# Mid-South Regional Travel Survey & Model Update

MDOT Quarterly Meeting

October 3-4, 2013

Memphis MPO
METROPOLITAN PLANNING ORGANIZATION

# Introduction & Overview

- Purpose of the project
  - Survey regional travel patterns
  - Update the MPO's regional Travel Demand Model
  - Long-range transportation planning
- Key components of regional travel
  - Automobile
  - Transit
  - Bicycle & Pedestrian
  - Freight
- Changing dynamics in the region
- Changes in transportation policy

# Project Overview – Key Components

## Project Management

- Schedule and Budget
- Quality Assurance Plans
- Effective Communication
- Engage Regional Stakeholders
- Easy-to-Follow Documentation

## Model Assessment

- Where are we?
- and
- Where do we need to be?
- Policies to be Tested; Integration with Air Quality, Land use
- Roadmap for Data Collection and Model Design

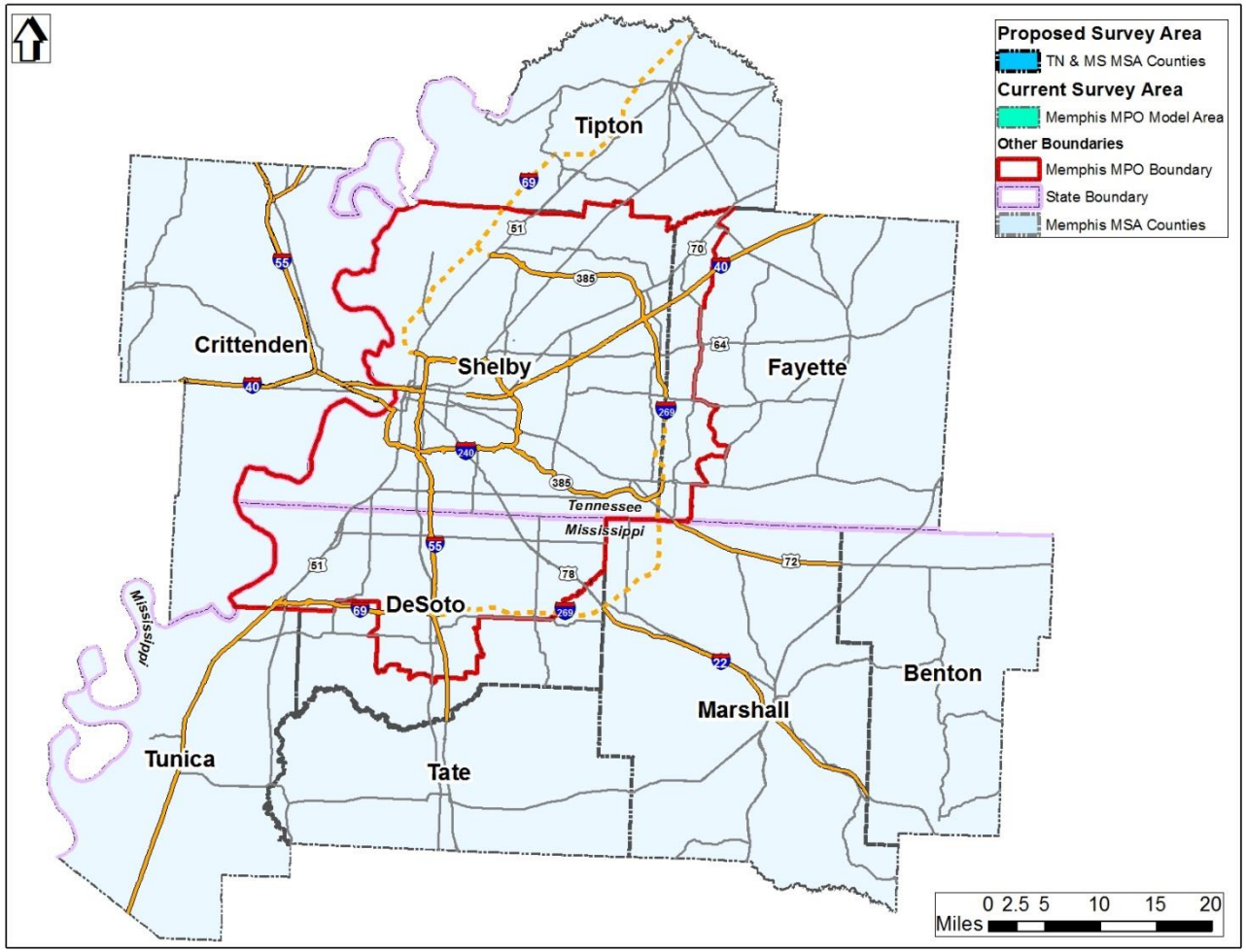
## Data Collection

- Household Surveys
  Transit Surveys
  Freight Surveys
  Bike/Ped Surveys
- Optional Surveys
  GPS, Visitor, External
- Sample Sizes
  Targeting Methods
  Survey Dates
  Questionnaires
  Data Cleaning
  Data Expansion

## Model Update

- Data-Driven Model Development
- Calibration and Validation
- Sensitivity Analysis
- Scripting and Documentation
- Staff Training and Reports

# Study Area – The Memphis MPO

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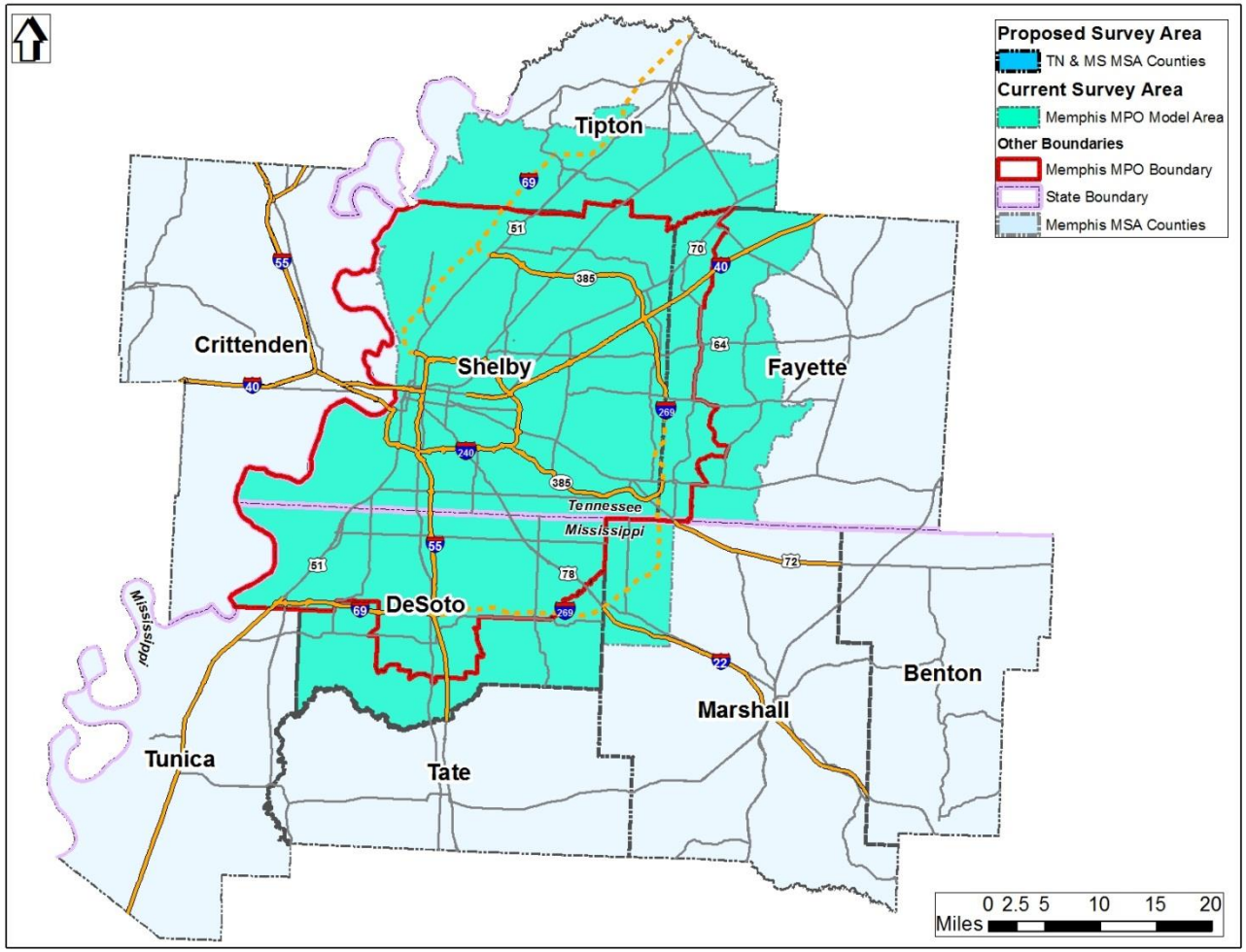
# Study Area – Current Model

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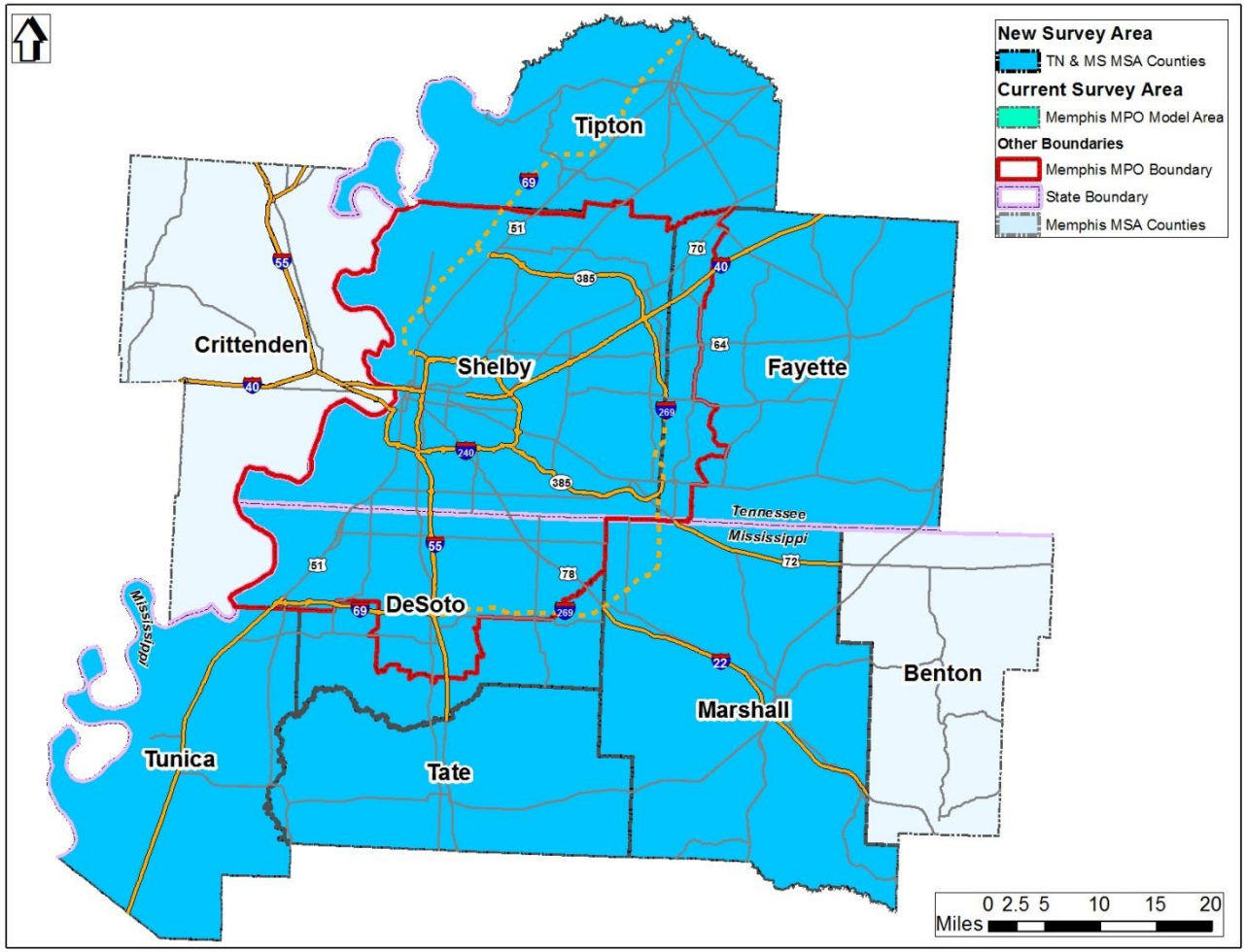
# Study Area – New Travel Survey

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# The Project Team

MDOT MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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TDOT

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

CAMBRIDGE SYSTEMATICS
Transportation leadership you can trust.

Abt SRBI

DIKITA

NEEL-SCHAFFER
Solutions you can build upon

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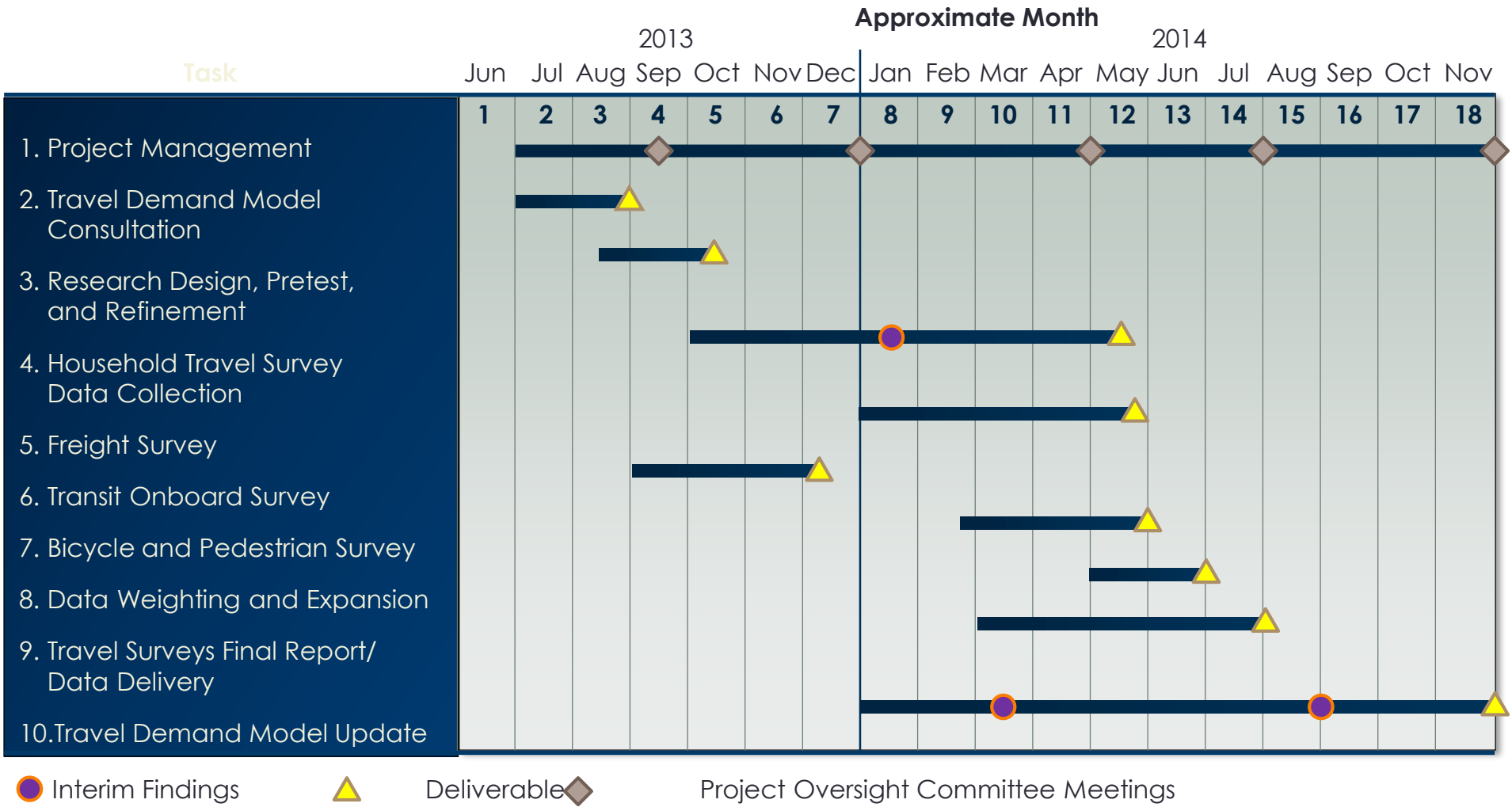
# Project Steering Committee

- 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

# Project Schedule

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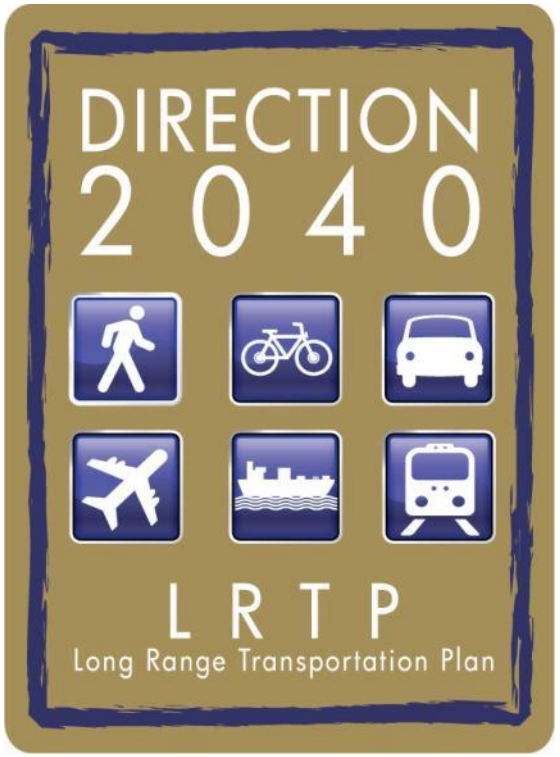
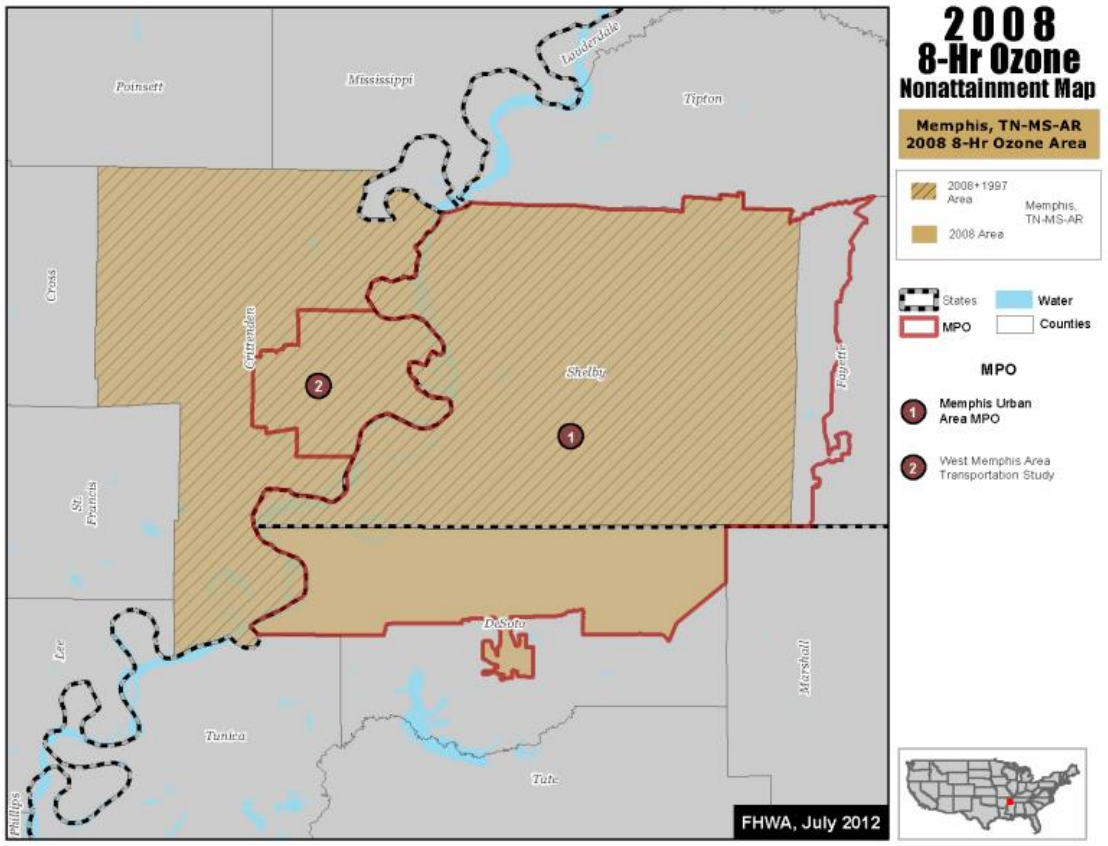
# Modeling Needs – Multimodal Focus

- Transit
  - Rapid transit capabilities – BRT/LRT
- Freight
  - The Memphis Aerotropolis
  - Multimodal goods movement
- Non-Motorized
  - Bicycle & Pedestrian
- Impacts of Modal Shifts
  - Economic impacts
  - Congestion mitigation
  - Environmental impacts



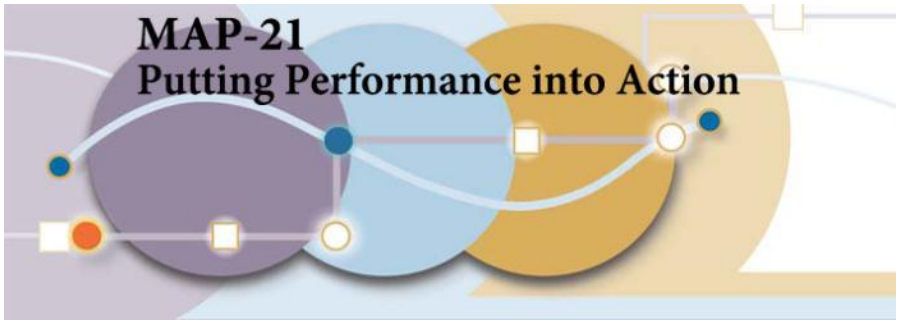
# Modeling Needs – Air Quality

- Integrating the MPO model with MOVES
- Streamlining the modeling process
- Ease of analysis and reporting



# Modeling Needs - Performance

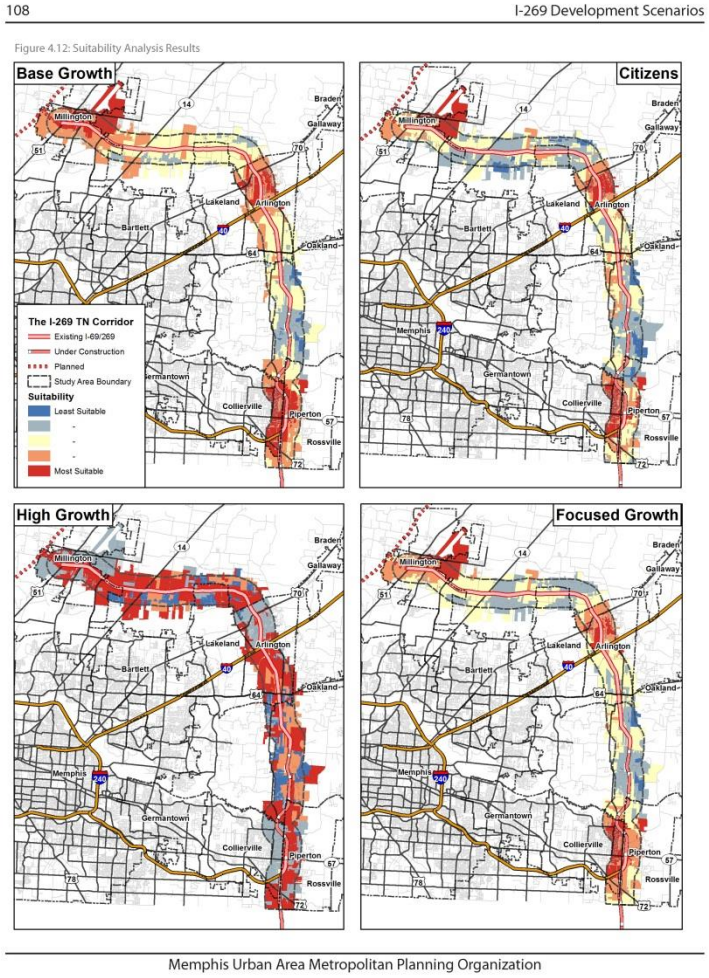
- Performance measures
- Performance-based planning
- Modeling transportation performance:
  - Locational factors
  - Travel patterns/times
  - Congestion
  - Transit usage
  - Modal shifts
- Assist in setting performance goals




| What We Track | How is the DVRPC Region Performing? | Trend |
|---|---|---|
| **TR 1:** Have vehicle crashes and fatalities declined? | Between 2001 and 2005, the DVRPC region experienced an 18% decrease in fatalities per million VMT and less than 1% decrease in all crashes per million VMT. However, the overall number of crashes rose by 4.6% during this same time period. | |
| **TR 2:** Is congestion getting worse? | Congestion appears to be stable – neither improving nor worsening, though VMT has increased. | |
| **TR 3:** Is transit ridership increasing? | While transit ridership has experienced some fluctuation, it has increased in the last 5 years. | |
| **TR 4:** Has the number of deficient bridges in need of rehabilitation or replacement decreased? | The number of bridges identified as structurally deficient in the DVRPC region has remained steady, but remains twice as high as the acceptable level set by FHWA in its current strategic plan. | |
| **TR 5:** Are roads better maintained? | The region saw a slight increase in road miles considered to be deficient, mostly due to NJDOT's stricter standards. | |
| **TR 6:** Are fewer people driving to work alone? | The number of people driving to work by themselves continues to increase and is now 73% of all commuters. | |
| **TR 7:** Are people driving less? | There are more cars and more drivers driving more miles every year in the region. The region appears to be more auto-dependent. | |
| **TR 8:** Are DVRPC's TIP investments in keeping with the LRP goals? | Approximately 97% of the mapped 2007-2010 TIP project funding supports the Long Range Plan and its stated goals. | |

# Modeling Needs – Scenario Planning

- Integrate land use modeling and transportation modeling
- Alternative scenarios and investment strategies
- Model impacts of:
  - Economic factors
  - Development patterns
  - Changing demographics

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# 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**

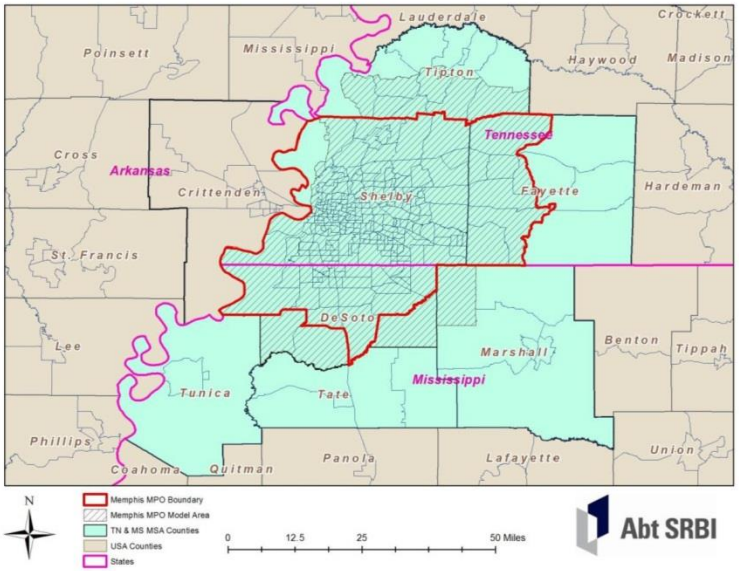
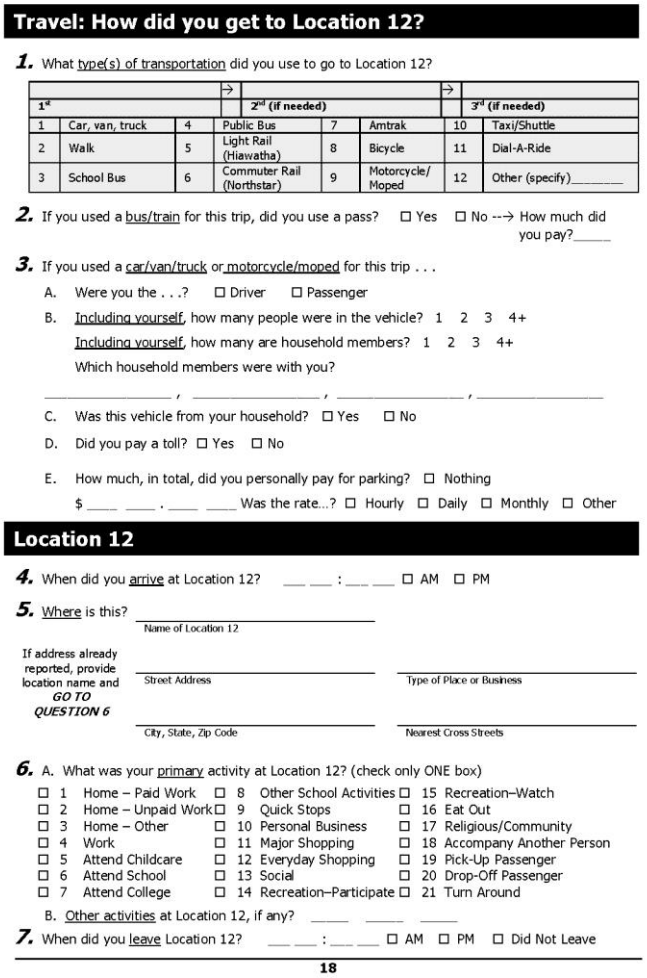



**Table 2.3 Household Counts in the Study Area**

| County | HH Size (Source: 2010 Census) | | | Number of Vehicles (Source: ACS five-year estimates) | | | Total |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3+ | 0 | 1 | 2+ | |
| Fayette, Tennessee | 3,013 | 5,480 | 6,012 | 530 | 3,509 | 8,781 | 12,820 |
| Shelby, Tennessee | 99,495 | 104,238 | 147,238 | 32,739 | 134,510 | 159,367 | 326,616 |
| Tipton, Tennessee | 4,264 | 6,929 | 10,424 | 889 | 5,725 | 12,627 | 19,241 |
| DeSoto, Mississippi | 11,436 | 18,170 | 28,142 | 1,489 | 16,205 | 34,889 | 52,583 |
| Marshall, Mississippi | 3,257 | 4,389 | 5,723 | 1,088 | 3,936 | 6,625 | 11,649 |
| Tate, Mississippi | 2,206 | 3,220 | 4,609 | 560 | 2,950 | 5,639 | 9,149 |
| Tunica, Mississippi | 1,159 | 1,041 | 1,727 | 422 | 1,826 | 1,550 | 3,798 |
| Total | 124,830 | 143,467 | 203,875 | 37,717 | 168,661 | 229,478 | 435,856 |

# Household Travel Survey

- Travel Diaries
  - Detailed account of a full day of trips
  - Every household member
  - All trips by all modes (car, bike, bus, walk, carpool)
- Demographic questions
  - Details on income, employment, school enrollment, auto availability, etc.
- Methods of participation
- GPS pilot survey



**Travel: How did you get to Location 12?**

**1.** What type(s) of transportation did you use to go to Location 12?

| 1st | | | 2nd (if needed) | | | 3rd (if needed) | |
|---|---|---|---|---|---|---|---|
| 1 | Car, van, truck | 4 | Public Bus | 7 | Amtrak | 10 | Taxi/Shuttle |
| 2 | Walk | 5 | Light Rail (Hiawatha) | 8 | Bicycle | 11 | Dial-A-Ride |
| 3 | School Bus | 6 | Commuter Rail (Northstar) | 9 | Motorcycle/ Moped | 12 | Other (specify)_____ |

**2.** If you used a bus/train for this trip, did you use a pass? ☐ Yes ☐ No --> How much did you pay?_____

**3.** If you used a car/van/truck or motorcycle/moped for this trip . . .

A. Were you the . . .? ☐ Driver ☐ Passenger

B. Including yourself, how many people were in the vehicle? 1 2 3 4+

Including yourself, how many are household members? 1 2 3 4+

Which household members were with you?

_____ , _____ , _____ , _____

C. Was this vehicle from your household? ☐ Yes ☐ No

D. Did you pay a toll? ☐ Yes ☐ No

E. How much, in total, did you personally pay for parking? ☐ Nothing

$ ____ ____ . ____ ____ Was the rate...? ☐ Hourly ☐ Daily ☐ Monthly ☐ Other

**Location 12**

**4.** When did you arrive at Location 12? ___ ___ : ___ ___ ☐ AM ☐ PM

**5.** Where is this? _____ Name of Location 12

If address already reported, provide location name and **GO TO QUESTION 6**

_____ Street Address _____ Type of Place or Business

_____ City, State, Zip Code _____ Nearest Cross Streets

**6.** A. What was your primary activity at Location 12? (check only ONE box)

| | | | | | |
|---|---|---|---|---|---|
| ☐ 1 | Home – Paid Work | ☐ 8 | Other School Activities | ☐ 15 | Recreation–Watch |
| ☐ 2 | Home – Unpaid Work | ☐ 9 | Quick Stops | ☐ 16 | Eat Out |
| ☐ 3 | Home – Other | ☐ 10 | Personal Business | ☐ 17 | Religious/Community |
| ☐ 4 | Work | ☐ 11 | Major Shopping | ☐ 18 | Accompany Another Person |
| ☐ 5 | Attend Childcare | ☐ 12 | Everyday Shopping | ☐ 19 | Pick-Up Passenger |
| ☐ 6 | Attend School | ☐ 13 | Social | ☐ 20 | Drop-Off Passenger |
| ☐ 7 | Attend College | ☐ 14 | Recreation–Participate | ☐ 21 | Turn Around |

B. Other activities at Location 12, if any? _____ _____ _____

**7.** When did you leave Location 12? ___ ___ : ___ ___ ☐ AM ☐ PM ☐ Did Not Leave

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# Transit On-Board Survey

- Calibrate & validate travel demand model
- Meet FTA reporting requirements
- Use of latest technology
  - Web-based management tools
- Survey all existing routes
  - Incorporate existing ridership data
  - AM Peak, Mid-day, PM Peak, Evening

MATA

**Program and Design**

- Sampling Plans
- Instruments
- Download schedules
- Methodology

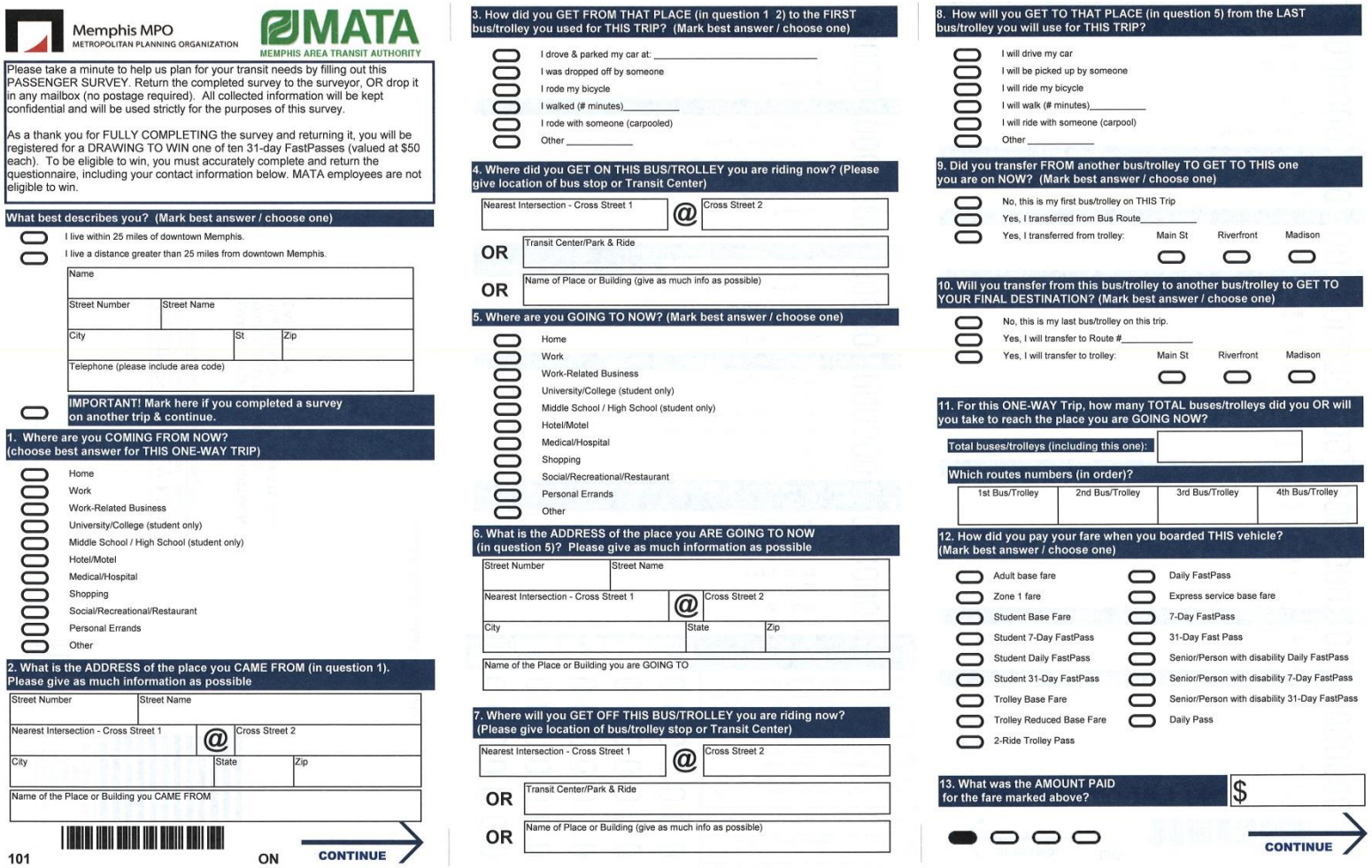
**Coordinate**

- 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



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MATA
MEMPHIS AREA TRANSIT AUTHORITY

Please take a minute to help us plan for your transit needs by filling out this PASSENGER SURVEY. Return the completed survey to the surveyor, OR drop it in any mailbox (no postage required). All collected information will be kept confidential and will be used strictly for the purposes of this survey.

As a thank you for FULLY COMPLETING the survey and returning it, you will be registered for a DRAWING TO WIN one of ten 31-day FastPasses (valued at $50 each). To be eligible to win, you must accurately complete and return the questionnaire, including your contact information below. MATA employees are not eligible to win.

**What best describes you? (Mark best answer / choose one)**

- I live within 25 miles of downtown Memphis.
- I live a distance greater than 25 miles from downtown Memphis.

Name
Street Number | Street Name
City | St | Zip
Telephone (please include area code)

**IMPORTANT! Mark here if you completed a survey on another trip & continue.**

**1. Where are you COMING FROM NOW? (choose best answer for THIS ONE-WAY TRIP)**

- Home
- Work
- Work-Related Business
- University/College (student only)
- Middle School / High School (student only)
- Hotel/Motel
- Medical/Hospital
- Shopping
- Social/Recreational/Restaurant
- Personal Errands
- Other

**2. What is the ADDRESS of the place you CAME FROM (in question 1). Please give as much information as possible**

Street Number | Street Name
Nearest Intersection - Cross Street 1 | @ | Cross Street 2
City | State | Zip
Name of the Place or Building you CAME FROM

101 ON CONTINUE

**3. How did you GET FROM THAT PLACE (in question 1 2) to the FIRST bus/trolley you used for THIS TRIP? (Mark best answer / choose one)**

- I drove & parked my car at: _____
- I was dropped off by someone
- I rode my bicycle
- I walked (# minutes)_____
- I rode with someone (carpooled)
- Other _____

**4. Where did you GET ON THIS BUS/TROLLEY you are riding now? (Please give location of bus stop or Transit Center)**

Nearest Intersection - Cross Street 1 | @ | Cross Street 2
OR Transit Center/Park & Ride
OR Name of Place or Building (give as much info as possible)

**5. Where are you GOING TO NOW? (Mark best answer / choose one)**

- Home
- Work
- Work-Related Business
- University/College (student only)
- Middle School / High School (student only)
- Hotel/Motel
- Medical/Hospital
- Shopping
- Social/Recreational/Restaurant
- Personal Errands
- Other

**6. What is the ADDRESS of the place you ARE GOING TO NOW (in question 5)? Please give as much information as possible**

Street Number | Street Name
Nearest Intersection - Cross Street 1 | @ | Cross Street 2
City | State | Zip
Name of the Place or Building you are GOING TO

**7. Where will you GET OFF THIS BUS/TROLLEY you are riding now? (Please give location of bus/trolley stop or Transit Center)**

Nearest Intersection - Cross Street 1 | @ | Cross Street 2
OR Transit Center/Park & Ride
OR Name of Place or Building (give as much info as possible)

**8. How will you GET TO THAT PLACE (in question 5) from the LAST bus/trolley you will use for THIS TRIP?**

- I will drive my car
- I will be picked up by someone
- I will ride my bicycle
- I will walk (# minutes)_____
- I will ride with someone (carpool)
- Other _____

**9. Did you transfer FROM another bus/trolley TO GET TO THIS one you are on NOW? (Mark best answer / choose one)**

- No, this is my first bus/trolley on THIS Trip
- Yes, I transferred from Bus Route_____
- Yes, I transferred from trolley: Main St | Riverfront | Madison

**10. Will you transfer from this bus/trolley to another bus/trolley to GET TO YOUR FINAL DESTINATION? (Mark best answer / choose one)**

- No, this is my last bus/trolley on this trip.
- Yes, I will transfer to Route #_____
- Yes, I will transfer to trolley: Main St | Riverfront | Madison

**11. For this ONE-WAY Trip, how many TOTAL buses/trolleys did you OR will you take to reach the place you are GOING NOW?**

Total buses/trolleys (including this one):

**Which routes numbers (in order)?**

1st Bus/Trolley | 2nd Bus/Trolley | 3rd Bus/Trolley | 4th Bus/Trolley

**12. How did you pay your fare when you boarded THIS vehicle? (Mark best answer / choose one)**

- Adult base fare
- Zone 1 fare
- Student Base Fare
- Student 7-Day FastPass
- Student Daily FastPass
- Student 31-Day FastPass
- Trolley Base Fare
- Trolley Reduced Base Fare
- 2-Ride Trolley Pass
- Daily FastPass
- Express service base fare
- 7-Day FastPass
- 31-Day Fast Pass
- Senior/Person with disability Daily FastPass
- Senior/Person with disability 7-Day FastPass
- Senior/Person with disability 31-Day FastPass
- Daily Pass

**13. What was the AMOUNT PAID for the fare marked above?** $

CONTINUE

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# Transit On-Board Survey

**14. If bus/trolley service was not available, how would you MAKE THIS TRIP? (Mark best answer / choose one)**

- Drive
- Get a ride
- Bicycle
- Walk
- Taxi
- Would not make trip

**15. Was a CAR (or other personal motor vehicle) AVAILABLE to make this trip**

- Yes
- No

**16. Was a bicycle available to make this trip?**

- Yes
- No

**17. How many working motor vehicles (autos, vans, trucks, motorcycles) are AVAILABLE in your household?**

- None
- One
- Two
- Three
- Four or more

**18. Are you…?**

- Male
- Female

**19. How OLD are you?**

- Under 16
- 16-18
- 19-24
- 25-34
- 35-49
- 50-64
- 65 or older

**20. Are you a LICENSED DRIVER AND ABLE to drive?**

- Yes
- No

**21. Including yourself, how many PEOPLE live in your household?**

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

101 OFF CONTINUE

**22. Including yourself, how many people in your household are employed?**

- 1
- 2
- 3
- 4 or more

**23. Are you…? (mark all that apply)**

- Employed full-time
- Unemployed/Looking for job
- Unemployed/Not looking for job
- Employed Student
- Unemployed Student
- Homemaker
- Retired

**24. Are you of Hispanic, Latino, or Spanish Origin?** (Mark best answer / choose one)

- No
- Yes, Mexican, Mexican American, Chicano
- Yes, another Hispanic, Latino or Spanish Origin
- Yes, Cuban
- Yes, Puerto Rican

**25. What is your race? (Mark best answer / choose one)**

- Black or African American
- White
- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Asian
- Other

**26. What was your estimated HOUSEHOLD INCOME in 2012 before taxes (EVERYONE AT HOME)?**

- Less than $6,000
- $6,000 - $18,000
- $18,001 - $30,000
- $30,001 - $42,000
- $42,001 - $60,000
- $60,001 - $90,000
- More than $90,000

| 27. How much do you AGREE or DISAGREE with the following? | Strongly Agree | Agree | No Opinion | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Transit services mostly operate on time. | | | | | |
| Customer Service Staff are helpful and friendly | | | | | |
| Drivers are helpful and friendly. | | | | | |
| Buses are clean and well-maintained. | | | | | |
| Website provides detailed up-to-date information | | | | | |
| Informational materials are easy to understand | | | | | |
| I use MATA's trip planner or MATA-Traveler to plan my trip or determine the next available transit | | | | | |

TAPE HERE
PEGAR AQUI

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 2553 DALLAS TX
POSTAGE WILL BE PAID BY ADDRESSEE

MARKET RESEARCH DEPARTMENT
DIKITA ENTERPRISES INC
1420 W MOCKINGBIRD LN STE 600
DALLAS TX 75247-9922

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

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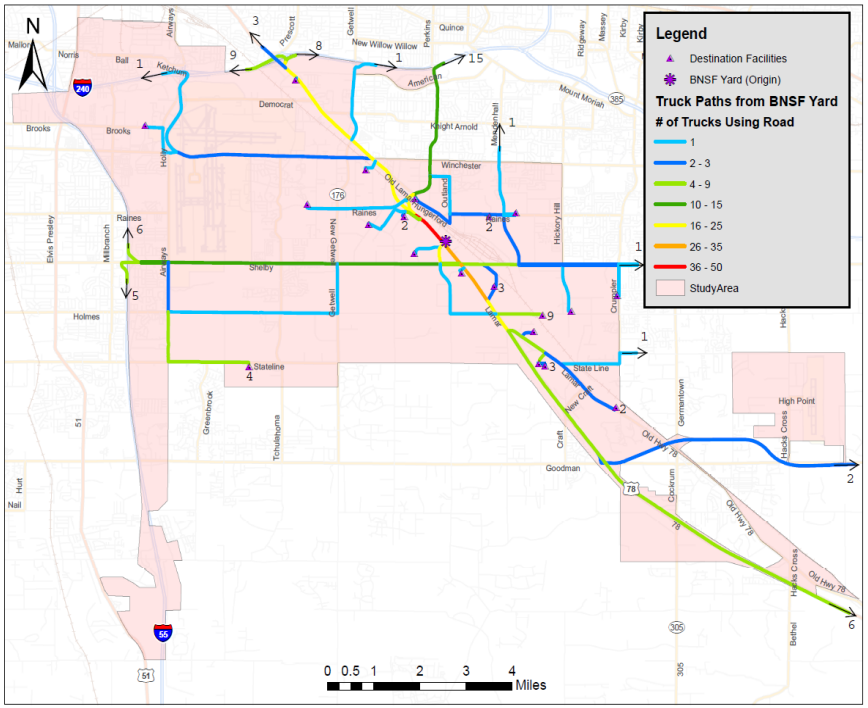
# Non-Motorized Survey

- 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

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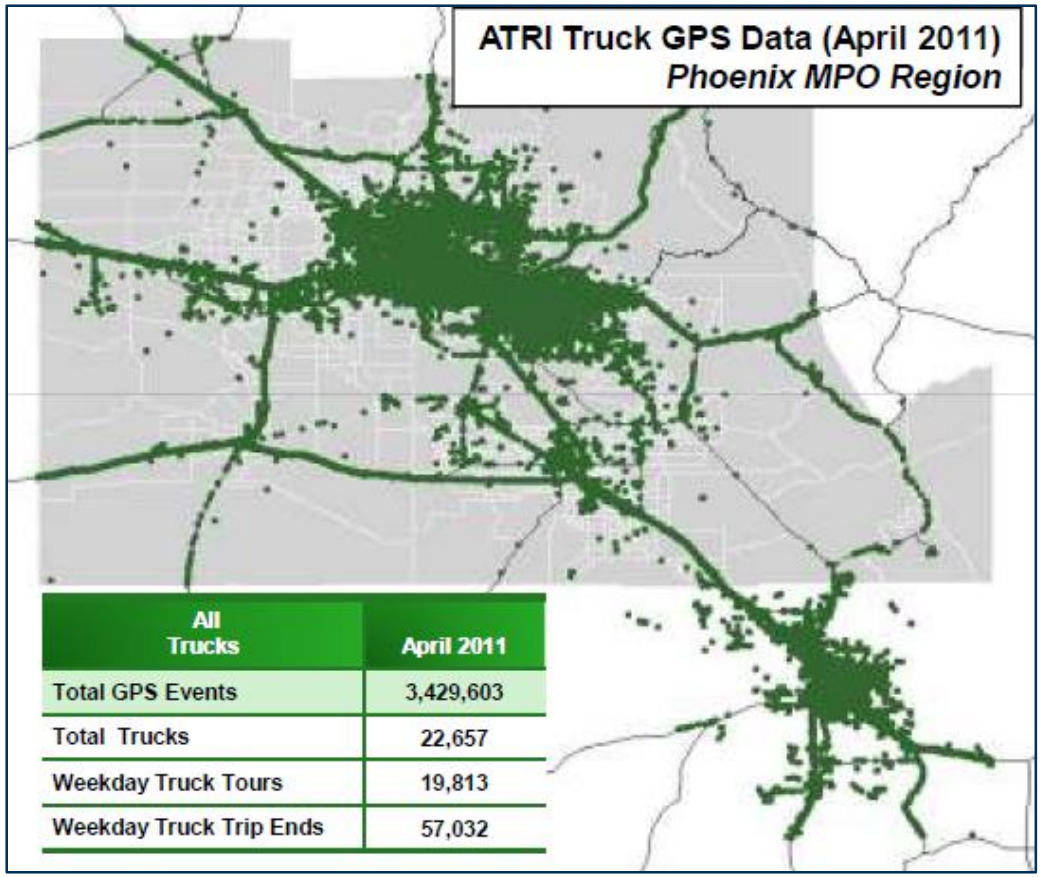
# Freight Survey – GPS Data

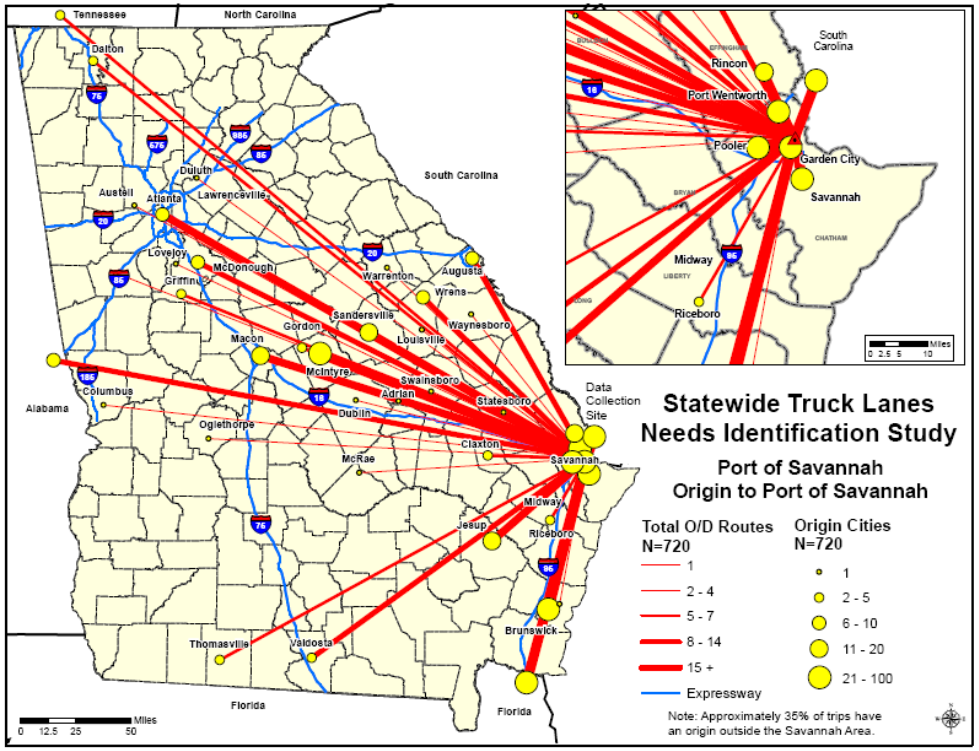
- Next generation truck activity data
  - Significant improvement relative to establishment surveys
- Millions of truck activity events
  - Speeds
  - Precise origins and destinations
  - Routing information
  - Multiple stop trips
  - Time-of-day stamp




| All Trucks | April 2011 |
|---|---|
| Total GPS Events | 3,429,603 |
| Total Trucks | 22,657 |
| Weekday Truck Tours | 19,813 |
| Weekday Truck Trip Ends | 57,032 |

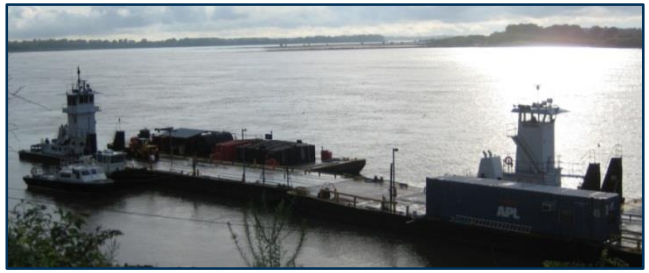
# Freight Survey – Gate Surveys

- 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



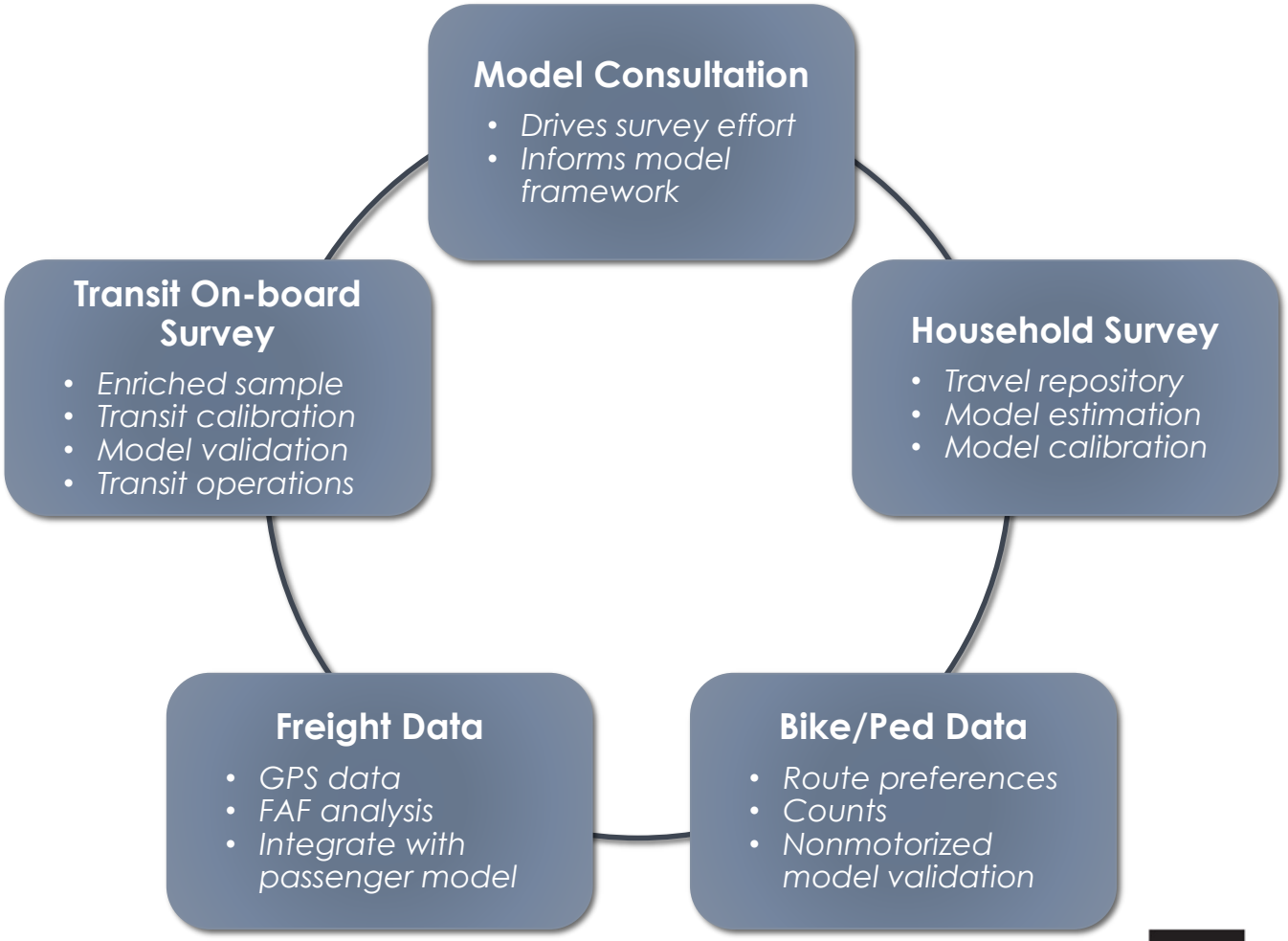
# Freight Survey – Data Analysis

- 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?*

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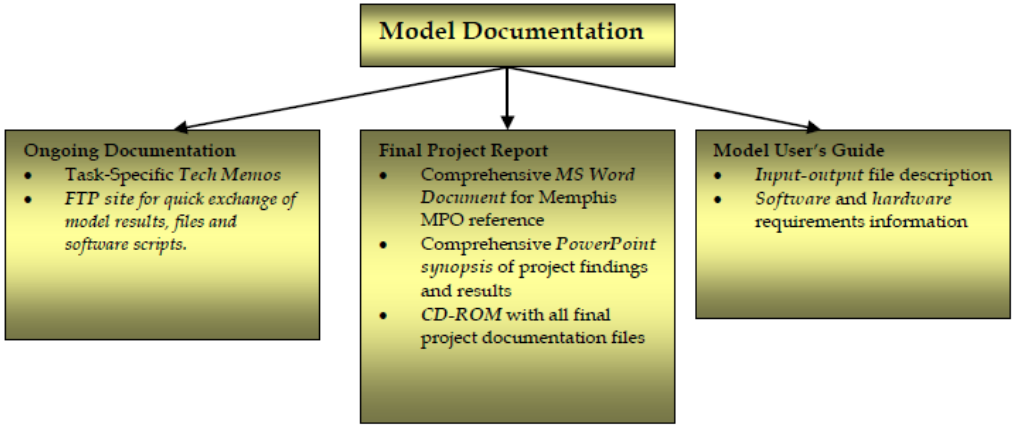
# Travel Demand Model Update

- 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

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