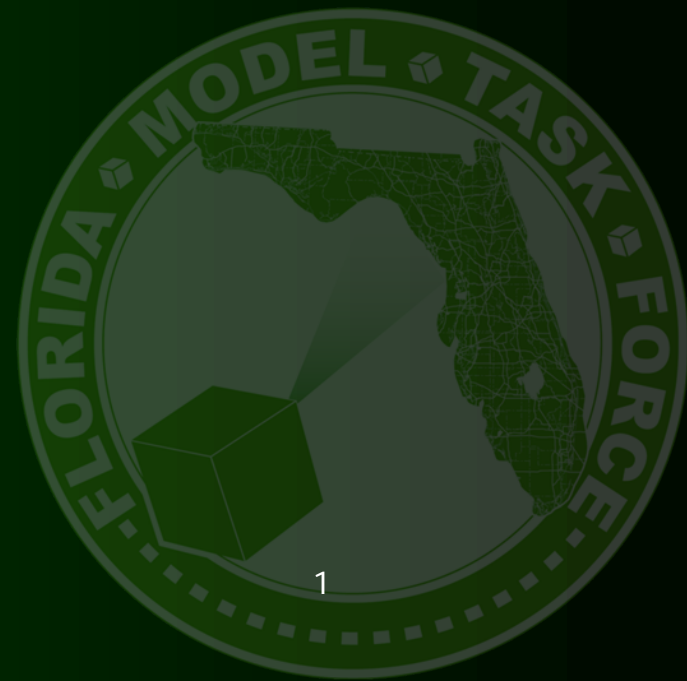# Trip Generation Review and Recommendations

presented to
MTF Model Advancement Committee

presented by
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Purpose

- **Review trip generation procedures**

- **Recommend changes and improvements**

- **While several districts and MPOs have implemented model variations, there have been few changes in the standard model since the mainframe days**

Previous FSUTMS Work Specific to Trip Generation

- *New FSUTMS Framework*, a report prepared by AECOM for the Florida Department of Transportation, Systems Planning Office, August 21st, 2008.

- *FSUTMS New Standards And Enhancements – A User Oriented Approach*, A Florida Model Task Force White Paper, Systems Planning Office, Florida Department of Transportation, Tallahassee, FL, January 2006

- *FSUTMS-Cube Framework Phase I: Transferable Model Parameters and FSUTMS-Cube Framework Phase II: Model Calibration and Validation Standards*, reports prepared by Cambridge Systematics, Inc., for the Florida Department of Transportation, Systems Planning Office, 2007, 2008.

Recommendations

- **Use Voyager GENERATION and MATRIX for new or revised models.**

- **Continue to use daily trip generation models unless sufficient data to estimate period-specific models are available.**

- **Continue using cross-classification models for productions and rate models for attractions.**

- **Estimate the models locally from survey or NHTS data.**

Recommendations (continued)

- **Add an income variable. Models in larger urbanized areas should consider segmenting the HBW trip purpose by income level. This will allow the distribution model to distribute workers from higher income households to higher income jobs.**

- **Subarea balancing should be allowed, but if there are clear reasons.**

- **New models should consider the use of an area type variable in trip generation.**

Recommendations (continued)

- Some new trip purposes should be added, requiring realignment of others.

- Some changes in production and attraction variables are recommended.

- Special generators should be retained, but omitted from balancing.

- The external trip purposes should contain independent E-I and I-E purposes as well as E-E.

Subarea Balancing

This issue impacts both trip generation and trip distribution. Subarea balancing should be applied very carefully, only when it is needed, and only when a clear reason can be identified. Assumptions for subarea districting should be documented (compared against travel surveys, CTPP, etc.). Nevertheless, subarea balancing should be available in the standard FSUTMS framework. Different subsets should be allowed for each trip purpose.

Area Type Variable

The generation model should include area type in the trip attraction equations as a zonal variable. Furthermore, the model should include a dynamic method for estimating area type so that its value will change between base and future years. The impact of area type on attractions, by purpose, should be determined from local origin-destination survey data. In the absence of such data, or confidence that data can be borrowed from another similar area, use of area type in trip generation should be omitted. Thus, the model should allow the area type feature to be turned off if area type is not used.

Trip Purposes

- Home-based work (HBW), in larger urbanized areas stratified by income.
- HBSH (shopping).
- HBSR (social-recreational).
- Home-based school, with possible stratifications by public/private, and by grade school, middle school, high school, and university consistent with local conditions. Furthermore, using student assignment districts to assign public school trips should be considered.
- Nonwork Airport.
- HBO (other).
- NHBW (nonhome-based work-oriented).
- NHBO (nonhome-based other).
- Commercial vehicles.
- Medium and heavy trucks.

New   Modified

Zonal Data Variables (Productions)

- Add **income** as a zonal variable.

- Add a children/no-children stratification.

- Drop the single-family/multi-family stratification.

- Auto ownership should be replaced by an auto ownership model derived from **income**, accessibility, and other variables.

- Use the number of workers in the household in the estimation of HBW productions

Zonal Data Variables (Attractions)

- **Realign employment variables**
  - **Manufacturing Industrial (NAICS 22, 31-33, 42, 48-49)**
  - **Other industrial (NAICS 11, 21, 23)**
  - **Commercial (retail trade) (NAICS 44-45)**
  - **Service (NAICS 52, 53, 51, 81, 99)**
  - **Total (NAICS 11-99)**

- **School variables**
  - **Enrollment (K-12, University)**
  - **Assignment Districts**

- **Airport enplanements (FAA)**

Special Generators

- **Keep existing FSUTMS process with small modification:**

- **Exclude production and attraction special generators from the Production – Attraction balancing process.**

External Trips

- **Estimate E-I productions at external stations (exogenous).**

- **Estimate E-I attractions for each internal TAZ from attraction data, balance E-I productions to the attractions.**

- **Estimate I-E productions for each internal TAZ from household data.**

- **Estimate I-E attractions for external stations, balance to match I-E productions.**

- **E-E trips at each external station from estimated station volumes, roadside travel surveys, minus the E-I and I-E trips.**