APPENDIX V

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MEMORANDUM

Date:	May 26, 2011	Project #: 8477
To:	Rick Simon, Shasta County	
From:	Andy Daleiden and John Ringert, PE	
Project:	Knighton & Churn Creek Commons Retail Center – Shasta County	
Subject:	Updated Trip Generation, Diverted Link Trips, and Roadway Segment Level of Service	

Per the request of Shasta County, Kittelson & Associates, Inc. has reviewed the Traffic Impact Analysis (TIA) included in the Partially Recirculated Draft EIR (PRDEIR) and provides the following information to address a couple of calculation errors in the analysis. The updated traffic analysis is presented for the following items which contained errors:

- Trip Generation, Table 3.12-8
- Diverted Link Trips and Roadway Level of Service, Tables 3.12-10 and 3.12-17

Overall, the findings and proposed mitigations are not affected by the calculation errors and therefore do not impact the conclusions and recommendations of the study.

Trip Generation

In the PRDEIR TIA, two errors were identified. The first was the way in which diverted link trips were shown in Table 3.12-8, Vehicle Trip Generation Summary. While the percentage utilized for the diverted link trips was correct, the percentage was applied to the total trips which included internal trips that never reach the roadway system. This results in a small overestimation of diverted link trips. The number of diverted link trips, shown in Table 3.12-8, as amended, has been updated based on the following calculation:

- Internal Trips = Total Project Trips x Internal Trip %
- Diverted Link Trips = (Total Project Trips – Internal Trips) x Diverted Link Trip %

The second error was the daily trip rate shown for the Saturday analysis did not match the referenced source, ITE Trip Generation, 8th Edition. Therefore, the Saturday daily trip rate has been

updated to reflect the correct trip generation rate from the ITE Trip Generation, 8th Edition. Table 1 summarizes the revised trip generation for the project.

Table 1 **Vehicle Trip Generation Summary**

Land Use	Size (sf)	ITE Code	Weekday				Saturday			
			Daily	PM Peak Hour			Daily	Midday Peak Hour		
				Total	In	Out		Total	In	Out
Discount Club	158,700	857	6,634	673	336	337	8,530	1,087	533	554
Shopping Center	425,496	820	17,407	1,679	822	857	23,007	2,196	1,142	1,054
High Turnover Restaurant	18,863	932	2,398	210	124	86	2,987	265	141	124
Fast Food Restaurant	3,600	934	1,786	122	63	59	2,599	214	109	105
Drive In Bank	3,500	912	519	90	45	45	302	93	48	45
Home Improvement Store	130,501	862	3,889	309	148	161	7,402	589	300	289
Total Project Trips[1]			32,632	3,083	1,538	1,545	44,828	4,444	2,273	2,171
Internal Trips (24%, 23%, 29%)[2]			*7,832*	*709*	*354*	*355*	*10,759*	*1,289*	*659*	*630*
Total External Trips			**24,801**	**2,374**	**1,184**	**1,190**	**34,069**	**3,155**	**1,614**	**1,542**
Diverted Link Trips (22%)[3]			*5,456*	*522*	*261*	*262*	*7,495*	*694*	*355*	*339*
Total Net New Trips			**19,344**	**1,852**	**924**	**928**	**26,574**	**2,461**	**1,259**	**1,202**

[1]Trip generation rates based on the ITE Trip Generation, 8th Edition and PRDEIR TIA

[2]Internal trip percentages based on ITE Trip Generation Handbook, 2nd Edition and PRDEIR TIA

[3]Diverted link trip percentages based on ITE Trip Generation Handbook, 2nd Edition and PRDEIR TIA

Table 2 provides a summary of the trip generation differences between Table 1 and the PRDEIR TIA Trip Generation Summary (Table 3.12-8).

Table 2 **Comparison of Revised Trip Generation and PRDEIR Trip Generation Table 3.12-8**

Trip Total Scenario	Weekday				Saturday			
	Daily	PM Peak Hour			Daily	Midday Peak Hour		
		Total	In	Out		Total	In	Out
Updated Total Project Trips	32,632	3,083	1,538	1,545	44,828	4,444	2,273	2,171
PRDEIR Total Project Trips	32,633	3,168	1,583	1,585	43,400	4,444	2,228	2,216
Total Trip Difference	*-1*	*-85*	*-45*	*-40*	*1,428*	*0*	*45*	*-45*
Updated Internal Trips (24%, 23%, 29%)	7,832	709	354	355	10,759	1,289	659	630
PRDEIR Total Internal Trips	7,832	729	364	365	10,400	1,289	646	643
Internal Trip Difference	*0*	*-20*	*-10*	*-10*	*359*	*0*	*13*	*-13*
Updated Total External Trips	24,801	2,374	1,184	1190	34,069	3,155	1,614	1,542
PRDEIR Total External Trips	24,801	2,439	1,219	1220	33,000	3,155	1,582	1,573
External Trip Difference	*0*	*-65*	*-35*	*-30*	*1,069*	*0*	*32*	*-31*
Updated Diverted Link Trips (22%)	5,456	522	261	262	7,495	694	355	339
PRDEIR Diverted Link Trips	7,179	697	348	349	9,548	978	490	488
Diverted Link Trip Difference	*-1,723*	*-175*	*-87*	*-87*	*-2,053*	*-284*	*-135*	*-149*
Updated Total Net New Trips	19,344	1,852	924	928	26,574	2,461	1,259	1,202
PRDEIR Total Net New Trips	17,622	1,742	871	871	23,452	2,177	1,092	1,085
Net New Trip Difference	*1,722*	*110*	*53*	*57*	*3,122*	*284*	*167*	*117*

As shown in Table 2, the differences in trip generation are primarily in the diverted link trips and net new trips. The diverted trips were generally over-estimated and new trips under estimated. The total impact on the new trip estimates was approximately 6%-14%.

While the allocation of trips between diverted trips and new trips affects the analysis, it typically has a very small impact since the trips are still accounted for at most intersections. This is because diverted trips are handled similarly to new trips on facilities external to the facility the diversion is occurring from. So the impact of the calculating too many diverted trips only affects the intersections where the diversion occurs. For instance, if a car diverts off of Interstate 5 to go to the new shopping center, once it leaves Interstate 5, it shows up as a new trip on the ramp and on Knighton Road. So it

does not matter on the ramp or Knighton Road whether it is counted as diverted or new. At the point of diversion traffic volumes are affected because if the car was supposed to be a new trip, there would be one more car remaining on Interstate 5.

The revised Saturday daily trip generation increases for the project with the use of the correct trip generation rate. However, a review of the PRDEIR TIA for Saturday traffic conditions did not find any changes to occur in level of service for existing plus project or cumulative plus project conditions at the intersections, ramps, or freeway.

Overall, the revised trip generation does not change any of the mitigation findings included in the PRDEIR TIA. The next section addresses the revised trip generation, diverted link trips, and corresponding roadway segment level of service on Knighton Road.

Roadway Level of Service on Knighton Road

In the PRDEIR TIA, the diverted link trips were assumed to come from Interstate-5. The diverted link trips were routed through the Interstate-5/Knighton Road interchange and on Knighton Road to enter and exit via the Knighton Road/Main Project Access (Intersection #15 in the PRDEIR Figures). With the routing described, the traffic analysis at the study intersections correctly took in account the diverted link trips at the Interstate-5 Ramps and Main Project Access intersection. The intersection analysis and freeway merge/diverge analysis on Interstate 5 also adequately addressed diverted link trips. However, diverted link trips were not accounted for in the Roadway Level of Service analysis on Knighton Road which is the roadway link between the two intersections. We believe this was a simple oversight. The Roadway LOS analysis was included in Tables 3.12-10 and 3.12-17 and Figures 3.12-6 and 3.12-10 of the PRDEIR. This section provides updated tables to reflect the addition of diverted link trips on Knighton Road. Tables 3 and 4 summarize the revised roadway LOS for existing plus project and cumulative plus project, respectively.

Table 3 **Roadway Level of Service, Existing Plus Project Conditions**

Roadway Segment	Lanes	Existing No Project			Existing Plus Project			V/C Difference
		Volume	V/C	LOS	Volume	V/C	LOS	
Knighton Road, I-5 SB Ramps to I-5 NB Ramps[1]	2	5,572 (4,466)	0.37 (0.30)	A (A)	15,492 (18,093)	1.03 (1.20)	F (F)	0.66 (0.9)
Knighton Road, I-5 NB Ramps to Churn Creek Road[1]	2	6,705 (4,772)	0.45 (0.32)	A (A)	26,049 (31,345)	1.74 (2.09)	F (F)	1.29 (1.77)
Note: All other values in the PRDEIR Table 3.12-10 are shown correctly.								
XX (YY) = Weekday (Weekend) V/C – Volume-to-capacity ratio [1]Minor Collector								

Table 4 **Roadway Level of Service, Cumulative Plus Project Conditions**

Roadway Segment	Lanes	Cumulative No Project			Cumulative Plus Project			V/C Difference
		Volume	V/C	LOS	Volume	V/C	LOS	
Knighton Road, I-5 SB Ramps to I-5 NB Ramps[1]	2	7,500 (6,300)	0.50 (0.42)	A (A)	17,420 (19,927)	1.16 (1.33)	F (F)	0.66 (0.91)
Knighton Road, I-5 NB Ramps to Churn Creek Road [1]	2	11,100 (9,200)	0.74 (0.61)	C (B)	37,149 (40,545)	2.48 (2.70)	F (F)	1.74 (2.09)
Note: All other values in the PRDEIR Table 3.12-17 are shown correctly.								
XX (YY) = Weekday (Weekend) V/C – Volume-to-capacity ratio [1]Minor Collector								

As shown in Tables 3 and 4, the Knighton Road segments between the Interstate 5 SB Ramp and Churn Creek Road are identified to operate over the planning threshold segment capacity with the addition of project traffic for both weekday and Saturday conditions. The segment analysis presented in these tables is based on the 2000 Highway Capacity Manual (HCM) planning thresholds for different types of roadways. These thresholds are based on certain assumptions for number of traffic signals, speed, turning movement counts, peak hour factor, and length of facility. These planning level thresholds provide a quick assessment of the segment operations.

While the roadway segment levels of service are shown to be over capacity, the standard of practice is to utilize the more detailed intersection level of analysis to verify whether the general segment analysis is adequately describing the operational condition. This is because the generalized segment thresholds are based on individual intersection analysis with generalized assumptions on the lane

configurations, turning movements, signal timing and other characteristics based only on the facility type. For instance, a typical minor collector road might have two lanes without turn lanes or signals so the capacity would be based on that configuration. In reality, a minor collector might have a turn lane and signals and operate more like a minor arterial. Knighton Road would be more appropriately classified as a minor arterial, given its regional nature anticipated urban settings, and current connection with Interstate 5.

For Knighton Road, the daily volume threshold for a minor collector with two lanes is 15,000 vehicles per day for LOS E (Reference: PRDEIR TIA). If the roadway was classified as a major collector with two lanes, the daily volume threshold would be 18,000 vehicles per day for LOS E (Reference: PRDEIR TIA). Furthermore, the recently developed 2010 HCM provides a daily traffic volume range of 15,000 to 20,000 daily vehicles for LOS E operations on a two-lane street. Using the 2010 HCM planning thresholds, the Knighton Road segment between the Interstate 5 SB and NB ramps would operate under capacity and fall within the higher threshold of LOS E. It would be reasonable for the County to use the 20,000 daily vehicles threshold for Knighton Road.

Per the standard of practice for urban settings, a more detailed analysis is typically conducted at the signalized intersections to evaluate the traffic operations and resultant level of service to identify the lane geometry required to accommodate the traffic demand and meet a level of service standard. In the PRDEIR TIA, an intersection analysis was conducted that includes the mitigation measures at the intersections along Knighton Road. These mitigations were identified based on the project traffic volumes with diverted link trips and provide the appropriate mitigation measures for the project impacts. Therefore, the traffic analysis and mitigations provided at the intersections is typically a better tool for identifying specific improvements for development projects.

Based on the above assessment, no additional mitigation is identified for the Knighton Road roadway segment between the I-5 SB and NB ramps under the existing plus project or cumulative plus project conditions.

We trust this addresses the revised minor calculations for trip generation, diverted link trips, and roadway segment level of service on Knighton Road. Please contact us at 208.338.2683 if you have any questions.