

Enhancements to the Tampa Bay Regional Planning Model

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**INTRODUCTION AND HISTORY OF
MODELING IN THE TAMPA BAY
AREA AND FLORIDA**

What is FSUTMS?

- **Florida Standard Urban Transportation Model Structure**
 - computerized transportation planning model package
 - developed by the Florida Department of Transportation
 - used by all 26 Metropolitan Planning Organizations (MPOs), FDOT Districts and other planning agencies in Florida.
- **Allows planners to perform analyses of multi-modal transportation systems**

History of FSUTMS

- **First version - 1978**
 - Built around Urban Transportation Planning System (UTPS)
 - Distributed by the Federal Highway Administration and the Urban Mass Transit Administration (FHWA / UMTA).
- **Second version – 1985**
 - Built around TranPlan
 - Distributed by Urban Analysis Group and later Citilabs.
- **The current FSUTMS under development is**
 - Powered by Cube
 - Distributed by Citilabs

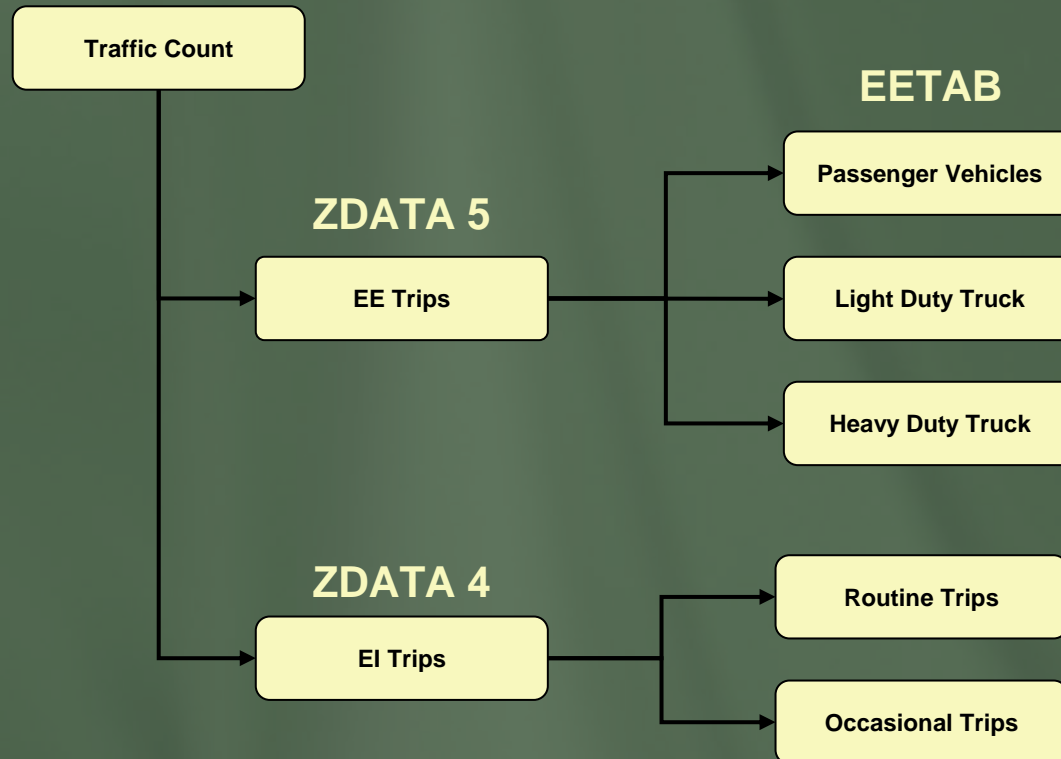
TBRPM Supporting Travel Characteristic Surveys

- **Household surveys (1991, 1996, and 2000)**
- **Cordon line surveys (1991, 1996 and 2003)**
- **Rest area survey (1996)**
- **Truck attraction survey (1991)**
- **Seasonal resident surveys (1996 and 2000)**
- **Trip attraction surveys (1997 and 2000)**
- **Taxi survey (1991)**
- **Hotel/Motel surveys (1991 and 2000)**
- **Employer survey (2000)**
- **Employee survey (2000)**

TBRPM Enhancements

- Enhanced External Zone Processing
- New Lifestyle Trip Generation
- Refined Employment Type Definitions
- New Area Type Model
- Refined Trip Attraction Equations
- Refined Trip Purposes
- 1st to Use Two Digit Highway Facility Types
- Use of Highway / Transit CPI for Distribution
- Refined Mode Choice to Five Purposes
- Separate Truck Assignment
- Special Truck Speed Delay Curves

TBRPM External Zone Processing



TBRPM External Zone Processing



- After EE trips, the rest of External Trips are converted to EI person and vehicle trips in Trip Generation
- EI Person Trips are mixed with Internal Zonal Trips
- Vehicle Trips go straight through to Assignment

TBRPM Trip Generation Enhancements

- **New Lifestyle Trip Generation**
- **Refined Employment Type Definitions**
- **New Area Type Model**
- **Refined Trip Attraction Equations**
- **Refined Trip Purposes**

FSUTMS Standard Trip Generation

- **Households are stratified by**
 - Dwelling unit type
 - Household size
 - Auto ownership
- **These account for variation in household trip production rates**

FSUTMS Standard Trip Generation

- **Estimates the same number of work trips for a household of only retirees and a household with workers**
- **When this is applied to zones dominated by retired residents, models may grossly overestimate the total work trips**
- **Does not account for travel behavior of seasonal residents**
- **Does not account for home-based school trips**

TBRPM Lifestyle Trip Generation Model

- **All occupied dwelling units have been classified into four categories based upon lifestyle characteristics of their residents**
 - **Retired Households**
 - **Working Households with No Children**
 - **Working Households with Children**
 - **Seasonal Households**

TBRPM Lifestyle Trip Generation Model

- **Hotels are classified based on characteristics of occupants as well as available amenities**
 - **Resort Hotels / Motels**
 - **Business Hotels / Motels**
 - **Economy Hotels / Motels**

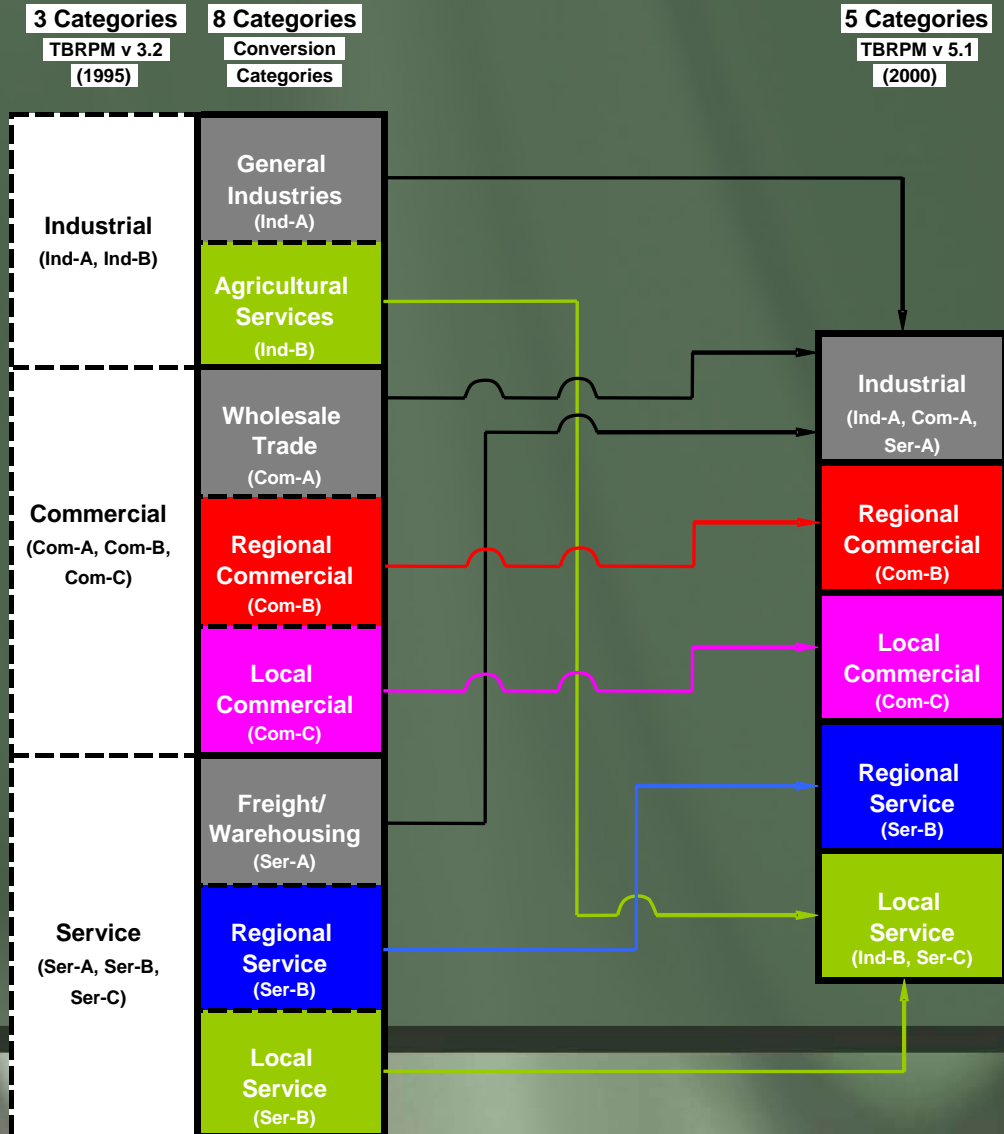
TBRPM Trip Attraction Model

- **Refinement of Trip Attraction Rates Based on 2000 West Central Florida Trip Attraction Survey**
- **Explanatory variables for trip attraction rates**
 - **Employment type based on SIC code or business type**
 - **Area type and other measures of land use density / intensity**
 - **Freestanding versus non-freestanding structure type**
 - **Available mode choices (including pedestrian and bicycle)**
 - **Distance travelers are willing to go to satisfy different types of needs**

TBRPM Trip Attraction Model

- **Two New Concepts Incorporated Into the Trip Attraction Modeling Process**
 - **Employment Type Definition Changes**
 - **Area Type**

Enhanced Employment Type Definitions



Enhanced Employment Type Definitions

- Industrial
 - Agriculture, Mining and Extraction, Construction, Manufacturing, Freight and Warehousing, Wholesale Trade
- Regional Commercial
 - Comparative Retail
- Local Commercial
 - Convenience Retail
- Regional Service
 - Air Transport, Office / Professional, Health, Government, Hotels, Others
- Local Service
 - Postal, Banking, Personal, Educational, Private Households

Why do we need an Area Type Model?

- Regional modeling highlights unexplained variations in trip attraction potential
- Patchwork of “fixes”, no overall solution

Area Type Model Hypotheses

- **Area Type May Play a Role in Trip Attraction Potential**
- **Area Type Is Characterized**
 - Intensity of development
 - Density of development
 - Mix of land uses

Area Types

- **CBDs**
- **Major Outlying Business Centers**
- **Suburban**
- **Suburban Fringe**
- **Rural**

Trip Attraction & Area Type Conceptual Frameworks



Cow Continuum

Mostly Cows

No Cows

Rural

Fringe

Suburban

Urban

CBD



Commercial

Balance

CBD

Urban

Suburban

Fringe

Rural

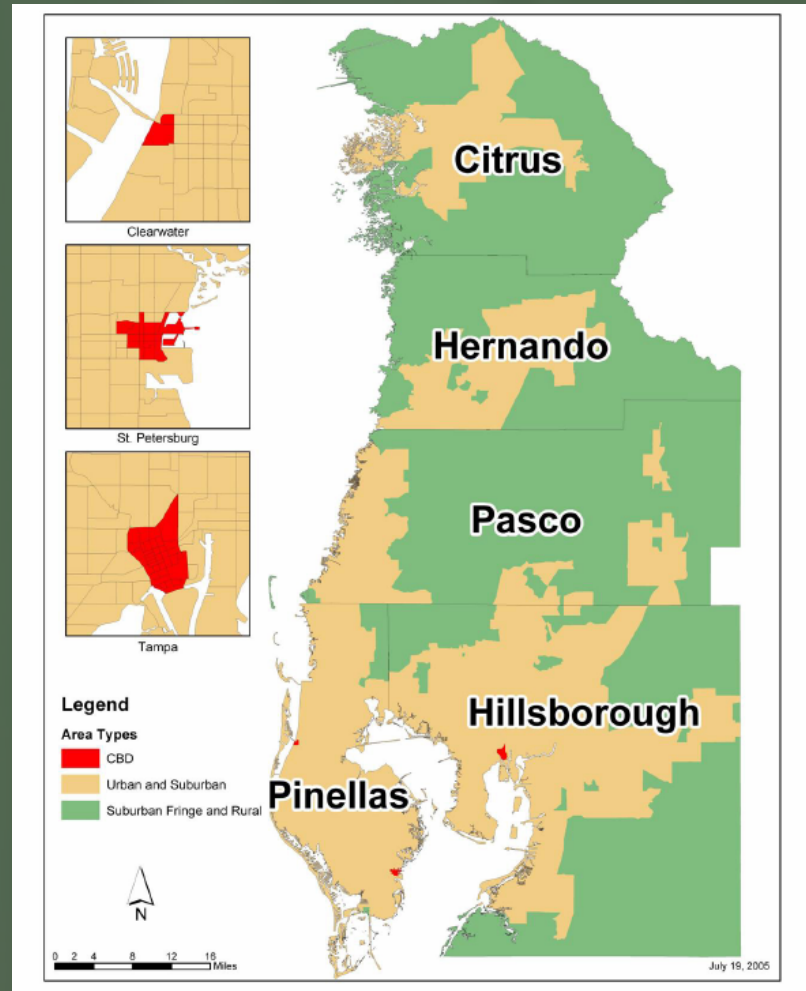
Agricultural / Vacant

3 corners are one
intense use

Residential



TBRPM Area Types



TBRPM Area Type Model – Conclusions

- **A Quantifiable Method of Determining Area Type**
 - Requiring only a relatively few, readily available variables
 - Relying on a simple and easily interpreted Discriminant Analysis technique
- **Improved Model Performance**
 - Fewer special generators
 - Better validation in sub-areas, particularly CBDs
- **Readily transferable to other urban areas**

TBRPM GEN Refined Trip Purposes

| TBRPM | FSUTMS |
|------------------------------|------------------------------|
| Home-based Work | Home-based Work |
| Home-based Shopping | Home-based Shopping |
| Home-based Social-Recreation | Home-based Social-Recreation |
| Home-based School | Home-based Other |
| Home-based Other | |
| Airport | |
| College / University | |
| Non Home-based Work | Non Home-based |
| Non Home-based Other | |
| Light Truck | TRUCK/TAXI |
| Heavy Truck | |
| Taxi | |
| EI | EI |

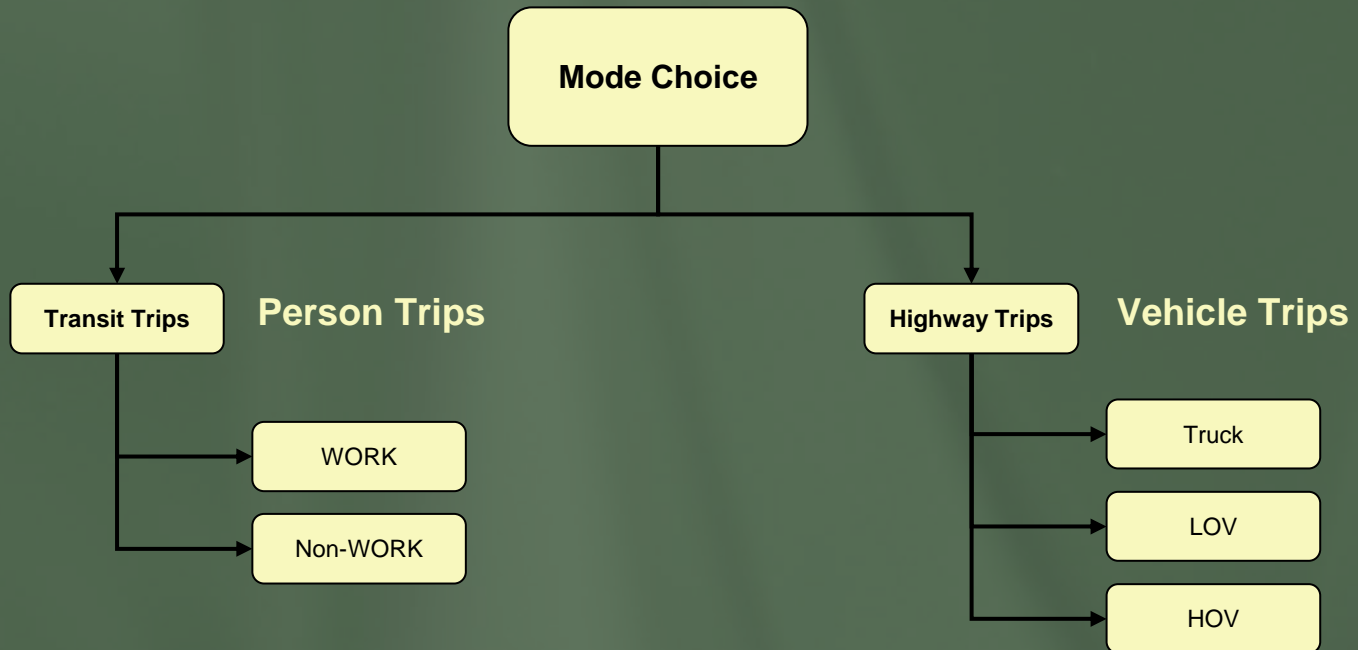
TBRPM HNET Enhancements

- **FSUTMS historically used single digit facility type definitions**
- **TAMPA BAY RTA First in Florida to Develop Two Digit Highway Facility Types**
 - Provides for a greater variation in link speeds
 - Better reflects capacity values recommended in FDOT's Level-of-Service (LOS) Manual

TBRPM DISTRIB Enhancements

- **Use of Composite Impedance (CPI)**
- **Impedance is the Measure of the spatial separation between zones by several variables**
 - congested travel time
 - travel cost
 - other measures
- **CPI properly account for the availability and influence of transportation modes**
 - Highway
 - bus transit
 - future guideway transit

RTA Trip Assignment



- Standard FSUTMS Highway Assignment is by LOV and HOV only
- RTA splits out and tracks the Truck Assignment separately
- Transit Trips are assigned by Work and Non-Work Networks

TBRPM Truck Speed-Flow Relationships

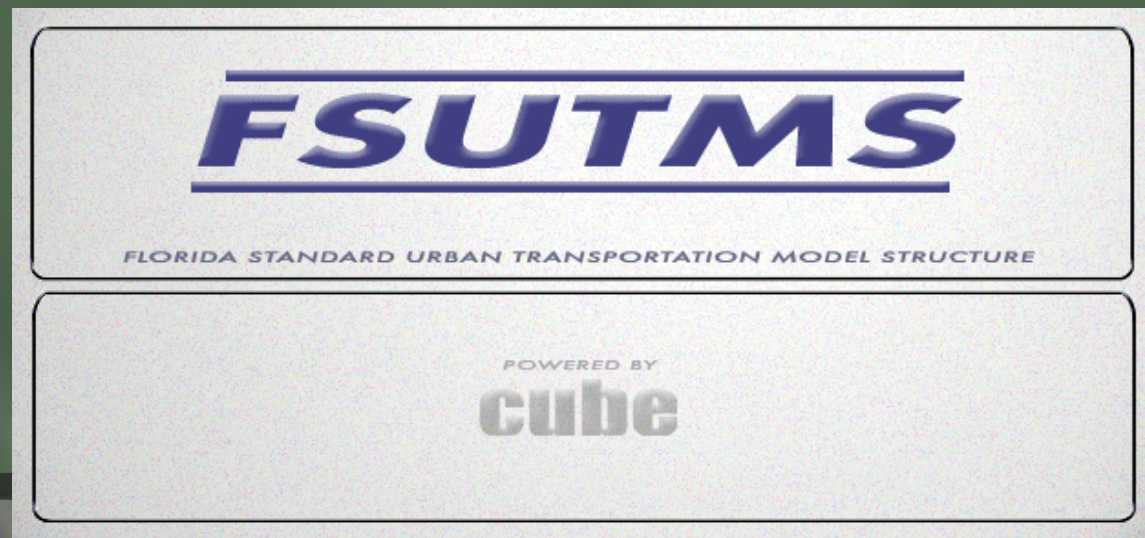
- The traditional BPR (Bureau of Public Road) function representing the speed-flow relationships for roadway facilities was modified to specifically include the impacts of trucks
- A number of new speed-flow curves have been developed based on CORSIM simulation results for freeways and urban arterials

TBRPM Development

- **Conversion to Cube Voyager**
- **Land Use Allocation Model**
- **Activity Based Modeling**

CUBE Conversion

- October 2004, Model Task Force Adopted CUBE as new FSUTMS Software Engine
- Conversion of TBRPM to CUBE Voyager Is a 2 Step Process
 - 1. Convert TBRPM to CUBE TRANPLAN (Existing)
 - 2. Convert TBRPM to CUBE VOYAGER



Future Directions

- **Land Use Allocation Model**
 - DELTA-SIM
- **Activity Based Modeling**

Questions ?

