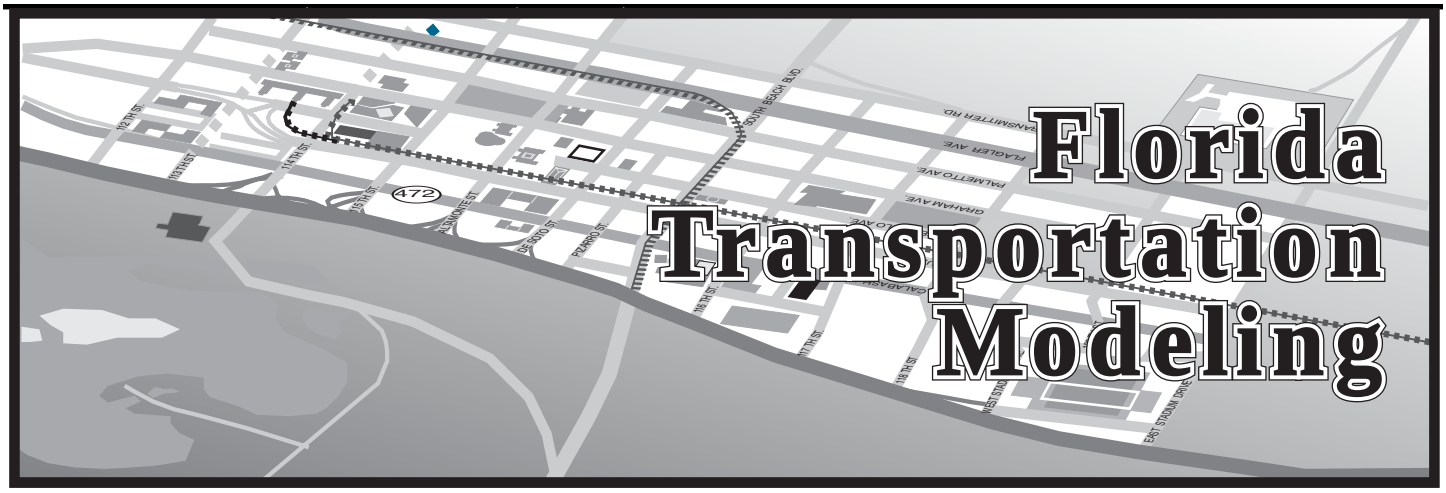


Volume 19 April 2002

STATEWIDE MODEL TASK FORCE MEETING SCHEDULED FOR APRIL18 in Orlando

8:30 AM - 4:00 PM

Embassy Suites Hotel 8978 International Drive Orlando, Fl 32819

Phone: (407) 352-1400 or 1- 800-EMBASSY (Reservations)

April 17
Transit Subcommmittee Meeting 9:00 AM - 11:30 AM
and
Modeling Software Vendor Demonstrations 1:00 PM - 6:00 PM

Model Task Force convenes Blue-Ribbon Panel to evaluate FSUTMS

by Terrence Corkery, Systems Planning Office

As this issue of the *Florida Transportation Modeling* newsletter reaches your desk, a Blue-Ribbon Panel will be discussing the future transportation model software possibilities available to Florida. The Florida Model Task Force (MTF) tri-chairs and subcommittee chairs will be present at the Blue-Ribbon Panel meeting on April 2 and 3 in Orlando. The MTF tri-chairs selected seven panel members in an effort to balance private sector and public sector input, as well as input from those who work in Florida and those who do not. The makeup of the panel is as follows: Patrick Costinett, Parsons Brinckerhoff Quade & Douglas; David Hartgen, UNC-Charlotte; Dane Ismart, Louis Berger Group; Kenneth Kaltenbach, The Corradino Group; Eric Miller, University of Toronto; Thomas Rossi, Cambridge Systematics, Inc., and James Ryan, Federal Transit Administration.

At the last MTF meeting held in October 2001, the Model Task Force members selected the topics that will be discussed by the Blue-Ribbon Panel members. Of main interest will be the discussion on conceptual changes and paradigm shifts in transportation planning. Related topics include trip chaining, induced travel, integrated land use/transportation models, micro-simulation approaches and activity-based methods. A

In this issue

Model Task Force convenes Blue-Ribbon Panel to evaluate FSUTMS *Continued*

review of tools and platforms in the context of conceptual changes and paradigm shifts will be discussed as well. Discussions will focus on the different software platforms available, and what their strengths, capabilities, and data requirements are. FSUTMS, Citilabs Products, EMME/2, TransCAD, QRS II, TRANSIMS, and other software packages will be evaluated.

A key goal of the MTF is to maintain a common modeling platform while enhancing flexibility. This felibility will improve our capabilities in GIS tools for transportation modeling, a graphical user interface, visualization of output, and input/output database structures.

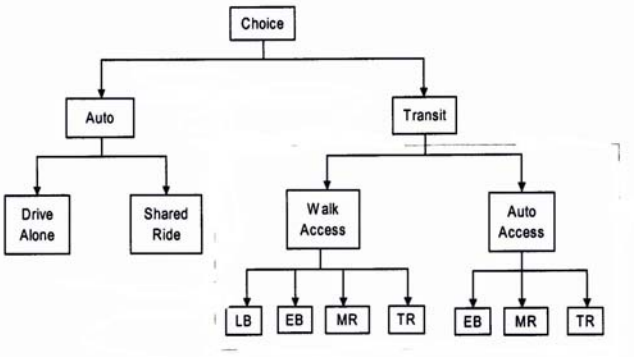
The findings of the Blue-Ribbon Panel will be discussed at the MTF meeting on April 18, 2002 in Orlando. We would like to urge all transportation planners and engineers to attend the April meeting to provide us with input at this important meeting.

For more information on the Model Task please visit our website at www11.myflorida.com/planning/systems/stm/mtf/mtfhome.htm or contact Huiwei Shen at (850) 414-4911 at the Florida Department of Transportation, Systems Planning Office.

Calibration of a Florida nested-logit mode choice model

By Mohamed Abdel-Aty, PhD, PE - University of Central Florida

This article describes the development of mode choice nested logit models for Southeast Florida. Data from the 1999 travel survey conducted in Southeast Florida were used in the calibration of the model. The calibration also involved the travel time and cost of the highway and transit systems obtained from the skim files of the southeast model. Several alternative nesting structures were investigated. Finally, the mode choice model was estimated as a three-level nested logit structure (see figure below). The model included seven



Structure of the mode-choice HBW model

transit mode/access combinations and two highway modes. Different models were calibrated for three different trip purposes (home-based work trips (HBW), home-based non-work trips (HBNW), and non home-based trips (NHB)). The selection of the proper universal nesting structure was chosen to address existing transit services while at the same time provide suitable flexibility to permit the addition of future modes that might be considered.

Two separate surveys were used in the estimation process. The first is the on-board transit survey, and the second is the household survey. In conducting the 1999 Southeast Florida surveys, the sampling methodology followed in the household travel survey was different from the one used for the on-board transit survey. Therefore, the weighted exogenous sampling maximum likelihood (WESML) methodology was adopted to estimate the model. The weights are the ratio of population market shares to the sample (survey data) market shares. The modeling estimation approach was based on estimation of two nested-logit models. One of which is based on the on-board transit survey and the other on the household travel survey. The two models were linked through the use of the inclusive value of transit. The transit section of the model was calibrated using full information weighted exogenous sampling maximum likelihood (FI-WESML) approach. The FI-WESML estimation is the most efficient statistical approach, because different nesting levels are estimated simultaneously as opposed to sequentially in the limited information case. The overall model was also calibrated using Full Information Maximum Likelihood (FIML).

The adopted structure consisted of a three-level nesting structure. In the primary nest, total person trips are divided into auto and transit trips. In the secondary nest, the auto trips are split into drive-alone and shared-ride trips, and the transit trips are split into walk-access and auto-access trips. In the third nest, the transit walk-access trips are split into local-bus (LB), express bus (EP), metro rail (MR), and tri rail (TR). The transit auto-access trips are divided into express bus (EP), metro rail (MR) and tri rail (TR) – see figure. This structure was adopted to achieve the best use of the available data. Among the significant variables that entered in the transit portion of the model were: walk or drive time to transit, transit in-vehicle time, wait time, transfers, and fare. In the overall model, in-vehicle times, costs, walk time to transit, and area type were among the significant variables. In all levels of the model, mode-specific constants reflecting the car ownership were entered in the model.

Statewide Freight Model Completed!

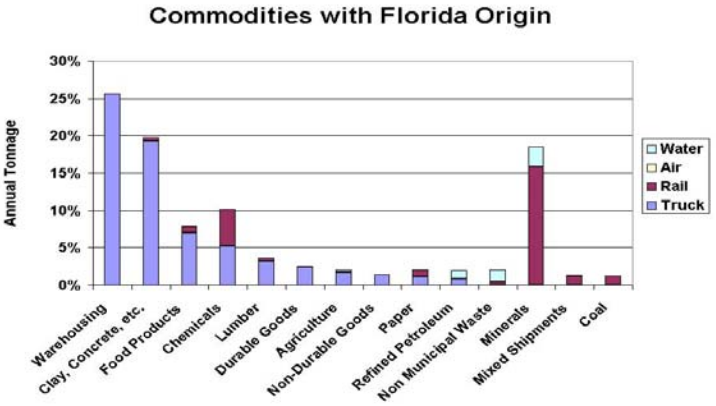
by Daniel Beagan, Cambridge Systematics

Being able to understand the movement of freight by truck is important to the Florida Department of Transportation. Travel by heavy combination trucks is 7 percent of the daily vehicle miles of travel (VMT) in Florida but theses trucks impact the highway system to a greater extent than passenger cars. A heavy truck causes as much pavement damage as 2,000 to 3,000 cars, according to a study at the University of Texas. Heavy trucks use as much highway capacity as 2 to 4 passenger cars on flat terrain and as much as 15 cars on steep grades. In order to operate the highway system efficiently and to best utilize its resources, FDOT needs to be able to analyze and forecast the movement of trucks.

While service, local delivery, and construction trucks are also included in the truck totals, a substantial proportion of that travel, and the majority of intercity travel, is by trucks carrying freight. Freight is defined as the commercial movement of products from a location where it is produced to a location where it is consumed. As measured by the Federal Highway Administration, the 1998 volume of freight originating or terminating in Florida is 414 million tons, or almost 26 tons for each resident. The share of that freight that is moved by truck is 55 percent by all commodities. Excluding bulk commodities such as phosphate, coal and petroleum, which move primarily by water and rail, truck's share of the freight tonnage is over 70 percent. The efficient movement of that freight by truck is important to Florida's economy

With FDOT's existing statewide highway model, as implemented in FSUTMS, Florida has a forecasting and analysis tool that is unsurpassed by any other state. Since addressing freight concerns in transportation planning is a fairly recent focus, FDOT determined that its existing statewide travel demand models forecast the movement of all types of trucks and do not provide the level of detail necessary to do freight planning. While other states have addressed their freight planning needs by simplified growth factoring or by purchasing demand and forecasts of freight movement from commercial sources, FDOT set itself the challenge of integrating freight planning directly into FSUTMS. Based on that challenge, FDOT's Systems Planning Office initiated a project to develop an intermodal highway freight model that analyzes and forecasts freight truck movements using the same zone structure, networks, socioeconomic data, and forecasting techniques as the passenger models that are part of FSUTMS. Since a parallel effort was underway to update the statewide passenger model, the freight model had to also be able to utilize new zone, network and socioeconomic data as it became available.

The freight model set out to transfer the four-step passenger demand modeling process to freight. Since the model was to be intermodal, the basic forecasting unit for much of the model was the tonnage shipped by all modes. As in the development of passenger models, a survey of travel was sought to specify and calibrate the model parameters. FDOT acquired Reebie Associates' TRAN SEARCH database, which through direct measurements as supplemented by surveys, provides a complete inventory of freight tonnage in Florida by origin, destination, mode, and commodity. The origins and destinations in the database include not only Florida, but also, recognizing the national scope of freight movement, all of North America. The movement of freight through Florida's ports and airports is also an important concern and rather than attempting to forecast these movements, these facilities were established as special generators whose tonnage were to be obtained from the facility operators and directly integrated into the model. The 40 commodities in the freight model, which were used as analogs to trip purposes in passenger models, were reduced to the 14 groups, with the largest being warehousing, building materials, chemicals, and food products. (The originating tonnages of these commodity groups, sorted by the volumes shipped by truck, are shown in the figure below.) The three existing FSUTMS employment ZDATA categories for the statewide TAZs were disaggregated to the two-digit Standard Industrial Classification codes associated with the commodity classes.



The ZDATA freight data was used, together with the freight database, to develop trip generation equation of productions and attractions. The resulting equations show a very high degree of statistical correlation to the observed data. These equations where implemented in a Freight Generation program in FSUTMS using standard datasets. The distribution of freight between origins and destinations in a national market was found to follow a gravity model whose impedance was a function of the distance shipped by commodity group. This finding made it possible to use the TRANPLAN TRIP DISTRIBUTION program in FSUTMS directly with the freight data sets.

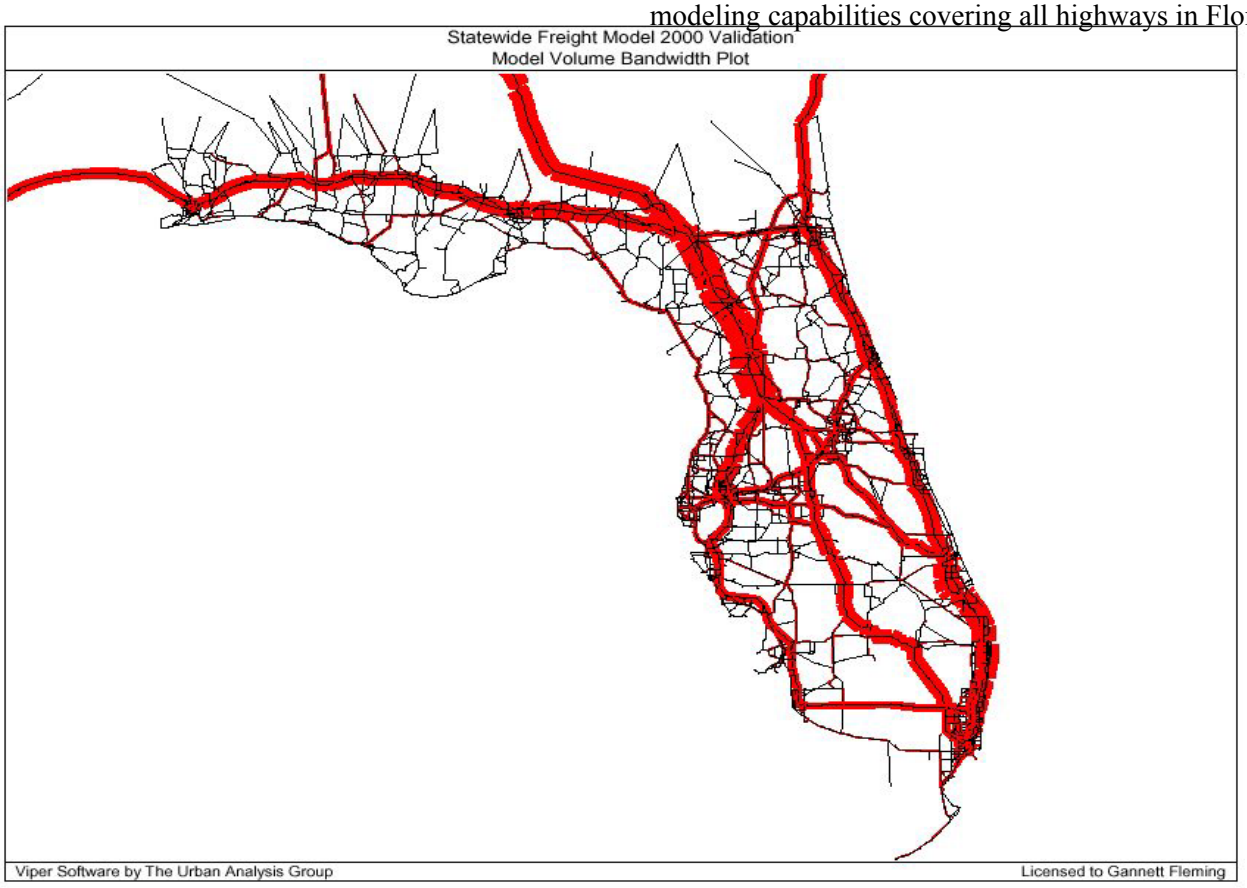
Statewide Freight Model Completed! *Continued*

The share of freight between origins and destinations which travels by truck, rail, water and air modes is estimated by an incremental mode split equation which uses the existing modal shares as identified in the TRANSEARCH database modified by the change in utility of truck and rail from the base conditions. This utility considers the distance, time and cost traveled between zones by rail and truck. While the tonnage shipped by each mode is output to a table, only the truck table is carried further for analysis. The table of truck tonnage is converted to daily trucks based on payload factors of tons per truck developed from the Vehicle Inventory and Usage Survey for Florida. Those conversion factors, which account for average loads including the distance a truck travels empty, vary by commodity group and distance traveled. The mode split and truck trip conversion equations were implemented in a special FSUTMS program that uses standard FSUTMS files in addition to the freight-specific constants.

As the final step in forecasting truck volumes, the truck trip table is assigned to a modified version of the statewide highway network. That network retained the external stations used to load passenger car trips, supplemented by a national truck highway network that connects to the Florida network at the Florida border. The assignment of truck trips used the standard FSUTMS routines, modified to preload truck volumes based on all-or-nothing congested times from a previous passenger car assignment. In this manner, combined freight truck and passenger car volumes can be forecast. A band-width plot of the resulting daily truck volumes is shown in the figure below.

This process of forecasting freight truck volumes was validated against observed heavy truck volumes on major intercity highways. On these roads, away from urban truck activity centers, freight trucks should represent the majority of truck traffic. The truck model was found to match observed truck volumes very well. The ratio of assigned freight truck volumes to the total of observed truck volumes was 1.0. The Root Mean Square Error (RSME) for the truck forecasts is 34 percent for all intercity freeways and 18 percent for freeways with over 5,000 truck AADT. These values compare very favorably with the assignment validations obtained from urban models.

With the completion of the freight model Florida has a tool that can forecast intercity freight truck volumes in response to changes in the economy, changes in modal operating costs, changes in the demand at ports and airports, and changes in the highway network. The information in the model provides forecasts for truck volumes passing through the external boundaries of the urban and regional models. This can be used to produce better estimates of external-external and external-internal truck trips. Upon completion of parallel efforts by FDOT to provide guidance for urban freight and truck modeling, Florida will have state-of-the-practice freight modeling capabilities covering all highways in Florida.



Modeling Workshops

The Basic FSUTMS Workshop gives participants an overview of the transportation planning process, travel demand forecasting methodologies, and FSUTMS modules and file formats. Participants will learn to install and execute FSUTMS, interpret the output results, create standard plots, and execute the Visual Planning Environment (VIPER) software. An overview of the GIS-TM (GIS for Transportation Modeling) software is also included.

April 8 - 12, 2002
Hilton Hotel Tampa Airport Westshore
2225 Lois Avenue, Tampa, Fl 33607
Phone: (813) 877-6688 or (800) Hiltons
Room Rate: $89 Per Night
Start at 1:00 PM Monday (4/8) & End at 12:00 PM Friday (4/12)

The **GIS-TM Workshop** will teach the basic functionalities of GIS-TM, including: Conversions from FSUTMS to ARCVIEW environments of loaded and unloaded networks, ZDATA files, Toll links, TCARDS, transit optional links, transit walk access zones, and transit station and production/ attraction files, all of which may be displayed as GIS layers. Editing spatial and attribute data for the highway and transit layers using GIS-TM tools, and then exporting back to FSUTMS format. Compare highway/transit networks or ZDATA files and to identify differences in attributes. Learn the Level of Service calculator, customize GIS-TM for the individual model, manage data and utilize Florida Geographic Data library (FGDL) along with the GIS-TM for transportation planning applications.

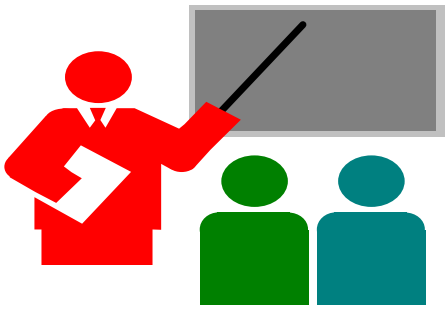
April 22 - 25, 2001
Embassy Suites Boca Raton
661 NW 53rd St, Boca Raton, Fl 33487
Phone: (561) 994-8200 or (800) Embassy
Room Rate: $70 Per Night
Start at 1:00 PM Monday (4/22) & End at 12:00 PM Thursday (4/25)

The **Freight Modeling Workshop** discusses the incorporation of freight and goods movement in the modeling process and FSUTMS freight modeling techniques. The workshop teaches the structure of the Florida Statewide Highway Freight Model and a generalized methodology for urban truck models. These applications have been specifically designed for Florida areas and produce truck trip tables that can be included as part of regional or urban models. A national perspective on freight modeling will also be presented by representatives from the Federal Highway Administration.

May 6-8, 2002
Hilton Daytona Beach Oceanfront Resort
2637 S. Atlantic Avenue, Daytona Beach, Florida 32118
Phone: (386) 767-7350
Room Rate: $80 Per Night
Start at 1:00 PM Monday (5/6) & End at 12:00 PM Wednesday (5/8)

The **Land Use Modeling Workshop** provides an overview of land use models used in Florida and detailed instructions on the Urban Land use Allocation Model (ULAM). Hands-on exercises using ULAM allow attendees to learn how to prepare input files, execute the model, and interpret model results. The interface of ULAM and GIS databases is also discussed. The developer of the ULAM software is invited to teach this workshop.

May 20 – 21, 2002 Basic Land Use Workshop
May 22, 2002 Advanced Land Use Workshop
Embassy Suites Boca Raton
661 NW 53rd Street, Boca Raton, Florida 33487
Phone: (561) 994-8200 or (800) Embassy
Room Rate: $70 Per Night
Start at 8:30 AM Monday (5/20) & End at 4:30 PM Wednesday (5/22)



The **Fundamentals of FSUTMS Transit Modeling Workshop** is designed for professionals with highway modeling experience but little experience in transit modeling. Discussions on transit modeling terminology, transit network building, transit path building, transit assignment, and transit evaluation are included. The workshop also provides details on the mode choice routine for single-path transit models and a review of the control files, parameters, options, reports, and report interpretation for FSUTMS transit modules. A Guest Modeler with extensive transit modeling experience is invited to help prepare and teach this workshop.

June 3-6, 2002
Homewood Suites
8745 International Drive, Orlando, Florida 32819
Phone: (407) 248-2232
Room Rate: $85 Per Night
Start at 1:00 PM Monday (6/3) & End at 12:00 PM Thursday (6/6)

Registration can be completed on-line at: www11.myflorida.com/planning/systems/stm/training/training.htm

For further information please contact Huiwei Shen at :
Email: Huiwei.Shen@dot.state.fl.us
or Systems Planning Office, MS 19
605 Suwannee Street
Tallahassee, Florida 32399-0450
(850) 414-4911, SC 994-4911
FAX (850) 921-6361

Metroplan Orlando completes monumental task: developing a land use allocation model for creating socioeconomic data

By Craig Batstone, GIS Manager, Senior Associate, Canin Associates

The Orlando metropolitan area (Seminole, Orange and Osceola Counties) is one of the most dynamic growth areas in the United States and has roughly doubled in size over a 20- to 25-year period. Determining current and future traffic needs for the Orlando metropolitan area has been, and continues to be, a complex task involving multi-jurisdictional entities with independent and often uncoordinated growth management programs.

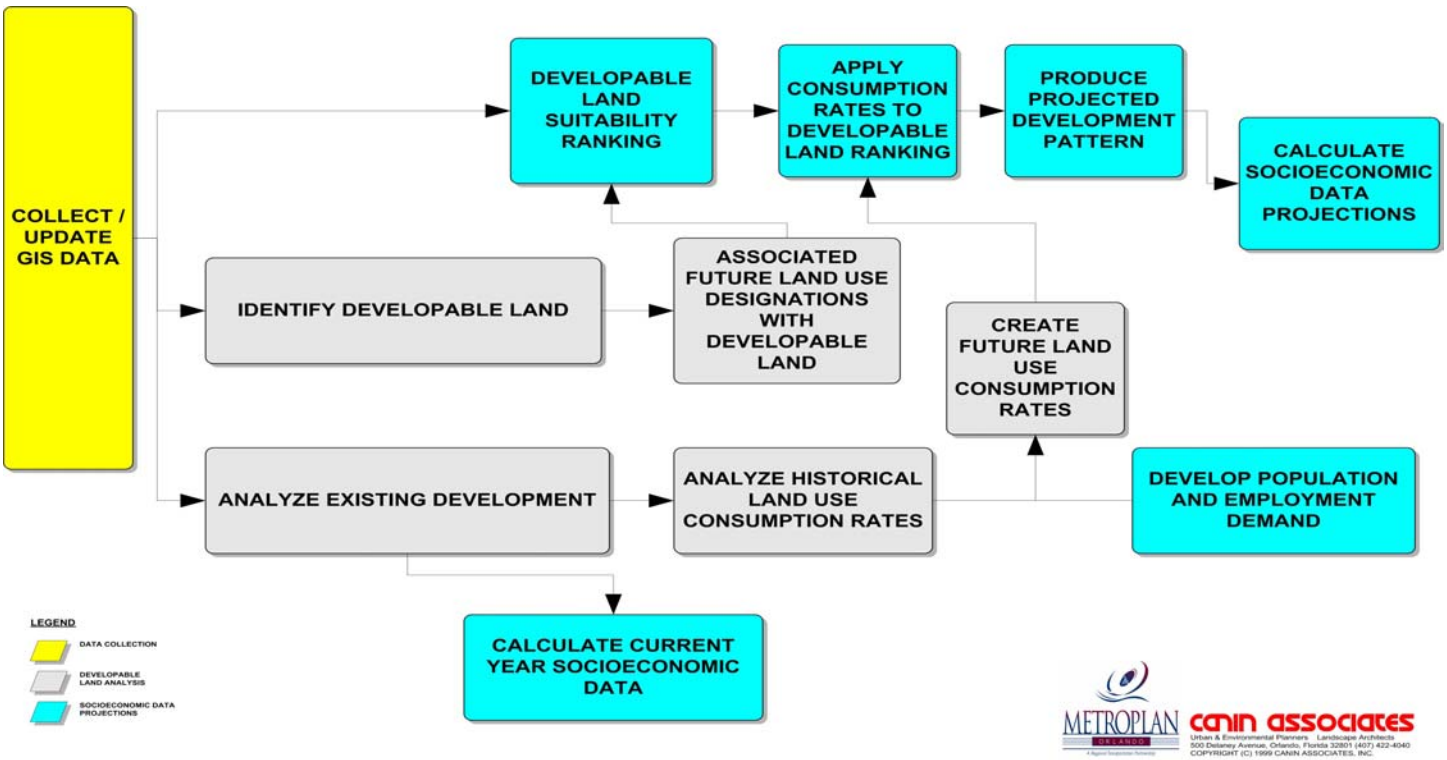
The process of developing socioeconomic data projections for traffic modeling has traditionally been accomplished through a top-down methodology, where control totals are created for a county and then disaggregated down to individual traffic analysis zones. Metroplan Orlando and Canin Associates have developed an application, built on ESRI's Arc/Info, ESRI's MapObjects, and Microsoft's Visual Basic, that will analyze existing and future land uses at the parcel level to generate socioeconomic data projections. The application has several modules that perform tasks such as: Data Update, Analyze Existing Development, Identify Developable Land, Developable Land Suitability Ranking, Projected Growth Pattern, and Socioeconomic Data Calculations.

The development of the data at the traffic analysis zone (TAZ) level projected into the future involves consideration of an extraordinary range of variables. Metroplan Orlando's new modeling process utilizes consensus management to determine planning standards, policy interpretations and highly informed judgments on the direction and form that development patterns will take.

GIS decision support for planning had to: include an inventory of available land, be sensitized to the subtleties of timing of development, and recognize the demands and trends of private development. The GIS model also accounts for factors affecting physical feasibility such as utility availability, site conditions, and availability of transportation networks; and was sensitized to the regulatory policies utilized at the local, regional and state levels of government in the growth management process.

The process flow diagram shown below details the GIS data flow for this new approach to Growth Allocation Modeling. The shaded boxes indicate output information.

The table on page 5, lists a summary of the GIS data that was collected from each of the counties. South Florida Water Management District (SFWMD) data was used to supplement some of the Osceola County data. GIS data that was collected from the cities within the counties was incorporated into the county data structure where required. Each of the GIS data layers in the table was utilized to perform a specific analysis function in the development of the socioeconomic data. There are over 700,000 parcels within the study area. Tax parcels were used to create Existing Land Use layers for each county. The Existing Land Use data identified the type of development that is currently associated with each parcel. The Lakes, Wetlands and the



Metroplan Orlando completes monumental task: developing a land use allocation model for creating socioeconomic data *Continued*

DATA REQUIRED	ORANGE COUNTY	SEMINOLE COUNTY	OSCEOLA COUNTY
Tax Parcel Information	X	X	X
Future Land Use	X	X	CA
Existing Land Use	X	X	X
Road Network	X	X	X
Urban Service Area Boundary	X	X	
Lakes	X	X	SFWMD
Wetlands	X	X	SFWMD
100-Year Floodplain	X	X	SFWMD
Utility Sites / Lines	X	X	
Traffic Analysis Zones	X	X	X
County Boundary	X	X	X
Municipal Boundary	X	X	X
Census Data (1990 and 2000)	X	X	X
SFWMD Data	X	X	X

Summary of the GIS data

100-Year Floodplain data were used to identify environmentally constrained areas that will limit future development. The remaining area was considered to be developable. The Future Land Use layer was used to determine the type of development that can be expected in the developable areas. The Road Network, Urban Service Area Boundary, Municipal and County boundaries, as well as current development trends were used as indicators for the future growth scenarios. Traffic analysis zones were used as the summary areas for the socioeconomic data, and census data aided in developing the baseline data. The combination of these GIS data layers formed the basis for the development of the socioeconomic data projections.

The Developable Land Analysis allows the user to Analyze Existing Development and Identify Developable Land through an exclusionary process using Tax Parcel Data and Environmental Constraints. Land that is developed or committed was removed by querying the tax parcel database and the committed land use layers. Environmental constraints such as wetlands, lakes, and the 100-year floodplain were then extracted from the undeveloped land to create a developable land layer. Publicly owned land was also identified because, although it may be developable, these lands are not available during a typical development scenario. The remaining land is vacant developable land.

Parcels with existing development were used to calculate the current year socioeconomic data. Historical land use consumption rates were an important factor in understanding development trends. These consumption rates were calculated by analyzing tax parcel data, future land use designations and developable land.

BEBR data and 2000 Census population totals were used as a starting point in the development of refined population and employment demand numbers. In this process, the demand numbers were broken down into sub-market areas within each county. The sub-market areas were consistent with existing TAZ boundaries, and each sub-market contained several TAZs. The residential and employment sub-markets were developed independent of each other. Population demand numbers were distributed at the sub-market level based on housing development trends, planned development and availability of developable land. Employment forecasts were based on recent leasing activity, recent or planned development, apparent patterns of land acquisition, and evaluations of demand generating factors for non-residential land uses.

Future land use consumption rates were derived from the analysis of historical land use consumption rates and the development of population and employment demand numbers. The association of future land use designations with developable land was accomplished by overlaying local government future land use layers on the developable land layer. This process defined what types of development could occur.

Development of the growth allocation model involved an assessment of the long range planning efforts conducted by each of the local governments. Future land use designations developed at the local planning level impact regional growth patterns. Incorporating local government Comprehensive Plans into this process assists Metroplan Orlando in consensus building with the local governments. Developable land with the future land use designations was then run through a Developable Land Suitability Ranking in order to determine the development potential of each parcel.

The Developable Land Suitability Ranking was achieved by creating development indicators, which were derived from parcel data, utility information, accessibility to existing and

Metroplan Orlando completes monumental task: developing a land use allocation model for creating socioeconomic data *Continued*

planned roads, and other influences. The results of this analysis assisted in creating a **Projected Growth Pattern.** Each future land use designation was ranked separately with respect to those development indicators that provided the most influence. Development indicators can be weighted differently for the various types of development.

The projected development pattern was produced by applying the consumption rates and demand numbers to the developable land ranking. Each of the ZData land uses was projected separately.

Metroplan Orlando plans to develop a World Wide Web (WWW) site to facilitate the exchange of information between Metroplan Orlando and the local governments. This WWW site will house tools that will enable local governments to create and print maps in their own offices. The site will also be used to exchange GIS and Socioeconomic data. Another potential function of the site will be the ability to upload GIS data from the local governments. The implementation of a WWW site at the end of this process should enable all parties to exchange and develop data more freely and cost-effectively.

FSUTMS Users' Group News

The next meeting for the **Northeast Florida Users' Group** is set for Wednesday **May 8, 2002.** The topic will be announced. The users' group meets at the FDOT-District 2 Jacksonville Urban Office-Training Facility. The meeting starts at 2:00 PM and runs until approximately 4:00 PM. For additional information, please contact *Imran Ghani (904)360-5682*

The **Tampa Bay Applications Group** will be holding its next meeting on **May 23, 2002**. The focus of the meeting will be multi-modal planning. This brown bag lunch meeting will be held from 12:00 PM to 2:00 PM at the FDOT-District 7 office. For more information, please contact *Danny Lamb (813) 975-6437*

The **Southwest Florida Users' Group** will be meeting during the month of **May,** the actual date to be announced. The focus of the meeting will be the use and application of the Info USA employment database as well as an overview on the topics discussed at the April Model Task Force meeting. The meeting will be held at the Charlotte County Airport (2800 A-6 Airport Rd., Punta Gorda, FL). For additional information about the group, please contact *Jim Baxter (863) 519-2562*

The **Central Florida Users' Group** has scheduled its next meeting on **April 4th** from 2:00 PM - 4:00 PM at FDOT District 5 Urban Office. For additional information about the group, please contact *John Zielinski (407) 482-7868*

The **Southeast Florida Users' Group** has scheduled their next meeting on **Tuesday, May 28, 2002**. The Miami Downtown Transportation Master Plan will be presented at the meeting. The time of the meeting has been tentatively set at 10:30 AM. at the FDOT-District 4 office . For additional information, please contact *Shi-Chiang Li (954) 777-4655*

Florida Transportation Modeling is published under contract to the FDOT Systems Planning Office in Tallahassee. All information and materials contained in the newsletter are contributed by FSUTMS users and Model Task Force members. Please contact the editors to submit articles for future issues or to get on the mailing list.

Coeditor: Jeanette F. Berk
Advanced Planning, Inc.
52 Saint Augustine Blvd.
Saint Augustine, Florida 32080
(904) 823-8982, FAX (904) 823-8953
api@aug.com

Coeditor: Terrence Corkery, AICP
FDOT Systems Planning Office
605 Suwannee Street, Mail Station 19
Tallahassee, Florida 32399-0450
(850) 414-4903, FAX (850) 921-6361
terrence.corkery@dot.state.fl.us