Forum Agenda

- Model Overview: Growth Forecast and Travel Demand Model
- Transportation Network Development
- Travel Demand Model Resources
Model Overview: Growth Forecast and Travel Demand Model

Rick Curry
What is a Transportation Model?

- Mathematical Equations that Replicate Observed Human Travel Behavior
- Based on Survey Data
- Assumes Constant Behavior
What is the model used for?

- Transportation System
- Land Use and Demographics
- Transportation/Land Use Policies

Transportation Model

- System Demand
- Environmental Impact
- System Performance
4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

Growth Forecast → Traffic Analysis Zones

Traffic Census → Travel Surveys

Highway Network → Transit Network

1. Truck Trip Generation
2. Truck Trip Distribution

Mode Choice is connected to Trip Assignment.

Post-Processing leads to Air Quality.
4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

Post-Processing
Air Quality

- Growth Forecast
- Traffic Analysis Zones
- Traffic Census
- Travel Surveys
- Highway Network
- Transit Network
- Truck Trip Generation
- Truck Trip Distribution
- Air Quality
## Linking Growth Forecasts with RTPs

<table>
<thead>
<tr>
<th>Growth Forecast</th>
<th>RTP</th>
<th>Base Year</th>
<th>Horizon Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series 5</td>
<td>1980</td>
<td>1978</td>
<td>2000</td>
</tr>
<tr>
<td>Series 6</td>
<td>1986</td>
<td>1980</td>
<td>2005</td>
</tr>
<tr>
<td>Series 7</td>
<td>1989</td>
<td>1986</td>
<td>2010</td>
</tr>
<tr>
<td>Series 8</td>
<td>1994</td>
<td>1990</td>
<td>2015</td>
</tr>
<tr>
<td>Series 9</td>
<td>2000</td>
<td>1998</td>
<td>2020</td>
</tr>
<tr>
<td>Series 10</td>
<td>2003</td>
<td>2000</td>
<td>2030</td>
</tr>
<tr>
<td>Series 11</td>
<td>2007</td>
<td>2003</td>
<td>2030</td>
</tr>
<tr>
<td>Series 12</td>
<td>2011</td>
<td>2008</td>
<td>2050</td>
</tr>
</tbody>
</table>
Regional Results: Population, Jobs, Housing

![Graph showing population, jobs, and housing trends from 1970 to 2050.](image-url)
Regionwide Age Structure: 1990, 2000, 2010 and 2050

Male Female

85+ 80 to 84 75 to 79 70 to 74 65 to 69 60 to 64 55 to 59 50 to 54 45 to 49 40 to 44 35 to 39 30 to 34 25 to 29 20 to 24 15 to 19 10 to 14 5 to 9 Under 5

Source: U.S. Census Bureau, Census 1990, 2000, 2010; SANDAG, 2050 Regional Growth Forecast, February 2010
4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

- Growth Forecast
- Traffic Census
- Highway Network
- Travel Surveys
- Transit Network
- Truck Trip Generation
- Truck Trip Distribution

- Post-Processing
- Air Quality
Traffic Analysis Zones

SANDAG Series 11
Traffic Analysis Zones and MGRAs
Otay Mesa Area

Zones and Roads:
- Traffic Analysis Zone 102
- Major Geographic Reference Areas (MGRAs)
- 2000 Participating Metropolitan Areas
- 2000 Participating Metropolitan Areas
- 2000 Participating Metropolitan Areas

Zone Labels:
- zone number
- significant road intersections
- Major Geographic Reference Areas (MGRAs)
The Traditional 4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

- Growth Forecast
- Traffic Census
- Highway Network
- Transit Network
- Travel Surveys
- Truck Trip Generation
- Truck Trip Distribution
- Post-Processing
- Air Quality
Surveys

- **Travel Behavior Surveys**
  - Inter-regional
  - Intra-regional
  - California Household Travel Survey (CHTS)
  - National Household Travel Survey (NHTS)

- **Regional / On-board Transit Surveys**

- **Transit Passenger Counting Program**

- **Census / ACS / CTPP**

- **Cross-Border Surveys**

- **Parking Surveys**

- **Taxi Surveys**

- **Vehicle Occupancy and Classification Surveys**

- **Visitor Surveys**

- **Market Research Surveys**
4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

Air Quality

Highway Network
Transit Network
Highway & Transit Networks

2050 Revenue Constrained Transit Network
- High Speed Rail
- Commuter Rail
- Express LRT
- LRT
- Peak Period BRT
- BRT
- Streetcar/Shuttle
- Rapid Bus
- Local Bus

Revenue Constrained 2050 Highway Network
- Managed Lanes
- General Purpose Lanes
- Toll Lanes
- Operational Improvements
  - Freeway Connectors
  - HOV Connectors
  - Freeway & HOV Connectors
- C = Conventional Highway
- F = Freeway
- HOV = High Occupancy Vehicle
- MB = Movable Barrier
- ML = Managed Lanes
- OPS = Operational Improvements
- T = Toll Road
Highway Networks

Freeway
Prime Arterial
Major Arterial
Collector
Local Collector
Rural Collector
Local Road
Local Ramp
Connector Ramp
Zone Connector
Transit Routes and Stops
4-Step Transportation Model

1. Trip Generation
2. Trip Distribution
3. Mode Choice
4. Trip Assignment

Post-Processing

Air Quality

Truck Trip Generation

Truck Trip Distribution

Growth Forecast
Traffic Analysis Zones
Traffic Census
Travel Surveys
Highway Network
Transit Network

Trip Generation

Mode Choice

Trip Assignment

Air Quality

19
# SANDAG Travel Demand Model Comparisons

<table>
<thead>
<tr>
<th></th>
<th>Series 10</th>
<th>Series 11</th>
<th>Series 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
<td>TranPlan</td>
<td>TransCAD 4.8</td>
<td>TransCAD 5.0</td>
</tr>
<tr>
<td><strong>Platform</strong></td>
<td>UNIX</td>
<td>Windows XP</td>
<td>Windows Server</td>
</tr>
<tr>
<td><strong>Model Run Time</strong></td>
<td>10 hours</td>
<td>12 hours</td>
<td>20 hours</td>
</tr>
<tr>
<td><strong>MGRA</strong></td>
<td>33353</td>
<td>33353</td>
<td>21633</td>
</tr>
<tr>
<td><strong>TAZ</strong></td>
<td>4605</td>
<td>4605</td>
<td>4682</td>
</tr>
<tr>
<td><strong>TDZ</strong></td>
<td>n/a</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td><strong>RTP</strong></td>
<td>2003</td>
<td>2006 Update and 2007</td>
<td>2011</td>
</tr>
<tr>
<td><strong>Base Year</strong></td>
<td>2000</td>
<td>2003</td>
<td>2008</td>
</tr>
<tr>
<td><strong>Horizon Year</strong></td>
<td>2030</td>
<td>2030</td>
<td>2050</td>
</tr>
<tr>
<td><strong>Trip Generation</strong></td>
<td>Dwelling Unit, Acre, Site &amp; Unique</td>
<td>Dwelling Unit, Acre, Site &amp; Unique</td>
<td>Dwelling Unit, Acre, Site, Unique &amp; Truck</td>
</tr>
<tr>
<td><strong>Regional CCDC</strong></td>
<td>Dwelling Unit, Employee, Site &amp; Unique</td>
<td>Dwelling Unit, Employee, Site &amp; Unique</td>
<td>Dwelling Unit, Employee, Site, Unique &amp; Truck</td>
</tr>
<tr>
<td><strong>Feedback Loops</strong></td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>Trip Distribution:</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>Trip Length Calibration</td>
</tr>
<tr>
<td><strong>Mode Choice:</strong></td>
<td>9 modes</td>
<td>16 modes</td>
<td>16 modes</td>
</tr>
<tr>
<td><strong>Mode Choice: 4D</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>Utility Equation Updated</td>
</tr>
<tr>
<td><strong>Toll</strong></td>
<td>Speed Reduction</td>
<td>Speed Reduction</td>
<td>Congestion Pricing</td>
</tr>
<tr>
<td><strong>Assignment Classes</strong></td>
<td>2: SOV &amp; HOV</td>
<td>4: SOV, SOVT, HOV, &amp; HOVT</td>
<td>14: SOV, SOVT, HOV2, HOV2N, HOV2T, HOV3+HOV3+N, HOV3+T, LHD, MHD, HHD, LHDT, MHD, &amp; HHD</td>
</tr>
<tr>
<td><strong>Assignment Function</strong></td>
<td>User Equilibrium</td>
<td>Multi-Modal Assignment (equilibrium)</td>
<td>Multi-Modal Assignment (bi-conjugate)</td>
</tr>
<tr>
<td><strong>Assignment Iterations</strong></td>
<td>4 iterations</td>
<td>0.01 Convergence Criteria</td>
<td>0.001 Convergence Criteria</td>
</tr>
</tbody>
</table>

* 4D = **Density** (units/jobs per acre), **Diversity** (mix of land use), **Design** (walk and bike) and **Destination** (regional activity centers)
Changes for 2050 RTP

- Zones
  - New boundaries for MGRA and TAZ
- Jurisdiction Network Review
- Updated for Base Year 2008
  - Cordons & POE forecasts
  - Airport demand (AMAP)
  - Traffic and transit boarding counts
Changes for 2050 RTP

- **Costs**
  - Parking costs
  - Transit fares and structure
  - Auto operating costs based on RTAC

- **Mode Choice Model**
  - FTA Newstarts update

- **Highway Assignment**
  - Additional vehicle classes
  - Stricter assignment convergence criteria
4D’s Model Enhancements

- The 4D’s
  - Residential and employment **Density**
  - **Diversity** of complimentary land uses
  - Neighborhood form: Transit and pedestrian oriented **Design**
    - Includes **Distance to transit**
  - Accessibility to **Destinations**
4D Model Enhancements

- **Trip Distribution**
  - Trip lengths are more likely to be shorter in dense and diverse areas

- **Mode Choice**
  - Trip modes are more likely to shift to transit \ non-motorized in dense and diverse areas
Truck Model

IE and EI

EE

I = Internal
E = External
Is the model output any good?

I think you should be more explicit here in step two.
Model Reports

- Validation Report
- Sensitivity Report
Model Documentation

- Series 12 Model Documentation
  - 2050 regional growth forecast
  - 2050 regional travel demand model
- Related Publications
  - 4D model development
  - Truck model development

http://www.sandag.org/models
Model Transportation Networks

Joaquin Ortega
SANDAG Transportation Model Dimensions

- **Spatial**
  - 4,682 Traffic Analysis Zones (TAZ)
    - 12 external cordon zones
  - 2,500 Transit Access Points (TAP)

- **Network**
  - 34,000 Roadway Network Links
  - 21,000 Roadway Network Nodes
  - 10 Roadway Facility Types
Transportation Model Network

Freeway
Prime Arterial
Major Arterial
Collector
Local Collector
Rural Collector
Local Road
Local Ramp
Connector Ramp
Zone Connector
Transportation Network Data Review

- **Timeline**
  - 6 Months
  - Took Place in 2009

- **Attributes**
  - Number of Lanes
  - Facility Type
  - Posted Speed
  - Intersection Controls

- **Data Sources**
  - 2008 Base Year
  - Aerial Photos
  - EIRs and site plans
  - Local General Plans / Circulation Elements
  - Regional Transportation Improvement Program (RTIP)
Observed Challenges

- Ongoing regional growth
- Land use & demographic forecast frequency
- Volume of links & nodes
- Staff time
Transportation Model Review Website

- Allows local agencies to review model network using a web-browser
- Simple navigation
- Controlled access
Comment # 2238:
Created by Poway on 5/6/2011 12:01:33 PM
Converted to traffic signal in 2007
Transportation Model Editing
Transportation Model Review Website
Total Scope
Results

- Very high participation rate
- Over 2,000 comments submitted
- Over 4,000 edits made
- Project Timeline: 6 months
Results

- **Lanes Added or Removed**
  - 195 Freeway ramps
  - 155 Prime arterial links
  - 308 Major arterial links
  - 504 Collector links
  - 132 Local street links

- **Intersection Edits**
  - 218 Traffic signals added
  - 381 All way stops added
  - 86 Directional stops removed

- **Speed Limit Edits**
  - 1,591 Link changes of ± 5 mph
  - 580 Link changes of ± 10 mph
  - 160 Link changes of ± 15 mph
Benefits

- Streamlined calibration process
- Low cost of web tool development
- Increased rapport with jurisdictional staff
- Increased model mapping accuracy
Future Application

- Series 13 forecast
- Base Year 2010
- Enhanced internal checks before soliciting feedback
- Future year networks
Travel Demand Model Resources

Mike Calandra
Travel Demand Model Resources

- Model users and uses
- Model inputs
- Standard model output
- Customized model output
- Downloadable model data
- Model Documentation
- External data sources
Transportation Model Users

- Caltrans
- CARB
- SANDAG
- APCD
- City of San Diego
- MTS
- Local Jurisdictions
- NCTD
- Private Developers
Transportation Model Website

http://www.sandag.org/models
Model Input
Growth Forecast

Region-wide Forecast (DEFM)

Land Use Plans And Policies

Growth Allocation Model (UDM)

Interregional Commute Model (IRCM)

Transportation Model
Model Input
Freeway Traffic Census

https://pems.eecs.berkeley.edu
# Model Input

## Local Traffic Census

### City of La Mesa

<table>
<thead>
<tr>
<th>Primary Street</th>
<th>1st Cross Street</th>
<th>2nd Cross Street</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLISON AVE</td>
<td>UNIVERSITY AVE</td>
<td>SPRING ST</td>
<td>7600 N</td>
<td>5500 N</td>
<td>5500 N</td>
<td>5500 N</td>
<td>5500 N</td>
</tr>
<tr>
<td>ALLISON AVE</td>
<td>SPRING ST</td>
<td>PALM AVE</td>
<td>5000 N</td>
<td>4600 N</td>
<td>4600 N</td>
<td>4600 N</td>
<td>4600 N</td>
</tr>
<tr>
<td>ALLISON AVE</td>
<td>PALM AVE</td>
<td>LA MESA BLVD</td>
<td>3300 N</td>
<td>2900 N</td>
<td>2900 N</td>
<td>2900 N</td>
<td>2900 N</td>
</tr>
<tr>
<td>ALVARADO RD</td>
<td>70TH ST</td>
<td>I-8 RAMPS</td>
<td>11700 N</td>
<td>11700 N</td>
<td>33800 N</td>
<td>33800 N</td>
<td>33800 N</td>
</tr>
<tr>
<td>ALVARADO RD</td>
<td>I-8 RAMPS</td>
<td>GUAVA AVE</td>
<td>3000 N</td>
<td>3000 N</td>
<td>2500 N</td>
<td>2500 N</td>
<td>2500 N</td>
</tr>
<tr>
<td>ALVARADO RD</td>
<td>GUAVA AVE</td>
<td>I-8 RAMPS</td>
<td>4200 N</td>
<td>4200 N</td>
<td>3100 N</td>
<td>3100 N</td>
<td>3100 N</td>
</tr>
<tr>
<td>AMAYA DR</td>
<td>FLETCHER PKWY</td>
<td>SEVERIN DR</td>
<td>13500 N</td>
<td>14000 N</td>
<td>13400 N</td>
<td>13400 N</td>
<td>13400 N</td>
</tr>
<tr>
<td>AMAYA DR</td>
<td>SEVERIN DR</td>
<td>WATER ST</td>
<td>5300 N</td>
<td>9500 N</td>
<td>9100 N</td>
<td>9100 N</td>
<td>9100 N</td>
</tr>
<tr>
<td>AMAYA DR/MURRAY DR</td>
<td>WATER ST</td>
<td>WESTWIND DR</td>
<td>3800 N</td>
<td>4600 N</td>
<td>4600 N</td>
<td>4600 N</td>
<td>4600 N</td>
</tr>
<tr>
<td>AZTEC DR</td>
<td>LAKE MURRAY BLVD</td>
<td>BALTIMORE DR</td>
<td>2700 N</td>
<td>2700 N</td>
<td>2700 N</td>
<td>2700 N</td>
<td>2700 N</td>
</tr>
<tr>
<td>BALTIMORE DR</td>
<td>BERTRO DR</td>
<td>LAKE MURRAY BLVD</td>
<td>12700 N</td>
<td>12300 N</td>
<td>12300 N</td>
<td>12300 N</td>
<td>12300 N</td>
</tr>
<tr>
<td>BALTIMORE DR</td>
<td>LAKE MURRAY BLVD</td>
<td>AZTEC DR</td>
<td>13600 N</td>
<td>12800 N</td>
<td>12800 N</td>
<td>12800 N</td>
<td>12800 N</td>
</tr>
<tr>
<td>BALTIMORE DR</td>
<td>AZTEC DR</td>
<td>FLETCHER PKWY</td>
<td>17500 N</td>
<td>16400 N</td>
<td>16400 N</td>
<td>16400 N</td>
<td>16400 N</td>
</tr>
<tr>
<td>BALTIMORE DR</td>
<td>FLETCHER PKWY</td>
<td>EL CAJON BLVD</td>
<td>27900 N</td>
<td>22700 N</td>
<td>22700 N</td>
<td>22700 N</td>
<td>22700 N</td>
</tr>
<tr>
<td>BALTIMORE DR</td>
<td>EL CAJON BLVD</td>
<td>UNIVERSITY AVE</td>
<td>28500 N</td>
<td>22100 N</td>
<td>22100 N</td>
<td>22100 N</td>
<td>22100 N</td>
</tr>
<tr>
<td>BANCROFT DR</td>
<td>SEVERIN DR/FUERTE DR</td>
<td>GROSSMONT BLVD</td>
<td>3800 N</td>
<td>3500 N</td>
<td>3500 N</td>
<td>3500 N</td>
<td>3500 N</td>
</tr>
<tr>
<td>BANCROFT DR</td>
<td>GROSSMONT BLVD</td>
<td>LEMON AVE</td>
<td>7600 N</td>
<td>7300 N</td>
<td>7300 N</td>
<td>7300 N</td>
<td>7300 N</td>
</tr>
<tr>
<td>BANCROFT DR</td>
<td>LEMON AVE</td>
<td>EDGEWOOD DR</td>
<td>8800 N</td>
<td>8100 N</td>
<td>8100 N</td>
<td>8100 N</td>
<td>8100 N</td>
</tr>
<tr>
<td>BANCROFT DR</td>
<td>EDGEWOOD DR</td>
<td>TERRACE DR</td>
<td>8300 N</td>
<td>7500 N</td>
<td>7500 N</td>
<td>7500 N</td>
<td>7500 N</td>
</tr>
</tbody>
</table>

[http://www.sandag.org/resources/demographics_and_other_data/transportation/adtv/index.asp](http://www.sandag.org/resources/demographics_and_other_data/transportation/adtv/index.asp)
Model Input Local Traffic Census (Coming Soon)
Model Input
Regional Traffic Count Database (Coming in 2013)

- A central repository and historical archive of all non-automated arterial traffic counts
- Interactive mapping application
- Currently under contract!
# Model Input - Traffic Generators

## Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region

**April 2002**

*NOTE: This listing only represents a guide of average, or estimated, traffic generation "driveway" rates and some very general trip data for land uses (emphasis on acreage and building square footage) in the San Diego region. These rates (both local and national) are subject to change as future documentation becomes available, or as regional sources are updated. For more specific information regarding traffic data and trip rates, please refer to the San Diego Traffic Generators manual. Always check with local jurisdictions for their preferred or applicable rates.*

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Trip Categories [Primary;Diverted;Pass-by]</th>
<th>Estimated Weekday Vehicle Trip Generation Rate (Driveway)</th>
<th>Highest Peak Hour % (plus in/out ratio) Between 6:00-9:30 A.M. Between 3:00-6:30 P.M.</th>
<th>Trip Length (Miles)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture (Open Space)</td>
<td></td>
<td>2/acre**</td>
<td>3% (6:30) 6% (5:5)</td>
<td>10.8</td>
</tr>
<tr>
<td>Airport</td>
<td></td>
<td>60/acre, 100/flight, 70/1000 sq. ft. **</td>
<td>8% (7:3) 15% (5:5)</td>
<td>12.5</td>
</tr>
<tr>
<td>General Aviation</td>
<td></td>
<td>0/aacre, 2/flight, 5-based aircraft **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heliports</td>
<td></td>
<td>100/aacre**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automobiles</td>
<td></td>
<td>900/auto, 600/aacre**</td>
<td>4% (6:5) 0% (5:5)</td>
<td>2.8</td>
</tr>
<tr>
<td>Car Wash</td>
<td></td>
<td>100/washabant**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasoline</td>
<td></td>
<td>160/vehicle fueling space **</td>
<td>7% (6:5) 8% (5:5)</td>
<td></td>
</tr>
<tr>
<td>with Food Mart</td>
<td></td>
<td>150/vehicle fueling space **</td>
<td>8% (6:5) 9% (5:5)</td>
<td></td>
</tr>
<tr>
<td>with Food Mart &amp; Car Wash</td>
<td></td>
<td>50/1000 sq. ft., 300/aacre, 60/service-stall **</td>
<td>5% (7:3) 8% (4:6)</td>
<td></td>
</tr>
<tr>
<td>Sales (Dealer &amp; Repair)</td>
<td></td>
<td>20/1000 sq. ft., 400/aacre, 20/service-stall **</td>
<td>8% (7:3) 11% (4:6)</td>
<td></td>
</tr>
<tr>
<td>Auto Repair Center</td>
<td></td>
<td>60/1000 sq. ft. **</td>
<td>4% (6:3) 0% (5:5)</td>
<td></td>
</tr>
<tr>
<td>Auto Parts Sales</td>
<td></td>
<td>40/service-stall**</td>
<td>7% (6:4) 10% (5:5)</td>
<td></td>
</tr>
<tr>
<td>Tire Store</td>
<td></td>
<td>25/1000 sq. ft., 30/service-stall **</td>
<td>7% (6:4) 11% (5:5)</td>
<td></td>
</tr>
<tr>
<td>Cemetery</td>
<td></td>
<td>5/aacre*</td>
<td>5% (6:4) 8% (5:5)</td>
<td>5.1</td>
</tr>
<tr>
<td>Church (or Synagogue)</td>
<td></td>
<td>9/1000 sq. ft., 30/aacre ** (quadruple rates for Sunday, or days of assembly)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Process
Standard Model Output
Average Daily Traffic (ADT)
Standard Model Output
Level of Service (LOS)
Standard Model Output
Transit Flow

Mode of Access
- 1,000 Boardings
- Walk Access %
- Auto Access %
- Transfer Access %
- Bus/BRT Volumes
- Coaster Volumes
- LRT Volumes

2030 Transit Flow Volumes
Standard Model Output
Person Trip End Density

2030 Transit Network with Trip End Densities

Transit Routes:
- Commuter Rail
- Light Rail
- BRT
- Express Bus
- Local Bus

Trip End Density:
- Very Low
- Low
- Medium
- High
- Very High
Standard Model Output
Traffic Forecast Information Center

http://gis.sandag.org/tficsr11/
Standard Model Output
Vehicle Miles of Travel (VMT)

- VMT is the key output metric from travel demand models as an input into Air Quality Analysis
- Calculations
  - Link VMT = ( ADT * Length ) / 5280
  - Aggregated to regional figures

<table>
<thead>
<tr>
<th>Year</th>
<th>VMT (Vehicles Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Base Year</td>
<td>80,316,066</td>
</tr>
<tr>
<td>2050 RC</td>
<td>118,309,850</td>
</tr>
</tbody>
</table>
Customized Model Output
Traffic Distribution Analysis
Customized Model Output
Travel Time Analysis

2000 PSI Travel Time
Counters from Schools to Industrial

Legend:
- Unique Zone
- 1 - 10 Minutes
- 11 - 20 Minutes
- 21 - 30 Minutes
- 31 - 40 Minutes
- 41 - 50 Minutes
- 51 - 60 Minutes
- 61 - 69 Minutes
- Over 69 Minutes

February 13, 2003
Utilizing existing tools, cities can calculate their VMT for the purpose of conducting sustainable community strategy analyses.

- City-wide Select Zone assignment
- Compressing trip tables
- GIS overlays
- Spread sheet output
Downloadable Model Output

FTP directory /sandag/pub/Series 12/Final/

ftp://ftpx.sandag.org/sandag/pub/Series 12/Final/
External Data Sources

- Institute of Traffic Engineers (ITE)
  - Traffic Management Data Dictionary (TMDD)

http://www.ite.org/standards/tmdd/
External Data Sources

- Transportation Research Board (TRB)

http://www.trb.org/
External Data Sources

- Travel Model Improvement Program (TMIP)

http://tmip.fhwa.dot.gov/
External Data Sources

- **Caltrans**
  - Description of Transportation Models
  - Statewide Travel Model
  - Travel Forecasting Guidelines
    [http://ntl.bts.gov/DOCS/TF.html](http://ntl.bts.gov/DOCS/TF.html)
  - EMFAC Air Quality Model
External Data Sources

- Federal Highway Administration (FHWA)
  - Planning team resource center
    http://www.fhwa.dot.gov/resourcecenter/teams/planning/travel.cfm
  - Traffic Analysis Toolbox (TAT)
    http://ops.fhwa.dot.gov/trafficanalysistools/
External Data Sources

- Federal Transit Administration (FTA)
  - Travel forecasting for Newstarts
  - National Transit Database
Forum Agenda Recap

- Model Overview: Growth Forecast and Travel Demand Model
- Transportation Network Development
- Travel Demand Model Resources

Next Transportation Modeling Forum: June 13, 2012
Open Discussion