



TECHNICAL MEMORANDUM

To: Carson City Public Works
From: Wood Rodgers, Inc. – Mario Tambellini, PE, TE
Date: June 10, 2019
Subject: CAMPO Travel Demand Model External Gateway Validation

INTRODUCTION

This memorandum was prepared to document the results of a validation and consistency check of external gateway volumes estimated by the latest version of the Carson Area Metropolitan Planning Organization (CAMPO) Travel Demand Model (TDM). The latest version of the TransCAD-based CAMPO TDM, last updated by Kimley-Horn in 2018, was provided by Carson City (City). The CAMPO TDM contains scenarios for years 2015 (base year), 2025, and 2040. There are “constrained” and “unconstrained” scenarios for years 2025 and 2040, however these do not affect the external gateway forecasts. The CAMPO TDM contains the following seven external gateways:

1. US-50 (East), located east of Rainbow Drive in Dayton
2. SR-341 (North), located north of Industrial Parkway in Lyon County
3. US-395/I-580 (North), located north of Hobart Road in Carson City
4. US-50 (West), located west of Carson Street in Carson City
5. Jacks Valley Road (South), located south of Big Sky Trail in Douglas County
6. US-395 (South), located south of Johnson Lane in Douglas County
7. East Valley Road (South), located south of Sandra Lane in Douglas County

VALIDATION

The CAMPO TDM estimated base year 2015 external gateway daily volumes were validated against year 2015 average annual daily traffic (AADT) counts obtained from the Nevada Department of Transportation (NDOT) TRINA web application. The percent difference between the counts and model volumes were calculated and compared to model validation targets in the *Travel Model Validation and Reasonableness Checking Manual* (Federal Highway Administration, September 2010). Table 1 summarizes the validation results.

The NDOT TRINA web application did not have counts for East Valley Road in Douglas County, therefore the segment of Fremont Street south of Johnson Lane (shown as Gateway 7a in Table 1) was used to validate Gateway 7 as it is located just north of (and becomes) East Valley Road. As shown in Table 1, all of the CAMPO TDM external gateway volumes meet the validation targets except for Gateway #5 Jacks Valley Road (South). However, Jacks Valley Road (South) has a low AADT (1,900), which means the 28 percent difference only corresponds to a relatively insignificant daily volume difference of 533 vehicles. Generally, slightly larger percent differences on low-volume roadways are considered acceptable in a County-wide TDM. However, it would be relatively easy to adjust the CAMPO TDM volume to meet validation targets, if desired, as it is at a gateway. Also,

while Gateway #7a Fremont Street does meet validation targets, the CAMPO TDM volumes on Gateway #7 Eastern Valley Road (South) look potentially too low (only 142 daily vehicles).

Table 1. CAMPO TDM External Gateway Validation Against Counts

#	Gateway	Roadway Classification	TRINA AADT Count	CAMPO TDM ADT	Percent Difference	NCRP Validation Target	Validation Target Met?
1	US-50 (East)	Principal Arterial	7,200	6,941	-3.6%	+/-10%	Yes
2	SR-341 (North)	Collector	2,900	2,595	-10.5%	+/-25%	Yes
3	US-395/I-580 (North)	Freeway	38,000	38,997	2.6%	+/-7%	Yes
4	US-50 (West)	Principal Arterial	12,300	12,282	-0.1%	+/-10%	Yes
5	Jacks Valley Road (South)	Minor Arterial	1,900	2,433	28.1%	+/-15%	No
6	US-395 (South)	Principal Arterial	27,500	26,319	-4.3%	+/-10%	Yes
7	East Valley Road (South)	Collector	n/a	142	n/a	+/-25%	n/a
7a	Fremont Street	Collector	1,400	1,237	-11.6%	+/-25%	Yes

CHECKING EXTERNAL GATEWAY GROWTH

Future year 2025 and 2040 CAMPO TDM volume forecasts at external gateways were compared against forecasts for those same facilities from TDMs of neighboring agencies. The four models the CAMPO TDM was compared against were NDOT's Statewide TDM, Regional Transportation Commission (RTC) of Washoe County's TDM, Tahoe Regional Planning Agency's (TRPA) TDM, and Douglas County's TDM. Latest available model files, documentation, and/or volumes were obtained for the four neighboring models.

The four models compared to the CAMPO TDM all had different scenario years and assumptions. When forecast scenarios varied, the forecasted volumes were adjusted to match the CAMPO TDM's future forecast scenarios of year 2025 and year 2040 average weekday daily conditions. Adjustments were made using seasonal adjustment factors on NDOT's website and growth rate interpolation.

Table 2 shows the base year 2015 daily volume estimates of all five models along with year 2015 AADT traffic counts from the NDOT TRINA web application.

Table 2. Year 2015 Daily Volumes (Raw Model Volumes)

#	Gateway	TRINA AADT Count	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	7,200	6,941	8,409	n/a	n/a	n/a
2	SR-341 (North)	2,900	2,595	3,168	n/a	n/a	n/a
3	US-395/I-580 (North)	38,000	38,997	44,554	37,988	n/a	n/a
4	US-50 (West)	12,300	12,282	14,769	n/a	15,268	5,343
5	Jacks Valley Road (South)	1,900	2,433	n/a	n/a	n/a	3,263
6	US-395 (South)	27,500	26,319	30,163	n/a	n/a	31,862
7	East Valley Road (South)	n/a	142	n/a	n/a	n/a	1,733

As shown in Table 2, the CAMPO TDM generally matches the existing traffic counts the closest out of the five models analyzed.

Table 3 shows the future year 2025 daily volume forecasts from all five travel demand models analyzed. Table 4 shows the future year 2025 forecasted percent growth from all five travel demand models analyzed.

Table 3. Year 2025 Daily Volumes (Raw Model Volumes)

#	Gateway	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	8,607	9,435	n/a	n/a	n/a
2	SR-341 (North)	2,839	3,390	n/a	n/a	n/a
3	US-395/I-580 (North)	46,620	48,344	40,583	n/a	n/a
4	US-50 (West)	13,411	16,248	n/a	15,423	5,836
5	Jacks Valley Road (South)	2,944	n/a	n/a	n/a	4,362
6	US-395 (South)	28,195	30,193	n/a	n/a	35,225
7	East Valley Road (South)	147	n/a	n/a	n/a	2,526

Table 4. Year 2025 Forecasted Percent Increase Over Year 2015 Volumes

#	Gateway	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	24.0%	12.2%	n/a	n/a	n/a
2	SR-341 (North)	9.4%	7.0%	n/a	n/a	n/a
3	US-395/I-580 (North)	19.5%	8.5%	6.8%	n/a	n/a
4	US-50 (West)	9.2%	10.0%	n/a	1.0%	9.2%
5	Jacks Valley Road (South)	21.0%	n/a	n/a	n/a	33.7%
6	US-395 (South)	7.1%	0.1%	n/a	n/a	10.6%
7	East Valley Road (South)	3.5%	n/a	n/a	n/a	45.8%

As shown in Table 4, the CAMPO TDM forecasts the highest percent growth of the five models at Gateways 1, 2, and 3. The CAMPO TDM forecasts the lowest percent growth of the five models at Gateways 5 and 7. At Gateway 4, the CAMPO TDM forecasts percent growth which essentially matches (within a percent) the forecasts of the NDOT Statewide TDM and the Douglas County TDM. At Gateway 6, the CAMPO TDM forecasts percent growth which falls in the middle of the NDOT Statewide TDM and Douglas County TDM forecasts.

Table 5 shows the future year 2040 daily volume forecasts from all five travel demand models analyzed. Table 6 shows the future year 2040 forecasted percent growth from all five travel demand models analyzed. Since the NDOT Statewide TDM has two future year 2040 scenarios, “standard” and “high-growth”, two NDOT Statewide TDM year 2040 scenarios are shown. The “standard” year 2040 NDOT Statewide TDM scenario represents growth based on current projections from counties and RTCs. The “high-growth” year 2040 NDOT Statewide TDM scenario represents growth based on a recent economic study prepared for NDOT.

Table 5. Year 2040 Daily Volumes (Raw Model Volumes)

#	Gateway	CAMPO TDM	NDOT Statewide TDM	NDOT Statewide TDM High-Growth Scenario	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	9,902	11,177	12,090	n/a	n/a	n/a
2	SR-341 (North)	2,959	3,827	3,997	n/a	n/a	n/a
3	US-395/I-580 (North)	53,990	55,226	59,034	43,980	n/a	n/a
4	US-50 (West)	14,092	18,402	19,577	n/a	16,863	6,688
5	Jacks Valley Road (South)	3,244	n/a	n/a	n/a	n/a	7,167
6	US-395 (South)	29,526	35,092	35,986	n/a	n/a	36,016
7	East Valley Road (South)	153	n/a	n/a	n/a	n/a	2,828

Table 6. Year 2040 Forecasted Percent Increase Over Year 2015 Volumes

#	Gateway	CAMPO TDM	NDOT Statewide TDM	NDOT Statewide TDM High-Growth Scenario	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	43%	33%	44%	n/a	n/a	n/a
2	SR-341 (North)	14%	21%	26%	n/a	n/a	n/a
3	US-395/I-580 (North)	38%	24%	32%	16%	n/a	n/a
4	US-50 (West)	15%	25%	33%	n/a	10%	25%
5	Jacks Valley Road (South)	33%	n/a	n/a	n/a	n/a	120%
6	US-395 (South)	12%	16%	19%	n/a	n/a	13%
7	East Valley Road (South)	8%	n/a	n/a	n/a	n/a	63%

As shown in Table 6, the CAMPO TDM forecasts the highest percent growth of the five models at Gateway 3. The CAMPO TDM forecasts the lowest percent growth of the five models at Gateways 2, 5, 6, and 7. At Gateway 1, the CAMPO TDM forecasts percent growth which essentially matches (within a percent) the forecast of the NDOT Statewide TDM High-Growth Scenario. At Gateway 4, the CAMPO TDM forecasts percent growth which is noticeably lower than both the NDOT Statewide TDM scenarios and the Douglas County TDM, but higher than the TRPA TDM.

Since TDM estimated base year volumes never perfectly match base year traffic counts, it is typically best practice to post-process TDM forecasts. Post-processing TDM forecasts helps ensure that any inconsistencies in TDM traffic volume estimates which exist in the base year scenario are not carried over into future year forecasts, and help create consistent forecasts. One way of doing this, as recommended in the *NDOT Traffic Forecasting Guidelines* (NDOT, August 2012), is to use the Difference Method. The Difference Method says: Final Adjusted Forecast = (Future Year Model Volume – Base Year Model Volume) + Base Year Traffic Count. Essentially, this method adds the growth projected by a TDM to the base year traffic count. Year 2025 projected daily growth in ADT is shown in Table 7, Year 2025 final adjusted forecasts (using the difference method) are shown in Table 8, and the percent difference of year 2025 final adjusted forecasts from the five TDMs analyzed vs. the CAMPO TDM final adjusted forecasts are shown in Table 9. Note that since no count was available for East Valley Road (South), a base year count of 1,000 ADT was assumed.

Table 7. Projected Growth in ADT between Year 2015 and Year 2025

#	Gateway	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	+1,666	+1,026	n/a	n/a	n/a
2	SR-341 (North)	+244	+222	n/a	n/a	n/a
3	US-395/I-580 (North)	+7,623	+3,790	+2,595	n/a	n/a
4	US-50 (West)	+1,129	+1,479	n/a	+155	+493
5	Jacks Valley Road (South)	+511	n/a	n/a	n/a	+1,099
6	US-395 (South)	+1,876	+30	n/a	n/a	+3,363
7	East Valley Road (South)	+5	n/a	n/a	n/a	+793

Table 8. Year 2025 Final Adjusted Forecasts Using the Difference Method

#	Gateway	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	8,866	8,226	n/a	n/a	n/a
2	SR-341 (North)	3,144	3,122	n/a	n/a	n/a
3	US-395/I-580 (North)	45,623	41,790	40,595	n/a	n/a
4	US-50 (West)	13,429	13,779	n/a	12,455	12,793
5	Jacks Valley Road (South)	2,411	n/a	n/a	n/a	2,999
6	US-395 (South)	29,376	27,530	n/a	n/a	30,863
7	East Valley Road (South)	1,005	n/a	n/a	n/a	1,793

Table 9. Percent Difference of Year 2025 Final Adjusted Forecasts vs. CAMPO TDM

#	Gateway	CAMPO TDM	NDOT Statewide TDM	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	0%	-7%	n/a	n/a	n/a
2	SR-341 (North)	0%	-1%	n/a	n/a	n/a
3	US-395/I-580 (North)	0%	-8%	-11%	n/a	n/a
4	US-50 (West)	0%	+3%	n/a	-7%	-5%
5	Jacks Valley Road (South)	0%	n/a	n/a	n/a	+24%
6	US-395 (South)	0%	-6%	n/a	n/a	+5%
7	East Valley Road (South)	0%	n/a	n/a	n/a	+78%

Year 2040 projected daily growth in ADT is shown in Table 10, Year 2040 final adjusted forecasts (using the difference method) are shown in Table 11, and the percent difference of year 2040 final adjusted forecasts from the five TDMs analyzed vs. the CAMPO TDM final adjusted forecasts are shown in Table 12. Note that since no count was available for East Valley Road (South), a base year count of 1,000 ADT was assumed.

Table 10. Projected Growth in ADT between Year 2015 and Year 2040

#	Gateway	CAMPO TDM	NDOT Statewide TDM	NDOT Statewide TDM High-Growth Scenario	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	+2,961	+2,768	+3,681	n/a	n/a	n/a
2	SR-341 (North)	+364	+659	+829	n/a	n/a	n/a
3	US-395/I-580 (North)	+14,993	+10,672	+14,480	+5,992	n/a	n/a
4	US-50 (West)	+1,810	+3,633	+4,808	n/a	+1,596	+1,345
5	Jacks Valley Road (South)	+811	n/a	n/a	n/a	n/a	+3,904
6	US-395 (South)	+3,207	+4,929	+5,823	n/a	n/a	+4,154
7	East Valley Road (South)	+11	n/a	n/a	n/a	n/a	+1,095

Table 11. Year 2040 Final Adjusted Forecasts Using the Difference Method

#	Gateway	CAMPO TDM	NDOT Statewide TDM	NDOT Statewide TDM High-Growth Scenario	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	10,161	9,968	10,881	n/a	n/a	n/a
2	SR-341 (North)	3,264	3,559	3,729	n/a	n/a	n/a
3	US-395/I-580 (North)	52,993	48,672	52,480	43,992	n/a	n/a
4	US-50 (West)	14,110	15,933	17,108	n/a	13,896	13,645
5	Jacks Valley Road (South)	2,711	n/a	n/a	n/a	n/a	5,804
6	US-395 (South)	30,707	32,429	33,323	n/a	n/a	31,654
7	East Valley Road (South)	1,011	n/a	n/a	n/a	n/a	2,095

Table 12. Percent Difference of Year 2040 Final Adjusted Forecasts vs. CAMPO TDM

#	Gateway	CAMPO TDM	NDOT Statewide TDM	NDOT Statewide TDM High-Growth Scenario	Washoe TDM	TRPA TDM	Douglas County TDM
1	US-50 (East)	0%	-2%	+7%	n/a	n/a	n/a
2	SR-341 (North)	0%	+9%	+14%	n/a	n/a	n/a
3	US-395/I-580 (North)	0%	-8%	-1%	-17%	n/a	n/a
4	US-50 (West)	0%	+13%	+21%	n/a	-2%	-3%
5	Jacks Valley Road (South)	0%	n/a	n/a	n/a	n/a	+114%
6	US-395 (South)	0%	+6%	+9%	n/a	n/a	+3%
7	East Valley Road (South)	0%	n/a	n/a	n/a	n/a	+107%