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# CSTDM09 - California Statewide Travel Demand Model

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Model Development

Validate Model System

Final System Documentation: Technical Note

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## 1. Background

The ULTRANS Institute at University of California at Davis and HBA Spectro Incorporated developed the new California Statewide Travel Demand Model (CSTDM), to support the California Department of Transportation in its transportation planning and forecasting activities.

This Technical Note describes the work that was performed to validate the CSTDM Model System.

## 2. Model Calibration and Validation Overview

The CSTDM has five different model components:

- A Short Distance Personal Travel Model (SDPTM);
- A Long Distance Personal Travel Model (LDPTM);
- A Short Distance Commercial Vehicle Model (SDCVM);
- A Long Distance Commercial Vehicle Model (LDCVM);
- An External Vehicle Trips Model (ETM).

The development of the overall CSTDM model has involved 4 basic steps.

1. **Model specification** – where the form and structure of each model is identified.
2. **Model parameter specification / estimation** – where the parameters used in each model are identified or estimated. For the short distance model the parameters have been estimated using travel survey collected around the time of the year 2000 base year. For the other four models initial parameter values have been obtained from other models, or calculated from available observed data.
3. **Model calibration** – where each model is run for the entire state for the year 2000 base year, and the model output is compared to observed data calibration targets. Parameters for each model are adjusted until a reasonable fit is obtained between model and observed values. The Technical Note that describes each model component contains details of the calibration results for each model component.

4. **Model validation** – where the output from all models running for the whole state are compared to observed vehicle and passenger flows across screenlines. Additional adjustments are made to model parameters as appropriate, for one or more of the models, until a reasonable fit between model output and observed data for the screenlines is obtained. For the CSTDM the primary model validation process has been carried out for the “current year” year 2008 model run, because the end product is a model with parameters that reflect current travel patterns. The Year 2000 model run was used for initial validation to confirm calibration results / identify areas for potential improvement in the model development.

A set of dedicated technical notes provides details on each step of the CSTDM model development described above. The object of this document is the description of the Model Validation.

Model calibration is required for a number of reasons, including:

- For the short distance personal travel survey, the sub-models are estimated from a sample survey of observed travel patterns for a sub-set of households in California, scaled to represent the entire population. The survey results may not entirely reflect the true travel patterns for the whole state, because of sample size limitations, and possible survey bias not eliminated in the scaling process. The results obtained from running the models estimated from the travel survey data thus need to be adjusted to represent the true travel patterns of the whole population.
- For the long distance personal travel model, the model was specified to use the long distance inter-regional travel model component of the California High Speed Rail model, but using a different representation of the California TAZ system, road and transit networks, and implemented using different computer software scripts. Calibration is required to make the new model output consistent with the original model.

- For the short distance commercial vehicle model and the external vehicle trip model, the initial model parameters are specified using values for models applied in other jurisdictions. These initial parameters have to be adjusted to ensure the model results reflect California travel behavior.

Validation to observed screenlines is required because this is the level of detail to which the models have to perform. The observed data reflects the true variation in travel patterns that occur in the state transportation system, that are not captured in the aggregate model calibration targets. Typically, validation is carried out for the year of calibration. For the CSTDM the calibration year is 2000, based on survey data availability. Primary validation is applied for “current year” year 2008 observed flows. (The CSTDM model has been developed in a 15-month period from July 2009 to September 2010. During this time, 2008 was the most current “full” year where input network, demographic and count data were available).

### **3. Year 2008 Validation**

The overall model performance is measured by a comparison of modeled vehicle and transit passenger flows to observed flows across defined screenlines / along transportation corridors.

Additional information on the vehicle screenlines used in the CSTDM model validation with observed data for the year 2000 and 2008 is contained in the appendices at the end of this Technical Note. Data were collected for a typical weekday in the fall of each year. Appendix A shows the location of the screenlines. Appendix B contains a table describing which stations are associated with the specific screenlines.

Tables 1a and 1b give the summary of model to observed daily directional vehicle flows for each screenline, for the year 2008 run.

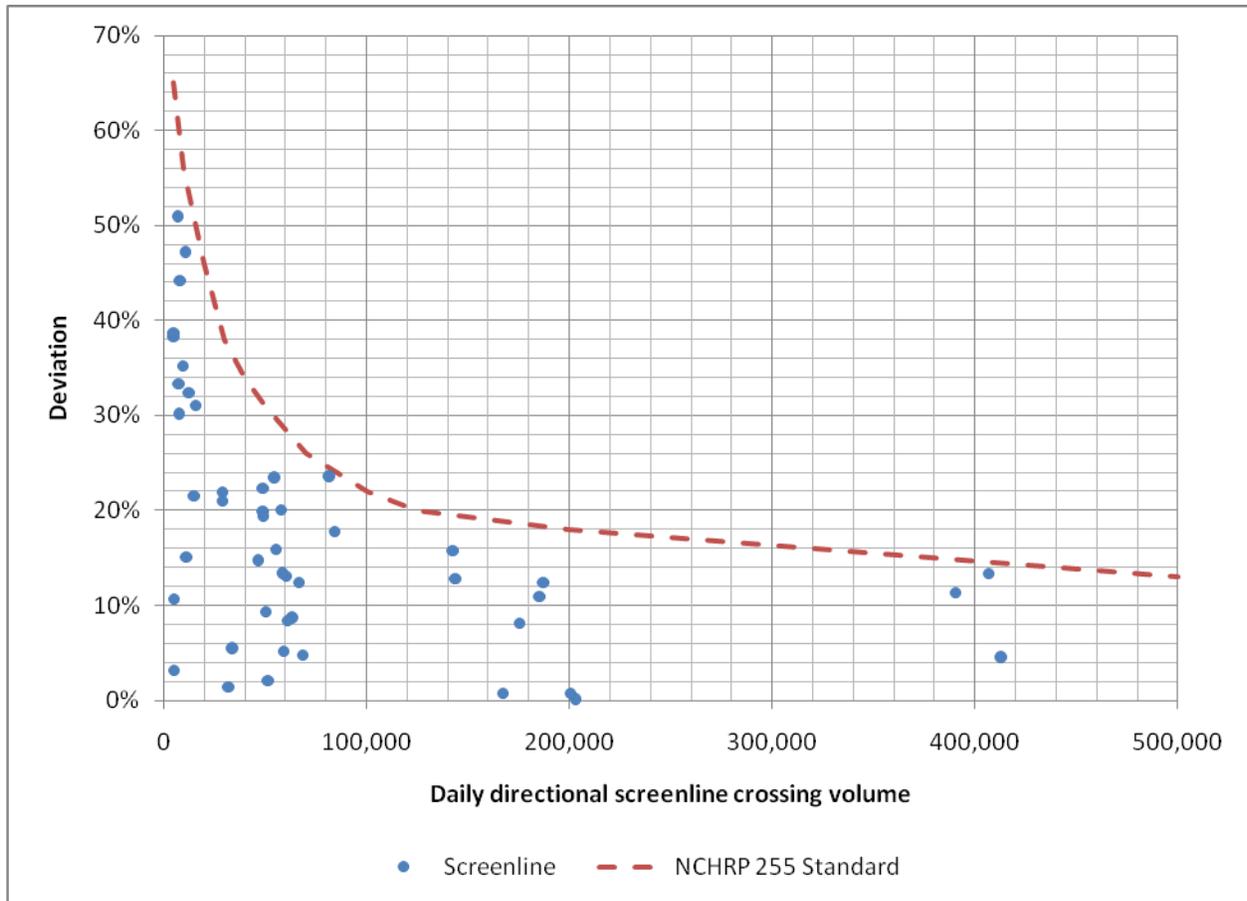
**Table 1a. Screenlines primarily in Northern California, SACOG and MTC regions**

Screenline name	Observed volume	Model volume	% difference
Internal to External	202,900	202,700	-0.1%
External to Internal	204,400	201,800	0.7%
Siskiyou, Modoc to Trinity, Shasta, Lassen	5,100	4,900	-3.1%
Trinity, Shasta, Lassen to Siskiyou, Modoc	5,300	4,800	-9.6%
Tehama, Shasta to Lassen, Plumas	1,700	500	-68.9%
Lassen, Plumas to Tehama, Shasta	1,700	500	-69.2%
Trinity, Mendocino to Glenn, Tehama, Shasta	4,700	7,500	62.0%
Glenn, Tehama, Shasta to Trinity, Mendocino	4,700	7,700	63.0%
Humboldt, Trinity, Tehama, Plumas to Mendocino, Glenn, Butte, Sierra	28,900	23,700	-18.0%
Mendocino, Glenn, Butte, Sierra to Humboldt, Trinity, Tehama, Plumas	28,900	23,900	-17.4%
Mendocino, Lake, Colusa, Butte, Sierra to Sonoma, Yolo, Sutter, Yuba, Nevada	48,800	40,600	-16.6%
Sonoma, Yolo, Sutter, Yuba, Nevada to Mendocino, Lake, Colusa, Butte, Sierra	46,600	40,600	-12.8%
El Dorado, Sacramento to Amador, Alpine	6,900	14,100	104.0%
Amador, Alpine to El Dorado, Sacramento	7,900	14,100	79.1%
Sacramento to San Joaquin	58,400	51,500	-11.8%
San Joaquin to Sacramento	59,300	62,600	5.5%
Napa to Solano, Yolo	55,200	47,700	-13.7%
Solano, Yolo to Napa	58,100	48,400	-16.7%
SF Bay Area Bridges (Peninsula / East Bay)	412,800	394,700	-4.4%
Marin, Solano to San Francisco, Contra Costa	187,000	213,500	-23.8%
San Francisco, Contra Costa to Marin, Solano	175,300	190,800	-26.6%
SF Bay Area to Central Valley	185,100	166,900	-9.8%
Central Valley to SF Bay Area	167,100	168,300	0.7%
SF Bay Area to Monterey Bay	66,700	76,100	14.2%
Monterey Bay to SF Bay Area	68,400	71,900	5.0%

**Table 1b. Screenlines primarily in Central California, SCAG and SANDAG regions**

Screenline name	Observed volume	Model volume	% difference
Merced, Stanislaus, San Joaquin to Mariposa, Tuolumne, Calaveras, Amador	15,800	12,100	-23.7%
Mariposa, Tuolumne, Calaveras, Amador to Merced, Stanislaus, San Joaquin	14,700	12,100	-17.7%
San Joaquin to Stanislaus	81,400	106,600	30.9%
Stanislaus to San Joaquin	84,400	102,600	21.6%
Stanislaus to Merced	54,400	71,100	30.7%
Merced to Stanislaus	60,500	69,900	15.0%
Merced, Mariposa to Fresno, Madera	48,800	62,800	28.8%
Fresno, Madera to Merced, Mariposa	49,200	61,100	24.1%
West of Sierra Crest to East of Sierra Crest	10,600	7,200	-32.1%
East of Sierra Crest to West of Sierra Crest	9,600	7,100	-26.1%
Central Coast to Central Valley, Ventura	31,900	31,400	-1.4%
Central Valley, Ventura to Central Coast	33,700	31,900	-5.2%
Central California to Southern California	63,200	69,200	9.5%
Southern California to Central California	60,900	66,400	9.1%
Kern to Ventura, Los Angeles	50,200	55,400	10.3%
Los Angeles, Ventura to Kern	51,300	52,400	2.1%
Ventura to Santa Clarita	12,300	9,300	-24.5%
Santa Clarita to Ventura	11,000	9,500	-13.1%
Los Angeles, Orange Cordon Outbound	406,900	359,000	-11.8%
Los Angeles, Orange Cordon Inbound	390,500	350,700	-10.2%
Orange, Riverside to San Diego, Imperial	143,700	164,700	14.6%
San Diego, Imperial to Orange, Riverside	142,400	169,100	18.7%
San Diego to Imperial	7,700	11,000	43.3%
Imperial to San Diego	7,400	11,000	49.9%
<b>All screenline volumes combined</b>	<b>3,930,500</b>	<b>3,983,500</b>	<b>1.3%</b>

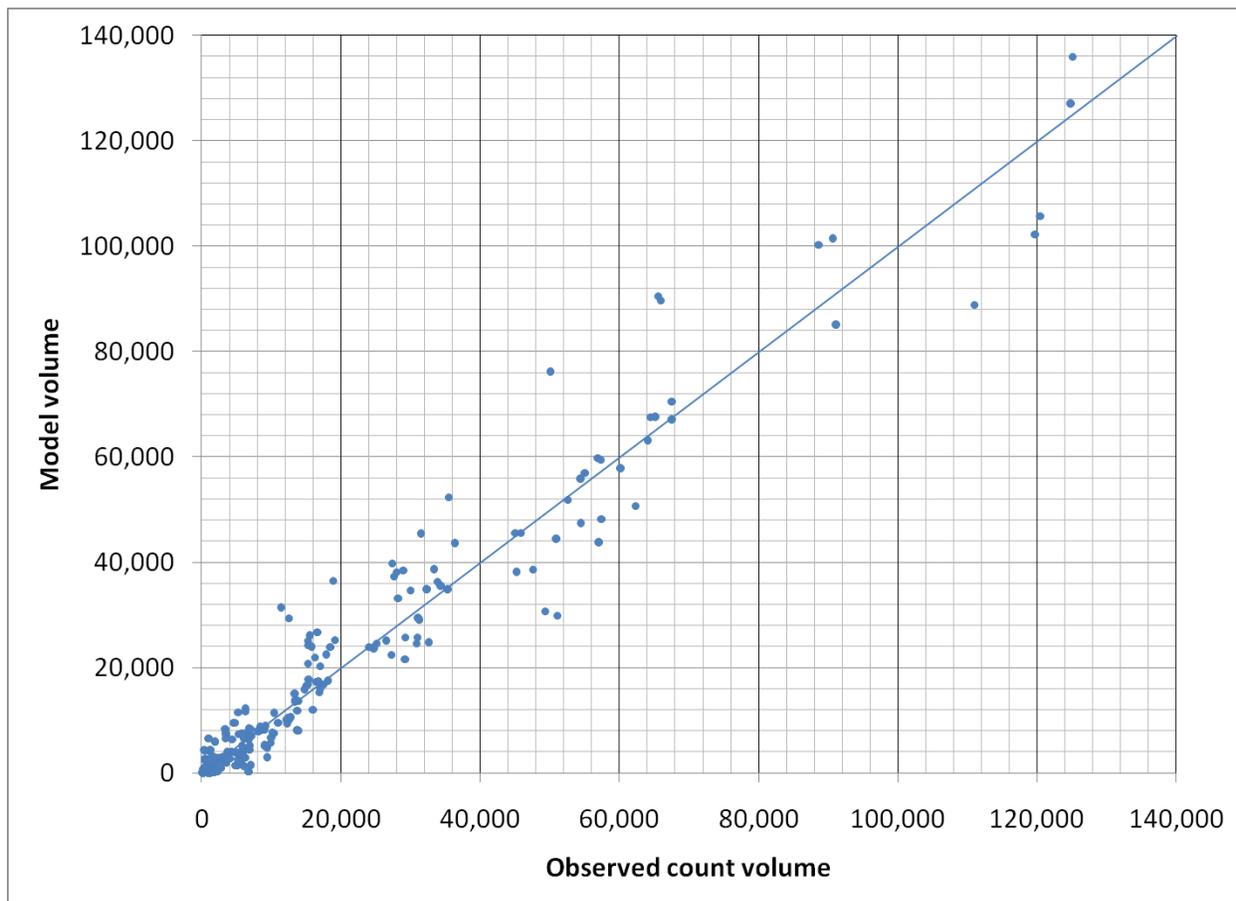
Figure 1 shows the year 2008 validation results for vehicle flows, compared to the guidelines for urban travel model screenline performance set out in the NCHRP255 report (Highway Traffic Data for Urbanized Area Project Planning and Design, NCHRP Report 255, TRB, 1982). The NCHRP255 guideline figure is applied to screenline volumes up to 200,000 vehicles per day. For the CSTDM validation, it has been extrapolated out to volumes up to 500,000 vehicles per day, to cover the range of volumes represented in the CSTDM screenlines.



**Figure 1. Screenline volumes versus NCHRP 255 standard**

The results from Figure 1 show that model results meet the NCHRP 255 standards, for every screenline.

Figure 2 shows the 2008 validation results for all of the individual count locations. The model volumes are quite close to the 45 degree line shown (where model and observed are equal). The  $R^2$  is 0.946, which is quite high.



**Figure 2. Individual count stations: model volumes versus observed**

In general, the 2008 model slightly over-estimates 2008 observed traffic flows. Although there may be several reasons for this, two factors relevant to the CSTDM application need to be noted:

1. Observed data is not available for some minor roads that actually cross some of the identified screenlines. In these cases the “observed” screenline totals in Table 2 understate the actual number of vehicles crossing.
2. There is some uncertainty in practice about the “actual” state demographic population and employment totals in the fall of 2008, the time-frame for the observed counts. Model population totals and detail spatial allocations were obtained where possible from each MPO. The resulting 2008 statewide population used in the model was 38,426,595. This number is 1.4% higher than

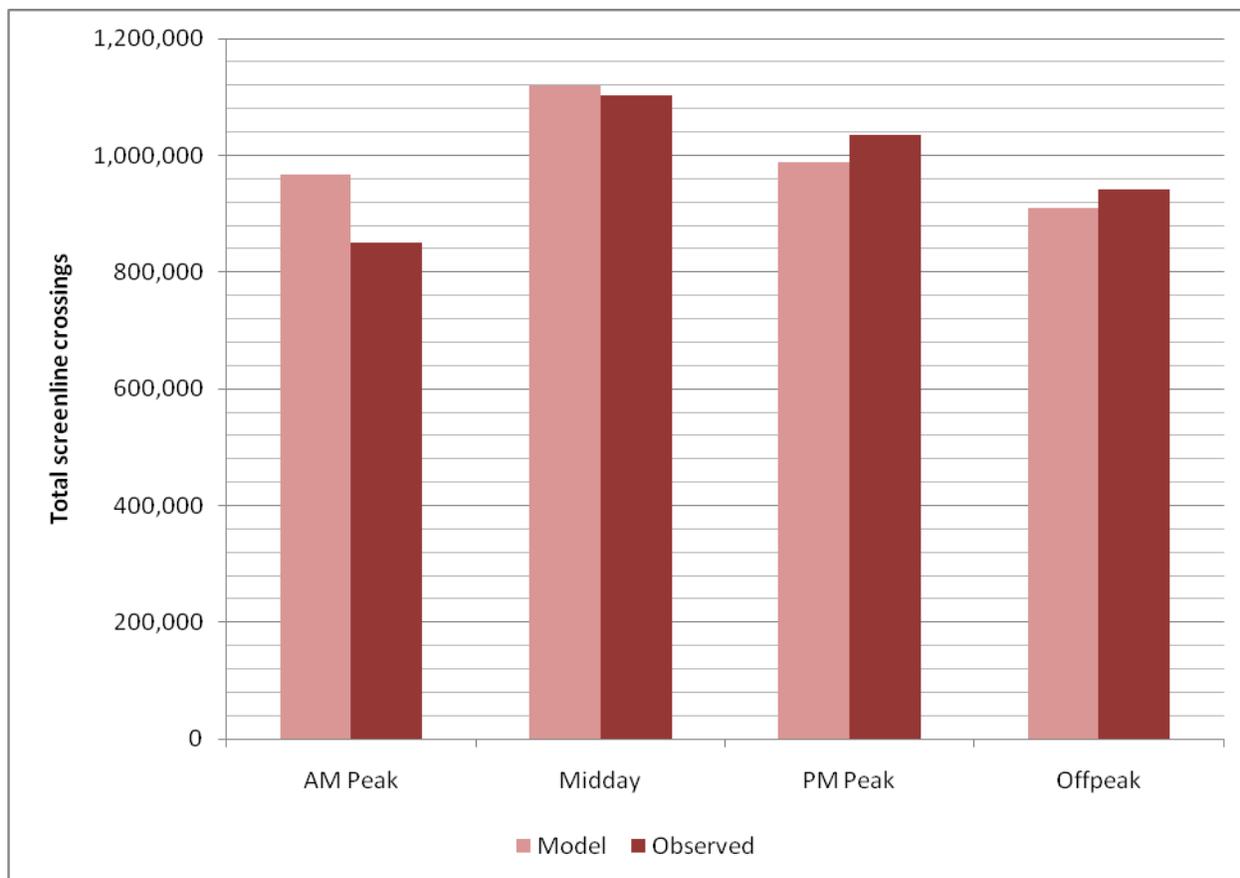
the January 1<sup>st</sup> 2008 state-wide total of 37,883,992 given by the California Department of Finance, and 0.4% higher than the January 1<sup>st</sup> 2009 state-wide total of 38,292,687.

One feature that should be mentioned is that the CSTDM explicitly forecasts travel by time of day (AM Peak; Midday; PM Peak; Off-peak). However, the CSTDM models a large number of vehicle trips that are long in terms of trip length (for both distance and time). These longer trips present significant challenges for accurate comparison of model and observed flows by time periods, for two reasons:

- In the current application of the CSTDM a trip has to be assigned to one of the four time periods;
- The static assignment process implicitly assumes that, for each vehicle trip in the trip list, the trip simultaneously travels on every road link between the origin zone and the destination zone.

For example, a vehicle trip between San Francisco and Los Angeles starting at 9AM may take 7 hours, and travel in three different model time periods (AM, Midday, PM). In the modeling process it has to be allocated to only one of these time periods, and is counted on every link it uses between San Francisco and Los Angeles in that time period.

Model time of day allocation factors were adjusted during validation, to try to match observed distributions of traffic flow. This included shifts of 10% of flows from the AM peak to the Midday and 20% from PM peak to the Offpeak for the two short distance travel models. Figure 3 compares the model time of day distribution for vehicle flows with observed data. It shows a slight overassignment to the PM Peak and Offpeak, and a slight underassignment to the AM peak. The time period distribution is still fairly reasonable.



**Figure 3. Total screenline crossings by time period**

The LDPTM component of the CSTDM forecasts air travel made by California residents. Observed data for year 2008 air flows for main corridors has been tabulated from air passenger travel data. These flows are compared with model results in Table 2 below.

**Table 2: 2008 Daily Air Travel Validation Results**

<b>Air Corridor</b>	<b>2008 Daily Model Flows</b>	<b>2008 Daily Observed Flows</b>
Los Angeles / San Francisco	24,050	32,000
Los Angeles / Sacramento	7,650	8,750
San Francisco / San Diego	7,100	9,850
San Diego / Sacramento	1,950	2,600
Los Angeles / San Diego	2,000	1,650
San Joaquin Valley / Los Angeles + San Francisco	2,150	1,250
Other	2,700	3,900
<b>Total</b>	<b>47,550</b>	<b>59,950</b>

The observed flows include data on:

- Flights made by California residents for intra-state travel;
- Flights made by California residents on connecting flights as part of out-of-state travel;
- Flights made by out-of-state persons.

The model only considers the first of these categories, and so it should generally under predict air flows. Given this, Table 2 shows a reasonable fit between observed and model air flows.

The CSTDM also explicitly models rail flows, in the SDPTM (<100 miles) and LDPTM (>100 miles) models. However the necessity to represent local transit with a simplified representation of the network for the SDPTM means that transit flows in that model are at the TAZ-TAZ level rather than individual station to station. The SDPTM model has been calibrated to overall local transit mode shares (including rail). The LDPTM has been calibrated to the rail share of long distance trips. Validation to rail screenlines is not directly possible.

## Appendix A Screenline Definitions



## Appendix B: Screenline Lookup Table

**Screenline 1: Central CA to Southern CA**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
16	18	94	273_SLO_S	S1 South
16	18	158	552_SLO_S	US101 South
17	19	160	58_KIN_S	S33 South
17	19	64	203_KIN_S	I5 South
17	19	178	652_KER_S	S43 South
17	19	237	91_KER_S	S99 South
17	19	166	606_TUL_S	S65 South
15	20	182	700_INY_S	US395 South
15	20	267	955_INY_S	S127 South

**Screenline 1: Southern CA to Central CA**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
18	16	93	273_SLO_N	S1 North
18	16	157	552_SLO_N	US101 North
19	17	159	58_KIN_N	S33 North
19	17	63	203_KIN_N	I5 North
19	17	177	652_KER_N	S43 North
19	17	236	91_KER_N	S99 North
19	17	165	606_TUL_N	S65 North
20	15	181	700_INY_N	US395 North
20	15	266	955_INY_N	S127 North

**Screenline 2: Central Coast to Central Valley, Ventura**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
16	17	31	154_MON_E	S198 East
18	19	85	243_SLO_N	S41 North
18	19	189	71_KER_E	S58 East
18	21	148	501_SB_S	US101 South

**Screenline 2: Central Valley, Ventura to Central Coast**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
17	16	32	154_MON_W	S198 West
19	18	86	243_SLO_S	S41 South
19	18	190	71_KER_W	S58 West
21	18	147	501_SB_N	US101 North

**Screenline 3: West of Sierra Crest to East of Sierra Crest**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
10	15	19	139_ALP_E	S88 East
10	15	99	303_CAL_E	S4 East
10	15	45	172_TUO_E	S108 East
10	15	256	948_MNO_E	S120 East
19	20	264	953_KER_E	S58 East

**Screenline 3: East of Sierra Crest to West of Sierra Crest**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
15	10	20	139_ALP_W	S88 West
15	10	100	303_CAL_W	S4 West
15	10	46	172_TUO_W	S108 West
15	10	257	948_MNO_W	S120 West
20	19	265	953_KER_W	S58 West

**Screenline 4: El Dorado, Sac to Amador, Alpine**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
7	10	185	708_SAC_E	S104 East
7	10	15	129_AMA_E	S16 East
7	10	82	240_AMA_S	S49 South
7	15	180	653_ED_S	S89 South

**Screenline 4: Amador, Alpine to El Dorado, Sac**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
10	7	186	708_SAC_W	S104 West
10	7	16	129_AMA_W	S16 West
10	7	81	240_AMA_N	S49 North
15	7	179	653_ED_N	S89 North

**Screenline 5: Internal to External**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
1	103	206	807_DN_N	US101 North
2	103	73	231_SIS_N	I5 North
2	103	97	290_SIS_N	US97 North
2	103	27	145_SIS_N	S139

2	103	47	178_MOD_N	US395 North
6	102	66	215_LAS_S	US395 South
7	102	284	495_NEV_E	I80 East
7	102	39	166_PLA_E	S28 East
7	102	125	386_ED_E	US50 East
15	102	131	42_ALP_E	S88 East
15	102	276	991_MNO_N	S395 North
15	102	155	514_MNO_N	S182 North
15	102	163	602_MNO_E	S167 East
15	102	278	997_MNO_N	US6 North
15	102	254	943_MNO_E	S168 East
15	102	242	925_INY_N	S127 North
15	102	251	637_INY_E	S178 East
20	101	230	907_SBD_N	I15 North
20	101	217	848_SBD_S	U95 South
20	101	222	885_SBD_E	I40 East
20	101	326	909_RIV_E	I10 East
24	101	318	988_IMP_E	I8 East
24	100	321	943_IMP_S	S186 South
24	100	168	607_IMP_S	S7 South
24	100	184	708_IMP_S	S111 South
23	100	263	950_SD_S	S188 South
23	100	13	125_SD_E	S905 South
23	100	333	1114228	I5 South

102	15	279	997_MNO_S	US6 South
102	15	255	943_MNO_W	S168 West
102	15	243	925_INY_S	S127 South
102	15	250	637_INY_W	S178 West
101	20	231	907_SBD_S	I15 South
101	20	216	848_SBD_N	U95 North
101	20	223	885_SBD_W	I40 West
101	20	327	909_RIV_W	I10 West
101	24	319	988_IMP_W	I8 West
100	24	320	943_IMP_N	S186 North
100	24	167	607_IMP_N	S7 North
100	24	183	708_IMP_N	S111 North
100	23	262	950_SD_N	S188 North
100	23	14	125_SD_W	S905 North
100	23	332	1114091	I5 North

**Screenline 6: HUM, TRU, TEH, PLU to MEN, GLU, BUT, SIER**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
1	5	24	142_HUM_S	US101 South
3	6	259	95_GLE_S	I5 South
3	6	54	182_TEH_S	S99 South
3	6	50	180_BUT_W	S32 West
4	6	58	199_BUT_W	S70 West
4	6	61	200_PLU_E	S70 East
4	6	96	289_LAS_S	US395 South

**Screenline 5: External to Internal**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
103	1	207	807_DN_S	US101 South
103	2	74	231_SIS_S	I5 South
103	2	98	290_SIS_S	US97 South
103	2	28	145_SIS_S	S139
103	2	48	178_MOD_S	US395 South
102	6	65	215_LAS_N	US395 North
102	7	285	495_NEV_W	I80 West
102	7	40	166_PLA_W	S28 West
102	7	126	386_ED_W	US50 West
102	15	132	42_ALP_W	S88 West
102	15	277	991_MNO_S	S395 South
102	15	156	514_MNO_S	S182 South
102	15	164	602_MNO_W	S167 West

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
5	1	23	142_HUM_N	US101 North
6	3	258	95_GLE_N	I5 North
6	3	53	182_TEH_N	S99 North
6	3	49	180_BUT_E	S32 East
6	4	57	199_BUT_E	S70 East
6	4	62	200_PLU_W	S70 West
6	4	95	289_LAS_N	US395 North

**Screenline 7: Kern to Ventura, Santa Clarita**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
19	21	76	233_SLO_S	S33 South
19	20	174	631_KER_S	I5 South
19	20	245	927_KER_S	S14 South

**Screenline 7: Ventura, Santa Clarita to Kern**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
20	19	173	631_KER_N	I5 North
20	19	244	927_KER_N	S14 North

**Screenline 8: LA, Orange, Riverside to San Diego, Imperial**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
22	23	130	401_ORA_S	I5 South
22	23	253	941_RIV_S	S79 South
20	24	269	962_IMP_S	S86 South
20	24	188	709_IMP_S	S111 South
20	24	215	844_IMP_W	S78 West

**Screenline 8: San Diego, Imperial to LA, Orange, Riverside**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
23	22	129	401_ORA_N	I5 North
23	22	336		I15 North
24	20	268	962_IMP_N	S86 North
24	20	187	709_IMP_N	S111 North
24	20	214	844_IMP_E	S78 East

**Screenline 9: Los Angeles, Orange County to Outside Cordon**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
22	21	135	427_VEN_N	S1 North
22	21	272	768253	US101 North
22	21	140	444_LA_W	S118 West
22	20	70	224_LA_W	S138 West
22	20	226	900_SBD_N	I15 North
22	20	208	808_RIV_E	I10 East
22	20	260	950_RIV_E	S74 East

**Screenline 9: Outside Cordon to Los Angeles, Orange County**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
21	22	136	427_VEN_S	S1 South
21	22	273	768265	US101 South
21	22	139	444_LA_E	S118 East
20	22	291	751_LA_S	I5 South
20	22	227	900_SBD_S	I15 South
20	22	209	808_RIV_W	I10 West
20	22	261	950_RIV_W	S74 West

**Screenline 10: Marin, Solano to SF, Contra Costa**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
8	13	6	118_SF_S	US 101 South
8	13	152	504_CC_E	I580 East
8	13	283	489_SOL_W	I80 West
8	13	300	401134	I780 South
8	13	297	400265	I680 West
9	13	103	317_SOL_E	S12 East

**Screenline 10: SF, Contra Costa to Marin, Solano**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
13	8	5	118_SF_N	US101 North
13	8	286	504_CC_W	I580 West
13	8	282	489_SOL_E	I80 East
13	8	301	401148	I780 North
13	8	298	400295	I680 East
13	9	104	317_SOL_W	S12 West

**Screenline 11: Men, Lak, Colu, But, Sier to Son, Yol, Sut, Yub, Nev**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
5	8	52	180_MEN_S	S1 South
5	8	221	86_SON_S	US101 South
5	8	211	81_NAP_S	S29 South
6	7	1	104_YOL_E	S16 East
6	7	205	80_YOL_S	I5 South
6	7	121	355_SUT_E	S20 East
6	7	102	305_BUT_S	S99 South
6	7	118	340_YUB_W	S70 West

6	7	116	338_NEV_S	S89 South
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**Screenline 11: Son, Yol, Sut, Yub, Nev to Men, Lak, Colu, But, Sier**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
8	5	51	180_MEN_N	S1 North
8	5	220	86_SON_N	US101 North
8	5	210	81_NAP_N	S29 North
7	6	2	104_YOL_W	S16 West
7	6	204	80_YOL_N	I5 North
7	6	122	355_SUT_W	S20 West
7	6	101	305_BUT_N	S99 North
7	6	117	340_YUB_E	S70 East
7	6	115	338_NEV_N	S89 North

**Screenline 12: Merc, Stanis, SanJ to Marip, Tuol, Calav, Amad**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
11	10	234	91_CAL_E	S12 East
11	10	87	244_CAL_E	S26 East
12	10	133	420_TUO_E	S120 East
12	10	191	71_STA_E	S132 East
14	10	123	36_MPA_E	S140 East

**Screenline 12: Marip, Tuol, Calav, Amad to Merc, Stanis, SanJ**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
10	11	235	91_CAL_W	S12 West
10	11	88	244_CAL_W	S26 West
10	12	134	420_TUO_W	S120 West
10	12	192	71_STA_W	S132 West
10	14	124	36_MPA_W	S140 West

**Screenline 13: Merced to Stanislaus**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
14	12	330	285_MER_N	I5 North
12	14	106	320_MER_S	S99 South
14	12	107	324_STA_N	S165 North

**Screenline 13: Stanislaus to Merced**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
12	14	331	285_MER_S	I5 South
14	12	105	320_MER_N	S99 North
12	14	108	324_STA_S	S165 South

**Screenline 14: Merced, Mariposa to Fresno, Madera**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
14	17	219	851_FRE_S	I5 South
14	17	170	62_FRE_S	S33 South
14	17	29	152_MAD_E	S152 East
14	17	241	92_MAD_S	S99 South
10	17	247	93_MPA_S	S49 South
10	17	172	620_MAD_S	S41 South

**Screenline 14: Fresno, Madera to Merced, Mariposa**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
17	14	218	851_FRE_N	I5 North
17	14	169	62_FRE_N	S33 North
17	14	30	152_MAD_W	S152 West
17	14	240	92_MAD_N	S99 North
17	10	246	93_MPA_N	S49 North
17	10	171	620_MAD_N	S41 North

**Screenline 15: Napa to Solano, Yolo**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
8	7	197	730_YOL_E	S128 East
8	9	111	333_SOL_E	I80 East

**Screenline 15: Solano, Yolo to Napa**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
7	8	198	730_YOL_W	S128 West
9	8	112	333_SOL_W	I80 West

**Screenline 16: SF Bay Area to Central Valley**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
9	7	228	903_SOL_N	I505 North
9	7	119	346_YOL_E	I80 East
9	7	175	645_YOL_N	S84 North

13	7	212	816_SAC_N	S160 North
13	11	3	11_SJ_E	S12 East
13	11	7	123_CC_E	S4 East
13	11	334	421_SJ_E	I580 East
13	11	200	76_SJ_E	I205 East
13	14	280	248_MER_E	S152 East

**Screenline 16: Central Valley to SF Bay Area**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
7	9	229	903_SOL_S	I505 South
7	9	120	346_YOL_W	I80 West
7	9	176	645_YOL_S	S84 South
7	13	213	816_SAC_S	S160 South
11	13	4	11_SJ_W	S12 West
11	13	8	123_CC_W	S4 West
11	13	335	421_SJ_W	I580 West
11	13	201	76_SJ_W	I205 West
14	13	281	248_MER_W	S152 West

**Screenline 17: SF Bay Area to Monterey Bay**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
13	16	38	165_SM_S	S1 South
13	16	44	170_SCL_S	S9 South
13	16	290	550_SCR_S	S17 South
16	13	162	58_SCL_S	US101 South
16	13	194	712_SBT_W	S156 West

**Screenline 17: Monterey Bay to SF Bay Area**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
16	13	37	165_SM_N	S1 North
16	13	43	170_SCL_N	S9 North
16	13	289	550_SCR_N	S17 North
13	16	161	58_SCL_N	US101 North
13	16	193	712_SBT_E	S156 East

**Screenline 18: SF Bay Area Bridges**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
13	13	303	401556	I80 West
13	13	302	401546	I80 East

13	13	296	400071	S92 West
13	13	299	400683	S92 East
13	13	288	506_ALA_S	S84 West
13	13	287	506_ALA_N	S84 East

**Screenline 19: Sacramento to San Joaquin**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
7	11	80	24_SJ_S	I5 South
7	11	146	500_SAC_S	S99 South

**Screenline 19: San Joaquin to Sacramento**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
11	7	79	24_SJ_N	I5 North
11	7	145	500_SAC_N	S99 North

**Screenline 20: San Diego to Imperial**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
23	24	270	973_SD_E	S78 East
23	24	274	981_SD_E	I8 East

**Screenline 20: Imperial to San Diego**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
24	23	271	973_SD_W	S78 West
24	23	275	981_SD_W	I8 West

**Screenline 21: San Joaquin to Stanislaus**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
11	12	203	79_STA_S	I5 South
11	12	92	250_SJ_S	S33 South
11	12	67	219_STA_E	S132 East
11	12	128	4_SJ_S	S99 South
11	12	59	2_SJ_E	S120 East

**Screenline 21: Stanislaus to San Joaquin**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
12	11	202	79_STA_N	I5 North
12	11	91	250_SJ_N	S33 North
12	11	68	219_STA_W	S132 West

12	11	127	4_SJ_N	S99 North
12	11	60	2_SJ_W	S120 West

1	3	55	192_TRI_E	S36 East
5	6	9	124_COL_E	S20 East

**Screenline 22: Siskiyou, Modoc to Trin, Shas, Lass**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
2	1	18	137_SIS_W	S96 West
2	1	78	237_SIS_S	S3 South
2	3	84	242_SHA_S	S89 South
2	3	36	165_SHA_W	S299 West
2	4	26	144_MOD_S	S139 South
2	4	90	246_MOD_S	US395 South

**Screenline 24: Glen, Teha, Shasta to Trinity, Mendocino**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
3	1	34	159_TRI_W	S299 West
3	1	56	192_TRI_W	S36 West
6	5	10	124_COL_W	S20 West

**Screenline 22: Trin, Shas, Lass to Siskiyou, Modoc**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
1	2	17	137_SIS_E	S96 East
1	2	77	237_SIS_N	S3 North
3	2	83	242_SHA_N	S89 North
3	2	35	165_SHA_E	S299 East
4	2	25	144_MOD_N	S139 North
4	2	89	246_MOD_N	US395 North

**Screenline 25: Ventura to Santa Clarita**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
21	20	195	724_VEN_E	S126 East

**Screenline 25: Santa Clarita to Ventura**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
20	21	196	724_VEN_W	S126 West

**Screenline 23: Tehama, Shasta to Lassen, Plumas**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
3	4	21	139_LAS_E	S44 East
3	4	71	225_TEH_E	S36 East

**Screenline 23: Lassen, Plumas to Tehama, Shasta**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
4	3	22	139_LAS_W	S44 West
4	3	72	225_TEH_W	S36 West

**Screenline 24: Trinity, Mendocino to Glen, Teha, Shasta**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
1	3	33	159_TRI_E	S299 East

**Screenline 26: Other to Other**

FROM	TO	STATION_ID	CALTRANS_ID	STREET_NAME
99	99	41	170_MOD_E	S299 East
99	99	42	170_MOD_W	S299 West
99	99	11	125_LAS_E	S70 East
99	99	12	125_LAS_W	S70 West
99	99	232	908_RIV_E	I10 East
99	99	233	908_RIV_W	I10 West
99	99	322	152_SIS_W	S161 West
99	99	323	152_SIS_E	S161 East
99	99	312	400580	S24 West
99	99	313	400748	S24 East
99	99	314	400791	I680 South
99	99	315	401492	I680 South
99	99	316	400870	I680 North
99	99	317	400232	I680 North