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## The New VCTM: An Updated Model for Ventura County

May 23, 2018

# Today's Agenda

- Introduction
- Ventura County Traffic Model (VCTM)
  - Background
  - Development
  - Calibration and Validation
  - Applications
- Next Steps & Into The Future





# Introduction

- Iteris selected by VCTC and SCAG - SMDT
- VCTC - Regional Transportation Planning Agency
- Changing Transportation Trends in Ventura County
- Upcoming Plans and Projects
- Need for Travel Demand Forecasts and Practical Tools
- Cooperative Interagency Process



# VCTM– A Long History!

- Previous Version developed in 2009 (base year 2007, forecast Year 2030)
- Based on 1997 TransCAD Software Platform (converted from previous Tranplan model developed in 1992)
- Land Use Based (Building Square Footage and LU Acres)
- Autos only (No Transit or Goods Movement/HDT Component)

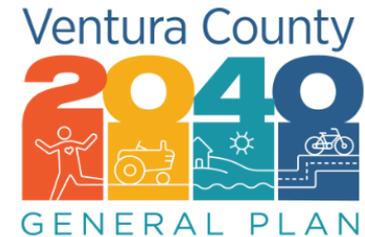
# Collaboration is the Key!

- Working Closely with SCAG Modeling Staff - SMDT
- Collaboration with all local agencies through VCTC and TTAC
- Data exchange and review
- Centroid connection locations (link mid-points)
- Local street link additions during SMDT
- Running of model add-ins for initialization
- Potential uses of the model for other agencies



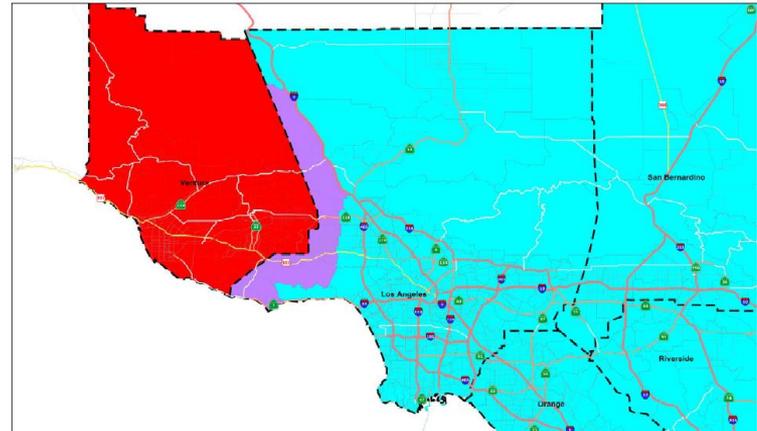
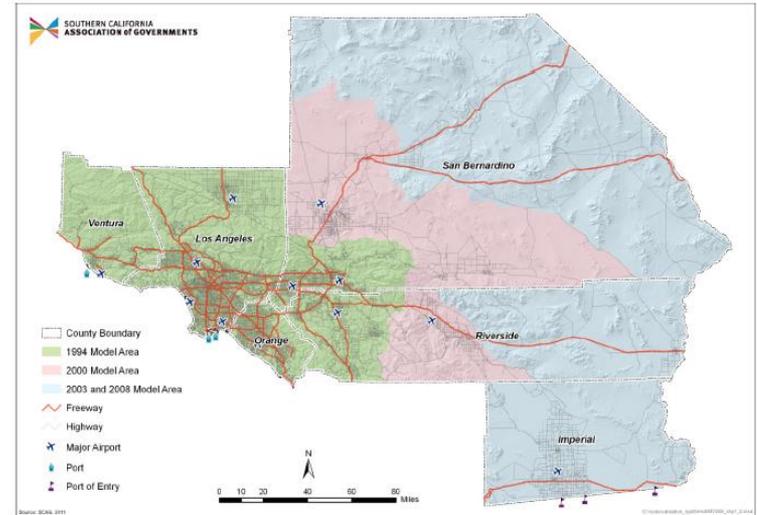
# Key Application Needs

- VCTC's Highway and Multi-Modal Planning and Infrastructure Needs Assessment
- Environmental Analyses
- County General Plan Update
- SB 743
- Compatibility with CMP/RTP/SCS
- Impact Fee/Fair Share Needs
- Next Generation of Local Models
- US-101 HOV Lane



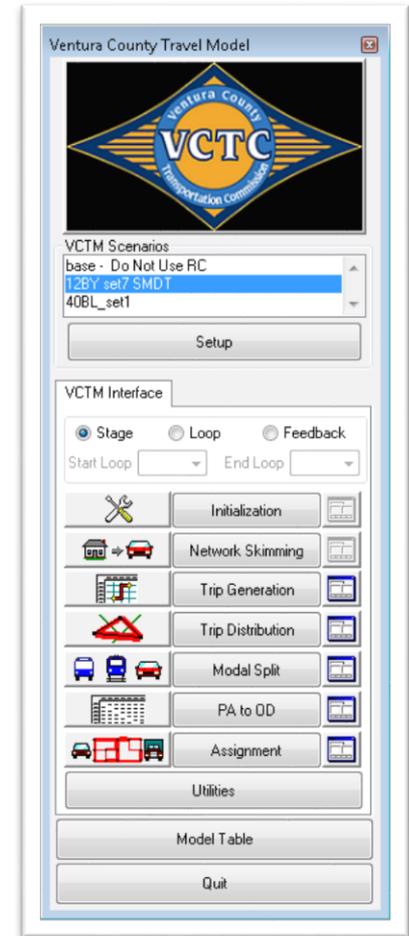
# What's In The Model?

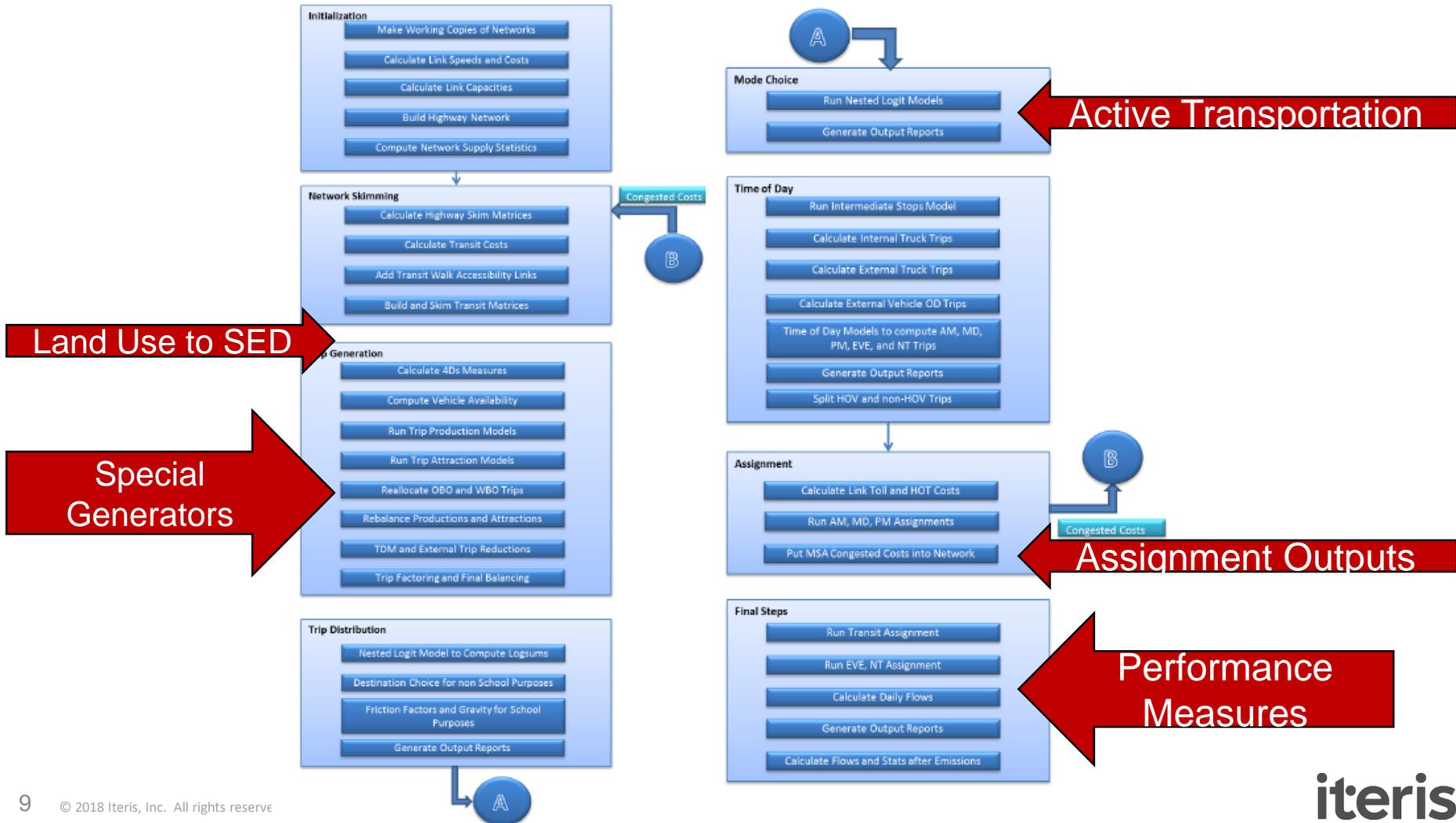
- SCAG 2016 Regional Transportation Plan (RTP)/Sustainable Communities Strategies (SCS) Regional Travel Demand Model
  - Subarea Model Development Tool
  - Ventura County Subarea Model
- SCAG Zone Structure
  - 11,000+ zones – Used for trip distribution and mode choice
  - Full Model run time upwards of 7-10 days
- VCTM
  - 663 Ventura County zones
  - 1,021 total zones
  - Full Model run time 13-15 hours.



# Improvements Customized to Local Needs

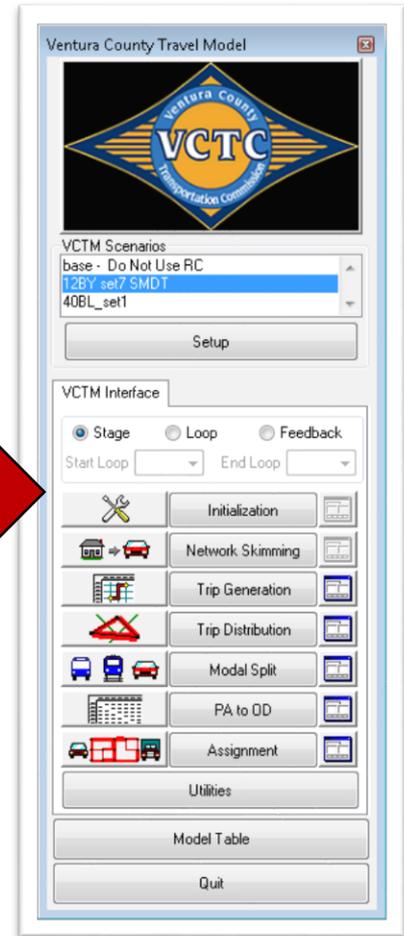
- Land Use to Socio-Economic Data Conversion
- Special Generator Trip Generation
- Enhanced Active Transportation in Mode Choice
  - Previous Model did not include a Mode Choice component
- Additional Assignment Output Capabilities
- Specialized and Standardized Performance Measure Outputs for VCTC and local needs





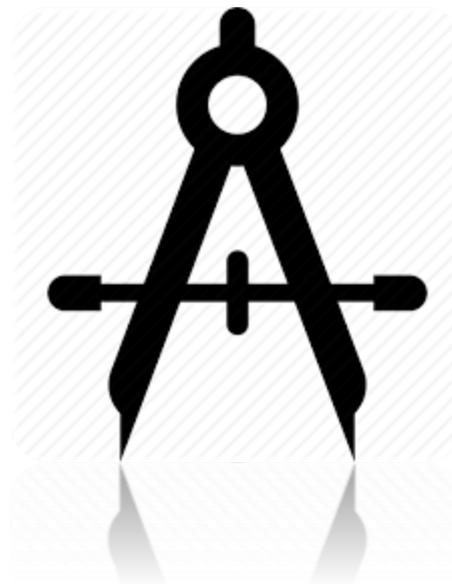
# Land Use Model

- Obtained raw land use for 2012 and 2040 from SCAG, coordinated with local agencies through VCTC
  - Performed Adjustments (open space, water, undevelopable, etc.)
- Developed conversion factors for Land Use to SED
  - Based on Representative Zones by Land Use Category
  - Developed for Total Employment & Total Households
  - Performed calibration of rates to match Countywide SED totals



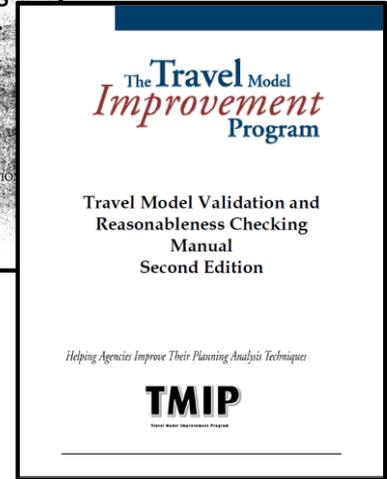
# Model Calibration

- What needs calibration?
  - Trip Generation Rates
  - Regional Boundaries (External Stations)
  - Special Generator Rates
  - Transit Trips
  - Mode Choice Coefficients
  - Trip Distribution



# Model Validation

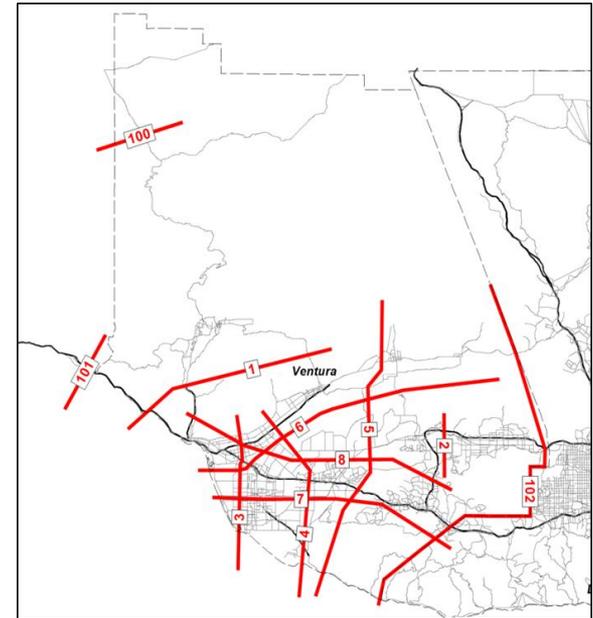
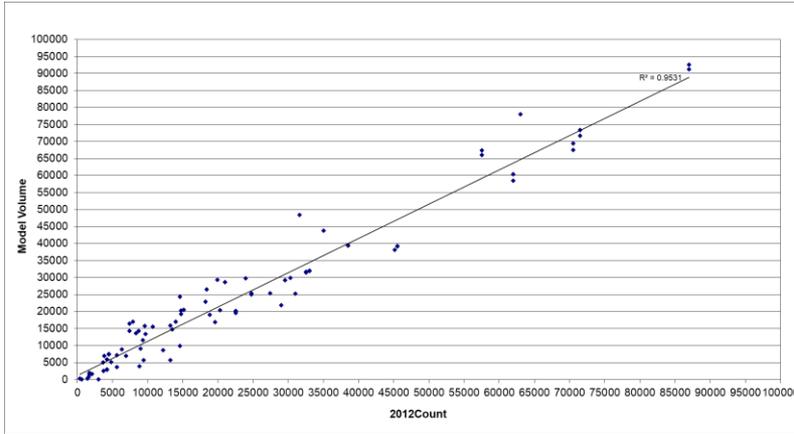
- Freeway and Arterial Street Networks
  - Count/Volume Comparison (FHWA & Caltrans)
    - Freeways +/- 7%
    - Major Arterials +/- 10%
    - Minor Arterials +/- 15%
  - Percent Root Mean Squared Error (%RMSE )
    - Caltrans = 40
    - FHWA = 30
  - Coefficient of Determination ( $R^2$ ) (FHWA & Caltrans)
    - 0.88
  - Caltrans Standard Deviation
    - >0.75



- ❖ *Caltrans Criteria from the Caltrans Travel Forecasting Guidelines, November 1992*
- ❖ *FHWA Criteria from the TMIP Model Validation and Reasonableness Checking Manual*

# Model Validation Results

- Screenlines



Scenario		VCTM Model Update VCTM_12BY_Validation5						
Time Period		Daily						
Screenline Name	Number	Screenline Direction	Number of Counts	Total Sum of Counts	Total Volumes at Locations with Counts	Volume/Count Ratio	Caltrans Pass/Fail Criteria	FHWA Pass/Fail Criteria
EW - In-Between SR-150 and SR-126	1	EB/WB	5	94,160	98,722	1.05	PASS	PASS
NS - From Madera Rd (Simi Valley) to SR-126	2	NB/SB	5	131,600	152,379	1.16	PASS	PASS
NS - From Port Hueneme through Foothill Rd	3	NB/SB	11	243,100	242,010	1.00	PASS	PASS
NS - From PCH to Foothill Rd (East of Wood Rd)	4	NB/SB	14	255,300	269,152	1.05	PASS	PASS
NS - From PCH to SR-126 (East of Camarillo)	5	NB/SB	7	145,000	163,631	1.13	PASS	PASS
EW - In-Between SR-126 and SR-118	6	EB/WB	7	249,200	259,420	1.04	PASS	PASS
EW - South of US-101	7	EB/WB	12	176,900	171,551	0.97	PASS	PASS
EW - North of US-101	8	EB/WB	12	233,600	243,174	1.04	PASS	PASS
EW - Outline on Maricopa Highway (Ojai)	100	EB/WB	1	310	346	1.12	PASS	PASS
EW - Outline on PCH (Santa Barbara County)	101	EB/WB	2	65,000	63,190	0.97	PASS	PASS
NS - Ventura County/Los Angeles County Line	102	NB/SB	8	343,700	389,459	1.13	PASS	PASS
<b>Combined Screenline Totals</b>			<b>42</b>	<b>869,160</b>	<b>925,894</b>	<b>1.07</b>		

\*\* All Counts are for 2014

# Model Validation

- Freeway and Arterial Street Networks

**VCTM Model Update Count - Volume Comparison - (VCTM\_12BY\_Validation5) -**

Functional Classification	ADT Counts	ADT Volumes	ADT % (Count / Volume)
Freeway	8288151	8241073	-0.6%
HOV	0	0	
Principal Arterial	2239150	2071049	-8.1%
Minor Arterial	1101700	1055104	-4.4%
Major Collector	411500	323191	-27.3%
Minor Collector	27000	23137	-16.7%
Ramps	570985	488818	-16.8%
	12638486	12202372	-3.6%

*\*Note: Travel statistics do not include travel on centroids.*

	ADT
<b>Caltrans and FHWA Criteria:</b>	
Freeways +/- 7%	-1%
Major Arterials +/- 10%	-8%
Minor Arterials +/- 15%	-4%

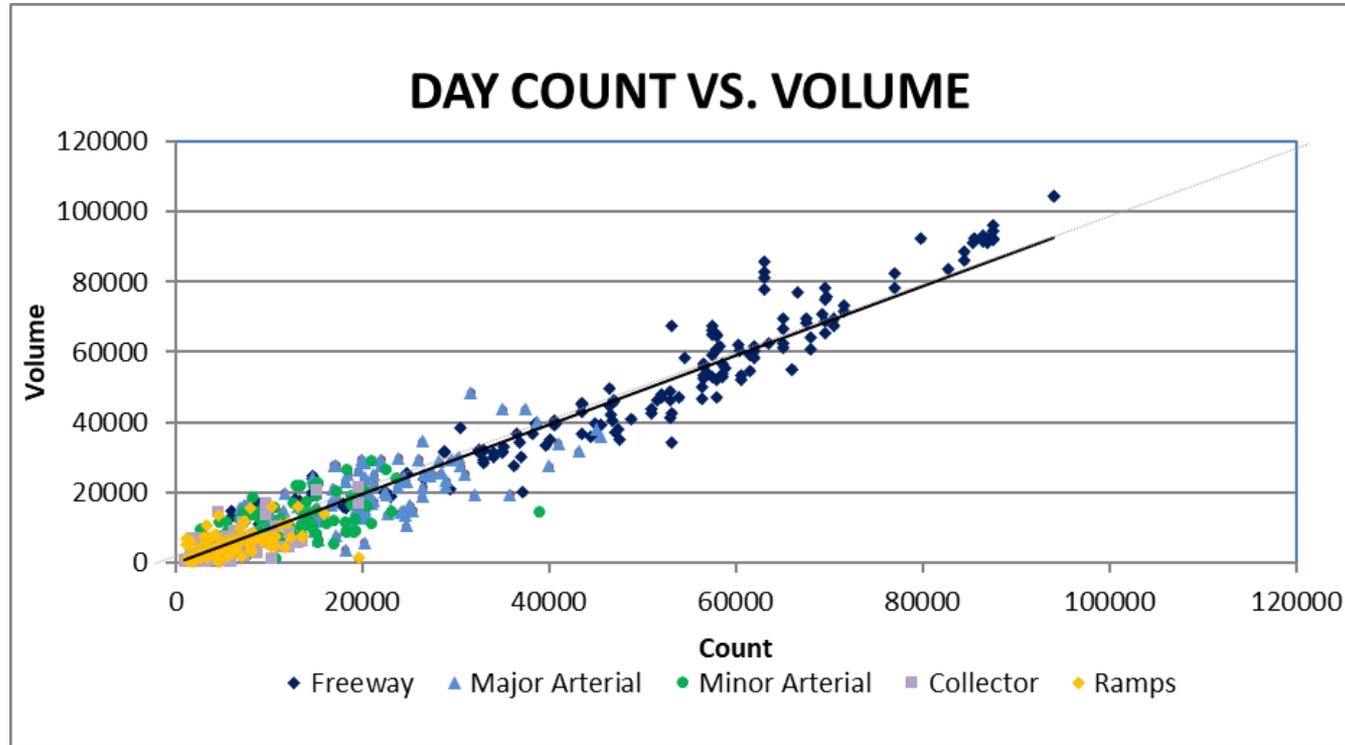
	ADT
<b>Caltrans Recommended Guidance:</b>	
(<40=Green, 40-45=Yellow, >45=Red)	
%RMSE =	25
<b>FHWA Recommended Guidance:</b>	
(Periods: <40=Green, 40-45=Yellow, >45=Red)	
(Day: <30=Green, 30-35=Yellow, >35=Red)	
%RMSE =	25

	ADT
<b>FHWA Criteria:</b>	
Coefficient of Determination (R <sup>2</sup> )	
(>=0.88=Green, <0.88=Red)	0.94

	ADT
<b>Caltrans Criteria:</b>	
% of Links within Caltrans Standard Deviations	
(>=0.75=Green, 0.70-0.75=Yellow, <0.70=Red)	75%

# Model Validation Results

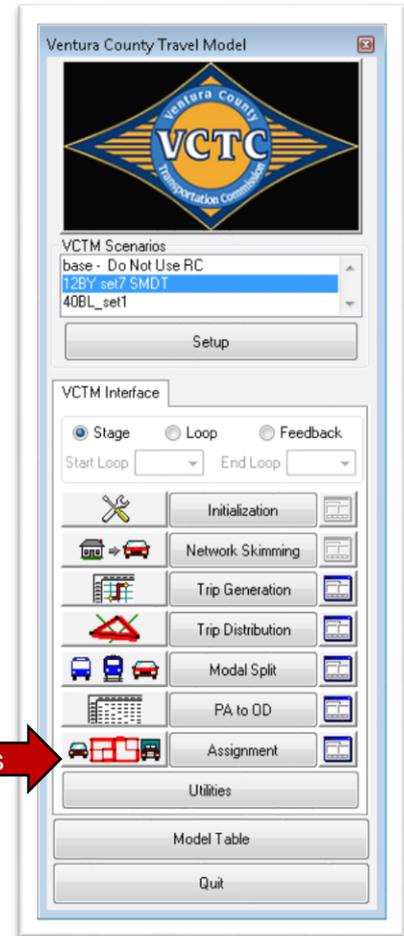
- Freeway and Arterial Street Networks



# Performance Measures/Outputs

- Specialized Outputs for Various Stages of Model Run
- Standardized Model Outputs For Each Model Loop
  - Network Outputs
  - Assignment Loading (Volumes and Speeds)
  - Screenline Outputs
  - Internal/External Origins and Destinations By District
  - Air Quality Outputs
  - Vehicle Miles Traveled/Vehicle Hours of Travel/Vehicle Hours of Delay (VMT/VHT/VHD)
  - V/C Ratios on Facilities
  - Heavy Duty Vehicle Volumes
  - Transit Ridership by Mode
  - Active Transportation Modes

Performance Measures



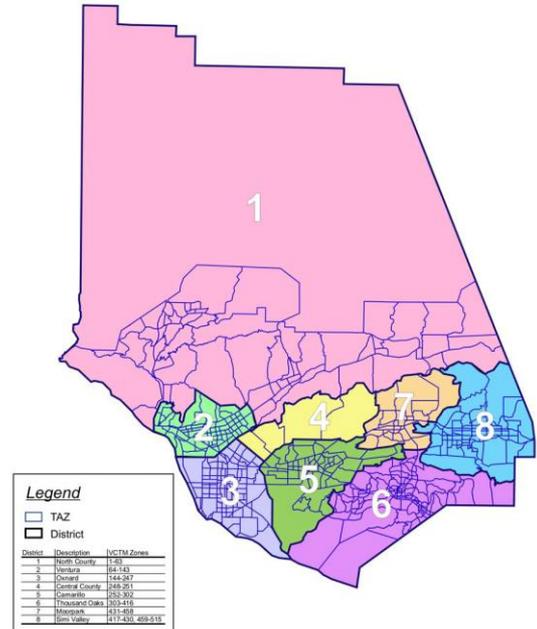
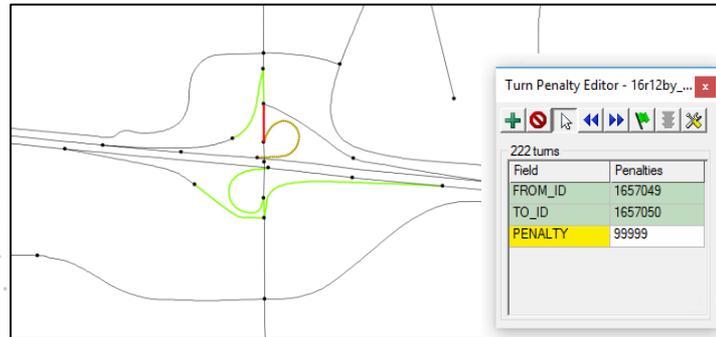
# Model Application

- Functional Class Plots
  - With Number of Lanes
  - With Speeds
- Volume to Capacity Plots
- Air Quality Speed Bin Outputs
- Vehicle Miles of Travel Automated Outputs
- Vehicle Hours of Travel Automated Outputs
- Vehicle Hours of Delay Automated Outputs



# Added Features for Practical Applications

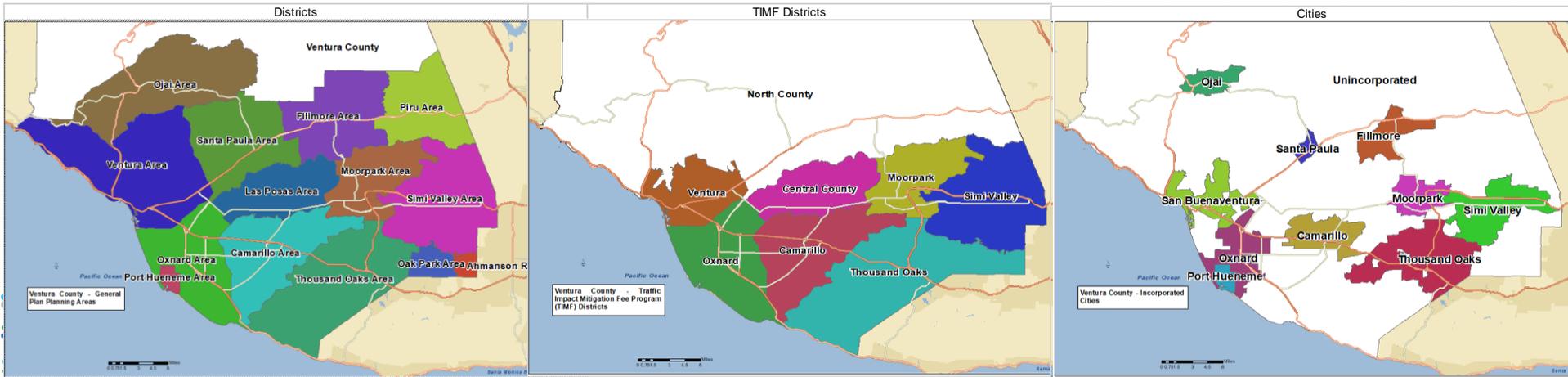
- **Updated UI Format**
- **Turn Penalties & Turn Movements:** Turn penalties have been added into the model stream. Turn movements are now reported for flagged model nodes.
- **Specialized District & City-level Reporting**



# Model Outputs – Automated Processing

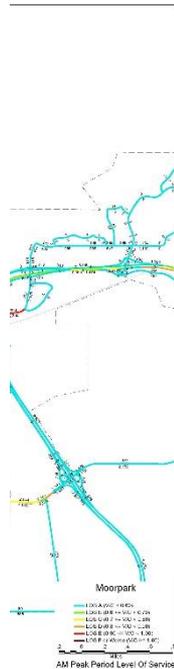
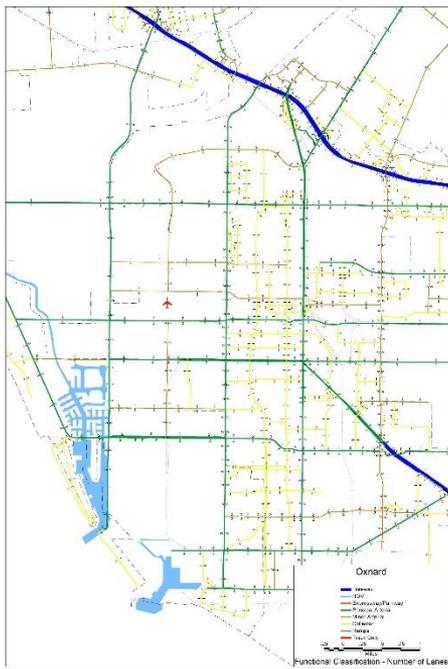
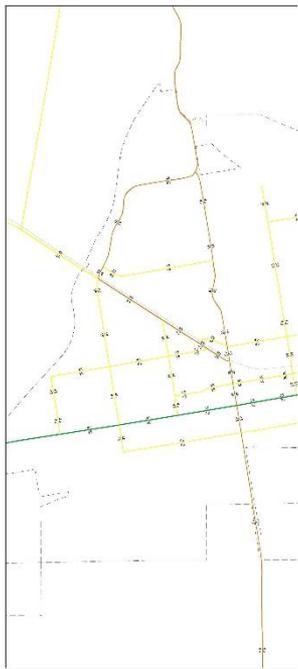
❖ All outputs developed for the following:

- Ventura County, General Plan Districts, TIMF Districts, Cities
- By Time of Day (AM peak period, Mid-day, PM peak period, Evening, Night)



# Model Outputs – Automated Plotting

- Incorporated Into Model Stream



# Model Outputs – Automated Processing

- Automated outputs from each model run
- Standardized spreadsheet tool

Air Quality - Ventura County							
Travel Model Update VCTM_12BY_Validation							
Vehicle Miles Traveled							
Speed Ranges	AM Peak Period 6 AM to 9 AM	Midday Period 9 AM to 3 PM	PM Peak Period 3 PM to 7 PM	Evening Period 7 PM to 9 PM	Nighttime Period 9 PM to 6 AM	Average Daily	Percent of Travel
0 - 5 mph	333	261	719	0	0	1,312	0.0%
5 - 10 mph	12,241	2,093	22,813	204	133	37,485	0.2%
10 - 15 mph	29,526	30,713	43,633	6,245	3,832	113,949	0.7%
15 - 20 mph	41,096	32,960	102,936	6,142	6,717	189,850	1.2%
20 - 25 mph	92,015	49,239	154,738	10,705	8,085	314,782	1.9%
25 - 30 mph	225,443	307,235	384,633	53,670	57,948	1,028,929	6.3%
30 - 35 mph	342,703	483,645	653,369	97,781	99,972	1,677,470	10.3%
35 - 40 mph	603,322	907,287	885,131	228,457	236,723	2,860,921	17.5%
40 - 45 mph	465,780	622,310	654,966	155,965	214,465	2,113,485	12.9%
45 - 50 mph	211,795	259,825	432,371	58,467	78,572	1,041,030	6.4%
50 - 55 mph	204,345	502,158	410,187	42,549	35,893	1,195,132	7.3%
55 - 60 mph	355,213	862,824	419,991	283,721	422,235	2,343,983	14.3%
60 - 65 mph	386,583	615,978	538,255	174,428	337,145	2,052,388	12.5%
65 - 70 mph	113,645	83,773	281,479	34	2,185	481,116	2.9%
70 - 75 mph	115,654	437,970	50,082	135,358	171,628	910,693	5.6%
75 - 80 mph	0	0	0	0	0	0	0.0%
<b>VMТ - Total</b>	<b>3,199,693</b>	<b>5,198,268</b>	<b>5,035,302</b>	<b>1,253,726</b>	<b>1,675,535</b>	<b>16,362,525</b>	<b>100.0%</b>
<small>*Note: Travel statistics do not include travel on centroids or local roads which are not included in the model.</small>							
Travel Model Update VCTM_12BY_Validation							
Total Vehicle Miles Traveled (VMT) by Facility Classification							
Functional Classification	AM Peak Period 6 AM to 9 AM	Midday Period 9 AM to 3 PM	PM Peak Period 3 PM to 7 PM	Evening Period 7 PM to 9 PM	Nighttime Period 9 PM to 6 AM	Average Daily	Percent of Travel
Freeway	1,530,991	2,401,740	2,327,578	594,913	903,857	7,759,080	47.4%
HOV	183	209	1,034	26	0	1,452	0.0%
Expressway/Parkway	0	0	0	0	0	0	0.0%
Principal Arterial	789,342	1,325,352	1,267,109	311,814	381,415	4,075,031	24.9%
Minor Arterial	515,315	860,579	835,694	204,753	226,983	2,643,323	16.2%
Major Collector	211,715	349,090	350,664	80,099	88,090	1,079,657	6.6%
Minor Collector	57,150	97,374	97,447	21,027	22,714	295,712	1.8%
Ramp	94,998	163,924	155,777	41,094	52,477	508,269	3.1%
Trucks Only	0	0	0	0	0	0	0.0%
<b>Total</b>	<b>3,199,693</b>	<b>5,198,268</b>	<b>5,035,302</b>	<b>1,253,726</b>	<b>1,675,535</b>	<b>16,362,525</b>	<b>100.0%</b>

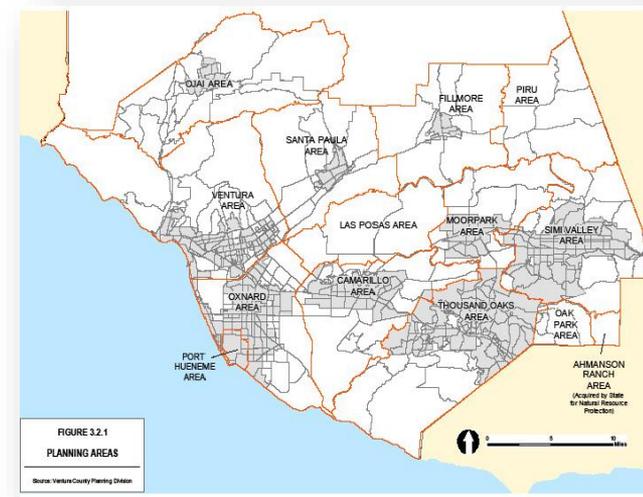
# Next Steps and Into the Future

- Coordination with Ventura County General Plan Update
- US-101 HOV Lane PA&ED Effort
- Local Applications and Updates



# Next Steps

- Collect Feedback from TTAC regarding Land Use Data
- Complete Special Generator Determination and Inclusion into the Model
- Complete Model Calibration and Validation
- Finalize Standardized Performance Measures
- Modify and Refine Active Transportation Model
- Coordination with General Plan



# Thank You!

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