



THE FLORIDA NHTS ADD-ON PROGRAM

By Huiwei Shen, Florida DOT and Krishnan Viswanathan, Cambridge Systematics, Inc.

The National Household Travel Survey (NHTS) is a tool for the urban transportation planning process that helps us understand travel behavior. The NHTS provides data on personal travel behavior, trends in travel over time, a source of four-step model parameters, national benchmarks for reviewing against local data, and data for a wide range of transportation planning applications. The transportation research community, including academics, consultants, and government agencies, use the NHTS extensively to examine:

- Travel behavior at the individual and household level;
- The characteristics of travel such as trip chaining, use of the various modes, amount and purpose of travel by time of day and day of week, vehicle occupancy, and a host of other attributes;
- The relationship between demographics and travel; and
- The public’s perceptions of the transportation system.

The National Sample and the Add-on Program

The Federal Highway Administration (FHWA) first conducted the NHTS in 1969 and has repeated it (in various incarnations) in 1977, 1983, 1990, 1995, and 2001. It has been the flagship survey to quantify travel behavior of the American public. Traditionally the NHTS has conducted a survey on a nationwide scale and, starting in 1990, initiated the Add-on program to allow states and metropolitan planning organizations (MPOs) to purchase NHTS samples to create a household travel survey dataset for their area. However, due to federal budget cuts the next iteration of the NHTS, originally slated for 2007, was in jeopardy. The Transportation Pooled Fund (TPF) put out a solicitation for states and MPOs to carry out the Add-on program. The overwhelming response to the Add-on program highlighted the importance of these data to the transportation community. Nineteen geographic areas are participating, including Florida.

The survey will now take place in 2008 and funding for the national sample came through on February 19, 2008. The national sample will be 25,000 households and funding has been provided by Federal Highway Administration, Federal Transit Administration, and the AARP.

Why is Florida participating in the Add-on Program?

The motivation behind Florida’s participation in the NHTS Add-on program is to achieve a statistically valid sample and thus provide a greater level of confidence in assessing current and future travel patterns throughout the state. This in turn should result in more defensible transportation projects for federal and state funding.

The NHTS provides a wealth of household information in terms of demographics and characteristics, vehicle characteristics, trip-making (both daily and long-distance) characteristics, transit trip characteristics and other items

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such as citizen perceptions of the transportation system, telecommuting, etc. The transportation planning and modeling community have used these data items to:

- Develop trip rates and trip length distributions by purpose for travel demand models;
- Enhance air quality analysis;
- Provide a source of standard model parameters and validation benchmarks; and
- Understand trends and patterns in travel behavior among distinct population groups such as the elderly and minorities.

In addition to the usefulness of NHTS data for informed decision-making, the Add-on provides recent household survey data for smaller MPOs that, due to budgetary pressures, have been unable to perform household survey data collection on a regular basis. The Add-on program would give MPOs and other agencies around the state a comprehensive, statistically valid dataset (14,000 samples) for use in modeling and planning activities.

Given all these reasons, the Metropolitan Planning Organization Advisory Council (MPOAC) approved funding for the Florida Add-on program through appropriation of metropolitan planning (PL) funds. The MPOAC allocated \$2.1 million for 12,000 urban samples and \$500,000 for data analysis and tabulation. In addition, the Florida DOT allocated \$350,000 for collection of 2,000 rural samples.

The Sampling Plan

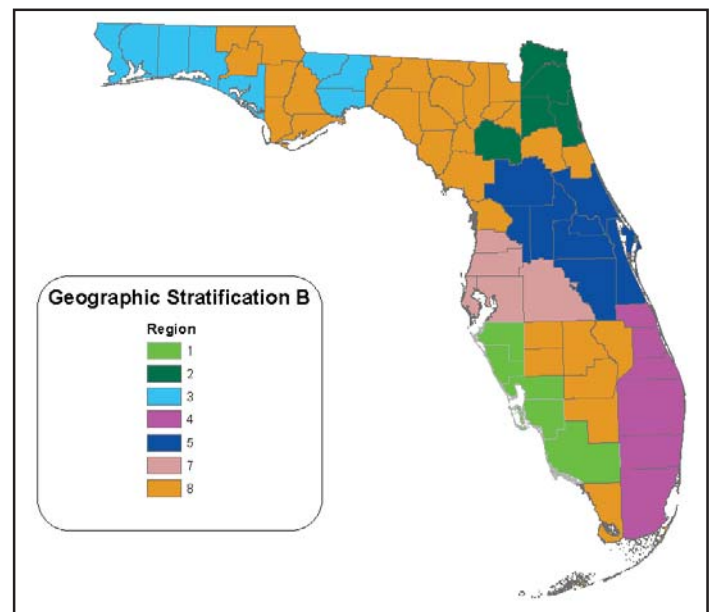
As a first step, FHWA reviewed a sampling plan with different geographic stratifications. FHWA and Florida DOT staff held a meeting in March 2007 to explain the different geographic stratifications and their corresponding sample sizes. The conversation continued via email and telephone discussions and, after extensive discussion with FHWA, Florida DOT staff revised the sampling plan to reflect FHWA concerns and comments.

Following review by FHWA, Florida DOT staff submitted the sampling plan to members of the Florida Model Task Force (MTF) Data Committee for review. The MTF Data Committee held a meeting in the summer of 2007 to go over the sampling plan. The members reviewed two different geographic stratifications that were under consideration.

1. One divided the state into three regions (South Florida, Central Florida, and North Florida); and
2. The other stratification closely followed Florida DOT district boundaries with some adjustments to group areas with similar travel patterns.

The MTF members reviewed the sampling plan and the sample size for each region. Discussion with the MTF Data Committee helped address concerns regarding sample size allocation for each region and ensured that the larger regions were comfortable with donating some of their samples to the smaller regions without loss of statistical significance. The MTF members felt the geographic stratification that loosely followed Florida DOT district boundaries was more appropriate and recommended its adoption. **Figure 1** shows the recommended stratification for the 2008 NHTS FL sample after review by FHWA and the MTF Data Committee.

Figure 1. Proposed Geographic Stratification



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The proposed geographic stratification divides the state into seven regions (Florida DOT districts 4 and 6 together form region 4) as follows:

- **Region 1** – Collier, Lee, Charlotte, Sarasota, and Manatee (Census 2000 Households: 545,158);
- **Region 2** – Duval, St. Johns, Clay, Nassau, and Alachua (Census 2000 Households: 613,890);
- **Region 3** – Leon, Gadsden, Wakulla, Walton, Okaloosa, Santa Rosa, Escambia, and Bay (Census 2000 Households: 424,149);
- **Region 4** – Broward, Miami-Dade, Palm Beach, Indian River, St. Lucie, and Martin (Census 2000 Households: 2,150,666);
- **Region 5** – Orange, Osceola, Seminole, Lake, Sumter, Brevard, Volusia, and Marion (Census 2000 Households: 1,040,095);
- **Region 7** – Hernando, Hillsborough, Pasco, Pinellas, and Polk (Census 2000 Households: 1,196,954); and
- **Region 8** – Rural (non-MPO) counties not in the first seven regions (Census 2000 Households: 317,548).

Florida DOT staff determined regional sample sizes by multiplying the percentage of Florida’s total households within each region by 14,000 total surveys (12,000 for urban areas and 2,000 for rural areas). The sample size stratification ensured each of the proposed regions had a minimum sample size of 1,200 and the regions generally conformed to existing Florida DOT districts.

Table 1 shows the original and revised sample size for the seven regions and the confidence intervals at the 95 percent confidence level. This table shows that, in theory, in 19 cases out of 20, overall results based on such samples differ by no more than the confidence interval that surveyors would obtain by seeking out all households in the region. This allocation and sharing among districts did not adversely affect the confidence interval and helped ensure that regions 1 and 3 received at least 1,200 samples.

Additional Questions

The Add-on program entitles Florida to three to five additional questions specifically of interest to the state. After extensive discussions with Florida DOT, FHWA, and other experts, Florida DOT staff proposed questions to collect the following information:

- Criteria to consider public transit for commute trips;
- Criteria to consider public transit for nonwork trips;
- Length of tenure at current residence;
- Top three reasons for choosing a particular neighborhood in the respondent’s region;
- Top three reasons for continuing to stay in this neighborhood in the respondent’s region; and
- Permanent or seasonal resident of Florida.

The additional questions approved for the survey appear at the end of this article. The 2001 version of the NHTS questionnaire also appears on-line at http://nhts.ornl.gov/2001/usersguide/appendix_m.pdf.

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Table 1. NHTS Add-on Sample Size

Region	Number of Households	Sample Size		Confidence Interval (95% CI)	
		Original	Revised	Original	Revised
1	545,158	1,096	1,200	± 3.0%	± 2.8%
2	613,890	1,234	1,234	± 2.8%	± 2.8%
3	424,149	852	1,200	± 3.4%	± 2.8%
4	2,150,666	4,322	4,116	± 1.5%	± 1.5%
5	1,040,095	2,090	2,000	± 2.1%	± 2.2%
7	1,196,954	2,406	2,250	± 2.0%	± 2.1%
8	370,209	2,000	2,000	± 2.2%	± 2.2%
Total	6,341,121	14,000	14,000	± 0.8%	± 0.8%

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Current Status

FHWA conducted pretests in Florida and Virginia in late 2007. The primary objective was to test the questionnaire flow, timing, and data collection and quality assurance processes. The pretest went very well – the full study required only a few questionnaire adjustments. FHWA will begin the full study in March 2008. The NHTS team has set up a respondent web site to explain and publicize the study (<http://www.fhwa.dot.gov/policy/ohpi/nhts/nhtsspinfo.htm>).

In addition, the NHTS team has published a 1990-2001 trends data set that contains the 1990, 1995, and 2001 NHTS data sets. It contains all Household files, Person files, Daytrip and Vehicle files and SAS datasets. Please contact Heather Contrino at FHWA (heather.contrino@dot.gov) for a copy of this trends CD.

Appendix – The Actual Additional Questions submitted by Florida DOT

Q1a. {IF RESPONDENT WORKS OUTSIDE HOME} For public transit (bus, express bus, subway, or train) to be a good option for your commuting trips to and from your workplace, which of the following criteria would be the most important to you? ((READ LIST-RANDOMIZE ORDER)).

- Public transit must be fast
- Public transit must be safe
- Public transit must be reliable and on-time
- Public transit must not require me to walk too much
- Public transit must provide a good travel experience
- Public transit costs must be reasonable
- Public transit must be stress-free

Q1b. {IF RESPONDENT DOES NOT WORK OUTSIDE HOME} For public transit (bus, express bus, subway, or train) to be an option for the trips you make most frequently, which of the following criteria would be the most important to you? ((READ LIST)).

- Public transit must be fast
- Public transit must be safe
- Public transit must be reliable and on-time
- Public transit must not require me to walk too much
- Public transit must provide a good travel experience
- Public transit costs must be reasonable
- Public transit must be stress-free

CLARIFICATION ON USING FSUTMS FOR INTERNAL CAPTURE ANALYSIS

By Jon Weiss, FDOT District Five

In the April 2007 issue of the *Florida Transportation Modeling Newsletter*, I submitted an article called “A Proposed Practice for the Calculation of Internal Capture Percentage based on FSUTMS Trip Tables.” I would like to dispel some misinterpretations in the modeling community that resulted from the article.

The article was never intended to set policy for the Department. In fact, until further research has been completed, FDOT District 5 does not support the results from the model as the sole source for internal capture forecasting. As the title indicated, the article was a proposed practice, meant as a starting point to generate discussion and research in the modeling community towards developing a commonly accepted procedure in the future. The model is one of many analysis tools available to transportation professionals and, as with all other tools, the fundamental assumptions of the procedure (in this case how the model assigns internal trips) should be well known and documented and the results should be checked for reasonableness (compared with manual techniques) and adjusted as needed.

Currently, the most widely accepted internal capture analysis technique continues to be a diagrammatical depiction of internal traffic flows between a mixed-use development’s individual land use components. The Florida modeling community must undertake a significant amount of research and testing before modeling results are as understood and accepted to the same degree as ITE-recommended techniques. While District 5 has some preliminary research underway, I would be interested in hearing from other colleagues who have proposed similar methodologies or who have successfully applied them to other projects.

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Q2. How long ago did you move to the place (house/apartment/condo) you live now?

Number of years _____ or
 Number of months _____

{IF less than 5 years CONTINUE WITH Q2A}

{IF more than 5 years SKIP TO Q2B}

Q2A. What are the top three reasons you chose the neighborhood you live in as compared to other neighborhoods in {COUNTY or CITY NAME}

Rotate List

- Built roots in the community
- The housing cost or rental price fit my needs
- The quality and size of the home fit my needs
- The size of the lot fit my needs
- The quality of the local school district fit my needs
- The quality of the neighborhood fit my needs
- The location was convenient to my or another family member's workplace
- The location was convenient to schools
- The location was convenient to shopping, entertainment, or restaurants
- The location was convenient to social, religious, civic, cultural or recreational facilities
- The location was convenient to friends or family
- The location was convenient to public transit services
- The location is on or near natural or scenic features such as beach/lake front, golf course etc.

Q2B. What are the top three reasons you have chosen to stay in the neighborhood you live in as opposed to moving to another neighborhood in {COUNTY or CITY NAME}

Rotate List

- Moving is too difficult
- Moving is too expensive
- Built roots in the community
- The housing cost or rental price fit my needs
- The quality and size of the home fit my needs
- The size of the lot fit my needs
- The quality of the local school district fit my needs
- The quality of the neighborhood fit my needs
- The location was convenient to my or another family member's workplace
- The location was convenient to schools

Q2B. What are the top three reasons you have chosen to stay in the neighborhood you live in as opposed to moving to another neighborhood in {COUNTY or CITY NAME} (continued)

- The location was convenient to shopping, entertainment, or restaurants
- The location was convenient to social, religious, civic, cultural, or recreational facilities
- The location was convenient to friends or family
- The location was convenient to public transit services
- The location is on or near natural or scenic features such as beach/lake front, golf course, etc.

Q3. Are you a permanent resident of Florida, living in Florida more than six months of the year, a seasonal resident of Florida, living in Florida less than six months of the year, or a visitor to Florida, living in Florida for less than one month of the year?

____ Permanent Resident (Live in Florida six or more months per year)

____ Seasonal Resident (Live in Florida less than six months per year)

____ Visitor (Live in Florida less than one month per year)

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For up-to-date information on upcoming meetings and minutes check out www.FSUTMSOnline.net.

FLORIDA MODEL TASK FORCE (MTF) UPDATE

By Keli Paul, Cambridge Systematics & Terrence Corkery, FDOT Systems Planning Office

On November 28-29, 2007, the full Model Task Force (MTF) and all four technical committees (Model Advancement, Data, Transit, and GIS) met in Orlando to discuss the future of travel demand modeling in Florida. Highlights of the full MTF meeting appear below while a summary of the committee meetings appears later in this article.

The topics discussed at the full MTF meeting on November 29th were the following:

- Technical committee and district modeling updates (*Technical Committee Chairs and District Modeling Coordinators*)
- Presentations and panel discussion on the feasibility of activity-based modeling in Florida, including the industry, government, and academic perspectives (*Mike Neidhart, Volusia County MPO, Mark Bradley, Bradley Research & Consulting, Danny Lamb, FDOT District 7, Mary Ross, Gannett Fleming, and Siva Srinivasan, University of Florida*)
- Cube Voyager update (*Mike Clarke and Wade White, Citilabs*)
- Toll modeling in Florida (*Mike Doherty, URS*)
- White paper on “A Recommended Approach to Delineating TAZs in Florida” (*Keli Paul, Cambridge Systematics*)
- National Household Travel Survey (NHTS) Add-On Status (*Huiwei Shen, FDOT Systems Planning*)

Most of the discussion focused on *activity-based modeling* (ABM), specifically what it is, potential impacts on Florida models and applications, and potential data needs. The discussion included industry, government, and academic perspectives along with a panel discussion. The participants at the MTF meeting agreed to conduct further research to determine if ABM is feasible in Florida.

Since the MTF meeting, discussions on ABM implementation in Florida have continued. The Model Advancement and Data Committees held a teleconference in February 2008 to discuss data needs for ABM. Tom Rossi described the structure of the Denver ABM. Additionally, the FDOT Systems Planning Office is planning a one-day activity-based model workshop in the spring for MTF leadership to further explore the possibility of developing ABM in Florida.

Citilabs presented new features included in *Cube Base 4.2*, which incorporates basic GIS functionalities focused on highway models, as well as new features included in *Cube 5.0 Beta*. The full release of Cube 5.0 will address GIS functionalities for transit modeling. The discussion included Cube Cluster and Cube Land, as well as alternative levels of modeling detail (macroscopic vs. mesoscopic vs. microscopic).

The presentation on *toll modeling* included a variety of enhancements currently underway by the Turnpike Enterprise, such as open-road tolling, discrete tolls (discount pricing), toll avoidance areas, and ramp-to-ramp modeling (“card system” with transponders). The estimated completion date for documentation of these new techniques is August 2008.

Keli Paul presented highlights from the white paper, “A Recommended Approach to Delineating Traffic Analysis Zones in Florida.” The white paper includes guidelines for the delineation of TAZ boundaries, as well as the corresponding socioeconomic data. The draft white paper is available online at www.fsutmsonline.net.

Huiwei Shen provided an update on the *National Household Travel Survey (NHTS) Add-on* for Florida. The federal government has awarded the contract and the sampling plan and questionnaire for Florida are complete. On February 29, 2008, FHWA secured funding for 25,000 national survey samples that will be taken in March 2008, along with the add-on surveys for 19 participating areas including Florida.

In addition to the full MTF meeting, each of the four technical committees met on the previous day (November 28th). Summaries of the meeting discussions and subsequent updates appear on the next page.



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Model Advancement and Data Committees

The Model Advancement and Data Committees held a joint meeting to discuss the following topics:

- Model calibration standards (*Rob Schiffer and Tom Rossi, Cambridge Systematics*)
- Synthesizing Freight Analysis Framework (FAF) Data to the County Level (*Krishnan Viswanathan, Cambridge Systematics*)
- Integration of LRTP and Mesoscopic or Microscopic Models (*Mike Neidhart, Volusia County MPO*)

The presentation included draft *Model Calibration Standards and Guidelines*, prepared under contract with and guidance from FDOT Central Office. The literature review conducted during task 1 is complete, and draft standards and guidelines were the product of task 2. Since the MTF meeting, task 3 of the project has commenced, focusing on the development of best practices in model calibration and validation. The committee discussed the potential for double-counting links and the value of summed volume-to-count ratios versus vehicle-miles traveled (VMT) volume-to-count ratios. Committee members voted to retain the summed volume-to-count ratio in the model calibration and validation standards as a statistical measure of performance with the understanding that established standards for coding and maintaining network traffic counts for model validation will be necessary. As a result, FDOT Systems Planning will develop a scope to develop traffic count database standards for modeling purposes.

As part of the *Freight Analysis Framework (FAF) Data* project for FDOT Systems Planning, we are disaggregating freight data for the five Florida FAF2 districts down to the county level. Once completed in June, we will provide upon request county-level data, which are useful for future-year freight data projections.

The committee discussed in detail the issue of policy makers asking macroscopic models to answer questions that they were never intended to answer. The committee discussed three types of models relative to their level of detail: 1) *macroscopic* models, which are used for LRTP planning applications, 2) *microscopic* models, which are used at the intersection and subarea level, and 3) *mesoscopic* models, considered to be in between macroscopic and microscopic

models and could be useful to assist with integration of Intelligent Transportation Systems (ITS) analyses into LRTP processes and for subarea modeling. Mike Neidhart suggested that mesoscopic models might be a good start for node-based modeling, whereas one could achieve standards for microsimulation modeling more fully later.

For additional information on the Model Advancement Committee, please contact the committee chair, Mike Neidhart at the Volusia County Metropolitan Planning Organization (MPO), via email at mneidhart@co.volusia.fl.us. For additional information on the Data Committee, please contact the committee chair, Gary Kramer at the West Florida Regional Planning Council, via email at kramerg@wfrpc.dst.fl.us.

Transit Committee

The Transit Committee discussed the following topics:

- Transit modeling framework and generalized mode choice model for FSUTMS (*Yongqiang Wu, FDOT Systems Planning and Dave Schmitt, AECOM*)
- The need for better transit survey data (*Larry Foutz, Miami-Dade MPO*)

The committee provided a timeline for development and implementation of the *transit modeling framework* during the meeting. MPOs are implementing the framework in the Metropolitan Orlando model, the Northeast Regional Planning Model (NERPM), and the Southeast Regional Planning Model (SERPM). In addition, the committee discussed in detail planned enhancements to the framework for the short-, mid-, and long-term.

In addition, the committee discussed the need for better *transit survey data*. Florida metropolitan planning organizations (MPOs) are currently in the process of developing their next Unified Planning Work Program (UPWP). During the meeting, Larry Foutz requested volunteers to assist with developing a draft scope for interested MPOs to include in their UPWPs for transit survey data collection. Since the MTF, the committee established a Transit Survey Subcommittee and developed a scope, which they distributed to the full MTF.

For additional information on the Transit Committee, please contact the committee chair, Larry Foutz at the Miami-Dade MPO, via email at lfoutz@miamidade.gov.

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USERS' GROUP PAGES

http://www.fsutmsonline.net/index.php?/user_groups_pages/user_groups_pages/

Local FSUTMS users' groups have been formed to provide a forum to facilitate and promote understanding and proper application of the models. These groups maintain mailing lists and hold regular meetings that usually feature one or more guest presentations. Year 2008 meeting dates are provided below, or check out the web address above for future dates and meetings.

The **Central Florida Traffic Data Users' Group** meets at the FDOT-District 5 Orlando Urban Office. For additional information, please contact **Jon Weiss** 407-482-7881.

Thursday, April 17, 2008 from Noon until 2:00 p.m.

The **Northeast Florida Transportation Applications Forum** meets at the First Coast MPO office at 1022 Prudential Drive from Noon until 2:00 p.m. For additional information, please contact **Karen Taulbee** (904) 360-5652 or **Jeanette Berk** (904) 823-8982.

Thursday, May 15, 2008

Thursday, September 18, 2008

The **Panhandle Transportation Applications and FSUTMS Users' Group** meets at the Washington County Public Library in Chipley from 1:15 p.m. to 3:00 p.m. For additional information, please contact **Linda Little** at (850) 638-0250.

The **Southeast Florida Users' Group** meets at the FDOT-District 4 Auditorium. For additional information, please contact **Min-Tang Li** at (954) 777-4652.

Friday, May 16, 2008 at 9:30 a.m.

The **Southwest Florida Users' Group** meets at the Charlotte County Airport at 2800 A-6 Airport Road, Punta Gorda. For additional information, please contact **Jim Baxter** (863) 519-2562.

The **Tampa Bay Applications Group** meets at the FDOT-District 7 Tampa Office from 12:00 p.m. to 2:00 p.m. For additional information, please contact **Danny Lamb** (813) 975-6437. Meeting dates are listed below:

Thursday, May 29, 2008

Thursday, August 21, 2008

Thursday, October 23, 2008

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GIS Committee

The GIS Committee discussed the following topics:

- FSUTMS GIS Web Portal (*Yongqiang Wu, FDOT Systems Planning and Albert Gan, FIU*)
- Cube 4.2 GIS Integration (*Colby Brown, Citilabs*)

The GIS Committee discussed two web portals: 1) the FSUTMSOnline web portal, which is a data warehouse and user discussion forum, and 2) the *FSUTMS GISOnline* web portal, which is a depository for GIS modeling data. FSUTMS GISOnline will assist with the preparation of FSUTMS model input data and provide tools for spatial data verification, analysis, and evaluation. During the meeting, the GIS Committee requested consideration of several functions for addition to the GIS web portal. FDOT Systems Planning is currently incorporating the additions.

Citilabs provided a demonstration of the GIS features of Cube 4.2 and the Cube 5.0 Beta. Committee Chair Lina Kulikowski requested that the GIS Committee use the GIS tools in the Cube Beta highway version so that they can meet via teleconference, compile comments, and provide them to Citilabs. The GIS Committee will beta-test the transit version upon release by Citilabs. Since the MTF meeting, the GIS Committee completed their beta-testing of the Cube Beta highway version and provided comments to Citilabs.

For additional information on the GIS Committee, please contact Lina Kulikowski at the Broward MPO, via email at lkulikowski@broward.org.

All PowerPoint presentations from both the MTF Committee meetings as well as the full MTF meeting are online at www.fsutmsonline.net.

FSUTMS TRANSIT TO HIGHWAY SPEED RELATIONSHIP STUDY

By: Eric Heinz and Hoyt Davis, Gannett Fleming, Inc.

Introduction

This article describes a transit to highway speed relationship study conducted for the Florida Department of Transportation (FDOT). The study recorded data collected from two major urban areas in Florida: Tampa and Jacksonville. The study team performed a linear regression analysis to determine whether the transit to highway speed relationship currently used for FSUTMS should continue to follow two-point curves relating transit to highway speeds directly, or whether the model should establish new relationships by including additional variables into the equations.

Data Collection & Review

The study team performed independent transit speed studies for FDOT Districts 2 (Jacksonville) and 7 (Tampa). The team reviewed the data collected from these studies for possible variables to use in formulating accurate transit to highway speed relationships to be used in future versions of FSUTMS using Cube Voyager.

Tampa Speed Study and Jacksonville Speed Study

The Tampa Speed Study (2003) included data for five transit routes in Hillsborough County and five routes in Pinellas County. The study also collected highway and transit speeds on four different area types (CBD, CBD Fringe, Other Urban and Other Business District) and four facility types (divided arterials, undivided arterials, collectors and one-way streets). The study did not include data collected for bus speeds for the other facility types in the FSUTMS model (freeways, ramps and toll facilities) because the study assumed the data to be nearly identical.

The Jacksonville Speed Study (2005) included data on the travel times for automobiles and buses along 26 routes in the Jacksonville area with a total of 508 paired directional trips. The Jacksonville study also collected data for other models (with additional variables) to measure factors such as transit level of service and to allow bus trip times to be estimated without access to a regional planning model.

Table 1 summarizes the variables used in both the studies to determine transit to highway speed relationships.

Table 1: Transit to Highway Speed Study Variables

Variable	Jacksonville	Tampa
Area Type	X	X
Facility Type	X	X
Segment Length Per FT	X	X
Segment Length Per AT	X	X
Peak Direction	X	
Peak Period	X	X
Total Route length	X	
# Of Left Turns	X	
# Of Stops Serving Passengers	X	X
# Of Traffic Signals		X

Both analyses divided the data by peak and non-peak period runs. However, the study found no significant difference in the transit/highway speed relationships in the peak and non-peak period runs.

Analysis & Findings

The study team conducted analysis of the data sets using SPSS statistical software. A visual inspection of the data point scatterplot indicated a linear relationship between transit and auto speed. The following linear regression models show the full range of collected variables analyzed:

1. β_1^* (Auto Speed)
2. β_1^* (Auto Speed) + β_2^* (Bus Stops)
3. β_1^* (Auto Speed) + β_2^* (Segment Length)
4. β_1^* (Auto Speed) + β_2^* (Segment Length) + β_3^* (Bus Stops)

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Table 2: Transit to Highway Speed Relationship – All Data Points

Linear Regression Equation		Data Points	Adjusted R ²	Coefficients		
				β_1	β_2	β_3
Bus Speed =	β_1 *(Auto Speed)	2,035	0.945	0.718		
	β_1 *(Auto Speed) + β_2 *(Stops)		0.946	0.734	-0.375	
	β_1 *(Auto Speed) + β_2 *(Length)		0.946	0.676	1.125	
	β_1 *(Auto Speed) + β_2 *(Length) + β_3 *(Stops)		0.949	0.680	1.846	-0.793

Linear Regression – All Data Points

The study tested the models using all data records regardless of area type or facility type classification. **Table 2** shows the results of the analysis. Model #1 provided a good fit to the observed data as demonstrated by an adjusted R² of 0.945.

Linear Regression – Facility Type

After the initial analysis of the aggregated data set, the study divided the data into categories based on facility type and tested each independent variable individually. Model #1 demonstrated the “best fit” to the data. Similar to the aggregated data analysis, independent variables other than auto speed had a very low correlation to transit speed when tested individually.

Linear Regression – Area Type/Facility Type Combination

For a more detailed analysis, the study regrouped the data records based on unique area type/facility type combinations (16 different area type/facility type combinations). In each case, Model #1 showed a strong correlation for estimating transit speed.

Stop Density

Although only minimal benefit was shown by including additional variables, the study created a new stop density variable to help in understanding the impacts of bus stops relative to density along the corridor. Stop density considered the combination of the segment length and the number of stops within the segment, or stops per mile. The analysis included five different datasets as shown in **Table 3**.

The study conducted linear regression analysis for all data points in each stop density category. The analysis focused on the Model #1 equation (β_1 *Auto Speed). The analysis also compared regression coefficients for the individual area type/facility type combinations. Results of these analyses were consistent with the results obtained in the area type and facility type analysis, as well as the overall analysis.

Conclusion and Recommendation

Based on the analysis of the combined data sets, the study determined that the model form β_1 *Auto Speed (Model #1) was the best fit for estimating transit speeds in FSUTMS. In addition, the inclusion of additional variables as shown in **Table 1** (page 9) only provided minimal benefit in terms of improving the adjusted R² of each equation. The study team recommends that the β_1 *Auto Speed model form be used to estimate transit speeds in FSUTMS. In addition, the study team recommends further analysis of the stop density variable to determine the most appropriate method of incorporation into the FSUTMS model. Eric Heinz (ehinz@gfnet.com) or Yongqiang Wu (yongqiang.wu@dot.state.fl.us) will provide additional information upon request.

Table 3: Stop Density Categories

Stop Density Category	Bus Stops per Mile
0	0
1	0.01 to 1
2	1.01 to 2
3	2.01 to 3
4	3+

2008 FSUTMS CUBE WORKSHOPS & SCHEDULE

For workshop descriptions and to register, visit
http://www.fsutmsonline.net/modeling_training.aspx

FSUTMS modeling training workshops are offered by FDOT to the Florida transportation modeling community. Live workshops focus exclusively on the new FSUTMS powered by Cube Voyager. A desktop computer-based training (CBT) program for the Tranplan version of FSUTMS is available for download.

Training workshops qualify for professional development hour (PDH) credit for Florida professional engineers. The number of PDH credits for each workshop is equal to the number of classroom hours. If you would like to obtain PDH credits, please provide your PE registration number to the Systems Planning Office prior to the workshop.

There is no fee to attend the workshops; however, registration is required. An automated email will be sent confirming your registration. A seat assignment will be sent at a later date.

FSUTMS Transit Modeling Workshop

Date: April 28–May 1, 2008
 Times: Mon. 1:00 p.m. – Thurs. 12:00 p.m.
 Location: Homewood Suites
 8745 International Drive
 Orlando, FL 32819
 Reservations: 1-888-697-8745
 Rate: \$99/night
 Group Code: FDOT Workshop
 Res. Deadline: 4/14/08

For further information please contact:

Terrence Corkery, Systems Planning Office
 Mail Station 19
 605 Suwannee Street
 Tallahassee, Florida 32399-0450
 (850) 414-4903
 FAX (850) 414-4876
terrence.corkery@dot.state.fl.us

Advanced FSUTMS-Cube & Scripting Workshop

Date: May 19-22, 2008
 Times: Mon. 1:00 p.m. – Thurs. 12:00 p.m.
 Location: Homewood Suites
 2233 Ulmerton Rd.
 Clearwater, FL 33762
 Reservations: 1-727-573-1500
 Rate: \$99/night
 Group Code: FDOT Workshop
 Res. Deadline: 5/5/08



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