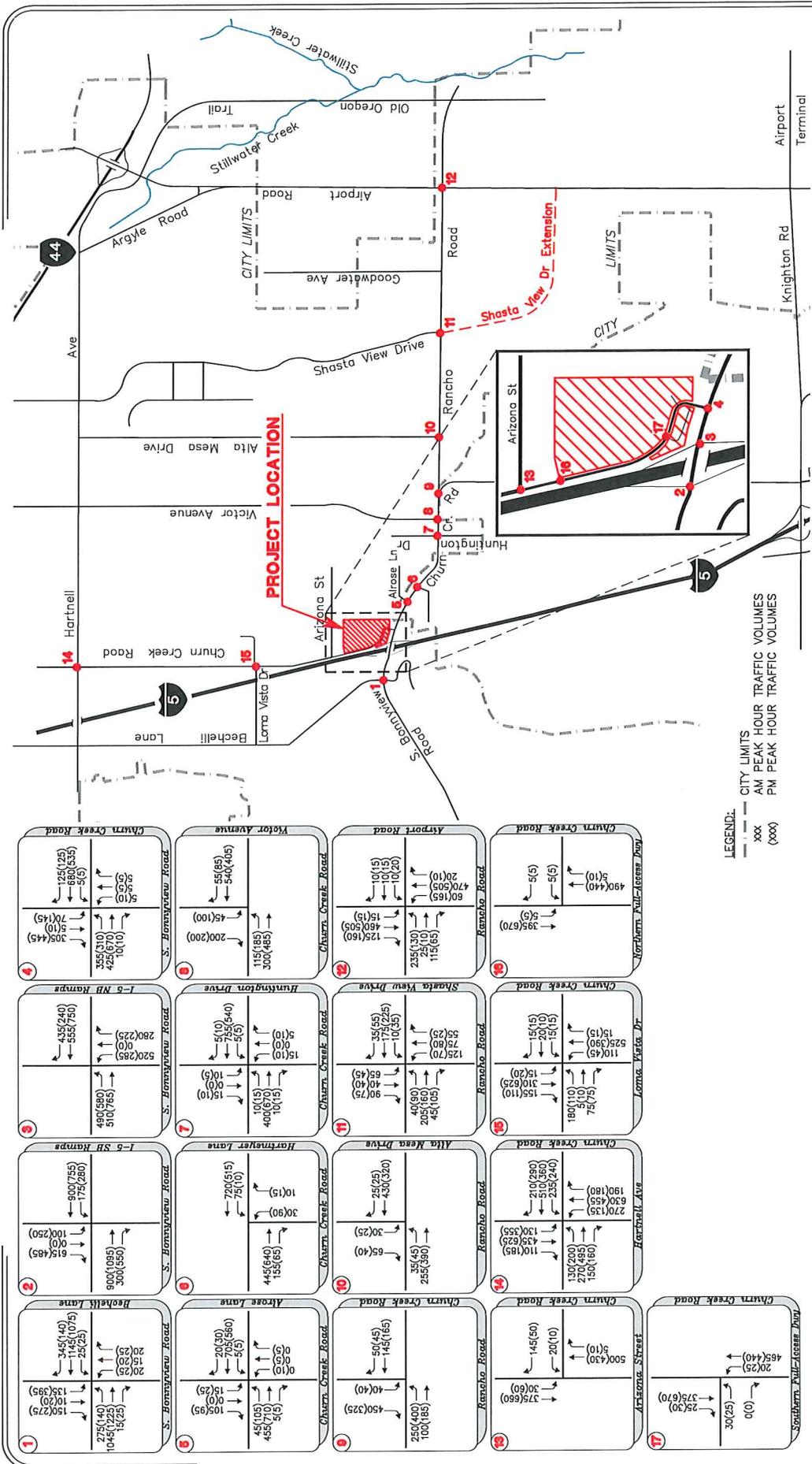


Figure 10



S. Bonnyview/Churn Creek Retail Center TIAR
 Year 2035 Lane Geometrics and Control

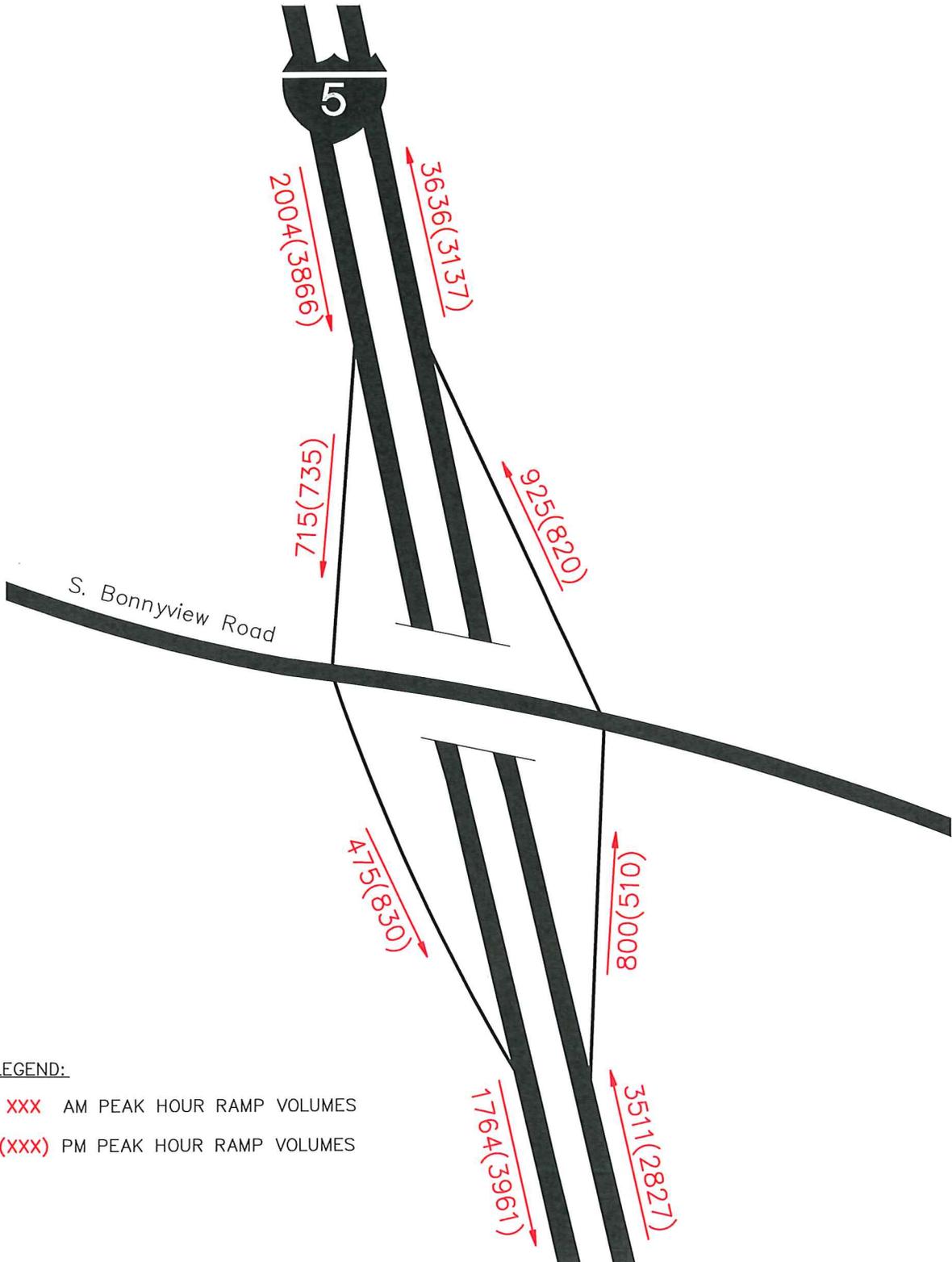


S. Bonnyview/Churn Creek Retail Center TIAR

Year 2035 Peak Hour Traffic Volumes

Figure 11





LEGEND:

XXX AM PEAK HOUR RAMP VOLUMES

(XXX) PM PEAK HOUR RAMP VOLUMES

S. Bonnyview/Churn Creek Retail Center TIAR

Figure 12

Year 2035 No Project Ramp Volumes



Year 2035 Plus Project Conditions

Year 2035 Plus Project conditions were simulated by superimposing traffic generated by full buildout of the proposed project onto Year 2035 No Project traffic volumes. Figure 13 (page 52) presents the Year 2035 Plus Project traffic volumes. Figure 14 (page 53) presents the Year 2035 Plus Project ramp volumes.

Year 2035 Plus Project Intersection Operations

Table 15 contains a summary of the Year 2035 Plus Project study intersection LOS conditions.

TABLE 15
YEAR 2035 PLUS PROJECT INTERSECTION LEVEL OF SERVICE

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	S. Bonnyview Rd/Bechelli Lane	Signal	C	21.3	C	-	27.1	C	-
2	S. Bonnyview Rd/I-5 SB Ramps	Signal	D	33.5	C	-	39.5	D	-
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	45.4	D	-	34.4	C	-
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	28.7	C	-	36.0	D	-
5	Churn Creek Rd/Alrose Lane	TWSC	C	17.3	C	-	49.6	E	Yes
6	Churn Creek Rd/Hartmeyer Lane	TWSC	E	45.8	E	-	58.9	F	No
7	Churn Creek Rd/Huntington Dr	TWSC	C	33.5	D	No	32.1	D	No
8	Churn Creek Rd/Victor Ave	TWSC	C	41.3	E	Yes	178.7	F	Yes
9	Churn Creek Rd/Rancho Rd	TWSC	C	24.1	C	-	36.5	E	Yes
10	Rancho Rd/Alta Mesa Dr	TWSC	C	15.3	C	-	14.8	B	-
11	Rancho Rd/Shasta View Dr	TWSC	C	35.9	E	No	54.6	F	No
12	Rancho Rd/Airport Rd	Signal	C	19.5	B	-	21.0	C	-
13	Churn Creek Rd/Arizona St	TWSC	C	13.0	B	-	11.9	B	-
14	Churn Creek Rd/Hartnell Ave	Signal	C	42.4	D	-	53.9	D	-
15	Churn Creek Rd/Loma Vista Dr	Signal	C	18.7	B	-	16.8	B	-
16	Churn Creek Rd/Northern Full-Access Driveway	TWSC	C	12.6	B	-	19.1	C	-
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	62.7	F	-	OVR	F	Yes

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

4. Bold font denotes unacceptable LOS

As shown in Table 15, all study intersections, except the intersections listed below, are projected to operate at or above the threshold LOS:

- S Bonnyview Road/Churn Creek Road
- Churn Creek Road/Alrose Lane
- Churn Creek Road/Huntington Drive
- Churn Creek Road/Victor Avenue
- Churn Creek Road/Rancho Road
- Rancho Road/Shasta View Drive
- Churn Creek Road/Hartnell Avenue
- Churn Creek Road/Southern Full-Access Driveway

Year 2035 Plus Project Queues

Tables 16A and 16B present a comparison of the *Cumulative* and *Cumulative Plus Project* queues for the S. Bonnyview Road and Churn Creek Road corridor and the intersection of Churn Creek Road and Hartnell Avenue.

**TABLE 16A
YEAR 2035 PLUS PROJECT 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Cumulative 95th Percentile Queue (ft)		Cumulative Plus Project 95th Percentile Queue		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1	S. Bonnyview Rd/Bechelli Lane		--	--	--	--	--
	Eastbound Left	Signal	153	305	266	436	500
	Eastbound Thru		257	435	285	677	
	Eastbound Thru/Right		238	328	153	676	
	Westbound Left		69	59	52	94	145
	Westbound Thru		270	266	255	280	
	Westbound Right		45	122	115	59	200
	Northbound Left/Thru		95	71	65	92	
	Northbound Right		64	59	50	70	30
	Southbound Left		281	148	148	410	
	Southbound Left/Thru		267	94	119	421	
	Southbound Right		200	112	132	235	190
2	S. Bonnyview Rd/I-5 SB Ramps			--	--	--	--
	Eastbound Thru	Signal	545	624	605	890	250
	Eastbound Right		303	144	113	497	250
	Westbound Left		255	198	272	425	
	Westbound Thru		118	116	325	229	
	Southbound Left/Thru		239	239	313	477	175
	Southbound Right		275	458	441	581	
3	S. Bonnyview Rd/I-5 NB Ramps		--	--	--	--	--
	Eastbound Left	Signal	451	451	475	457	
	Eastbound Thru		237	246	246	481	
	Westbound Thru		268	261	288	282	
	Westbound Right		191	244	257	255	110
	Northbound Left/Thru		278	433	502	341	
	Northbound Right		109	133	356	319	285

**TABLE 16B
YEAR 2035 PLUS PROJECT 95TH PERCENTILE QUEUE LENGTH**

Int. #	Intersection/Approach	Control Type	Cumulative 95th Percentile Queue (ft)		Cumulative Plus Project 95th Percentile Queue		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
4	S. Bonnyview Rd/Churn Creek Rd		--	--	--	--	--
	Eastbound Left	Signal	172	224	244	277	130
	Eastbound Thru		201	230	277	338	
	Eastbound Right		5	11	9	13	
	Westbound Left		15	29	25	27	
	Westbound Thru		168	144	197	319	
	Westbound Thru/Right		175	236	386	341	
	Northbound Left/Thru		39	33	26	49	
	Northbound Right		21	18	21	26	
	Southbound Left/Thru		181	122	180	391	
	Southbound Right		204	171	286	484	
5	Churn Creek Rd/Alrose Lane		--	--	--	--	--
	Eastbound Left/Thru/Right	Signal	202	140	212	316	
	Westbound Left/Thru		20	11	642	49	
	Westbound Thru/Right		5	8	642	34	
	Northbound Left/Thru/Right		-	-	-	45	
	Southbound Left		49	38	141	77	
	Southbound Right		68	6	141	77	
14	Churn Creek Rd/Hartnell Ave		--	--	--	--	--
	Eastbound Left	Signal	205	175	174	213	110
	Eastbound Thru		302	216	206	306	
	Eastbound Right		152	73	71	136	75
	Westbound Left		276	249	252	283	175
	Westbound Thru		378	285	289	397	
	Westbound Right		131	110	100	137	145
	Northbound Left		198	187	193	201	115
	Northbound Thru		298	334	502	332	
	Northbound Thru/Right		272	336	417	308	
	Southbound Left		160	182	180	160	110
	Southbound Thru		302	289	274	300	
	Southbound Thru/Right		330	233	233	337	

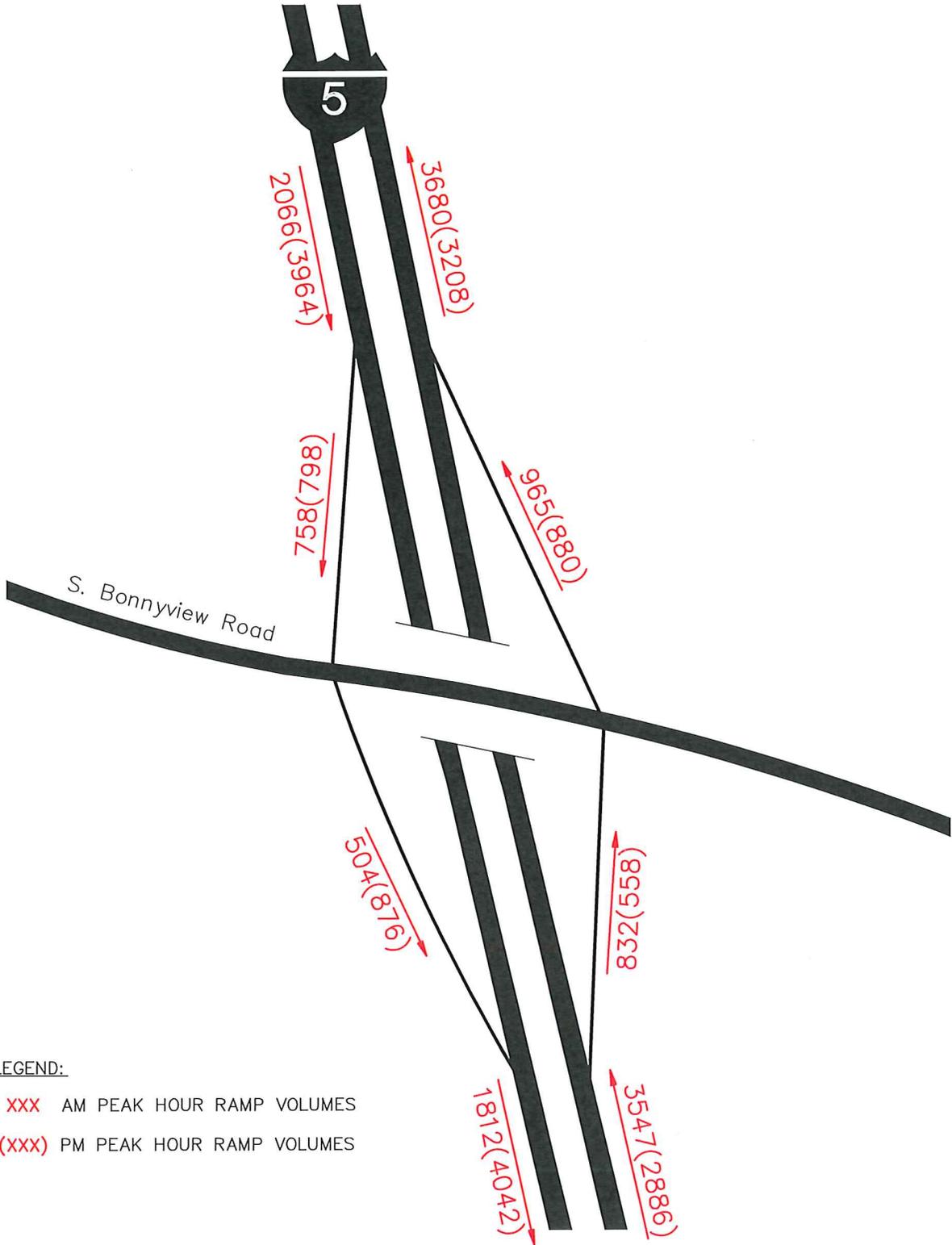
Year 2035 Plus Project Ramp Operations

Table 17 provides a summary of the *Year 2035 Plus Project* ramp merge and diverge operations.

TABLE 17
YEAR 2035 PLUS PROJECT RAMPS LEVEL OF SERVICE

Interchange Location	Target LOS	Segment Type	No. of Lanes	AM Peak Hour			PM Peak Hour		
				Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
<i>I-5 at S Bonnyview Rd/Churn Creek Rd</i>									
I-5 NB Off Ramp	D	Diverge	1	832	23.4	C	558	19.2	B
I-5 NB On Ramp	D	Merge	1	965	23.8	C	880	20.7	C
I-5 SB Off Ramp	D	Diverge	1	758	15.2	B	798	25.7	C
I-5 SB On Ramp	D	Merge	1	504	14.1	B	876	26.5	C

As presented in Table 17, all ramps are projected to operate at acceptable LOS under *Year 2035 Plus Project* conditions.



S. Bonnyview/Churn Creek Retail Center TIAR

Figure 14

Year 2035 Plus Project Ramp Volumes



Recommended Improvements & CEQA Mitigation Measures

This section presents recommended improvements and project-related mitigation measures at the study intersections, developed based on the findings from the analyses presented in the prior sections of this report. The mitigations are provided for both *Existing Plus Project Conditions* and *Year 2035 Plus Project Conditions* separately, so it may be possible that the same mitigations at one location are applicable in both conditions.

Impact Significance Criteria

In accordance with the January 2009 City of Redding TIA Guidelines, the following thresholds of significance are used to determine if the proposed project causes a significant impact and requires mitigation:

Signalized Intersections

- The project causes an acceptable LOS to decline to an unacceptable LOS, or
- The project increases the overall average delay by more than 5 seconds per vehicle at an intersection having an unacceptable LOS without project traffic

Two-Way Stop Intersections

- The project causes the following to occur for the worst-case movement:
 - The LOS declines to an unacceptable LOS, and
 - The volume to capacity ratio exceeds 0.75, and
 - The 95th percentile queue exceeds 75 feet (3 vehicles), or
- The project causes the worst-case movement's acceptable LOS to decline to an unacceptable LOS and the peak hour volume signal warrant is met, or
- The project increases the average delay for the worst-case movement by more than 5 seconds per vehicle at an intersection that has an unacceptable LOS without the project and the intersection also meets the peak hour volume signal warrant

Existing Plus Project Impacts

Table 18 presents the intersections projected to operate at below target levels of service under *Existing Plus Project* conditions.

**TABLE 18
EXISTING PLUS PROJECT SIGNIFICANT IMPACTS**

PM Peak Hour												
#	Intersection	Control Type ¹	Target LOS	Existing Plus Project		Existing Plus Project		Delay Increase (D2-D1)	Signal Warrant Met?	V/C ⁴	95% Queue (veh) ³	Significant Impact?
				Existing LOS ²	Project LOS ²	Existing Delay (D1)	Project Delay (D2)					
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	C	C	29.8	32.9	3.1	-	0.77	9	Yes
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	C	C	22.4	26.1	3.7	-	0.52	11	Yes
5	Churn Creek Rd/Alrose Lane	TWSC	C	D	D	26.9	28.8	1.9	No	0.19	1	No
8	Churn Creek Rd/Victor Ave	TWSC	C	D	D	28.0	32.2	4.2	Yes	0.68	5	No
14	Churn Creek Rd/Hartnell Ave	Signal	C	D	D	35.9	37.5	1.6	-	0.90		No
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	C	D	17.7	28.0	10.3	Yes	0.55	3	Yes

Notes:

1. TWSC = Two Way Stop Control; OVR = >300 Seconds Delay
2. LOS = Delay based on worst minor street movement for TWSC intersections; average delay for AWSC and Signal intersections
3. V/C and 95% Queue not reported if not required to determine significance
4. Addition of project traffic results in significant queue spillback. Specifically for Intersection 3 the spillback is for westbound right and for Intersection 4 the spillback is for eastbound left.

Existing Plus Project: Improvements and Mitigation Measures

The following improvements are proposed to provide acceptable operations at intersections where a project's significant impact is identified.

Intersection 3 - S. Bonnyview Road & I-5 Northbound Ramps (CEQA Mitigation Required)

This intersection is projected to experience unacceptable queues in the westbound direction (right turn). The project creates a significant impact at this intersection due to the projected westbound right queue increase (from approximately 4 vehicles to 9 vehicles). The available storage is for 4 vehicles. The following improvements are proposed to mitigate the project impact to less than significant:

- Construct an additional eastbound left turn lane
- Widen Northbound on-ramp to accommodate dual left turns from eastbound S. Bonnyview Rd.

Intersection 4 - S. Bonnyview Road & Churn Creek Road (CEQA Mitigation Required)

This intersection is projected to experience unacceptable queues in the eastbound direction (left turn). The project creates a significant impact at this intersection due to the projected eastbound left queue increase (from approximately 6 vehicles to 10 vehicles). The available storage is for 5 vehicles. The following improvements are proposed to mitigate the project impact to less than significant:

- Provided permitted-overlap phasing for the southbound right turn movement

Intersection 5 - Churn Creek Road & Alrose Lane (No Significant Impact)

This intersection is projected to operate at LOS D in the PM peak hour. The proposed project does not create a significant impact as the delay increase due to the project is less than 5 seconds at an unsignalized intersection that operates at unacceptable LOS in the “no project” condition. The following improvement will yield acceptable operations:

- Extend the current two-way left turn lane in the eastbound direction

Intersection 14 - Churn Creek Road & Hartnell Avenue (No Significant Impact)

This intersection is projected to operate at LOS D during the PM peak hour. The proposed project does not create a significant impact as the project does not increase the delay by more than 5 seconds per vehicle at an intersection operating at unacceptable LOS in the “no project” condition. The following improvement will yield acceptable operations:

- Construct an additional southbound left turn pocket

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway (CEQA Mitigation Required)

This intersection is projected to operate at LOS D during the PM peak hour. The proposed project creates a significant impact during the PM peak hour by increasing the delay from acceptable to unacceptable operations. The following improvement is proposed to mitigate the project impact to less than significant:

- Construct a traffic signal

Year 2035 Plus Project Impacts

Table 19 presents the intersections projected to operate below target levels of service under Year 2035 Plus Project conditions.

**TABLE 19
YEAR 2035 PLUS PROJECT SIGNIFICANT IMPACTS**

#	Intersection	Control Type ¹	Target LOS	Year 2035		Year 2035 Plus Project		Delay Increase (D2-D1)	Signal Warrant Met?	V/C ³	95% Queue (veh) ³	Significant Impact?
				Year 2035 LOS ²	Year 2035 Project LOS ²	Year 2035 Delay (D1)	Year 2035 Plus Project Delay (D2)					
7	Churn Creek Rd/Huntington Dr	TWSC	C	D	D	31.4	33.5	2.1	No	0.15	1	No
8	Churn Creek Rd/Victor Ave	TWSC	C	E	E	35.9	41.3	5.4	Yes	0.77	6	Yes
11	Rancho Rd/Shasta View Dr	TWSC	C	D	E	32.2	35.9	3.7	No	0.73	6	No
14	Churn Creek Rd/Hartnell Ave	Signal	C	D	D	40.6	42.4	1.8	-	-	-	No
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	C	F	17.9	62.7	44.8	-	0.74	5	Yes

PM Peak Hour												
#	Intersection	Control Type ¹	Target LOS	Year 2035		Year 2035 Plus Project		Delay Increase (D2-D1)	Signal Warrant Met?	V/C ³	95% Queue (veh) ³	Significant Impact?
				Year 2035 LOS ²	Year 2035 Project LOS ²	Year 2035 Delay (D1)	Year 2035 Plus Project Delay (D2)					
2	S. Bonnyview Rd/I-5 SB Ramps	Signal	D	C	D	28.1	39.5	11.4	-	-	20	Yes
3	S. Bonnyview Rd/I-5 NB Ramps	Signal	D	C	C	32.1	34.4	2.3	-	-	13	Yes
4	S. Bonnyview Rd/Churn Creek Rd	Signal	C	C	D	21.7	36.0	14.3	-	-	-	Yes
5	Churn Creek Rd/Alrose Lane	TWSC	C	E	E	44.4	49.6	5.2	Yes	0.50	2	Yes
6	Churn Creek Rd/Hartmeyer Lane	TWSC	E	E	F	47.9	58.9	11.0	No	0.44	2	Yes
7	Churn Creek Rd/Huntington Dr	TWSC	C	D	D	27.4	32.1	4.7	No	0.14	1	No
8	Churn Creek Rd/Victor Ave	TWSC	C	F	F	133.0	178.7	45.7	Yes	1.25	16	Yes
9	Churn Creek Rd/Rancho Rd	TWSC	C	D	E	29.9	36.5	6.6	Yes	0.82	8	Yes
11	Rancho Rd/Shasta View Dr	TWSC	C	E	F	40.3	54.6	14.3	No	0.76	6	No
14	Churn Creek Rd/Hartnell Ave	Signal	C	D	D	51.5	53.9	2.4	-	-	-	No
17	Churn Creek Rd/Southern Full-Access Driveway	TWSC	C	D	F	28.5	OVR	OVR	Yes	2.98	21	Yes

Notes:

1. TWSC = Two Way Stop Control; OVR = > 300 Seconds Delay
2. LOS = Delay based on worst minor street movement for TWSC intersections; average delay for AWSC and Signal intersections
3. V/C and 95% Queue not reported if not required to determine significance

The following improvements are proposed to provide acceptable operations at intersections where a project significant impact is identified.

Intersection 2 - S. Bonnyview Road & I-5 Southbound Ramps (CEQA Mitigation Required)

This intersection is projected to experience unacceptable queues in the eastbound direction (right turn). The project creates a significant impact at this intersection due to the projected eastbound right queue increase (from approximately 12 vehicles to 20 vehicles). The available storage is for 10 vehicles. The following improvements are proposed to mitigate the project impact to less than significant:

- Construct an additional eastbound through lane (4th) that transitions into a left turn lane at the intersection of S. Bonnyview Road and I-5 Southbound Ramps

Intersection 3 - S. Bonnyview Road & I-5 Northbound Ramps (CEQA Mitigation Required)

This intersection is projected to experience unacceptable queues. The project creates a significant impact at this intersection due to the projected northbound right queue increase (from approximately 4 vehicles to 13 vehicles). The available storage is for 12 vehicles. The following improvements are proposed to mitigate the project impact to less than significant:

- Construct an additional eastbound left turn lane
- Widen Northbound on-ramp to accommodate dual left turns from eastbound S. Bonnyview Rd.

Intersection 4 - S. Bonnyview Road & Churn Creek Road (CEQA Mitigation Required)

The intersection is projected to operate at LOS D in the PM peak hour. The proposed project creates a significant impact by increasing delay by more than 5 seconds at an intersection operating at unacceptable LOS in the "no project" condition. The following improvement is proposed to mitigate the project impact to less than significant:

- Provided permitted-overlap phasing for the southbound right turn movement

Intersection 5 - Churn Creek Road & Alrose Lane (CEQA Mitigation Required)

This intersection is projected to operate at LOS E in the PM peak hour. The proposed project creates a significant impact by increasing delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the "no project" condition. The following improvement is proposed to mitigate the project impact to less than significant:

- Construct an eastbound left turn lane
- Reconstruct the eastbound approach to accommodate a through lane and a through-right

Intersection 6 - Churn Creek Road & Hartmeyer Lane (CEQA Mitigation Required)

This intersection is projected to operate at LOS F in the PM peak hour. The proposed project creates a significant impact by increasing the delay by more than 5 seconds per vehicle at an intersection operating at unacceptable LOS in the "no project" condition. The following improvement will yield acceptable operations:

- Reconstruct intersection to eliminate westbound left turn movements, a receiving lane for northbound lefts and a northbound right turn pocket.

Intersection 7 - Churn Creek Road & Huntington Lane (No Significant Impact)

This intersection is projected to operate at LOS D in the AM and PM peak hours. Although the proposed project increases the delay by more than 5 seconds per vehicle at an intersection operating at unacceptable LOS in the "no project" condition, the proposed project does not create a significant impact as the peak hour signal warrants are not met. The following improvement will yield acceptable operations:

- Construct a two-way left turn lane approximately 200 feet on the west side of the intersection

Intersection 8 - Churn Creek Road & Victor Lane (CEQA Mitigation Required)

This intersection is projected to operate at LOS E and F during the AM and PM peak hours. The proposed project creates a significant impact by increasing the delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition. The following improvement is proposed to mitigate the project impact to less than significant:

- Construct the intersections of Churn Creek Road/Victor Avenue and Churn Creek Road/Rancho Road into a roundabout

Intersection 9 - Churn Creek Road & Rancho Road (CEQA Mitigation Required)

This intersection is projected to operate at LOS E during the PM peak hour. The proposed project creates a significant impact by increasing the delay by more than 5 seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition. The following improvement is proposed to mitigate the project impact to less than significant:

- Construct the intersections of Churn Creek Road/Victor Avenue and Churn Creek Road/Rancho Road into a roundabout

Intersection 11 - Rancho Road & Shasta View Drive (No Significant Impact)

This intersection is projected to operate at LOS E and F during the AM and PM peak hours respectively. Although the proposed project increases the delay by more than 5 seconds per vehicle at an intersection operating at unacceptable LOS in the “no project” condition, the proposed project does not create a significant impact as the peak hour signal warrants are not met. The following improvement will yield acceptable operations:

- Construct a traffic signal or
- Construct a roundabout

Intersection 14 - Churn Creek Road & Hartnell Avenue (No Significant Impact)

This intersection is projected to operate at LOS D during the AM and PM peak hours respectively. The proposed project does not create a significant impact as it does not increase the delay by more than 5 seconds per vehicle at an intersection operating at unacceptable LOS in the “no project” condition. The following improvement will yield acceptable operations:

- Construct an additional southbound left turn pocket
- Construct a northbound right turn pocket
- Construct a southbound right turn pocket
- Provide permitted-overlap phasing for westbound right turn movement
OR
- Construct a multi-lane roundabout

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway (CEQA Mitigation Required)

This intersection is projected to operate at LOS F during the AM and PM peak hours respectively. The proposed project creates a significant impact during the AM and PM peak hours by increasing the delay from acceptable to unacceptable operations. The following improvement is proposed to mitigate the project impact to less than significant:

- Construct a traffic signal

Fair-Share of Improvement Cost Calculations

Fair-share calculations have been identified for all intersections, which are projected to operate at unacceptable LOS under no project conditions, and experience an increase in delay with the addition of project traffic. Below is a listing of each of the study intersections warranting improvements, the corresponding improvements that the proposed project would be required to pay a Fair-Share of improvement cost towards, and the proposed project's equitable share of these improvements. The proposed project's equitable share is calculated using the method for calculating equitable mitigation measures outlined in the *Caltrans Guide for the Preparation of Traffic Impact Studies* (State of California, DOT, December 2002), which is shown below:

$$P = T / (T_B - T_E) \text{ where,}$$

P = The equitable share for the project's traffic impact.

T = The vehicle trips generated by the project during the peak hour of adjacent roadway facility in vehicles per hour (vph).

T_B = The forecasted traffic volume on an impacted roadway facility at the time of general plan build-out (e.g. 20 year model or the furthest model date feasible), vph.

T_E = The traffic volume existing on the impacted roadway facility plus other approved projects that will generate traffic that has yet to be constructed/opened, vph.

Note that the percent Fair-Share calculated using the above formula is reported to the nearest whole number and the calculations are based on the highest fair share percentage from all three peak hour scenarios.

Year 2035 Plus Project Fair-Share

Intersection 2 - S. Bonnyview Road & I-5 Southbound Ramps

Fair-Share %: T= 192

$$T_E = 2,941$$

$$T_B = 3,607$$

$$P = 29\%$$

Intersection 3 - S. Bonnyview Road & I-5 Northbound Ramps

Fair-Share %: T= 300

$T_E = 2,428$

$T_B = 3,145$

P= 42%

Intersection 4 - S. Bonnyview Road & Churn Creek Road

Fair-Share %: T= 519

$T_E = 1,892$

$T_B = 2,794$

P= 58%

Intersection 5 - Churn Creek Road & Alrose Lane

Fair-Share %: T= 69

$T_E = 1,264$

$T_B = 1,624$

P= 19%

Intersection 6 - Churn Creek Road & Hartmeyer Lane

Fair-Share %: T= 69

$T_E = 1,138$

$T_B = 1,404$

P= 26%

Intersection 8 - Churn Creek Road & Victor Avenue

Fair-Share %: T= 69

$T_E = 1,144$

$T_B = 1,529$

P= 18%

Intersection 9 - Churn Creek Road & Rancho Road

Fair-Share %: T= 49

$T_E = 873$

$T_B = 1,209$

P= 15%

Intersection 17 - Churn Creek Road & Southern Full-Access Driveway

Fair-Share %: T= 663

$T_E = 860$

$T_B = 1,853$

P= 67%

Development Impact Fee Program

The following development impact fee programs include transportation facilities included in this study:

Citywide Transportation Impact Fee Program:

- Churn Creek Road: Intersection with Rancho and Victor. \$2,982,000. Construct a roundabout to improve the intersection of Churn Creek Road, Victor Avenue, and Rancho Road.
- I-5 Interchange Improvements: Interchange at South Bonnyview. \$4,000,000. Placeholder project for capacity related work at the interchange of I-5 with South Bonnyview. Need PSR to determine needed improvement. Model input for northbound ramp widening.
- Minor Projects: Various Roadway, Bike and Pedestrian capacity enhancement, growth related safety and operational facilities, and grant match.
- Intersection Improvements: Based on City Priority. \$7,000,000. \$350,000 annual allotment for various signal or roundabout installations to maximize capacity.

Shasta County Public Facilities Impact Fee:

- I-5/South Bonnyview Phase 1: \$7,000,000.
- I-5/South Bonnyview Phase II: \$10,000,000.

Shasta County Major Road Impact Fee Program:

- South Bonnyview Road/Churn Creek Road: SR 273 to Rancho Road. Construct separation, widen, add signals, I-5 Interchange improvements including reconstruction of overcrossing and bridge. \$20,750,000.

Appendices

Appendix A: Intersection Turning Movement Counts

Appendix B: Synchro Outputs

Appendix C: HCS Outputs

Appendix D: Signal Warrant Analysis Worksheets