Mid-South Regional Travel Survey & Model Update

MDOT Quarterly Meeting
April 9-11, 2014
The Project Team

- Cambridge Systematics - Primary consultant
  - Lead modeling & survey analysis
- Dikita Engineering – transit survey
- Abt SRBI – household survey
- Neel-Schaffer – freight and bike/ped surveys
Project Steering Committee

- Memphis MPO Staff
- State DOTs
- Memphis Area Transit Authority (MATA)
- Regional Partners

Roles of the Committee:
- Review study materials
- Ask questions of the project team
- Provide guidance, feedback, and agency perspectives
- Facilitate outreach
Introduction & Overview

• Purpose of the project
  • Survey regional travel patterns
  • Update the MPO’s regional Travel Demand Model
  • Long-range transportation planning

• Modeling Needs
  • Air Quality Conformity
  • Congestion Management
  • Scenario Planning
  • Performance Measures
Introduction & Overview

- Key components of regional travel survey
  - Household Travel Survey
    - Statistical sample of households in the region
  - On Board Transit Survey
    - Survey all existing routes incorporating existing ridership data
  - Bike/Pedestrian Survey
    - Survey of non motorized travel methods
  - Freight Data
    - Incorporate freight data from a multiple of sources to incorporate into the travel demand model.
Study Area

1998 Survey Area

2014 Survey Area
Household Travel Survey

- Statistical sample of households in the region
  - 4,500 completed households
  - Stratified by county & household type
  - Address-based sampling
  - Use of GPS/GIS tools for quality control

- Survey issues
  - Maximizing response rates & addressing non-response
  - Oversampling of hard to reach households
  - Incentivizing participation

![Figure 2.4 Memphis HTS Study Area](image)

Table 2.3 Household Counts in the Study Area

<table>
<thead>
<tr>
<th>County</th>
<th>HH Size (Source: 2010 Census)</th>
<th>Number of Vehicles (Source: ACS five-year estimates)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3+</td>
</tr>
<tr>
<td>Fayette, Tennessee</td>
<td>3,013</td>
<td>5,480</td>
<td>6,012</td>
</tr>
<tr>
<td>Shelby, Tennessee</td>
<td>99,485</td>
<td>104,218</td>
<td>147,238</td>
</tr>
<tr>
<td>Tipton, Tennessee</td>
<td>4,264</td>
<td>6,929</td>
<td>10,424</td>
</tr>
<tr>
<td>DeSoto, Mississippi</td>
<td>11,450</td>
<td>18,170</td>
<td>28,142</td>
</tr>
<tr>
<td>Marshall, Mississippi</td>
<td>3,257</td>
<td>4,399</td>
<td>5,723</td>
</tr>
<tr>
<td>Tate, Mississippi</td>
<td>2,206</td>
<td>3,220</td>
<td>4,600</td>
</tr>
<tr>
<td>Tunica, Mississippi</td>
<td>1,159</td>
<td>1,041</td>
<td>1,727</td>
</tr>
<tr>
<td>Total</td>
<td>124,830</td>
<td>143,407</td>
<td>203,879</td>
</tr>
</tbody>
</table>
Household Travel Survey

Percent of surveys completed as of 3/20/14

- Shelby County: 49.5%
- DeSoto County: 38.6%
- Tipton County: 51.7%
- Fayette County: 53.3%
- Marshall County: 33.6%
- Tate County: 21.4%
- Tunica County: 30.8%
- TOTAL: 47.1%
# Household Travel Survey

<table>
<thead>
<tr>
<th>Travel Wk*</th>
<th>Recruited</th>
<th>Retrieval Mode**</th>
<th>Total Retrieval</th>
<th>Cumulative Retrieved</th>
<th>Retrieval Response Rate</th>
<th>% of Retrieval Target***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Phone</td>
<td>Web</td>
<td>Mail</td>
<td>Multi-Mode</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>885</td>
<td>1</td>
<td>499</td>
<td>100</td>
<td>0</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>324</td>
<td>0</td>
<td>140</td>
<td>51</td>
<td>0</td>
<td>191</td>
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<tr>
<td>3</td>
<td>694</td>
<td>3</td>
<td>182</td>
<td>111</td>
<td>0</td>
<td>296</td>
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<tr>
<td>4</td>
<td>669</td>
<td>0</td>
<td>200</td>
<td>97</td>
<td>0</td>
<td>297</td>
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<tr>
<td>5</td>
<td>643</td>
<td>1</td>
<td>253</td>
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<td>58</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>6523</td>
<td>5</td>
<td>1721</td>
<td>394</td>
<td>0</td>
<td>2120</td>
</tr>
</tbody>
</table>
Transit On-Board Survey

- Calibrate & validate travel demand model
- Meet FTA reporting requirements
- Survey all existing routes
  - Incorporate existing ridership data
  - AM Peak, Mid-day, PM Peak, Evening

**Program and Design**
- Sampling Plans
- Instruments
- Download schedules
- Methodology

**Coordinate**
- Agency requirements
- Survey activity
- Recruit, hire, and train local team

**Collect Data**
- Organize field activity
- Supervise with experienced field personnel
- Improve response rates
Transit On-Board Survey

- Survey of existing routes completed.
- Currently preparing Paratransit portion of the survey.
- Drawing
  - 10 Adult 31-day passes
  - iPhone
Non-Motorized Survey

- Purposes of the bike/ped surveys
  - Provide baseline data & model inputs
  - Evaluate impacts of investments & policies
- Mining of household and transit surveys
  - Trips made by biking and walking
  - Availability of bicycles for transportation
- Choice-based sample survey
  - 2011 Regional Bicycle & Pedestrian Plan
  - Over 2,100 responses
- Counts at key locations
  - National Bike & Ped Documentation Project
  - Existing & planned facilities; problem areas
Freight Survey – Existing Data

- Reliance on existing data sets/tools:
  - Federal Freight Analysis Framework
  - American Transportation Research Institute (ATRI)
  - TRANSEARCH
  - National Performance Management Research Data Set (NPMRDS)
- Previous studies
  - I-40 Origin-Destination Truck Survey
  - US-78 (Lamar Ave) Truck Field Survey
Freight Survey – GPS Data

• Next generation truck activity data
  • Significant improvement relative to establishment surveys
• Millions of truck activity events
  • Speeds
  • Precise origins and destinations
  • Routing information
  • Multiple stop trips
  • Time-of-day stamp

<table>
<thead>
<tr>
<th>All Trucks</th>
<th>April 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GPS Events</td>
<td>3,429,603</td>
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<tr>
<td>Total Trucks</td>
<td>22,657</td>
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<tr>
<td>Weekday Truck Tours</td>
<td>19,813</td>
</tr>
<tr>
<td>Weekday Truck Trip Ends</td>
<td>57,032</td>
</tr>
</tbody>
</table>
Freight Survey – Gate Surveys

- Gate surveys will be used for key freight generators in the Memphis region
  - Port gates
  - Intermodal rail yards
- Key information to include
  - Percent local v. through truck trips
  - Commodities and industries served
  - Origins / Destinations
  - Routes used
Freight Survey – Data Analysis

- Adds significant depth and breadth to existing data sets
- Supports regional travel demand model
- Enables project-level analysis of major freight investments
  - Traffic impacts
  - Economic impacts
- Informs broader freight planning efforts
  - Regional freight studies, TN Freight Plan, MAP-21
Travel Demand Model Update

How Do All the Pieces Fit into the Model?

Model Consultation
- Drives survey effort
- Informs model framework

Transit On-board Survey
- Enriched sample
- Transit calibration
- Model validation
- Transit operations

Household Survey
- Travel repository
- Model estimation
- Model calibration

Freight Data
- GPS data
- FAF analysis
- Integrate with passenger model

Bike/Ped Data
- Route preferences
- Counts
- Nonmotorized model validation
Travel Demand Model Update

- Updated demographic data and base year
- Increased focus on freight and bike/ped
  - Access and mobility
  - Mode shift
- Additional functionality
  - Scenario analysis
  - Rapid transit capabilities
  - Performance measures
  - Air quality post-processor
Questions & Discussion

Kwasi Agyakwa
Transportation Planner
kwasi.agyakwa@memphistn.gov
www.memphismpo.org