Transportation Modeling Forum

December 14, 2016
Forum Agenda

- Peak Hour Volume Tool
- ABM Version 13.3.0
- Modeling Needs for Community Planning Purposes
Peak Hour Volume Tool

Ramesh Thammiraju

RThammiraju@camsys.com
Agenda

- Big Picture
- Key Logics
- User Interface
- Q & A
Peak Hour Volume Tool

- Observed Traffic Counts
- Base Year Model flows*
- Future Year Model flows*

* Peak period flows

Tool processing logic

Tool creates a shapefile with adjusted peak hour volume fields
The Tool ...

- Post-processes the raw model forecasts

1. Peak period flow to peak hour flow

2. Adjust the differences between the model and counts

Temporal distributions

Model vs. Counts

DELTA
Peak Hour Factors (PHFs)

Temporal distributions
Adjustment Ratios (ARs)

Counts

Base Year

DELTA

1. Numeric diff. method
2. Ratio method
3. Average method

Model

Base Year

Future Year
Key Logics

- PHFs and ARs developed by roadway facility types
  - Freeways & state routes: Corridor/count station specific
  - Arterials, collectors, local: Regional average

- Ramps
  - Freeway to freeway ramps: Corridor/count station specific
  - Freeway to arterial ramps: Regional average
  - Arterial to freeway ramps: Regional average
Manual or Automated?

- Mostly automated
  - Manual checks necessary for a particular corridor project application

- User Interface (UI)
  - UI designed to run the tools/processes

- Tool is in initial draft/testing stage
  - Enhancements in progress
- **Automated corridor identification process**

19 corridors
168 count locations
(336 count station points)
Details

- **Automated association of hwy-links with count-station IDs:**
  - **Step 1** - tagging count-station geographic file with corridor IDs
  - **Step 2** - associate every freeway & State Route link with a count-station ID using the “shortest distance” method, so that the link peak-hour volume can be calculated using PHF as well as AR of the associated count-station
  - **Step 3** - association of new links created in future years highway network with count-station ID
Details

- Automated process to identify the corridor link flow directions

- Automated process to identify ramp types and nearest count station & association:
  - Fwy-to-fwy connectors
    - use the “shortest distance” method to associate a count-station ID
  - Fwy-to-arterial off-ramps
    - use the same count-station ID of the immediate upstream fwy link
  - Arterial-to-fwy on-ramps
    - treat them as local streets where the regional average PHFs and ARs will be applied
Default Adjustment Thresholds

- **Case I:**
  - observed-volume/modeled-volume < 1.00, use 0.75 for any ratios less than 0.75;

- **Case II:**
  - observed-volume/modeled-volume > 1.00, use 2.50 for any ratios greater than 2.50

Please note, these thresholds can be changed
Stage 1 Processing

**Inputs**

- Base Year Network (.dbd)
- Corridor Definition
- Count Station File (.dbd)
- Base Year Assignment (.bin)
- Base Year Count (.bin)

**Automated processes**

**Step 1**

- Corridor Links Identification
- Flow Direction Identification

**Step 2**

- Tag Stations with Link Attributes

**Step 3**

- Calculate Peak Hour Factors
- Calculate Adjustment Ratios

Lookup Table
Creates a Lookup Table

- Process creates lookup table with PHFs and ARs for each count station by time period and corridor flow direction
User Interface
User Interface
User Interface
Q & A

Thank you!
ABM Version 13.3.0

Yun Ma  yma@sandag.org
Wu Sun  wsu@sandag.org
Mike Calandra  mca@sandag.org
ABM 13.3.0 Highlights

- **Base year 2012 calibration & validation**
- **Graphic User Interface (GUI)**
  - create scenario + run model + validate model
- **Improved procedures**
  - Consistency checking between transit and active transportation networks
  - Cluster agnostic
- **Documentations**
  - release report + validation report + user guide + TRB presentation
Speed Validation

- Model Validation
  - Model results vs. against observed
  - Volume
  - Speed

- Speed Validation: An Emerging Topic
  - Newer mobile-device speed data, such as INRIX
  - Understand the new data source
  - How to validate the model using the speed data
Volume Delay Function (VDF) Model Form

- Parameters
- Free Flow Speed
- VOC
- Signal parameters
Speed Factors based on VDF Model Form

VDF Model Form

\[ T_f = T_0 \left[ 1 + \alpha_i \left( \frac{V}{C_i} \right)^{\beta_i} \right] + p \left( 1 - \frac{g}{c} \right) + 1 + \alpha_i \left( \frac{f_i V}{C_i} \right)^{\beta_i} \]
PeMS Speed Factor Variation by VOC by 15 minutes

\[ T_r = T_s \left[ 1 + \alpha \left( \frac{v}{C_i} \right)^\beta \right] \]
Model and INRIX Speed Factor Variation by VOC by TOD - ifc1
Free Flow Speed (Based on INRIX) vs Post Speed (Freeways)

$y = 1.0359x$

$R^2 = -0.026$

45 degree

INRIX Speed

ISPD

ISPD vs FFSPD

Linear (ISPD vs FFSPD)
Free Flow Speed (based on INRIX) vs Post Speed – Arterials & Others, ABCNT=0

Model Speed

Inrix Speed

Free Flow Speed (based on INRIX) vs Post Speed – Arterials & Others, ABCNT=0

- Linear (free_spd vs post_spd)
- 45 degree
- free_spd vs post_spd

\[ y = 0.8844x \]
\[ R^2 = 0.4647 \]
Speed Validation Results

Speed - Modeled vs INRIX - All Freeway – previous version

- Linear (45 degree)
- Linear (AM)
- Linear (PM)

Regression lines:
- $y = 0.82x$
- $R^2 = 0.07$
- $y = 0.8045x$
- $R^2 = 0.1925$
Speed Validation Results

Graph showing the comparison of modeled vs. INRIX speeds for freeways after adjustments. The graph includes multiple regression lines with different slopes and R² values, indicating the accuracy of the model predictions.
Speed Validation Results

Average Speed by Time Period - Modeled vs INRIX along Corridor - I-15 NB

- INRIX AM
- model_AM
- road
Speed Validation Results

Average Speed by Time Period - Modeled vs INRIX along Corridor - I-805 NB

INRIX AM
model_AM
road

Mile Stone
What are the issues?

- VDF curve
- INRIX data
- Matching between INRIX and SANDAG network links
- Free flow speed
- Balance between volume and speed validations
Next Steps

- Better matching between INRIX and SANDAG network links
- Free flow speed adjustment
- Peak hour analysis
Traffic Forecast Information Center

- Direct Link: http://tfic.sandag.org/
- Via Website: http://www.sandag.org

Demonstration
- Series 13 Version 13.0.0
- TAZs and MGRAs
- Site Navigation
- Activity Reports
Modeling Needs for Community Planning Purposes

Samir Hajjiri

shajjiri@sandiego.gov
Topics

- Modeling purposes
- Model Inputs
- Calibration & Validation
- Outputs/Reports
Modeling Purposes

- Mobility Element updates
- Impact Fee studies
- Impacts of development projects
- Performance of transportation facilities
- Transportation network changes
- CAP targets (mode share & trip length)
- CEQA analysis
- Community/City/Region-wide policies/measures
Active Modeling Efforts

- **Series 12 / Four-Step Model**
  - Midway / Old Town CPU
  - Serra Mesa CP Amendment
  - Balboa/Morena
    - Focused Area Plans

- **Series 13 / ABM Model**
  - Mira Mesa
  - Mission Valley
  - Kearny Mesa
  - Clairemont
Model Inputs

Four-Step Model

- LU files
  - Residential
  - Non residential
  - Special generators

- Network files
  - Roadway by classification
  - Freeways
  - Transit by type

Activity Based Model

- LU Files
  - Population synthesis
  - Employment & enrollment

- Network files
  - Roadway by classification
  - Freeways
  - Transit by type
  - Bike facilities by type

- Ground counts
Calibration & Validation

**Four-Step Model**

- **Targets**
  - Count data

- **Attributes**
  - Land Use
  - TAZ / loading
  - Network

- **Validation**
  - ADT ranges
  - Screen lines
  - Cordon lines

**Activity Based Model**

- **Targets**
  - Survey data
  - Count data

- **Attributes**
  - Work trip / tour mode
  - Transit mode
  - Shared ride mode

- **Validation**
  - Road type
  - ADT increments
  - VMT
# Four-Step Calibration Targets

<table>
<thead>
<tr>
<th>Calibration Criteria</th>
<th>Calibration Acceptance Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cordon\Screen line Analysis</td>
<td>The modeled Average Daily Traffic (ADT) of all links that cross the study area will be within +/- 10% ADT</td>
</tr>
<tr>
<td>Sum of all Links</td>
<td>The modeled ADT sum of all links within the study area will be within +/- 10% of the observed counts</td>
</tr>
<tr>
<td>Link by Link City Streets under 2,000 ADT</td>
<td>Within +/- 80% of the average observed counts for 50% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link City Streets between 2,000 and 4,000 ADT</td>
<td>Within +/- 66% of the average observed counts for 50% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link City Streets between 4,000 and 8,000 ADT</td>
<td>Within +/- 50% of the average observed counts for 60% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link City streets between 8,000 and 16,000 ADT</td>
<td>Within +/- 25% of the average observed counts for 65% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link City streets between 16,000 and 24,000 ADT</td>
<td>Within +/- 15% of the average observed counts for 70% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link City Streets over 24,000 ADT</td>
<td>Within +/- 20% of the average observed counts for 80% of the cases within the study area</td>
</tr>
<tr>
<td>Link by Link State Routes (Freeways &amp; Highways)</td>
<td>Within +/- 15% of the average observed counts for 85% of the cases within the study area</td>
</tr>
</tbody>
</table>
## ABM Calibration Targets

### Series 13 Validation Report: Subarea Performance Measures

<table>
<thead>
<tr>
<th>Gap Range</th>
<th>Freeways (IFC = 1)</th>
<th>Arterials over 24,000 ADT</th>
<th>Arterials between 12,000 - 24,000 ADT</th>
<th>Arterials under 12,000 ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50% ~ 100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30% ~ 50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20% ~ 30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% ~ 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0% ~ 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0% ~ -10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-10% ~ -20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-20% ~ -30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-30% ~ -50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-50% ~ -100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-10% ~ 10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-20% ~ 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-30% ~ 30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Average of Gaps

<table>
<thead>
<tr>
<th>Average (+) Gaps</th>
<th>Average (-) Gaps</th>
<th>Average of All</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 5%</td>
<td>&lt;= 10%</td>
<td>&lt;= 20%</td>
</tr>
</tbody>
</table>

* Fewer than 25 total records for any category is statistically insignificant

**Validation Report Date:** 10/4/2016
Model Output

- LU summaries
- Trip generation
- Trip tables by TAZ
- ADT volumes
- VMT (O/D pair)
- VHT
- Average commute trip length
- Mode share (Peak / Off-Peak / Total) (Region / CPA / TPA)
Application of Model Output

Uptown Community Plan
JUNE 2016

Downtown San Diego
Draft Mobility Plan
January 2016

Southeastern San Diego

Community Plan Update

SANDAG
Open Discussion
Forum Agenda Recap

- Peak Hour Volume Tool
- ABM Version 13.3.0
- Modeling Needs for Community Planning Purposes

Next Transportation Modeling Forum:
June 14, 2017
Transportation Modeling Forum

December 14, 2016