The NPTS Add-On Program

Florida Model Task Force Meeting

January 11, 2006

Nancy McGuckin
First, about the NPTS…

- A snapshot of travel by residents in the U.S. (all ages)
- Conducted periodically since 1969
- Important source of trends in daily travel

Survey Features:

- Households from all regions and rural and urban areas
- Conducted in English and Spanish
- Single-day travel-diary for each person’s travel, covering 365 days
- All trips, all purposes, all modes on an assigned day
- Travel by all household members, individually and together
- Weighted to represent annual and daily person travel
The NPTS obtains information on passenger travel, not freight or commercial activity...

Highway Statistics, 2001

<table>
<thead>
<tr>
<th>Category</th>
<th>VMT (000,000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total VMT</td>
<td>2,781,462</td>
</tr>
<tr>
<td>Passenger Travel</td>
<td>2,282,890</td>
</tr>
<tr>
<td>NPTS 2001 VMT</td>
<td>2,281,863</td>
</tr>
</tbody>
</table>
Government use is pretty evenly split across levels...

Source: “National Household Travel Survey Data Use: An Overview”
Prepared by: MacroSys Research and Technology for the Bureau of Transportation Statistics, 2005
The most used data elements are vehicle-related, mode and purpose…

- Vehicle Characteristics and Use: 17%
- Employment/Income: 9%
- Age/Gender: 10%
- Other Household Variables: 10%
- Trip Purpose: 16%
- Trip Length: 12%
- Travel Mode: 16%
- Travel Time: 10%

Source: “National Household Travel Survey Data Use: An Overview”
Prepared by: MacroSys Research and Technology for the Bureau of Transportation Statistics, 2005
Overview

Why household travel data is important...

- *Work travel has been declining* as a proportion of all travel
- People are making *more non-work trips* than ever before
- The profile of *daily travel is changing*, with more midday and weekend travel
- In addition, more workers are chaining trips together; nearly *half of workers stop* during their commute
- We are spending more time to travel about the same amount (congestion?)
- Safety analysis shows that *Older Americans* are at the greatest risk for fatal crashes
Since 1969, work travel has declined as a proportion of all travel...
That’s because other types of trips are growing faster than work trips…
Importantly, those trips have different time-of-day profiles...
In many areas vehicle traffic can be higher on Saturday than during weekday peak hours…
Overall, drivers are spending more time behind the wheel to travel the same distance…
Overview

More workers are inserting stops into their commute…

- Home
- Pick Child up at Daycare
- Work
- Pick-up Groceries for Dinner
- Boss' Birthday Lunch
- Pick-up Present for Boss' Birthday
- Drop Child At Daycare
But do we really know how that effects travel?
Overview

Safety Analysis shows that older drivers are more at risk of a fatal crash per mile driven

– Fatalities per 100 Million VMT by Age Group
Travel surveys provide an important data source for Travel Demand Forecasting...

The Add-On Program

Household Survey Data

Statewide Network

Trip Generation

Mode Choice

Network Assignment

Total Trips

Trips by O-D

O-D Trips by Mode

O-D Trips by Mode and Route
### Trip Generation Rates by Income

**Person Trips by General Purpose and Income**

<table>
<thead>
<tr>
<th>Income</th>
<th>HBW</th>
<th>HBO</th>
<th>NHB</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$35K</td>
<td>0.4</td>
<td>3.3</td>
<td>4.0</td>
<td>7.7</td>
</tr>
<tr>
<td>35-60K</td>
<td>0.7</td>
<td>4.8</td>
<td>6.0</td>
<td>11.5</td>
</tr>
<tr>
<td>60-80K</td>
<td>0.9</td>
<td>5.8</td>
<td>7.2</td>
<td>13.9</td>
</tr>
<tr>
<td>$80K+</td>
<td>0.9</td>
<td>6.3</td>
<td>8.0</td>
<td>15.1</td>
</tr>
<tr>
<td>All</td>
<td>0.6</td>
<td>4.4</td>
<td>5.5</td>
<td>10.6</td>
</tr>
</tbody>
</table>
### The Add-On Program

**Person Trips by Household Size and Number of Vehicles...**

<table>
<thead>
<tr>
<th>HH Size and Autos Owned</th>
<th>One Person</th>
<th>Two Person</th>
<th>Three Person</th>
<th>Four Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Car</td>
<td>2.5</td>
<td>4.4</td>
<td>5.6</td>
<td>7.3</td>
</tr>
<tr>
<td>One Car</td>
<td>4.8</td>
<td>6.7</td>
<td>8.8</td>
<td>12.1</td>
</tr>
<tr>
<td>Two Car</td>
<td>4.6</td>
<td>7.8</td>
<td>10.4</td>
<td>14.9</td>
</tr>
<tr>
<td>Three or more</td>
<td>4.6</td>
<td>7.8</td>
<td>12.1</td>
<td>15.1</td>
</tr>
<tr>
<td>Weighted Avg.</td>
<td>4.0</td>
<td>7.3</td>
<td>13.0</td>
<td>14.6</td>
</tr>
</tbody>
</table>

For urbanized areas 500,000-999,999 population
## Person and Vehicle Trips by Purpose...

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Person Trips/Day</th>
<th>Vehicle Trips/Day</th>
<th>P-trips/V-Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work and Work Rel</td>
<td>1.9</td>
<td>1.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Shop</td>
<td>2.1</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Fam/Pers</td>
<td>2.3</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Soc/Rec</td>
<td>2.7</td>
<td>1.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Misc</td>
<td>1.4</td>
<td>0.5</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td><strong>10.4</strong></td>
<td><strong>6.0</strong></td>
<td><strong>1.8</strong></td>
</tr>
</tbody>
</table>
Information for understanding local travel...

- Worker and immigrant status for everyone 16 and over, average work-trip length (including home-based work trips and complex tours), “retired” workers, etc.

- Vehicle fleet information and use of household vehicles

- Time of day and purpose for work and non-work travel, mode, occupancy, transit access and egress

- Special demographic modules for elderly: questions on mobility problems, changes in driving and travel related to age, etc.
The Add-On Program

Or even data to help understand the Census JTW flows better…

Percent of Workers by Usual and Actual Mode to Work on Travel Day, 2001 NHTS

<table>
<thead>
<tr>
<th>Usual Mode is:</th>
<th>Single Occupant Vehicle</th>
<th>Drove with Others</th>
<th>Transit</th>
<th>Walked</th>
<th>Biked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drove Alone</td>
<td>90.0%</td>
<td>9.3%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Carpool</td>
<td>22.2%</td>
<td>74.8%</td>
<td>1.0%</td>
<td>1.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Transit</td>
<td>7.8%</td>
<td>9.7%</td>
<td>69.4%</td>
<td>10.1%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Walk</td>
<td>8.1%</td>
<td>9.2%</td>
<td>2.6%</td>
<td>79.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Bike</td>
<td>6.7%</td>
<td>8.4%</td>
<td>1.7%</td>
<td>6.1%</td>
<td>77.1%</td>
</tr>
</tbody>
</table>

What are the steps in the household survey?

1) The add-on decides on sample strata (each MPO would be a stratum, for instance).

2) The sample list is developed to include listed and un-listed telephone numbers.

3) The numbers are matched to addresses (85 percent matched to an address) and a pre-contact letter is mailed with incentive.

4) Each household in the sample is assigned a specific 24-hour “Travel Day”.

5) Travel days are assigned over an entire year, including weekends and holidays.
What are the steps in the household survey? (cont.)

6) Multi-stage CATI approach (Computer-aided telephone interviewing):
   - Households are contacted to recruit (in the household interview we obtain the number of people, ages, work status and vehicle information)
   - Mail-out of travel diaries for each household member
   - Reminder call placed the night before travel day
   - A personal telephone interview is scheduled with each household member to record the travel on the assigned day

7) CATI improves accuracy and reduces burden:
   - Trip Rostering identifies other HH members on trip
   - Address matching recalls previously reported addresses
   - On-line Quality Checks, such as time and distance
Special Features of the NPTS

- **Toll-free telephone number** at FHWA for verification (helpful during Anthrax scare and for questions about legitimacy)

- **Website** for detailed information about survey, including history of NPTS, travel statistics obtained, and names of contact people

- **Odometer readings** for annual mileage estimates for vehicles obtained at least two months apart and annualized by ORNL

- **Fuel use** (modified mpg) and fuel cost (county-level average) data added by Energy Information Agency

- **Distance to transit** coded for home and work (nearest bus line or light rail stop)
What are the add-on deliverables?

- Edited, Cleaned Data, Correctly weighted to represent households in the Add-On area (by strata)
- Origin-Destination Geocodes for all trips by all purposes and all modes
- Including Transit, Walk and Bike Trips (plus detail on frequency for 2-week period)
- Documentation (basic tables included) and User’s Guide
- Web-based table maker for quick access and analysis (not GIS-based yet)
- User Support
Add-on Benefits:

- No local staff work to write RFP, review proposals, manage and administer contract, check quality or manage contractor
- Final product is a quality-tested file that is weighted, edited, documented and ready-to-run
- Local control over sample size and strata
- Trip origins and destinations geocoded with high accuracy (to latitude and longitude)
- Local requirement to match federal funds (SPR/PL funds) could be waived--saving 20% local funds
In 2001, 5 States and 4 MPOs purchased additional samples of the national survey…
The Add-On Program

Number of Local Samples in 2001

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Number of Local Samples Purchased</th>
<th>Number of National Samples (Free)</th>
<th>Total Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI - Hawaii DOT</td>
<td>1,694</td>
<td>19</td>
<td>1,713</td>
</tr>
<tr>
<td>HI - Oahu MPO</td>
<td>1,751</td>
<td>55</td>
<td>1,806</td>
</tr>
<tr>
<td>IA - Des Moines MPO</td>
<td>1,310</td>
<td>49</td>
<td>1,359</td>
</tr>
<tr>
<td>KY - Kentucky DOT</td>
<td>1,226</td>
<td>12</td>
<td>1,238</td>
</tr>
<tr>
<td>MD - Baltimore MPO</td>
<td>3,804</td>
<td>231</td>
<td>4,035</td>
</tr>
<tr>
<td>NY - New York DOT</td>
<td>11,887</td>
<td>1,536</td>
<td>13,423</td>
</tr>
<tr>
<td>PA - Lancaster MPO</td>
<td>1,030</td>
<td>46</td>
<td>1,076</td>
</tr>
<tr>
<td>TX - Texas DOT</td>
<td>4,065</td>
<td>1,478</td>
<td>5,543</td>
</tr>
<tr>
<td>WI - Wisconsin DOT</td>
<td>17,012</td>
<td>535</td>
<td>17,547</td>
</tr>
<tr>
<td><strong>Total samples</strong></td>
<td><strong>43,779</strong></td>
<td><strong>3,961</strong></td>
<td><strong>47,740</strong></td>
</tr>
</tbody>
</table>
Examples of Previous Add-on Applications:

- Inputs to Travel Demand Forecasting
- Air Quality Analysis
- Trend Analysis
- Trip Chaining
- Comparison with Census
- Special Studies (school trips, rural travel, etc.)
The Add-On Program

Wisconsin MPO Models
Wisconsin’s experience in integrating Statewide and MPO Models

- Stratified sampling plan
  - Over-sample individual MPOs
  - Modeling at state and MPO levels
  - NHTS sample-weighting approach
  - Rural samples to obtain “remainder of State”

- NPTS add-on allows direct comparison between different areas and comparisons between local areas, State and National

- MPO model results within the MPO boundaries

- Practical approach to model integration for all users
Comparing Wisconsin MPOs on Household Characteristics

Household Size Distribution

- 1
- 2
- 3
- 4
- 5 or more

% Households

The Add-On Program
Des Moines, IA used Add-on Data for Travel Demand Modeling

- Long-Range Transportation Plan for 2030 required current data (last collected in 1960s)
- Add-on resulted in 7,506 vehicle trips to determine Non-Home Based (NHB), Home-Based Other (HBO), and Home-Based Work Trips (HBW)
- Used household size and vehicles per household to update cross-classification trip rates
  - Data showed smaller household sizes and more vehicles per household
  - Cross-classification tables aided the calibration of the model
- From the 2001 NHTS Add-on data, in terms of person trips, the afternoon/evening commute is the most heavily traveled time of day
- Lunchtime also is more heavily traveled than the morning commute hours
Des Moines MPO Add-on Data: Percent of Travel by Time-of-Day

<table>
<thead>
<tr>
<th>Rank</th>
<th>Hour</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3:00 p.m to 4:00 p.m</td>
<td>9.1</td>
</tr>
<tr>
<td>2</td>
<td>4:00 p.m to 5:00 p.m</td>
<td>9.0</td>
</tr>
<tr>
<td>3</td>
<td>5:00 p.m to 6:00 p.m</td>
<td>8.9</td>
</tr>
<tr>
<td>4</td>
<td>11:00 a.m to 12:00 p.m</td>
<td>8.1</td>
</tr>
<tr>
<td>5</td>
<td>12:00 p.m to 1:00 p.m</td>
<td>7.3</td>
</tr>
<tr>
<td>6</td>
<td>7:00 a.m to 8:00 a.m</td>
<td>7.3</td>
</tr>
<tr>
<td>11</td>
<td>8:00 a.m to 9:00 a.m</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Des Moines MPO Average Trip Lengths

- Overall trip length averaged 8.3 miles
- Work trip length averaged 10.7 miles
- Social/recreational trip length averaged 13.2 miles
- Shopping/errand trip averaged 5.6 miles
- Medical/dental services trip averaged 7.3 miles
Baltimore, MD MPO Add-on: Changes in Auto-Ownership

1980 Census
- One: 22%
- Two: 30%
- Three or More: 48%

1990 Census
- One: 24%
- Two: 31%
- Three or More: 45%

2000 Census
- One: 27%
- Two: 32%
- Three or More: 41%

2001 National Household Travel Survey
- One: 26%
- Two: 32%
- Three or More: 42%
Baltimore MPO Add-on: Relationship between Vehicle Availability and Licensed Drivers

**Inside Baltimore City**
- Drivers = Vehicles: 48%
- Drivers < Vehicles: 5%
- Drivers > Vehicles: 9%
- Drivers or Vehicles = 0: 38%

**Outside Baltimore City**
- Drivers = Vehicles: 66%
- Drivers < Vehicles: 18%
- Drivers > Vehicles: 10%
- Drivers or Vehicles = 0: 6%
The Add-On Program

Baltimore MPO Add-on:

Motorized Person Trips by Purpose

Inside Baltimore City

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Trips in 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBW</td>
<td>300</td>
</tr>
<tr>
<td>HBSH</td>
<td>300</td>
</tr>
<tr>
<td>HBO</td>
<td>400</td>
</tr>
<tr>
<td>HBSCH</td>
<td>450</td>
</tr>
<tr>
<td>WBO</td>
<td>200</td>
</tr>
<tr>
<td>OBO</td>
<td>250</td>
</tr>
</tbody>
</table>

Outside Baltimore City

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Trips in 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBW</td>
<td>1000</td>
</tr>
<tr>
<td>HBSH</td>
<td>1200</td>
</tr>
<tr>
<td>HBO</td>
<td>1600</td>
</tr>
<tr>
<td>HBSCH</td>
<td>1400</td>
</tr>
<tr>
<td>WBO</td>
<td>600</td>
</tr>
<tr>
<td>OBO</td>
<td>800</td>
</tr>
</tbody>
</table>
Good decisions depend on good data...

- **National Personal Travel Survey**
  - Census Data
    - CTPP/PUMS
      - Add-on Survey
      - Transferred Data
      - Local Benchmark
  - State and Local Data
    - Federal Government Use
    - State and Local Government Uses
    - Consultant Uses
    - University and Research Uses
    - Media Users
    - National Level Decision and Policy Input
    - State and Local Level Transportation Planning
    - Travel Behavior and Trend Analysis
    - Emerging Issues and New Perspectives
    - Socio-economic Issues
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