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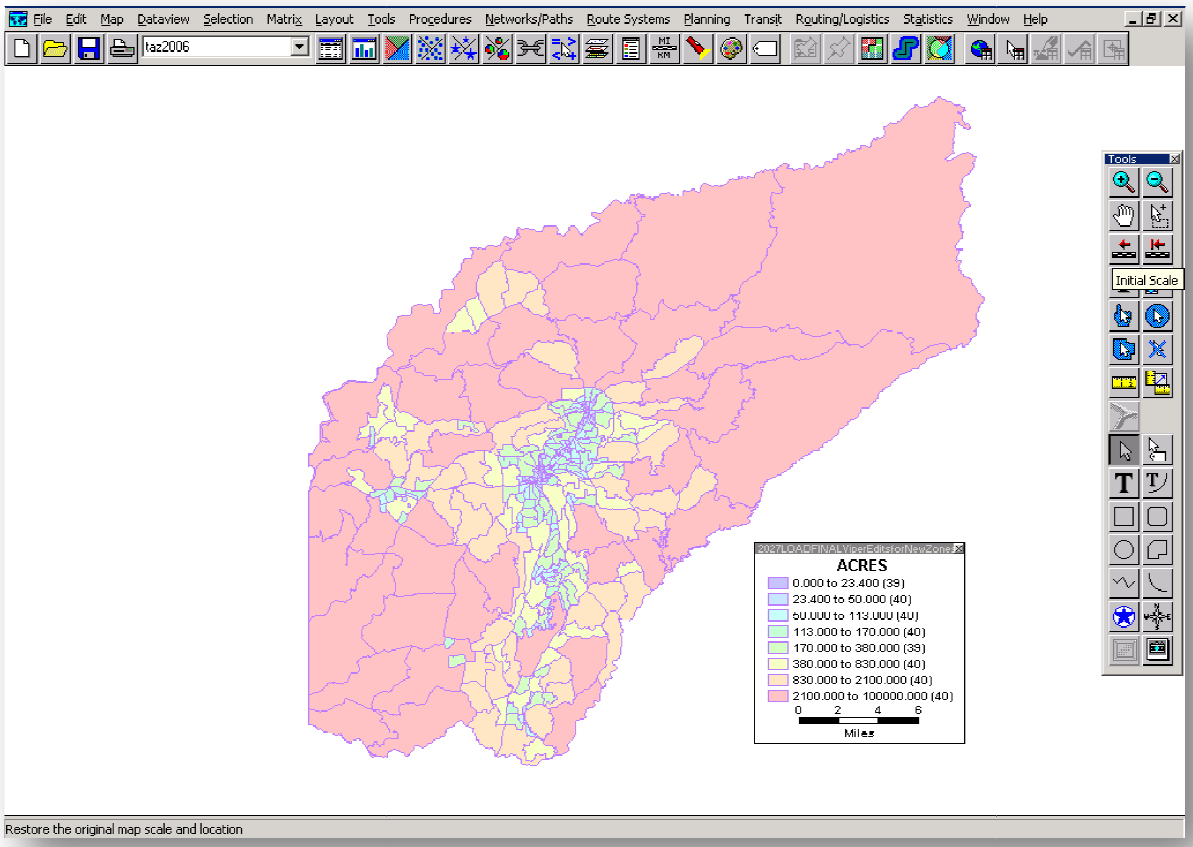

TRANSCAD Traffic Model Coverage Area (west slope Nevada County)

NCTC TRAFFIC MODEL AND LAND USE UPDATE

Prepared for the

NEVADA COUNTY TRANSPORTATION COMMISSION

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EXECUTIVE SUMMARY

The Nevada County Transportation Commission's traffic model scope covers the western slope of Nevada County, approximately west of the intersection of SR 20 with the I-80 freeway. The model has evolved for over two decades, initially as a command line MINUTP batch mode model in the late eighties, to a graphical based TP+/Viper format in the late nineties, and now the full GIS format in the TRANSCAD software format. TRANSCAD is a full-fledged GIS software package, and works with the widest variety of file formats for import and export, including EXCEL, ArcView ESRI Shape Files, Data files of a variety of formats, and native file formats for mapping and databases, etc. It interfaces with the County's GIS system through industry standard GIS "shape file" exchange and spreadsheet exchange of data.

MODIFYING TRAFFIC ANALYSIS ZONE BOUNDARIES

In the 2008 update the focus was to refine the land use data into a slightly modified traffic analysis Zone structure that would be compatible with the county's development fee program Zone structure. Specifically, the traffic model Zone structure was modified to be compatible and contiguous with the county's development fee Zone 8. The result of this work effort was to split any traffic Zones in the traffic model that crossed over the boundary of the county's development fee Zone 8, and split these Zones into two traffic analysis Zones, and effectively creating several new Zones within the traffic model. Prism engineering worked closely with the county staff to use the county's GIS System in developing these new traffic analysis Zones, and the land use data associated with each traffic analysis Zone affected.

ADDING DAILY COMPONENT TO TRAFFIC MODEL

The update of the county's development fee program required input from the traffic model based on daily condition traffic projections. Up to this point the NCTC's traffic model has been based solely upon the pm peak hour time period. The traffic model was expanded to incorporate a new scenario for daily conditions based upon daily trip generation rates and trip distribution assumptions. It was deemed insufficient to merely factor the pm peak hour traffic projections with a global daily factor because the pm peak hour does not sufficiently capture or represent say, school traffic and many other non work related trip purposes. Using the standard trip generation rates for all land uses represented in the traffic model allows for all trip generation to be accounted for in the traffic projections for a daily condition. In addition, the trip split information is more accurate (50/50) compared to factoring the pm peak hour volumes along roadways where directional volumes differ.

OVERVIEW, BACKGROUND, AND METHODOLOGY

OVERVIEW. The NCTC existing TRANSCAD traffic model was updated in 2008 for use in the update of the County's Regional Transportation Mitigation Fee program (RTMF), which correlates with fee Zones developed previously in the County's Development Fee Program (CDFP). The County's RTMF fee update required the model to be more compliant to the specific needs of updating the development fee program. More specifically, if traffic projections from the traffic model were to be used, the model needed to have its Traffic Analysis Zones (TAZs) and associated trip generation totals to be strictly compatible with the County's development fee Zone area boundaries. The model was originally set up to follow the Census Tract Zone area boundaries, which don't necessarily follow the boundaries set up for the CDFP Zones, some of which follow city limit lines. This was especially true for the CDFP Zone 8 which encompasses the urban area in the west slope of the County that includes the Cities of Grass Valley and Nevada City, but this boundary is not contiguous or necessarily related to the boundaries used in the traffic model (which are based on census tract boundaries). In this work effort Prism Engineering coordinated the changes to the traffic model with Nevada County DOT staff who worked with the County's GIS System to modify the specific traffic analysis Zone layer in the TRANSCAD model using shape files. Once these files were developed it was possible to graphically identify and filter all parcels that belonged to the original TAZ that was split into two Zones, and allocate the remainder to the new traffic Zone. The purpose of this exercise was so that the trip generation totals within CDFP 8 could be accurately represented, and not have overlapping trip generation from just outside the boundary.

In addition to modifying the TAZ structure in the vicinity of CDFP Zone 8, it was also necessary to add a "daily model" component so that traffic projections would be compatible with current methodologies used in calculating the fees within the CDFP. This report documents the changes made to the model's TAZ structure, land use updates, and the methodology of the daily traffic model component in the NCTC TRANSCAD model.

Nevada County DOT and Planning Staff had a part in the traffic model update by providing land use data growth projections and corrections for the model. Previously, Nevada County DOT Staff was instrumental in developing a "Maximum Entitlement" threshold of future land use quantities, that take into consideration the amount of land (parcels) in a TAZ that are available for future development. In this manner the NCTC can properly predict

future growth more accurately by allowing the assignment of growth only where it is *possible.* It goes beyond the simple application of a growth rate, and considers how much land is available to allow growth, so that growth is not occurring in a linear fashion among the data, but in a geographical manner, consistent with the GIS tools available. County Staff also provided the changes to the land use data and adjusted TAZ boundaries to conform to the CDFP Fee Zone 8, and made changes to land use data by shifting data into newly created TAZs, in or out of CDFP Fee Zone 8, etc.

The NCTC TRANSCAD traffic model is a state of the art tool that enables graphical representation of complex data sets, and the prediction of existing and future traffic scenarios, based upon a set of assumptions for land use quantities and roadway conditions. For example, with a traffic model is it possible to test future scenarios of land use development and find out what impacts in traffic volume is likely to take place on the roadway system. It is also possible to test new roadways and check their effectiveness or utilization. The model is a dynamic tool, with a base set of data that can be altered to check various scenarios.

TRANSCAD has GIS features built into its interface, including a GIS mapping tool, a wide variety of file import and export features, and robust traffic model functionality. This dual purpose provides the opportunity to more easily work with the large data sets. The program reads and writes industry standard "shape files" which are commonly used in programs such as ArcView, ArcInfo, and AutoCAD (currently in use by government agencies in Nevada County, and most every other county throughout California). The NCTC also has the ArcView software, but the County has the TRANSCAD software and can share TRANSCAD native format matrix files directly.

METHODOLOGY: ADD NEW TRAFFIC ANALYSIS ZONES

The NCTC Traffic model follows the CENSUS TRACT mapping areas for all Traffic Analysis Zones (TAZ), but this method had created a challenge in tracking data because the CENSUS areas do not necessarily coincide with the CDFP Zones created many years ago by the County of Nevada. In fact, several of the CENSUS areas overlap the boundary of CDFP Zone in the CDFP Zone map. Figure 1 illustrates the TAZ's that were overlapping the CDFP Zone boundary, because they followed the Census Tract area boundary.

The solid blue lines in Figure 1 represent CDFP Zone boundaries, and the shaded red areas represent the TAZ's that are affected in this change, or the

traffic analysis Zones that overlapped the fee Zone boundaries and therefore needed to be split.

Figure 2 is a close up view for the northernmost TAZ's affected, and shows more detail including specific TAZ numbers. It was decided by the NCTC Technical Advisory Committee (TAC) that it would be more useful to split these TAZ's into two Zones so that it would be possible to add up the totals of land uses by CDFP Zone areas, rather than do a manual count of developed parcels in each TAZ to determine which ones fell within the CDFP Zone or outside of it. For this reason, 13 new TAZ's were created from 13 larger TAZ's that previously straddled the CDFP Zone boundary line. These new TAZ's were numbered 801 to 813. The features within the NCTC's GIS based traffic model allowed us to graphically determine through the program's filters which specific parcels would fold into one or the other traffic analysis Zones created. This enabled a foolproof way to reallocate the data and assign a new traffic analysis Zone ID for all parcels affected. Using spreadsheet technology it was then possible to stratify the data by TAZ, and using pivot tables within Excel calculate summary totals of all land use data within each TAZ.

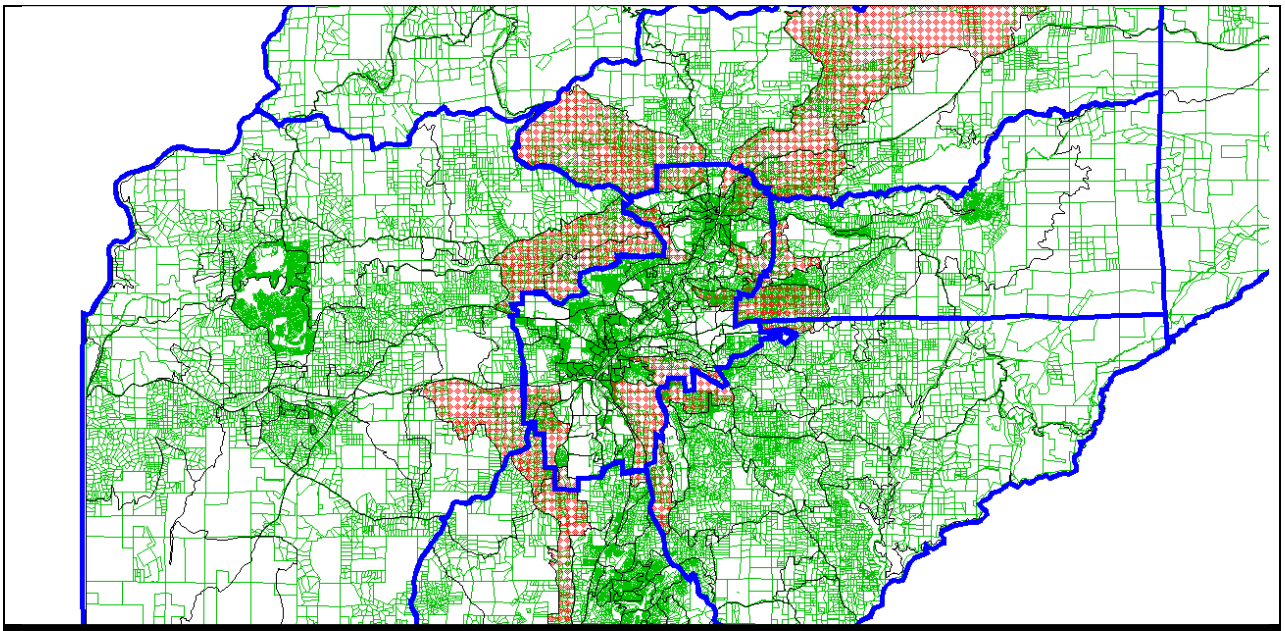

Figure 1 Overlapping Traffic Analysis Zones on CDFP Zone 8

The green lines shown in the figure represent the parcel boundaries for all parcels within the west slope of the County. The Black Lines represent the boundaries of the traffic analysis Zones, some of which are obscured by the figure blue lines which represent the County's development fee Zone boundaries. The hatched red areas represent the various traffic analysis Zones that had a portion within and without CDFP Zone.

Figure 2 shows more detail of how these affected TAZ areas overlap the CDFP Zone area boundary. For example, in the upper right of the figure, TAZ 179 can be seen. This TAZ has been split at the CDFP Zone boundary line, and that portion within CDFP Zone has been given the TAZ number of 802. Similarly, TAZ 109 below it was split into two areas, the outside area remaining with TAZ number 109, and that portion internal to CDFP Zone numbered as TAZ 803. The thirteen TAZ's affected by the CDFP Zone boundary were effectively split into 26 TAZ's in this manner, with the internal portion of the TAZ being numbered from TAZ 801 to 813.

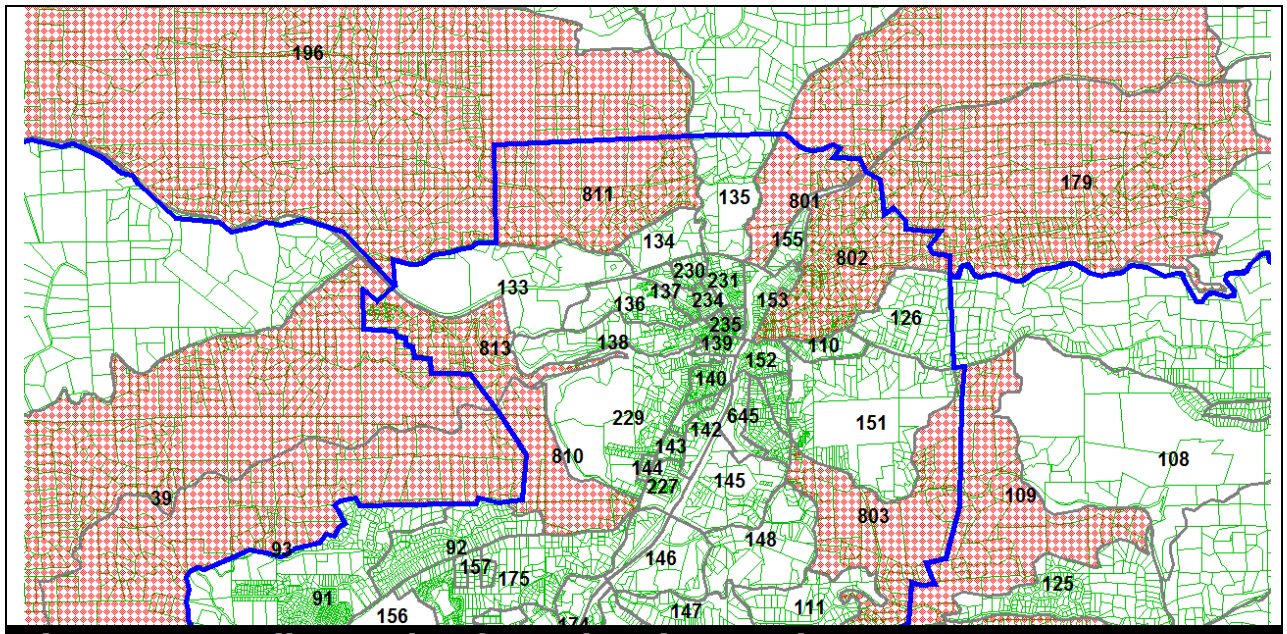

Figure 2 Detail Sample of Overlapping TAZ's on CDFP Zone 8

All remaining TAZ's in the model match the Census Tract block numbering area (BNA) boundaries contained in the computerized Tiger files in the County's GIS system. In many cases, the TAZ boundaries match the BNA boundaries, as the BNA was typically the smallest area that could become a TAZ. In a few cases where the BNA was very large (such as the BNA which contained the Nevada Union High School and Sierra College campuses), the BNA is further subdivided to account for significant differences in traffic assignment (the High School accesses Ridge Road exclusively, and the college accesses Sierra College Drive exclusively). As a general rule, the BNA is not subdivided except in very few cases. This was to keep the TAZ data as compatible as possible with the Census Tract data boundaries, except where it is detrimental to the proper operation of the traffic model. In this manner, it is much easier to verify and compare land use data in the traffic model to existing and future Census data.

METHODOLOGY: UPDATED STREET NETWORK AND ASSESSORS DATA

The calibrated street network in the new TRANSCAD model was built from the previous VIPER/TP+ model network, and converted to TRANSCAD format for use in the new model. For this reason and to remain backwards compatible as much as possible, the roadways in the latest model generally contain the same visual / geographic Global Positioning Satellite (GPS) surveyed data features, because these features were built into the previous model as well, having been created from the County's GIS files. This includes other data associated with the street network links (street name, surface type, functional class, lanes, roadway lane capacity, speeds, pm peak count, ADT count, Terrain, etc). The model is set up to be able to add new features and fields of data at any time. There are nearly 500 *unused* TAZ numbers, which allows for *future expansion* or subdivision of TAZ's at any time in the future as deemed necessary to obtain more detail. However, the NCTC traffic model in its current form is typically more detailed than most regional models, having over 300 TAZ areas within the western slope alone. The NCTC traffic model network contains every single road in the County, including the cities of Nevada City and Grass Valley, and all but the most minor rural roads get traffic assignment from the TAZ "centroid" connectors. The TAC worked together in the calibration process to create land use totals for each TAZ based on the County Assessor's Parcel data set. From this file, and using the EXCEL PIVOT TABLE feature, it was determined how many homes were in each TAZ, as well as how many acres of various land use, etc. This data was supplied to PRISM Engineering by the County and used in the TRANSCAD software to view visually, as well as in Excel spreadsheets to sort and further organize the data into a format useable by the traffic model features in TRANSCAD. The end result was an EXCEL format spreadsheet file of dwelling unit and acreage totals by TAZ, which is interchangeable with the TRANSCAD system, and which also calculates the Trip Generation for each TAZ in the model.

METHODOLOGY: LAND USE VALIDATION CHECK OF LAND USE DATA CONVERSION

As an example, the following methodology was employed to verify or validate the conversion of the Assessors Parcel data from the GIS into an EXCEL PIVOT table, and then to the traffic model itself. As an example, TAZ 165 was selected for this procedure, as it is located in a very busy area in the Brunswick Basin. Located along Sutton Way south of Brunswick and between Sutton and SR 20, there is a bank. Figure 3 shows this area in the TRANSCAD model, and the various colors representing the different land use categories in the NCTC model.

The bank in TAZ 165 is coded in red, and is located on the southwest corner of Sutton Way and Brunswick Road. In TRANSCAD the map tools were used to measure the perimeter length of this parcel called BANK as 0.115 miles. It has a square miles value of 0.000871 square miles. Calculating, this is reduced to square feet: 0.000871*(5280^2)=24282 sq ft. Dividing by 43,560 sq. ft per acre, this is 0.55 acres. Inspecting the land use file created from the PIVOT table in EXCEL, this value was 0.53 acres. Given the error in measuring the very small parcel on screen, this is essentially the same value, and validates the EXCEL PIVOT table methodology in converting the totals from the parcel file into the aggregated TAZ's.

Using same method, the remaining retail/office acreage area in TAZ 165 measured to 10.6 acres on the map, and the value in the EXCEL PIVOT table was also 10.6 acres, further validating the conversion process.

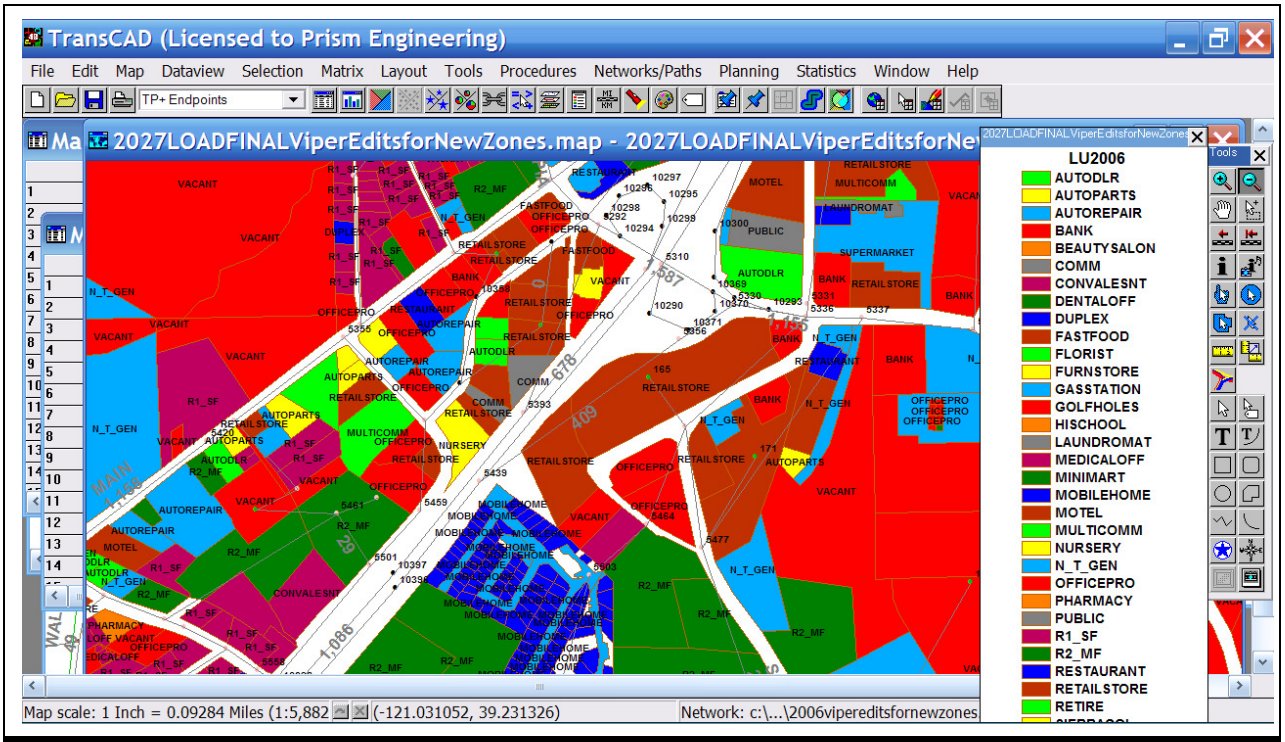

Figure 3 TAZ 165 Land Use Validation Process

MODEL PERFORMANCE AND CALIBRATION RESULTS

MODEL PERFORMANCE: CALIBRATION AND VALIDATION

The new TRANSCAD model was calibrated at a minimum according to Caltrans travel forecasting guidelines, and other methods utilized by Prism Engineering. The model has been used for several studies and work efforts including the Mitigation Fee and Capital Improvement Program studies, etc. The land use data was assembled from the Assessors detailed Parcel data, and trip generation rates the same as used previously were incorporated into the EXCEL Trip Generation spreadsheet, and traffic was assigned to the new TRANSCAD street network using the gravity model methods and equilibrium traffic assignment. The initial results needed revision or calibration adjustments. In the initial stages, mistakes and typos were found and corrected in the data sets. After the data was "cleaned up" and verified, it was still necessary to further adjust various traffic model parameters, such as trip generation rates, until the results of traffic projections in the new model closely replicated existing conditions. Previous parameters such as the friction factor curves, roadway speeds, and capacity were found to be in acceptable condition, and needed little to no adjustments. The TRANSCAD model is essentially a similar "engine" under the hood (the gravity model), but is also a GIS system. This allows for the creation of sophisticated mapping of data related to the model output, the land use file totals, and aerial photography as needed. The result is a better understanding of the data that goes into the model as well as the output results from the model.

The traffic projections from the model were compared within the traffic model software itself, to the existing traffic count data supplied by the County of Nevada Engineering Staff. The traffic count data was updated to Year 2006 levels of traffic by using a 1.5% growth rate per year to the current day. Generally speaking, the new traffic model calibration output matches fairly closely to the traffic count data. The Caltrans guidelines for traffic model performance is that major freeways or highways should match within 10% to 25% of the existing count (depending on the magnitude of the volume). For example, a major urban freeway system with over 100,000 ADT should match to within 10% of the traffic model projection. A minor highway with 10,000 ADT could have a margin of error as high as 25% and still be considered within the acceptable margin of error. Minor roadways within the County would have an even higher tolerance level (between 25% and 60% error). These Caltrans guidelines are "generous" pertaining to margins of error for hourly traffic volumes, primarily because many traffic models are not detailed and do not use peak hour trip generation rates. The results from a model limited in street network and land use categories, as well as the type of trip generation rate can yield

more broad-brushed results. The NCTC TRANSCAD traffic model is highly detailed in street network, has the most current (Year 2006) Assessors Parcel data set for accuracy, and yields better traffic projections as a result. All streets in the traffic model meet the specific Caltrans criteria for calibration and validation, as detailed in this section.

TRIP GENERATION ENHANCEMENTS. The TRANSCAD based NCTC traffic model has five residential trip generation rates. It takes advantage of the detail in the Assessor's data, and has 69 non-residential trip generation categories. This total of 74 trip generation categories and corresponding trip generation rates help to better account for the variety of land use types including fast food development, a variety of commercial/retail uses, service stations, and restaurant uses, etc. It also allows for better presentation of land use data in various TRANSCAD maps, because each land use type can have a unique color, making it very easy to determine, say, where the auto dealerships are located, or the schools, or the office buildings. The model has detailed land use which allows for more accurate trip generation and assignment in areas such as the Brunswick Basin where a variety of complex commercial land uses are in place.

Table I (broken into two parts) has been prepared to report the results of the most recent traffic model calibration[1] and validation as it relates to trip generation and trip assignment onto the street network. A traffic model is supposed to perform within certain parameters. Caltrans has prepared guidelines for the calibration and validation of traffic models. The new NCTC TRANSCAD model continues to perform well within the Caltrans guidelines.

Table I reports the calibration summary where traffic model traffic projections were compared to existing traffic count data along with numerous roadway segments throughout the county. In the table there are a few lines where the percentage error was greater than that allowed by the Caltrans guidelines, however, there are additional guidelines that when traffic volumes are very low, they are relatively insignificant to the overall performance of the model. In other words, it is expected that a few minor streets will have what appears to be large percentage differences from counts as this is normal given the limitations of a gravity model, but when the actual volume is considered in the case of the NCTC model, it is insignificant. Over 92% of the links summarized perform at acceptable levels.

[1] 2006 calibration

Table I, Part 1
Calibration Results of Traffic Model Performance to Existing Counts

	ROAD & LOCATION	Year 2006 ADT Counts	2006 Peak Hour Counts	2006 Traffic Model	2006 % Error	OK?
1	ADAM AVE. N OF SQUIRRELL CRK	1531	138	47	66%	Yes
2	ALLISON RANCH-S McCOURTNEY	929	84	44	47%	Yes
3	ALTA SIERRA DR. E. OF HWY 49	7107	640	820	-28%	Yes
4	ALTA SIERRA DR. W. OF DOG BAR RD.	2898	261	343	-32%	Yes
5	ALTA ST. SE. OF RIDGE RD.	3718	335	332	1%	Yes
6	AUBURN RD. S. OF McCOURTNEY RD.	1968	177	144	19%	Yes
7	BANNER LAVA CAP W. OF GAYLE LN.	4592	413	499	-21%	Yes
8	BANNER LAVA CAP W. OF GRACIE RD.	2515	226	276	-22%	Yes
9	BANNER LAVA CAP W. OLD TUNNEL	4483	403	606	-50%	Yes
10	BANNER LAVA CAP/E I.MARYLAND	1312	118	170	-44%	Yes
11	BANNER LAVA CAP/NW I. MARYLAND	1367	123	124	-1%	Yes
12	BITNEY SPRINGS RD N. OF R&R HWY	3280	295	432	-46%	Yes
13	BITNEY SPRINGS-N NEWTOWN	1312	118	288	-144%	No
14	BITNEY SPRINS/SE PLEASANT VALLEY	765	69	85	-23%	Yes
15	BOULDER ST. @ E. NEV CTY LIMIT	4920	443	517	-17%	Yes
16	BRUNSWICK RD N. OF HWY 174	8966	807	954	-18%	Yes
17	BRUNSWICK RD NW. OF E. BENNETT	12028	1083	1261	-16%	Yes
18	BRUNSWICK RD NW. OF LOMA RICA DR	16402	1476	1623	-10%	Yes
19	BRUNSWICK RD OVERXING TOTAL	30070	2706	2220	18%	Yes
20	BRUNSWICK RD SE. OF E. BENNETT RD	9841	886	1050	-19%	Yes
21	BRUNSWICK/N I.MARYLAND	13668	1230	1507	-23%	Yes
22	BRUNSWICK/S I.MARYLAND	15855	1427	1706	-20%	Yes
23	COMBIE RD. E. OF HWY 49	17495	1575	1562	1%	Yes
24	COMBIE RD. S OF SHOPPING CENTER	2187	197	294	-49%	Yes
25	COMBIE RD. SE. OF MAGNOLIA	6561	590	571	3%	Yes
26	DOG BAR RD. NW. OF ALTA SIERRA	6561	590	667	-13%	Yes
27	DOG BAR RD. S. OF ALTA SIERRA	4374	394	233	41%	Yes
28	DOG BAR RD. S. OF LABARR MDWS RD.	7654	689	827	-20%	Yes
29	DOG BAR RD. SE OF MAGNOLIA RD.	1312	118	59	50%	Yes
30	E.BENNETT RD E GV CITY LIMIT	2406	217	251	-16%	Yes
31	E.BENNETT RD SW BRUNSWICK RD	1312	118	248	-110%	No
32	E.EMPIRE ST E GRASS VALLEY CITY	4592	413	395	4%	Yes
33	GARDEN BAR RD S. OF WOLF RD.	1093	98	195	-98%	No
34	GOLD FLAT RD SE. OF HOLLOW WY	4920	443	302	32%	Yes
35	GOLD FLAT RD. S. OF GRACIE RD	2734	246	272	-11%	Yes
36	GRACIE RD. NW. OF BANNER LAVA CAP	1148	103	111	-7%	Yes
37	GRACIE RD. SE. OF GOLD FLAT RD	2078	187	282	-51%	Yes
38	GREENHORN RD NE. OF BRUNSWICK RD	3827	344	272	21%	Yes
39	IDAHO-MARYLAND RD W. OF BANNER L.C.	1312	118	178	-51%	Yes
40	IDAHO-MARYLAND/E BRUNSWICK	2187	197	134	32%	Yes
41	INDIAN SPRINGS RD W. OF McCOURTNEY	1640	148	184	-25%	Yes
42	JOERSCHKE DR SE. OF NEV CTY HWY	3280	295	160	46%	Yes
43	LaBARR MEADOWS RD E. OF HWY 49	765	69	60	13%	Yes
44	LaBARR MEADOWS RD N. OF DOG BAR RD.	8201	738	906	-23%	Yes
45	LaBARR MEADOWS RD SW. OF DOG BAR	1312	118	134	-13%	Yes
46	LIME KILN RD SE. OF McCOURTNEY	1585	143	81	43%	Yes
47	LIME KILN W. OF HWY 49	3280	295	370	-25%	Yes
48	LOMA RICA DR E. OF BRUNSWICK RD	7654	689	696	-1%	Yes
49	MAGNOLIA RD E. OF LK OF PINES	5467	492	417	15%	Yes

Source: NCTC Traffic Year 2006 TRANSCAD Model

Table I, Part 2
Calibration Results of Traffic Model Performance to Existing Counts

	ROAD & LOCATION	Year 2006 ADT Counts	2006 Peak Hour Counts	2006 Traffic Model	2006 % Error	OK?
50	McCOURTNEY RD S. OF INDIAN SPRINGS	2406	217	257	-19%	Yes
51	McCOURTNEY RD SW. OF BRIGHTON ST.	9841	886	783	12%	Yes
52	McCOURTNEY RD---NE INDIAN SPRINGS	2624	236	237	0%	Yes
53	McCOURTNEY-W AUBURN RD	6561	590	630	-7%	Yes
54	MOUNT OLIVE RD NE. OF DOG BAR RD	109	10	8	19%	Yes
55	NEV CTY HWY SW. OF BRUNSWICK RD	14324	1289	1524	-18%	Yes
56	NEV. CTY HWY NE. OF BRUNSWICK RD	19612	1765	974	45%	No
57	NEV. CTY HWY SW OF BANNER LAVA CAP	7654	689	565	18%	Yes
58	NEWTOWN RD NE. OF BITNEY SPRINGS	1093	98	144	-46%	Yes
59	NEWTOWN RD SW. OF HWY 49	1750	157	155	2%	Yes
60	OLD TUNNEL RD S. BANNER LAVA CAP	3827	344	432	-25%	Yes
61	OLD TUNNEL RD. N. OF BRUNSWICK RD	4592	413	398	4%	Yes
62	PENN VALLEY DR-- SE EASY ST	4374	394	371	6%	Yes
63	PENN VALLEY DR W. OF SPNCVLL RD	4374	394	301	24%	Yes
64	PENN VALLEY/SW HWY 20(E END)	5795	522	395	24%	Yes
65	PLEASANT VALLEY N-WILDFLOWER	2624	236	224	5%	Yes
66	PLEASANT VALLEY RD N. OF HWY 20	13121	1181	1446	-22%	Yes
67	PLEASANT VALLEY RD N. OF BITNEY SPR	1203	108	157	-45%	Yes
68	PLEASANT VALLEY RD W. OF HWY 49	875	79	100	-27%	Yes
69	QUAKER HILL CROSS RD NE. OF RED DOG	2187	197	236	-20%	Yes
70	RATTLESNAKE RD NE. OF DOG BAR RD	1203	108	69	36%	Yes
71	RATTLESNAKE RD S. OF HWY 174	3280	295	544	-84%	No
72	RED DOG RD-NW PARK AVE	4920	443	593	-34%	Yes
73	RED DOG SE PASQUALE	3280	295	290	2%	Yes
74	RIDGE RD E. OF R&R HWY	5467	492	687	-40%	Yes
75	RIDGE RD SW. OF HUGHES RD.	9294	836	1129	-35%	Yes
76	RIDGE RD W. OF NEV CTY HWY	8201	738	540	27%	Yes
77	ROUGH & READY HWY W. OF BITNEY SPRGS	4920	443	638	-44%	Yes
78	ROUGH & READY HWY W. OF RIDGE RD	8201	738	1066	-44%	Yes
79	SQUIRREL CREEK RD W. OF R&R HWY	3499	315	456	-45%	Yes
80	SQUIRREL CREEK RD-W ADAMS	2515	226	183	19%	Yes
81	SR 20 North of Empire	38271	3444	3628	-5%	Yes
82	SR 20 North of Uren	8201	738	863	-17%	Yes
83	SR 20 West of Brighton	17495	1575	1375	13%	Yes
84	SR 20 West of Penn Valley	7326	659	765	-16%	Yes
85	SR 49 East of Newtown	6889	620	757	-22%	Yes
86	SR 49 North of Tyler Foote	3608	325	398	-23%	Yes
87	SR 49 South of Combie	30616	2755	3030	-10%	Yes
88	SR 49 North of Combie	27336	2460	2791	-13%	Yes
89	SR 49 South of Empire	37177	3346	3542	-6%	Yes
90	SR 49 West of SR 20	12028	1083	1206	-11%	Yes
91	SUTTON @ GRASS VALLEY CITY	7654	689	387	44%	Yes
92	SUTTON-E OF BRUNSWICK WB & EB	12028	1083	733	32%	No
93	SUTTON-W OF BRUNSWICK WB& EB	12575	1132	707	38%	No
94	TYLER-FOOTE CROSS RD NE. OF 49	2187	197	198	-1%	Yes
95	WASHINGTON RD NE. OF HWY 20	437	39	142	-261%	No
96	WILLOW VALLEY RD @NEV CITY LIMIT	2734	246	210	15%	Yes
97	WOLF RD S. OF LIME KILN	547	49	44	11%	Yes
98	WOLF RD W. OF HWY 49 (W. OF	3827	344	323	6%	Yes
			58602	61540	-5%	

Source: NCTC Traffic Year 2006 TRANSCAD Model

DATA SETS AND DATA PRESENTATION

The detailed data for the Year 2006 TRANSCAD traffic model conversion can be found in the appendix of this report. Table II summarizes the acreage totals by land use category, the trip generation for each, and the reduced trip generation based on a pass-by reduction.

Table II, Part 1
Land Use Totals by Category

LAND USE	Acres or DU	PM Trip Rate		Pass by %	Trip Gen Reduction	Trips Assigned to Roads
AIRPORT	103.41	0.00	0	0.00	0	0
ANTIQUESTORE	1.85	27.75	51	0.50	26	26
ARCADE	4.27	3.30	14	0.00	0	14
AUTODLR	19.77	27.75	549	0.00	0	549
AUTOPARTS	22.13	27.75	614	0.50	307	307
AUTOREPAIR	17.55	27.75	487	0.50	244	244
BAKERY	1.59	27.75	44	0.50	22	22
BANK	9.42	65.00	612	0.00	0	612
BARBERSHOP	0.57	27.75	16	0.50	8	8
BEAUTYSALON	1.46	27.75	41	0.50	20	20
CAFE	0.78	48.94	38	0.45	17	21
CAMPGROUND	614.71	0.35	215	0.00	0	215
CHURCH	138.38	6.60	913	0.50	457	457
CLOTHESSTORE	0.49	27.75	14	0.50	7	7
CO_DUMP	141.7	0.00	0	0.00	0	0
COCKTAIL	5.14	3.30	17	0.00	0	17
COMM	26.41	27.75	733	0.50	366	366
COMMHI	62.64	35.25	2208	0.00	0	2208
CONVALESNT	30.33	12.02	365	0.00	0	365
DENTALOFF	1.76	16.84	30	0.00	0	30
DRYCLEAN	0.91	27.75	25	0.50	13	13
DUPLEX	2044	0.70	1431	0.00	0	1431
ELEMSCHOOL	278.18	3.40	946	0.00	0	946
FARMSUPPLY	3.61	27.75	100	0.50	50	50
FASTFOOD	4.99	218.48	1090	0.45	491	600
FIRESTA	62.91	0.00	0	0.00	0	0
FLORIST	1.83	27.75	51	0.50	25	25
FURNSTORE	1.79	27.75	50	0.50	25	25
GASFOOD	116	13.38	1552	0.40	621	931
GASSTATION	36.73	14.56	535	0.40	214	321
GOLFHOLES	89.29	2.74	245	0.00	0	245
HARDWARESTORE	3.8	65.00	247	0.00	0	247
HEALTHCLUB	7.32	19.93	146	0.75	109	36
HISCHOOL	154.49	6.00	927	0.00	0	927
HOSPITAL	8	20.04	160	0.00	0	160
HOTEL	1.79	0.35	1	0.00	0	1

Table II, Part 2
Land Use Totals by Category

LAND USE	Acres or DU	PM Trip Rate		Pass by %	Trip Gen Reduction	Trips Assigned to Roads
INDUST	2.38	2.16	5	0.00	0	5
JEWELRY STORE	0.85	27.75	24	0.50	12	12
LAUNDROMAT	0.67	65.00	44	0.00	0	44
LITEIND	446.44	7.26	3241	0.00	0	3241
LODGING	0.87	0.35	0	0.00	0	0
LUMBERYARD	13.56	27.75	376	0.50	188	188
MEDICALOFF	21.68	16.84	365	0.00	0	365
MINIMART	13.33	13.38	178	0.40	71	107
MINISTORAGE	30.73	5.66	174	0.50	87	87
MOBILEHOME	1480	0.70	1036	0.00	0	1036
MOTEL	144.1	0.35	50	0.00	0	50
MULTICOMM	59.66	65.00	3878	0.00	0	3878
N_T_GEN	39741	0.00	0	0.00	0	0
NURSERY	28.01	27.75	777	0.50	389	389
OFFICEGEN	0.26	16.84	4	0.00	0	4
OFFICEPRO	167.44	15.90	2662	0.00	0	2662
OPTICALOFF	0.11	16.84	2	0.00	0	2
PARK	127.74	0.45	57	0.00	0	57
PHARMACY	0.64	27.75	18	0.50	9	9
POSTOFF	1.9	116.50	221	0.50	111	111
PUBLIC	38.48	11.00	423	0.00	0	423
R1_SF	6552	0.90	5897	0.00	0	5897
R2_MF	2192	0.60	1315	0.00	0	1315
RACQUETCLUB	4.24	19.93	85	0.75	63	21
RESTAU_HI	0.05	53.21	3	0.45	1	1
RESTAU_LOW	0.27	48.94	13	0.45	6	7
RESTAURANT	34.6	48.94	1693	0.45	762	931
RETAILSTORE	95.2	27.75	2642	0.50	1321	1321
RETIRE	524	0.40	210	0.00	0	210
RR_RUR	22513	0.60	13508	0.00	0	13508
SIERRACOL	69.16	19.28	1333	0.00	0	1333
SUPERMARKET	12.35	65.00	803	0.00	0	803
THEATER	0.11	3.30	0	0.00	0	0
TOURIST	0.2	8.00	2	0.00	0	2
VACANT	222861	0.00	0	0.00	0	0
VARIETYSTORE	0.1	3.30	0	0.00	0	0
VETERINARY	18.42	16.84	310	0.00	0	310
WHOLESALEDIST	25.03	27.75	695	0.50	347	347
Grand Total	**301242**		**56511**		**6388**	**50122**

Source: NCTC TRANSCAD Traffic Model and PRISM Engineering

NCTC MODEL UPDATES

Several updates were made to the traffic model in February and March 2008 to correct some minor errors in trip generation where future traffic growth was assigned from an adjacent zone for approximately 5% of the TAZs in the model where a "negative growth" took place (indicating that future year 2030 land use totals were lower than existing land use totals). This does not mean that the future trip generation did not get assigned into the traffic models street network, but rather additional land use showed up in the adjacent TAZ instead. These errors for TAZs 133-153 were corrected by county staff in this update. In the regional picture these changes do not make any significant difference, however, on the local street systems where these traffic analysis zones connect there were some changes to link segment volumes.

DAILY ADT TRIP GENERATION COMPONENT OF NCTC MODEL. As a part of the RTMF update, daily ADT traffic projections were needed to facilitate the update of the fee calculations. Prism Engineering utilized the existing and future year 2030 traffic model land use files as a basis to calculate trip generation for the daily condition. The trip generation spreadsheet component of the traffic model which contained pm peak hour trip generation rates was expanded to also include daily trip generation rates in a separate component. ITE trip generation rates were utilized and factored as appropriate to account for similar calibrations of the pm peak hour trip generation rates for Nevada County.

TRIP DISTRIBUTION COMPONENT. The same street network, link speeds, and gravity model trip distribution friction factors calibrated previously were used in the daily model. The only difference in the modifications was to utilize a different matrix to describe origin and destination factors by time of day for the eight trip purposes in the model. These eight trip purposes include home to work, home to shopping, home to school, home to other, non home base work, non home based other, internal to external, and external to internal. In the daily model the trip split is 50% out and 50% inbound for each TAZ. This means that the traffic volumes along a roadway segment for a daily conditions model will be approximately the same going in and out of any traffic analysis zone.

PROCEDURE TO RUN NCTC TRANSCAD MODEL

TRIP GENERATION AND TRIP DISTRIBUTION. The traffic model is set up to run trip generation in a sophisticated EXCEL spreadsheet where detailed trip generation rates can be applied to each TAZ quantity, by land use category. The tool also allows for the assignment of a pass-by percentage for each category, as well as assigning internal to external percentage factors by trip purpose. There are eight trip purposes in the model, namely:

1. Home Based Work Trips
2. Home Based Shopping Trips
3. Home Based School Trips
4. Home Based Other Trips
5. Non Home Based Work Trips
6. Non Home Based Other Trips
7. Internal to External Trips
8. External to Internal Trips

This relatively high number of trip distribution purposes lends itself to the model eventually being utilized to analyze various smart growth scenarios, etc. The EXCEL spreadsheet tool breaks down the raw trip generation[2] for each TAZ and land use category, and places a portion of these into trip purpose components of trip generation by TAZ. This is the final format needed for input to actually run the traffic model: trips need to be further stratified by each of the eight trip purposes for each TAZ. In other words, the total trip generation for each TAZ will be the sum of the eight trip purposes. The trip generation is broken down into different trip purposes so that the gravity model can assign the various components of trip generation differently.

FRICTION FACTORS. The model uses the "friction factor curve set" to accomplish this procedure, and basically allows longer trips for work related trips, and shorter trips for shopping trips, etc. The friction factor curves are defined in Table III. They represent unit less numbers that are a factor in the calculation of the relative "gravity" between TAZ's using distance and time as a governing factor. Generally speaking, the larger the number in the table, the more "attractive" the trip will be. The data is separated by rows, the first row being the factors used for each trip purpose for a one minute trip. The second row gives factors for a two minute trip, and so on.

[2] Based on institute of transportation engineers trip generation rates calibrated for Nevada County

The EXCEL Trip Generation Tool formats the Production / Attraction table ready for import into TRANSCAD. The table has 17 columns of data, the first being the TAZ number for each row, and the remaining columns are populated with the trip generation, by trip purpose, first for the eight PRODUCTION trip purposes previously defined, and then for the eight ATTRACTION trip purposes

Table III
Friction Factor Curve Set

TIME	HBW	HBSH	HBSC	HBO	NHBW	NHBO	IX	XI
0	90000	90000	90000	90000	90000	90000	90000	90000
1	81600	81800	81600	81900	82000	82000	81600	81600
2	73200	73600	73200	73800	74000	74000	73200	73200
3	64800	65400	64800	65700	66000	66000	64800	64800
4	56400	57200	56400	57600	58000	58000	56400	56400
5	48000	49000	48000	49500	50000	50000	48000	48000
6	39600	40800	39600	41400	42000	42000	39600	39600
7	31200	32600	31200	33300	34000	34000	31200	31200
8	22800	24400	22800	25200	26000	26000	22800	22800
9	14400	16200	14400	17100	18000	18000	14400	14400
10	6000	8000	6000	9000	10000	10000	6000	6000
11	5821	7049	5410	7790	9123	9123	5521	5821
12	5642	6098	4820	6580	8246	8246	5042	5642
13	4606	5544	4004	6048	6538	6538	4306	4606
14	3570	4990	3188	5515	4830	4830	3570	3570
15	2989	4355	2653	4919	3254	3254	2989	2989
16	2408	3720	2118	4322	1677	1677	2408	2408
17	2343	3035	1620	3951	1542	1542	2343	2343
18	2278	2350	1121	3580	1407	1407	2278	2278
19	2189	1935	881	3010	1004	1004	1619	2119
20	2100	1520	640	2440	600	600	960	1960
21	1500	664	453	1696	290	290	609	609
22	1000	350	225	260	125	140	160	460
23	985	345	222	256	123	138	158	453
24	970	340	218	252	121	136	155	446
25	955	334	215	248	119	134	153	439
26	940	329	212	244	118	132	150	433
27	925	324	208	241	116	130	148	426
28	910	319	205	237	114	127	146	419
29	896	313	201	233	112	125	143	412
30	881	308	198	229	110	123	141	405
31	866	303	195	225	108	121	139	398
32	851	298	191	221	106	119	136	391
33	836	293	188	217	104	117	134	384
34	821	287	185	213	103	115	131	378
89	2	2	2	2	2	2	2	2
90	1	1	1	1	1	1	1	1

Source: NCTC TRANSCAD Model Source Files

Once these trips by trip purpose are imported into the TRANSCAD model

(through the Dbase format), it is necessary to "balance" the trips. In other words, make sure that the productions and attractions within the County have a match. This is accomplished in TRANSCAD and all attraction trips are balanced to productions, because the production (or residential) trips are considered a more reliable trip generation estimate, or have much more consistent trip generating characteristics. In the following paragraphs, the procedure to run the NCTC model is defined in a step-by-step format:

PROCEDURE TO RUN NCTC TRANSCAD MODEL

1. Modify the SKIMS matrix if the speeds have been changed, etc. by going to network layer in map, choosing NETWORKS/PATHS menu and MULTIPLE PATHS. In this dialog, choose to minimize the "time" field and go from centroid to centroid, using the network associated with the map. Once this is done, a matrix view comes up representing the new matrix created. It is still necessary to fill the intrazonals on this matrix with values of time by going to PLANNING menu, PLANNING UTILITIES, and choosing INTRAZONAL TRAVEL TIMES and fill it with default values shown on the dialog box. . Make sure and UPDATE network under SETTINGS under NETWORKS/PATHS menu. If a change was made to the NEW network, then use the a new network file.
2. Modify EXCEL Trip Generation Tool to reflect any changes in land use quantities, as needed.
3. USING EXCEL 2000 (as this program version can output in the dBase IV format, which is needed to avoid formatting and variable type error issues in TRANSCAD)… Output the "PA table OUTPUT" a DBF format file by selecting the TAB, and then choosing FILE SAVE AS using the Dbase IV format. Select an appropriate file name for the trip generation data file.
4. If EXCEL 2000 is NOT available, it is possible to load the EXCEL 97-2003 format file into TRANSCAD and then select the appropriate table and then save it as a DBF format. Then give the file an appropriate name and close TRANSCAD.
5. Open TRANSCAD and load an appropriate street map file (network).
6. Open the production and attraction PA table in TransCAD by choosing FILE OPEN and choosing the Dbase format. Select the file just created.
    a. Balance the PA Table by selecting PLANNING, BALANCE from the TRANSCAD menus.

i. Using the dialog box, add each trip purpose PRODUCTION and associate it with its ATTRACTION counterpart.

ii. For the EXTERNAL purposes, the PROD IX must be matched with ATTR XI (which is empty) and the PROD IX governs.

iii. For the PROD XI trips (which is empty) it must be paired with the ATTR IX (which has values) and make the ATTR IX the governing value by choosing "METHOD" field and selecting "Hold Vector 2" instead of the default "Hold Vector 1".

iv. Choose OK. This new file is now available for use in the next step.

b. Run PLANNING, TRIP DISTRIBUTION, GRAVITY APPLICATION. Using the dialog box, add each trip purpose once again, and be sure to select only the "balanced" columns from balanced matrix for each trip purpose, and not the originals, as those won't be "balanced," and an error would occur in running the model.

i. Make sure that the friction factor matrix is currently opened in TRANSCAD so that the model will utilize it, and not generate an error.

ii. Make sure that the skim travel times matrix is open, which was created from the street network file

c. Once the dialog has been populated with each of the trip purposes by choosing ADD for each, and each has also been associated with the corresponding Friction Factor trip purpose column, it is time to click OK and run the model. Give the Gravity Model run an appropriate file name. This file will be used to create an Origin Destination Matrix in the next step.

d. Run PA to OD Matrix from PLANNING Menu

i. Make sure that the lookup dataview is "STUDY HOURLY NCTC-PM-Peak," and that this matrix is open for the generation of the OD matrix.

ii. Select the OD Matrix as the input source.

iii. Select each trip purpose in dialog and check box the "Use matrix" below. Choose DEP_HBW for the HBW trips to get the percentages, and the corresponding RET_HBW for each of the trip purpose lines in the dialog box.

iv. Check "Choose Report each hour separately".

v. Type in 17 to 18 for the hours (5 to 6 pm).

vi. Click OK to run the procedure.

vii. Type in a unique name for the OD Matrix. This is the matrix that will be assigned to the street network, as it contains the origin and destination trip values.

viii. Choose MATRIX QUICKSUM so the total trips can be loaded into network for the total PM Peak Hour. It is possible to just load the HBW trips to see where and how much the HBW trips are impacting the network (optional).

ix. The file is ready for loading to a network file. This network file could be existing conditions, or a future network.

7. Load the Network with OD Matrix.
   a. Activate the network MAP file (click on map).
   b. Choose the appropriate LINE LAYER for the network.
   c. Choose PLANNING, TRAFFIC ASSIGNMENT.
      i. Use Equilibrium Assignment.
      ii. Select appropriate O&D matrix (QUICKSUM).
      iii. Click OK and choose a file name for this run.
      iv. Choose appropriate LAYER to post LABELS of traffic volumes for this, or land use parcel zoning, etc. for color themed maps, etc., by choosing AUTO LABELS button icon, and selecting the variable(s) to post.

VMT Runs: These are accomplished by performing a tabulation on the AB_Speed field, using VMT as the weight field. After performing a traffic assignment, the result is to get a joined dataview that includes the congested speeds plus the output VMT. After this step, perform a Statistics-Tabulation from the menu (choose Procedures-Statistics if the Statistics menu is not seen). Choose the speed field as the first field and weight by VMT. Choose Manual as the method, then set up the 5mph ranges.