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

<table>
<thead>
<tr>
<th>Scenario Name</th>
<th>Time Period</th>
<th>Screenline Name</th>
<th>Number</th>
<th>Screenline Direction</th>
<th>Number of Counts</th>
<th>Total Sum of Counts</th>
<th>Total Volumes at Locations with Counts</th>
<th>Volume/Count Ratio</th>
<th>Caltrans Pass/Fail Criteria</th>
<th>FHWA Pass/Fail Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>EW - In-Between SR-150 and SR-126</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>NS - From Madera Rd (Simi Valley) to SR-126</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>NS - From Port Hueneme through Foothill Rd</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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</tr>
<tr>
<td>NS - From PCH to Foothill Rd (East of Wood Rd)</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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<tr>
<td>NS - From PCH to SR-126 (East of Camarillo)</td>
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<tr>
<td>EW - In-Between SR-126 and SR-118</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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</tr>
<tr>
<td>EW - South of US-101</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>EW - North of US-101</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>EW - Cutline on Maricopa Highway (Ojai)</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>EW - Cutline on PCH (Santa Barbara County)</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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<td></td>
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<tr>
<td>NS - Ventura County/Los Angeles County Line</td>
<td>Daily</td>
<td>VCTM Model Update VCTM_12BY_Validation5</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Combined Screenline Totals</td>
<td></td>
<td></td>
<td>42</td>
<td></td>
<td>869,160</td>
<td>925,894</td>
<td>1.07</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**All Counts are for 2014**
Model Validation

- Freeway and Arterial Street Networks

<table>
<thead>
<tr>
<th>VCTM Model Update Count - Volume Comparison - (VCTM_12BY_Validation5) -</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional Classification</strong></td>
</tr>
<tr>
<td>Freeway</td>
</tr>
<tr>
<td>HOV</td>
</tr>
<tr>
<td>Principal Arterial</td>
</tr>
<tr>
<td>Minor Arterial</td>
</tr>
<tr>
<td>Major Collector</td>
</tr>
<tr>
<td>Minor Collector</td>
</tr>
<tr>
<td>Ramps</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

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

Caltrans and FHWA Criteria:

<table>
<thead>
<tr>
<th>ADT</th>
<th>Freeways +/- 7%</th>
<th>Major Arterials +/- 10%</th>
<th>Minor Arterials +/- 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT</td>
<td>-1%</td>
<td>-8%</td>
<td>-4%</td>
</tr>
</tbody>
</table>

Caltrans Recommended Guidance:

- (<40=Green, 40-45=Yellow, >45=Red)
  - %RMSE = 25

FHWA Recommended Guidance:

- (Periods: <40=Green, 40-45=Yellow, >45=Red)
- (Day: <30=Green, 30-35=Yellow, >35=Red)
  - %RMSE = 25

FHWA Criteria:

- Coefficient of Determination (R\(^2\))
  - (>=0.88=Green, <0.88=Red)
  - 0.94

Caltrans Criteria:

- % 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

![Day Count vs. Volume Graph]
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
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_VCTM_Validation

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>AM Peak Period 6 AM to 9 AM</th>
<th>Midday Period 9 AM to 3 PM</th>
<th>PM Peak Period 3 PM to 7 PM</th>
<th>Evening Period 7 PM to 9 PM</th>
<th>Nighttime Period 9 PM to 6 AM</th>
<th>Average Daily</th>
<th>Percent of Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td>1,530,991</td>
<td>2,401,742</td>
<td>2,327,276</td>
<td>349,912</td>
<td>933,897</td>
<td>7,759,980</td>
<td>47.4%</td>
</tr>
<tr>
<td>HOV</td>
<td>183</td>
<td>209</td>
<td>1,034</td>
<td>26</td>
<td>0</td>
<td>1,452</td>
<td>0.0%</td>
</tr>
<tr>
<td>Expressway/Parkway</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Principal Arterial</td>
<td>789,342</td>
<td>1,325,352</td>
<td>1,267,109</td>
<td>311,814</td>
<td>381,415</td>
<td>4,075,031</td>
<td>24.9%</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>515,315</td>
<td>860,579</td>
<td>835,694</td>
<td>204,753</td>
<td>226,983</td>
<td>2,643,323</td>
<td>16.2%</td>
</tr>
<tr>
<td>Major Collector</td>
<td>211,715</td>
<td>349,090</td>
<td>350,664</td>
<td>80,099</td>
<td>88,080</td>
<td>1,079,657</td>
<td>6.6%</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>57,150</td>
<td>97,374</td>
<td>97,447</td>
<td>21,027</td>
<td>22,714</td>
<td>295,712</td>
<td>1.8%</td>
</tr>
<tr>
<td>Trucks Only</td>
<td>94,988</td>
<td>163,924</td>
<td>155,777</td>
<td>41,094</td>
<td>52,477</td>
<td>508,269</td>
<td>3.1%</td>
</tr>
<tr>
<td>Total</td>
<td>3,199,693</td>
<td>5,198,266</td>
<td>5,035,302</td>
<td>1,253,726</td>
<td>1,675,535</td>
<td>16,362,525</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Note: Travel statistics do not include travel on centroids or local roads which are not included in the model.*

### Speed Ranges

#### AM Peak Period

- 0 - 5 mph: 339, 261, 778
- 5 - 10 mph: 12,241, 2,093, 22,813
- 10 - 15 mph: 29,526, 30,713, 43,633
- 15 - 20 mph: 41,096, 32,960, 6,142
- 20 - 25 mph: 92,015, 49,239, 154,738
- 30 - 35 mph: 342,703, 483,645, 653,369
- 35 - 40 mph: 603,322, 907,287, 885,131
- 40 - 45 mph: 465,760, 622,310, 654,966
- 45 - 50 mph: 211,796, 259,825, 432,371
- 50 - 55 mph: 204,345, 502,158, 410,187
- 55 - 60 mph: 305,213, 862,624, 419,991
- 60 - 65 mph: 386,583, 615,978, 538,255
- 65 - 70 mph: 113,645, 83,773, 281,479
- 70 - 75 mph: 76,154, 437,970, 50,082
- 75 - 80 mph: 0, 0, 0
- 80 - 85 mph: 0, 0, 0

#### Midday Period

- 6 AM to 9 AM: 339, 261, 778
- 9 AM to 3 PM: 12,241, 2,093, 22,813
- 3 PM to 7 PM: 29,526, 30,713, 43,633

#### PM Peak Period

- 3 PM to 7 PM: 41,096, 32,960, 6,142
- 7 PM to 9 PM: 92,015, 49,239, 154,738
- 9 PM to 6 AM: 325,443, 307,235, 384,633

#### Nighttime Period

- 9 PM to 6 AM: 342,703, 483,645, 653,369

#### Average Daily

- 0 - 5 mph: 1,312
- 5 - 10 mph: 37,485
- 10 - 15 mph: 113,349
- 15 - 20 mph: 314,782
- 20 - 25 mph: 1,028,929
- 25 - 30 mph: 1,677,470
- 30 - 35 mph: 2,860,321
- 35 - 40 mph: 2,113,485
- 40 - 45 mph: 1,195,132
- 45 - 50 mph: 2,543,963
- 50 - 55 mph: 2,052,388
- 55 - 60 mph: 481,116
- 60 - 65 mph: 171,628
- 65 - 70 mph: 910,693
- 70 - 75 mph: 0
- 75 - 80 mph: 0
- 80 - 85 mph: 0
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!

Viggen Davidian (Project Manager)
vdj@iteris.com
(213) 802-1707

Jennifer Martin (Technical Lead)
jmartin@iteris.com
(714) 277-8058

Chris Devlin (Technical Advisor/QC)
cdevlin@iteris.com
(949) 270-9658