

**To:** Natalie Porter, P.E., T.E.  
El Dorado County

**From:** Chris Gregerson, P.E., T.E., PTP  
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**Re:** ***Technical Memorandum #3: Validation and Calibration Results***  
El Dorado County Travel Demand Model Update

**Date:** August 22, 2018

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The purpose of this memorandum is to present the results of the validation analysis for the El Dorado County (EDC) Travel Demand Model (TDM). This memorandum explains the techniques, measures of effectiveness (MOEs), and criteria used to validate the EDC Model.

The EDC Model is validated for a 2016 base year using traffic count data provided by EDC for the period covering 2015 to 2017. The 2016 base year traffic assignment is validated for the daily (24 hour) assignment, the AM peak hour assignment, and the PM peak hour assignment. The validation process described within this memorandum is intended to establish a reasonable level of confidence that the model can be used as a forecasting tool for the analysis of future conditions.

## **I. Model Validation Methodology**

The principle techniques used to validate the EDC TDM involved the use of static validation tests. Static validation tests compare the model's base year traffic volume estimates to traffic counts using standard statistical measures. It should be noted that although the evaluation criteria for validating travel demand models differ among planning agencies, most California agencies include standards established by FHWA<sup>1</sup> and Caltrans<sup>2</sup>. Basic guidance regarding model validation is also provided in the *2010 California Regional Transportation Plan Guidelines*<sup>3</sup>. The validation techniques, MOEs, and criteria adopted for the EDC TDM conform to the requirements provided in these sources and are consistent with those of other comparable models.

As part of the model development process, two-way traffic counts for local roadways were obtained from EDC for 2016. Freeway traffic counts on US-50 were obtained for the three-year period between 2015 and 2017 from the Freeway Performance Measurement System (PeMS) web site for mixed-flow and HOV lanes. Based on a review of this data, a total of 189 count locations were identified as being appropriate for use in validating the model.

At the 189 locations identified for analysis, the EDC Model was validated for a 2016 base year using the traffic count data provided by EDC for 2016. The base year traffic assignment was validated for the daily (24 hour) assignment, the AM peak-hour assignment, and the PM peak-hour assignment. The analysis was also stratified by roadway classification.

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<sup>1</sup> FHWA Calibration and Adjustment of System Planning Models, 1990.

<sup>2</sup> Travel Forecasting Guidelines, Caltrans, 1992

<sup>3</sup> 2010 California Regional Transportation Plan Guidelines, California Transportation Commission

## II. Model Validation Criteria

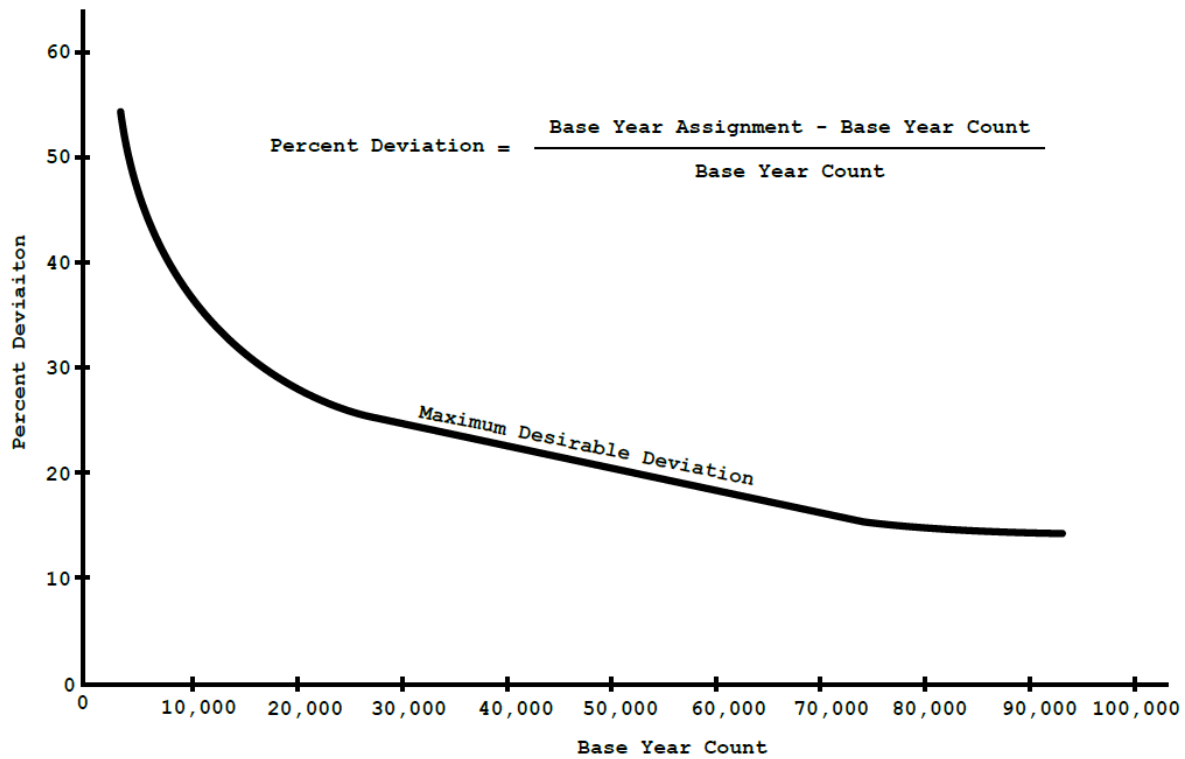
The principle Measures of Effectiveness (MOEs) used to validate the overall EDC TDM are shown in **Table 1**. As presented, the criteria referenced are those prescribed by Caltrans and the California Transportation Commission (CTC) guidelines that identify the maximum acceptable RMSE and correlation coefficient for the entire model. In addition, the table presents the percentage of roadway links that should be within an allowable percent error. The allowable percent error corresponds to a graph from NCHRP 255 shown in **Exhibit 1**, which illustrates the allowable deviation between the model volumes and the actual counts for individual roadway links. As shown, the acceptable percent deviation has an inverse relationship with traffic volume (the acceptable percent deviation increases as traffic volumes decrease).

The percent error and percent RMSE targets by roadway classifications shown in **Table 2** are based on FHWA guidelines.

**Table 1 – Model Validation Criteria**

MOE	Validation Criteria
<p>The <b>Correlation Coefficient</b> (R) estimates the correlation between the model volume and the actual count. The R value has a range of -1.0 to 1.0 that indicates the linear relationship between the model volume and the actual count. A value of 0 suggests that there is no correlation between the model volume and the actual count. The <b>Coefficient of Determination</b> (R<sup>2</sup>), “or goodness of fit”, measures how well the model volumes and the actual counts predict each other using a simple linear regression. The R<sup>2</sup> value has a range of 0 to 1.0, with a value of 1.0 indicating an exact fit between the model volume and the actual count.</p>	<p>The model-wide correlation coefficient should be greater than 0.88</p>
<p>The <b>Percent Root Mean Square Error</b> (percent RMSE) is a statistical measure of accuracy that calculates the standard deviation of the errors, or differences between the volumes predicted by the model and the actual counts. A higher percent RMSE value suggests that there is increasing variability between the model volume and the actual count.</p>	<p>The maximum acceptable RMSE for the entire model should not exceed 35%.</p>
<p>The <b>Percent Error</b> is the difference between the model volume and the actual count divided by the actual count. The higher the percent error, the greater the difference is between the model volume and the actual count.</p>	<p>A minimum of 75% of the roadway links should be within their maximum desirable deviation</p>

Exhibit 1 – Maximum Desirable Error for Link Volumes



Source: FHWA

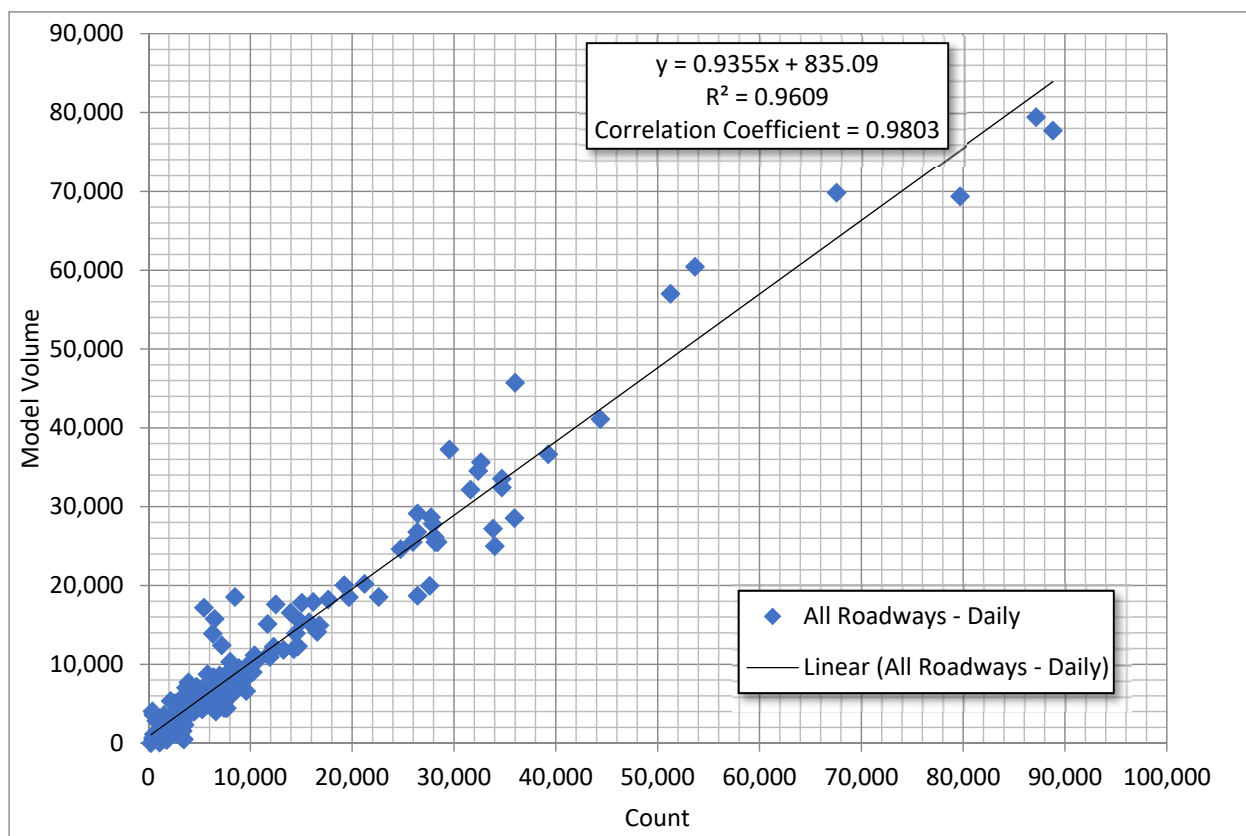
Table 2 – Validation Criteria by Roadway Classification

Roadway Classification	Link Code (CAPCLASS)	Percent Error Target	Percent RMSE Target
Freeway	1,8	+/- 7%	15%
Major Arterial	3	+/- 10%	40%
Minor Arterial	4	+/- 15%	40%
Rural Arterial	24	+/- 15%	40%
Collector	5	+/- 25%	50%
All Roads	n/a	+/- 10%	35%

III. Correlation Coefficient

The scatter plot in Exhibit 2 graphs the model volume for each roadway link and the corresponding traffic link count using a linear regression to show the relationship between the two. The model volumes and the actual counts have a positive correlation as shown by the slope of the trend line. The correlation coefficient for the overall model is **0.9803**, which indicates a strong relationship between the two variables and exceeds the targeted criteria of 0.88. The R<sup>2</sup> for the overall model is **0.9609**, which indicates that the model volumes and the actual counts are good predictors of each other.

Exhibit 2 – Model Volume versus Count Data



#### IV. Roadway Classification

The validation of the daily traffic assignment by roadway classification is summarized in the tables that follow. The percent error and percent RSME targets refer to the recommended limits adopted from FHWA and Caltrans guidelines. **Table 3** summarizes the validation of the daily assignment by roadway classification. The EDC model meets all of the validation targets for allowable error by roadway classification except for rural arterials. The assignment for rural arterials has a percent error of 15.7%, which just misses the allowable target for that roadway type by 0.7%. Due to the low volume, rural arterials are difficult for travel demand models to match leading to the minor miss for the percent error target. However, the overall model has a percent error 4.0%, which is well within the limit of 10%.

Table 3 – Percent Error by Roadway Classification

Roadway Classification	# Counts	Model	Observed	Difference	Percent Error	Target	Within Target?
Freeways	22	906,070	895,267	10,804	1.2%	+/- 7%	YES
Major Arterials	18	320,646	340,769	-20122.5	-5.9%	+/- 10%	YES
Minor Arterials	13	138,870	129,350	9,520	7.4%	+/- 15%	YES
Rural Arterials	97	594,986	514,047	80,939	15.7%	+/- 15%	NO
Collectors	39	88,080	90,722	-2641.55	-2.9%	+/- 25%	YES
ALL	189	2,048,654	1,970,155	78,499	4.0%	+/- 10%	YES

**Table 4** summarizes the validation of the daily assignment according to the percent RMSE limits by roadway classification. The EDC model meets all of the validation targets for percent RMSE by roadway classification. Rural arterials have a percent RMSE of 31%, which is well within the limit of 40%. The overall model has a percent RMSE of 22%, which is within the limit of 35%.

**Table 4 – Percent RMSE by Roadway Classification**

Roadway Classification	# Counts	Percent RMSE	Target	RMSE	Within Target?
Freeways	22	8%	< 15%	3448.21	YES
Major Arterials	18	21%	< 40%	3940.63	YES
Minor Arterials	13	30%	< 40%	3029.66	YES
Rural Arterials	97	31%	< 40%	1628.73	YES
Collectors	39	43%	< 50%	1004.99	YES
ALL	189	22%	< 35%	2250.37	YES

### V. Roadway Links

The daily traffic assignment for individual roadway links was analyzed for 189 count locations. The model volumes and the actual counts on the links are evaluated by comparing the percent error to the allowable limits recommended by NCHRP 255. The table below shows the roadway links at the count locations and how the percent error compared to limits according to NCHRP 255 criteria.

As shown in **Table 5**, of the 189 count locations, 160 or 85% of the links are within the limits for percent error.

**Table 5 – Roadway Link Validation**

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Major Arterial	Cameron Park Dr	300 yds S of Hacienda Dr	19,227	20,053	4.29%	+/- 28.32%	YES
Major Arterial	Cameron Park Dr	200 ft N of Oxford Rd	16,565	14,113	-14.80%	+/- 32.18%	YES
Major Arterial	El Dorado Hills Bl	100 ft N of Harvard Wy	19,677	18,524	-5.86%	+/- 29.15%	YES
Major Arterial	El Dorado Hills Bl	300 ft S of Francisco Dr	16,794	14,945	-11.01%	+/- 31.51%	YES
Major Arterial	El Dorado Hills Bl	100 ft S of Green Vly Rd	5,053	4,984	-1.37%	+/- 46.94%	YES
Major Arterial	Francisco Dr	200 ft S of Green Valley Rd	13,260	11,850	-10.63%	+/- 34.28%	YES
Major Arterial	Green Valley Rd	200 ft W of Mormon Island Dr	28,381	25,500	-10.15%	+/- 25.96%	YES
Major Arterial	Green Valley Rd	200 ft E of Mormon Island Dr	28,161	25,500	-9.45%	+/- 25.96%	YES
Major Arterial	Green Valley Rd	200 ft E of Francisco Dr	15,766	15,324	-2.80%	+/- 31.23%	YES
Major Arterial	Latrobe Rd	300 ft N of White Rock Rd	32,370	34,534	6.68%	+/- 39.52%	YES
Major Arterial	Missouri Flat Rd	100 ft N of SR 49	17,658	18,225	3.21%	+/- 29.32%	YES
Major Arterial	Missouri Flat Rd	100 ft S of China Garden Rd	21,216	20,196	-4.81%	+/- 28.25%	YES
Major Arterial	Missouri Flat Rd	S of Forni Rd	27,618	19,952	-27.76%	+/- 28.38%	YES

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Major Arterial	Missouri Flat Rd	400 yds N of Forni Rd	34,016	25,000	-26.50%	+/- 26.15%	NO
Major Arterial	Missouri Flat Rd	100 ft S of Plaza Dr	22,600	18,532	-18.00%	+/- 29.15%	YES
Major Arterial	Missouri Flat Rd	100 ft N of Plaza Dr	8,495	18,532	118.15%	+/- 29.15%	NO
Major Arterial	North Shingle Rd	400 yds E of Ponderosa Rd	8,148	8,584	5.35%	+/- 38.54%	YES
Major Arterial	North Shingle Rd	100 ft S of Green Valley Rd	5,764	6,300	9.30%	+/- 43.12%	YES
Minor Arterial	Cameron Park Dr	100 ft N of Robin Ln	8,214	7,854	-4.39%	+/- 39.80%	YES
Minor Arterial	Cameron Park Dr	100 ft N of Coach Ln	24,762	24,615	-0.59%	+/- 26.29%	YES
Minor Arterial	Cameron Park Dr	200 yds N of Mira Loma Dr	14,272	11,924	-16.45%	+/- 34.21%	YES
Minor Arterial	Cameron Park Dr	200 yds S of Green Valley Rd	10,415	11,157	7.12%	+/- 35.04%	YES
Minor Arterial	Country Club Dr	0.1 mi E of Merrychase Dr	2,668	5,061	89.71%	+/- 46.68%	NO
Minor Arterial	Durock Rd	50 ft S of Robin Ln	7,490	8,253	10.18%	+/- 39.09%	YES
Minor Arterial	Serrano Pkwy	450 ft E of Silva Valley Pkwy	14,482	13,928	-3.83%	+/- 32.33%	YES
Minor Arterial	Silva Valley Pkwy	100 ft S of Serrano Pkwy	5,448	17,188	215.49%	+/- 29.95%	NO
Minor Arterial	Silva Valley Pkwy	100 ft S of Harvard Wy	10,237	8,997	-12.11%	+/- 37.89%	YES
Minor Arterial	Silva Valley Pkwy	100 ft N of Harvard Wy	7,700	4,426	-42.51%	+/- 49.01%	YES
Minor Arterial	Silva Valley Pkwy	100 ft S of Green Valley Rd	7,144	6,125	-14.27%	+/- 43.56%	YES
Minor Arterial	Sophia Pkwy	200 ft S of Green Valley Rd	6,078	7,047	15.94%	+/- 41.40%	YES
Minor Arterial	White Rock Rd	100 ft E of Latrobe Rd	14,686	12,297	-16.27%	+/- 33.83%	YES
Collector	Barkley Rd	50 ft N of Carson Rd	1,121	2,757	145.93%	+/- 58.20%	NO
Collector	Bedford Av	At City Limits	454	631	39.04%	+/- 99.37%	YES
Collector	Big Cut Rd	100 ft N of Pleasant Vly Rd	1,014	746	-26.46%	+/- 93.54%	YES
Collector	Bucks Bar Rd	50 ft S of Pleasant Vly Rd	4,996	5,477	9.63%	+/- 45.36%	YES
Collector	Bucks Bar Rd	300 ft N of Mt Aukum Rd	4,084	4,935	20.84%	+/- 47.11%	YES
Collector	China Garden Rd	200 yds E of Missouri Flat Rd	3,554	2,324	-34.61%	+/- 61.92%	YES
Collector	El Dorado Rd	200 yds N of Pleasant Vly Rd	2,209	1,658	-24.94%	+/- 69.99%	YES
Collector	Enterprise Dr	100 ft E of Forni Rd	3,306	642	-80.57%	+/- 98.73%	YES
Collector	Fairplay Rd	100 ft S of Mt Aukum Rd	2,172	2,683	23.54%	+/- 58.77%	YES
Collector	Forebay Rd	100 ft N of Pony Express Tr	2,007	2,791	39.08%	+/- 57.93%	YES
Collector	Forni Rd	200 ft N of SR 49	3,490	476	-86.35%	+/- 110.06%	YES
Collector	Forni Rd	30 ft W of Arroyo Vista Wy	1,637	1,475	-9.88%	+/- 73.02%	YES
Collector	Forni Rd	W of P-ville Dr @ City Limits	956	1,474	54.20%	+/- 73.04%	YES
Collector	Garden Valley Rd	300 ft N of SR 193	536	1,118	108.49%	+/- 80.76%	NO
Collector	Garden Valley Rd	0.45 mi S of Marshall Rd	1,489	535	-64.08%	+/- 105.53%	YES
Collector	Greenwood Rd	100 ft W of Marshall Rd	1,217	1,271	4.47%	+/- 77.07%	YES
Collector	Greenwood Rd	0.03 mi S of SR 193	1,093	76	-93.05%	+/- 214.29%	YES

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Collector	Harvard Wy	0.15 mi E of El Dorado Hills Bl	7,329	8,364	14.13%	+/- 38.90%	YES
Collector	Lime Kiln Rd	100 ft E of China Garden Rd	2,085	2,030	-2.65%	+/- 65.04%	YES
Collector	Meder Rd	300 ft E of Cameron Park Dr	5,777	4,885	-15.44%	+/- 47.29%	YES
Collector	Meder Rd	200 yds W of Ponderosa Rd	4,319	4,066	-5.85%	+/- 50.54%	YES
Collector	Mosquito Rd	300 ft S of Union Ridge Rd	2,083	2,124	1.98%	+/- 63.97%	YES
Collector	Mosquito Rd	At American River Br	1,260	1,350	7.17%	+/- 75.40%	YES
Collector	Newtown Rd	200 yds N of Pleasant Vly Rd	2,697	3,310	22.73%	+/- 54.46%	YES
Collector	Oak Hill Rd	300 ft S of Pleasant Vly Rd	1,866	1,372	-26.45%	+/- 74.96%	YES
Collector	Patterson Dr	200 ft S of Pleasant Vly Rd	4,259	4,957	16.38%	+/- 47.04%	YES
Collector	Ponderosa Rd	100 ft N of Meder Rd	1,761	748	-57.53%	+/- 93.43%	YES
Collector	Ponderosa Rd	100 ft S of Green Valley Rd	1,227	575	-53.16%	+/- 102.81%	YES
Collector	Rock Creek Rd	100 ft E of SR 193	254	8	-97.00%	+/- 493.35%	YES
Collector	Sand Ridge Rd	100 ft W of Bucks Bar Rd	1,394	1,193	-14.41%	+/- 78.87%	YES
Collector	Sliger Mine Rd	50 ft N of SR 193	756	676	-10.58%	+/- 96.92%	YES
Collector	Snows Rd	400 ft N of Newtown Rd	1,089	1,446	32.81%	+/- 73.55%	YES
Collector	Snows Rd	200 ft S of Carson Rd	2,524	2,423	-4.02%	+/- 60.99%	YES
Collector	South Shingle Rd	0.5 mi E of Latrobe Rd	1,104	2,724	146.77%	+/- 58.45%	NO
Collector	South Shingle Rd	100 ft N of Barnett Ranch Rd	2,845	4,132	45.24%	+/- 50.25%	YES
Collector	Starbuck Rd	110 ft N of Green Valley Rd	1,677	1,516	-9.59%	+/- 72.30%	YES
Collector	Union Ridge Rd	100 ft W of Hassler Rd	508	387	-23.76%	+/- 118.64%	YES
Collector	Wentworth Springs Rd	100 ft W of Quintette Rd	924	423	-54.20%	+/- 114.88%	YES
Collector	White Rock Rd	100 ft S of Silva Valley Pkwy	9,581	8,300	-13.37%	+/- 39.01%	YES
Rural Arterial	Bass Lake Rd	400 yd N of Country Club Dr	11,924	10,921	-8.41%	+/- 35.31%	YES
Rural Arterial	Bass Lake Rd	100 yd S of Green Vly Rd	5,792	8,732	50.76%	+/- 38.30%	NO
Rural Arterial	Bassi Rd	200 ft W of Lotus Rd	1,031	623	-39.55%	+/- 99.82%	YES
Rural Arterial	Cambridge Rd	At US 50 OC	9,599	6,612	-31.12%	+/- 42.37%	YES
Rural Arterial	Cambridge Rd	300 ft S of Country Club Dr.	8,023	10,313	28.55%	+/- 36.06%	YES
Rural Arterial	Cambridge Rd	100 ft N of Country Club Dr	3,928	7,693	95.84%	+/- 40.10%	NO
Rural Arterial	Cambridge Rd	300 yds N of Oxford Rd	4,710	7,138	51.56%	+/- 41.21%	NO
Rural Arterial	Cambridge Rd	300 ft S of Green Valley Rd	4,819	7,019	45.65%	+/- 41.46%	NO
Rural Arterial	Carson Rd	0.6 Mi E of City Limits	1,666	1,247	-25.14%	+/- 77.61%	YES
Rural Arterial	Carson Rd	300 yds E of Gatlin Rd	1,615	651	-59.68%	+/- 98.25%	YES
Rural Arterial	Carson Rd	At Carson Ct	1,840	462	-74.87%	+/- 111.24%	YES

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Rural Arterial	Carson Rd	100 ft W of Barkley Rd	2,556	5,011	96.06%	+/- 46.85%	NO
Rural Arterial	Carson Rd	100 ft E of Ponderosa Wy	2,677	2,004	-25.16%	+/- 65.34%	YES
Rural Arterial	Cedar Ravine Rd	0.1 Mi N of Pleasant Vly Rd	1,794	2,107	17.46%	+/- 64.16%	YES
Rural Arterial	Cedar Ravine Rd	0.25 Mi S of Country Club Dr	2,584	2,823	9.26%	+/- 57.70%	YES
Rural Arterial	Cold Springs Rd	At City Limits	3,775	4,856	28.63%	+/- 47.39%	YES
Rural Arterial	Cold Springs Rd	300 yds S of Gold Hill Rd	3,253	2,729	-16.09%	+/- 58.41%	YES
Rural Arterial	Cold Springs Rd	100 ft S of SR 153	1,443	2,371	64.29%	+/- 61.47%	NO
Rural Arterial	Country Club Dr	0.4 mi E of Bass Lake Rd	3,688	7,024	90.45%	+/- 41.45%	NO
Rural Arterial	Country Club Dr	0.15 mi W of Knollwood Dr	3,285	3,746	14.04%	+/- 52.07%	YES
Rural Arterial	Country Club Dr	300 yds E of Cambridge Rd	2,859	4,847	69.53%	+/- 47.42%	NO
Rural Arterial	Country Club Dr	0.2 mi W of Cameron Park Dr	4,059	4,514	11.22%	+/- 48.66%	YES
Rural Arterial	Durock Rd	50 ft W of S Shingle Rd	6,989	8,566	22.57%	+/- 38.57%	YES
Rural Arterial	El Dorado Rd	0.2 mi S of US 50	4,686	5,737	22.43%	+/- 44.61%	YES
Rural Arterial	Francisco Dr	200 ft N of Green Valley Rd	14,935	15,372	2.93%	+/- 31.19%	YES
Rural Arterial	Francisco Dr	100 ft S of Sheffield Dr	2,513	1,176	-53.19%	+/- 79.28%	YES
Rural Arterial	Gold Hill Rd	100 ft E of Lotus Rd	1,941	2,060	6.11%	+/- 64.69%	YES
Rural Arterial	Gold Hill Rd	200 ft W of Cold Springs Rd	1,824	1,990	9.08%	+/- 65.51%	YES
Rural Arterial	Gold Hill Rd	100 yds E of Cold Springs Rd	563	749	32.96%	+/- 93.40%	YES
Rural Arterial	Green Valley Rd	200 ft W of Sophia Pkwy	25,966	25,523	-1.71%	+/- 25.95%	YES
Rural Arterial	Green Valley Rd	200 ft E of Sophia Pkwy	28,088	26,180	-6.79%	+/- 25.71%	YES
Rural Arterial	Green Valley Rd	300 ft W of Silva Valley Pkwy	15,059	17,819	18.33%	+/- 29.56%	YES
Rural Arterial	Green Valley Rd	200 ft W of Bass Lake Rd	12,301	12,224	-0.63%	+/- 33.90%	YES
Rural Arterial	Green Valley Rd	300 ft W of Cameron Park Dr	12,508	17,605	40.75%	+/- 29.69%	NO
Rural Arterial	Green Valley Rd	300 ft E of La Crescenta Dr	7,360	5,039	-31.54%	+/- 46.76%	YES
Rural Arterial	Green Valley Rd	500 ft E of Deer Valley Rd (E)	5,267	4,293	-18.49%	+/- 49.56%	YES
Rural Arterial	Green Valley Rd	300 ft W of Lotus Rd	8,151	9,394	15.25%	+/- 37.30%	YES
Rural Arterial	Green Valley Rd	100 ft W of Greenstone Rd	4,498	4,008	-10.89%	+/- 50.81%	YES
Rural Arterial	Green Valley Rd	400 ft W of Campus Dr	4,839	4,461	-7.82%	+/- 48.87%	YES
Rural Arterial	Green Valley Rd	200 ft W of Missouri Flat Rd	7,435	4,461	-40.00%	+/- 48.87%	YES
Rural Arterial	Greenstone Rd	300 ft N of Mother Lode Dr	1,443	805	-44.19%	+/- 90.96%	YES
Rural Arterial	Greenstone Rd	0.20 mi N of US 50	3,465	3,987	15.06%	+/- 50.90%	YES
Rural Arterial	Grizzly Flat Rd	200 yds E of Mt Aukum Rd	2,447	2,208	-9.77%	+/- 63.08%	YES
Rural Arterial	Latrobe Rd	250 ft N of County Line	4,469	6,864	53.59%	+/- 41.80%	NO



Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Rural Arterial	Latrobe Rd	1.5 mi N of S Shingle Rd	4,301	6,811	58.35%	+/- 41.91%	NO
Rural Arterial	Latrobe Rd	At Deer Creek Bridge	5,281	6,864	29.97%	+/- 41.80%	YES
Rural Arterial	Latrobe Rd	100 ft S of Investment Bl	6,391	8,367	30.92%	+/- 38.90%	YES
Rural Arterial	Latrobe Rd	100 ft N of Investment Bl	8,696	7,476	-14.03%	+/- 40.52%	YES
Rural Arterial	Latrobe Rd	100 ft N of Golden Foothill Pw	26,422	18,695	-29.25%	+/- 29.05%	NO
Rural Arterial	Lotus Rd	300 ft N of Green Valley Rd	8,872	9,537	7.49%	+/- 37.09%	YES
Rural Arterial	Lotus Rd	300 ft S of Thompson Hill Rd	5,557	5,810	4.55%	+/- 44.40%	YES
Rural Arterial	Lotus Rd	0.25 mi S of SR 49	5,848	5,766	-1.41%	+/- 44.53%	YES
Rural Arterial	Luneman Rd	100 ft W of Lotus Rd	3,006	2,924	-2.71%	+/- 56.96%	YES
Rural Arterial	Marshall Rd	200 yds E of SR 49	3,629	3,250	-10.45%	+/- 54.82%	YES
Rural Arterial	Marshall Rd	300 ft E of Garden Valley Rd	4,438	4,423	-0.33%	+/- 49.02%	YES
Rural Arterial	Marshall Rd	300 yds S of Lower Main St	765	2,822	268.84%	+/- 57.71%	NO
Rural Arterial	Mormon Emigrant Tr	100 ft E of Sly Park Rd	1,043	1,596	53.05%	+/- 70.96%	YES
Rural Arterial	Mosquito Rd	At City Limits	3,618	6,179	70.79%	+/- 43.42%	NO
Rural Arterial	Mother Lode Dr	200 ft W of Sunset Ln	13,971	16,546	18.43%	+/- 30.37%	YES
Rural Arterial	Mother Lode Dr	400 yds W of Pleasant Valley Rd	9,828	9,986	1.60%	+/- 36.48%	YES
Rural Arterial	Mother Lode Dr	0.43 mi E of Pleasant Valley Rd	3,381	2,704	-20.02%	+/- 58.61%	YES
Rural Arterial	Mt Aukum Rd	0.25 mi N of County Line	1,731	428	-75.26%	+/- 114.39%	YES
Rural Arterial	Mt Aukum Rd	300 ft S of Bucks Bar Rd	3,817	4,817	26.19%	+/- 47.53%	YES
Rural Arterial	Mt Aukum Rd	300 ft S of Pleasant Vly Rd	3,245	3,886	19.75%	+/- 51.38%	YES
Rural Arterial	Mt Murphy Rd	50 ft S of Marshall Rd	1,099	2,402	118.56%	+/- 61.18%	NO
Rural Arterial	Mt Murphy Rd	200 yds N of SR 49	387	4,021	939.11%	+/- 50.75%	NO
Rural Arterial	Newtown Rd	200 yds N of Pioneer Hill Rd	2,613	3,791	45.09%	+/- 51.84%	YES
Rural Arterial	Newtown Rd	100 ft E of Broadway	3,850	4,701	22.11%	+/- 47.95%	YES
Rural Arterial	Old Frenchtown Rd	400 yds S of Mother Lode Dr	1,357	1,966	44.86%	+/- 65.80%	YES
Rural Arterial	Omo Ranch Rd	100 ft E of Mt Aukum Rd	800	681	-14.84%	+/- 96.65%	YES
Rural Arterial	Oxford Rd	50 ft E of Salida Wy	3,964	5,109	28.88%	+/- 46.52%	YES
Rural Arterial	Pleasant Valley Rd	200 yds E of Mother Lode Dr	8,257	7,281	-11.82%	+/- 40.91%	YES
Rural Arterial	Pleasant Valley Rd	200 yds E of SR 49 (E)	16,172	17,921	10.81%	+/- 29.50%	YES
Rural Arterial	Pleasant Valley Rd	300 ft W of Oak Hill Rd	11,765	11,207	-4.74%	+/- 34.98%	YES
Rural Arterial	Pleasant Valley Rd	100 ft E of Cedar Ravine Rd	10,535	10,292	-2.31%	+/- 36.08%	YES
Rural Arterial	Pleasant Valley Rd	0.40 mi E of Newtown Rd	5,359	4,781	-10.79%	+/- 47.66%	YES

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Rural Arterial	Ponderosa Rd	300 ft N of Wild Chaparral Dr	7,647	7,460	-2.44%	+/- 40.55%	YES
Rural Arterial	Pony Express Tr	200 yds E of Carson Rd	3,263	3,035	-6.98%	+/- 56.20%	YES
Rural Arterial	Pony Express Tr	300 ft E of Gilmore Rd	5,096	5,922	16.20%	+/- 44.10%	YES
Rural Arterial	Pony Express Tr	300 ft W of Forebay Rd	6,606	4,010	-39.30%	+/- 50.80%	YES
Rural Arterial	Salmon Falls Rd	50 ft S of Malcolm-Dixon Rd	7,186	12,403	72.61%	+/- 33.72%	NO
Rural Arterial	Salmon Falls Rd	At New York Creek Bridge	2,172	5,343	145.99%	+/- 45.77%	NO
Rural Arterial	Salmon Falls Rd	400 yds S of Pedro Hill Rd	1,537	3,578	132.78%	+/- 52.94%	NO
Rural Arterial	Salmon Falls Rd	200 yds S of Rattlesnake Bar Rd	487	3,578	634.68%	+/- 52.94%	NO
Rural Arterial	Sand Ridge Rd	300 ft E of SR 49	627	887	41.41%	+/- 87.84%	YES
Rural Arterial	Serrano Pkwy	300 ft W of Bass Lake Rd	5,589	6,437	15.17%	+/- 42.78%	YES
Rural Arterial	Shingle Springs Dr	0.20 mi S of US 50	2,637	1,915	-27.37%	+/- 66.42%	YES
Rural Arterial	Sly Park Rd	0.35 mi E of Mt Aukum Rd	3,221	2,898	-10.02%	+/- 57.15%	YES
Rural Arterial	Sly Park Rd	1.62 mi W of Mormon Emigrant Tr	2,164	3,225	49.03%	+/- 54.98%	YES
Rural Arterial	Sly Park Rd	0.35 mi E of Mormon Emigrant Tr	3,826	4,598	20.18%	+/- 48.34%	YES
Rural Arterial	Sly Park Rd	100 ft S of Gold Ridge Tr (N)	5,947	6,178	3.88%	+/- 43.42%	YES
Rural Arterial	Sly Park Rd	100 ft S of Pony Express Tr	8,140	6,072	-25.41%	+/- 43.70%	YES
Rural Arterial	South Shingle Rd	100 ft S of Sunset Ln	6,549	5,614	-14.27%	+/- 44.96%	YES
Rural Arterial	Union Mine Rd	200 yds S of SR 49	1,375	469	-65.86%	+/- 110.64%	YES
Rural Arterial	Wentworth Springs Rd	0.7 mi E of Main St	3,354	1,542	-54.03%	+/- 71.86%	YES
Rural Arterial	White Rock Rd	At County Line	9,144	7,701	-15.78%	+/- 40.09%	YES
Rural Arterial	White Rock Rd	100 ft W of Latrobe Rd	11,708	15,117	29.12%	+/- 31.38%	YES
Freeways	WB US50 - GP Lanes	White Rock	88,809	77,714	-12.49%	+/- 15.30%	YES
Freeways	WB US50 - GP Lanes	White Rock	87,170	79,414	-8.90%	+/- 15.18%	YES
Freeways	WB US50 - GP Lanes	Zinfindel	67,577	69,835	3.34%	+/- 47.46%	YES
Freeways	WB US50 - GP Lanes	Zinfindel	79,707	69,360	-12.98%	+/- 47.36%	YES
Freeways	WB US50 - GP Lanes	Pyrites Way	51,263	57,014	11.22%	+/- 44.58%	YES
Freeways	WB US50 - GP Lanes	Pyrites Way	53,673	60,447	12.62%	+/- 45.35%	YES
Freeways	WB US50 - GP Lanes	Iron Point Rd	34,700	32,443	-6.51%	+/- 39.05%	YES
Freeways	WB US50 - GP Lanes	Iron Point Rd	32,643	35,634	9.16%	+/- 39.77%	YES
Freeways	WB US50 - GP Lanes	Prairie City	31,627	32,164	1.70%	+/- 38.99%	YES
Freeways	WB US50 - GP Lanes	Prairie City	34,697	33,535	-3.35%	+/- 39.30%	YES
Freeways	WB US50 - GP Lanes	w/o latrobe	44,362	41,123	-7.30%	+/- 41.00%	YES
Freeways	WB US50 - GP Lanes	w/o latrobe	36,007	45,726	26.99%	+/- 42.04%	YES
Freeways	WB US50 - GP Lanes	w/o latrobe	6,309	13,902	120.34%	+/- 32.35%	NO

Classification	Roadway	Location	Traffic Count	Model Volume	Percent Error	NCHRP 255 Limit	Within Limit?
Freeways	WB US50 - GP Lanes	w/o latrobe	6,493	15,752	142.59%	+/- 30.92%	NO
Freeways	WB US50 - GP Lanes	W. of Ponderosa	39,263	36,640	-6.68%	+/- 39.99%	YES
Freeways	WB US50 - GP Lanes	W. of Ponderosa	29,548	37,258	26.09%	+/- 40.13%	YES
Freeways	WB US50 - HOV Lane	W. of ShingleSprings	27,744	28,640	3.23%	+/- 24.89%	YES
Freeways	WB US50 - GP Lanes	W. of Greenstone	26,430	29,135	10.23%	+/- 24.73%	YES
Freeways	WB US50 - GP Lanes	Greenstone	26,392	26,786	1.49%	+/- 25.50%	YES
Freeways	WB US50 - GP Lanes	Greenstone	27,920	27,796	-0.44%	+/- 25.16%	YES
Freeways	WB US50 - GP Lanes	Missouri Flat	33,837	27,200	-19.62%	+/- 25.36%	YES
Freeways	WB US50 - GP Lanes	Missouri Flat	35,949	28,553	-20.57%	+/- 24.92%	YES

### VI. Validation of the Peak-Hour Assignments

The validation of the peak-hour traffic assignment by roadway classification is summarized in **Table 6**. The percent error and percent RSME targets refer to the recommended limits adopted from FHWA and Caltrans guidelines. **Table 6** summarizes the validation of the peak-hour assignment by roadway classification.

**Table 6 – Peak-Hour Validation**

Roadway Classification	AM Peak-Hour		PM Peak-Hour		Percent Error		Percent RMSE	
	Model	Observed	Model	Observed	AM	PM	AM	PM
Freeways	72,012	64,961	75,685	68,798	10.9%	10.0%	25%	21%
Major Arterials	23,885	26,629	25,831	29,967	-10.3%	-13.8%	14%	15%
Minor Arterials	11,514	11,558	12,677	12,391	-0.4%	2.3%	34%	34%
Rural Arterials	47,427	46,567	49,851	50,474	1.8%	-1.2%	40%	32%
Collectors	7,371	8,090	7,887	8,967	-8.9%	-12.0%	38%	39%
ALL	162,209	157,805	171,930	170,597	2.8%	0.8%	37%	31%

### VII. Validation Summary and Conclusion

**Table 7** below summarizes how the 2016 EDC TDM validates compared to the three validation criteria. As shown in **Table 7** the model passes all three validation criteria. As noted previously, the model-wide correlation coefficient is 0.9803 which is greater than 0.88, the entire model percent RMSE is 22%, well within the required 35%, and 85% of all roadway links are within their desirable deviation, greater than the 75% requirement.

**Table 7 – Summary of How Model Validates**

Validation Criteria	Pass/Fail
The model-wide correlation coefficient should be greater than 0.88	Pass
The maximum acceptable RMSE for the entire model should not exceed 35%.	Pass
A minimum of 75% of the roadway links should be within their maximum desirable deviation	Pass