Integrating Statewide and Metropolitan Planning Organization (MPO) Models

I-40/I-81 Corridor Feasibility Study

Presentation Overview
- I-40/I-81 Study Background
- Model Refinements and Adjustments
- Deficiency Analysis
- Testing of Alternatives
- Opportunities for Streamlining Approach
- Questions/Comments

I-40/I-81 Study Background
- Strategic Investment Plan Corridor
  - I-40, Mississippi River (Memphis) to I-81
  - I-81, I-40 to Virginia State Line (Bristol)
- Funded and managed by Tennessee DOT (TDOT)
- Cambridge Systematics – subconsultant to PB
  - Travel Demand Forecasting
  - Freight Modeling and Planning
  - ITS Planning

Model Refinements and Adjustments
- Models that include I-40/I-81 corridor
  - Statewide models
    - Passenger
    - Freight
  - Metropolitan Planning Organization (MPO) models
    - Memphis
    - Jackson
    - Nashville
    - Knoxville
    - Morristown
    - Kingsport
    - Bristol

Available model files – (May 2007)
- Statewide – 2003 and 2030
- Bristol – 2005 and 2030
- Jackson – 1999, 2020, and 2035
- Kingsport – 2004, 2015, and 2030
- Memphis – 2004, 2017, and 2030
- Morristown – 2004 and 2030
- Nashville – 2006 and 2030
Integrating Statewide and MPO Models –– I

Model Refinements and Adjustments (continued)

- Base-year models
  - Corrected network coding, where necessary
  - I-40 and I-55 external zones – West Memphis area
    - Originally two separate zones
    - Combined to allow diversion
    - Also connected future bridge crossing here

- Year 2030 models
  - Verified E+C/No Build networks along study corridor
  - Adjusted external trips in MPO models to match SWM forecasts
  - Work with smaller models discontinued
    - Jackson – new model under development; external trips from SWM
    - Morristown – does not currently operate in batch mode
  - Interpolated SE data, external trips, ODME trip tables
    - 2011 and 2016 interpolated and adjusted per SWM at external zones
    - Available 2017 data sets used in place of 2016 for Memphis

External Model Adjustments

- Model volume/capacity (v/c) ratios – LOS cutoffs per EVE
- LOS Calculator – used FDOT LOS Handbook lookup table
- Compared against TDOT Statewide Plan LOS deficiencies
- Refinements
  - Settled on approach using model/EVE v/c ratios for LOS
  - Added deficiencies where mountainous terrain documented

Note: SWM used for truck forecasts except in Memphis.
Deficiency Analysis (continued)

Truck/Rail Diversion Analysis

<table>
<thead>
<tr>
<th>Route</th>
<th>General Location</th>
<th>2003</th>
<th>2030</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-40</td>
<td>Memphis-Jackson</td>
<td>10,000</td>
<td>22,600</td>
<td>113%</td>
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<tr>
<td>I-40</td>
<td>Jackson-Nashville</td>
<td>10,500</td>
<td>22,900</td>
<td>118%</td>
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<tr>
<td>I-40</td>
<td>East of Nashville</td>
<td>11,100</td>
<td>25,800</td>
<td>132%</td>
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<tr>
<td>I-40</td>
<td>West of Cookeville</td>
<td>10,600</td>
<td>24,300</td>
<td>129%</td>
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<tr>
<td>I-40/I-75</td>
<td>West of Knoxville</td>
<td>18,400</td>
<td>41,200</td>
<td>124%</td>
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<tr>
<td>I-40</td>
<td>West of I-81/I-40</td>
<td>12,900</td>
<td>29,400</td>
<td>128%</td>
</tr>
<tr>
<td>I-81</td>
<td>East of I-40/I-81</td>
<td>8,300</td>
<td>19,100</td>
<td>130%</td>
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<tr>
<td>I-81</td>
<td>At Virginia State Line</td>
<td>7,500</td>
<td>19,000</td>
<td>140%</td>
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</table>

Growth

2003 2030

Truck Volumes

General Location

Route

Minimum Maximum Avg (1)

I-40 Memphis-Jackson 19.9 44.1 37.5
I-40 Jackson-Nashville 26.9 53.2 44.4
I-40 East of Nashville 25.4 42.8 35.6
I-40 West of Cookeville 28.7 43.3 36.9
I-40/I-75 West of Knoxville 18.4 30.0 25.0
I-40 West of I-81/I-40 24.6 30.8 28.1
I-81 East of I-40/I-81 24.3 35.5 32.2
I-81 At Virginia State Line 17.0 29.4 22.5

(1) Weighted Average Truck Percent based on corridor length.

Deficiency Analysis

Testing of Alternatives

Four initial 2030 alternatives

- Roadway capacity – generally adding 2-4 lanes to I-40/I-81
- Corridor capacity – add capacity to parallel corridors
- Operational solutions – ITS and operations strategies
- Rail-focused – new rail alignments/maximize truck diversion

Testing of Alternatives (continued)

Modeling alternatives

- Limited to Knoxville, Memphis, Nashville, and statewide models
- Limited to roadway capacity and corridor capacity alternatives
- Coded lane additions for roadway capacity alternative
  - Additional HOV lanes in Memphis model
  - Express lanes in Knoxville and Nashville (No HOV capability in models)
  - General purpose lanes elsewhere
- Coded new corridor capacity (lane additions on parallel routes)
  - Memphis > new I-40 bridge (2 options – SR 386, SR 385)
  - Nashville > add lanes to SR 840 and extend east past Lebanon
  - Knoxville > add SR 475 connector
  - Elsewhere > add lanes to parallel U.S. highways
Testing of Alternatives (continued)

Measures of Effectiveness

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<tbody>
<tr>
<td>Number of Fatalities</td>
<td>185,281</td>
<td>181,751</td>
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<td>Total Accidents</td>
<td>9,170,315</td>
<td>13,286,985</td>
<td>16,977,407</td>
<td>15,227,803</td>
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<tr>
<td>Time to Travel</td>
<td>634</td>
<td>753</td>
<td>649</td>
<td>726</td>
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<td>Regionalism</td>
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<td>Consider single regional model for Tri-Cities</td>
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<td>Consider adding Morristown to Knoxville or Tri-Cities</td>
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Opportunities for Streamlining Approach

- Model standardization considerations
  - Standard model interface
  - Consistent input/output file/attribute names/definitions
  - Potential model types – nested logit, highway only, etc.
  - Consistent TransCAD version/backwards compatibility
  - Default model parameters (e.g., auto occupancy rates, etc.)
  - Modes/purposes for generation/distribution/assignment
  - Time-of-day periods/methodologies

- Regionalism
  - Consider single regional model for Tri-Cities
  - Consider adding Morristown to Knoxville or Tri-Cities

- Standardize network coding methodology
  - Visualization standards (colors, layers, etc.)
  - Consistent double-line coding of limited access highways
  - Standard attribute codes/names (area type, facility type, etc.)
  - Speeds and capacities
  - Approach for coding HOV lanes
  - Coding toll plazas
  - Penalties and prohibits
  - Transit routes
  - Transit access

Q & A