1. Palm Beach County STOPS Model Development
2. Visualization of STOPS Forecasts using R
PART 1

Palm Beach County STOPS Model Development
What is STOPS?

STOPS is a simplified implementation of the conventional four-step travel demand model.

It is a tool developed by FTA to quantify travel demand measures used to evaluate and rate Capital Investment Grant (CIG) projects.

However, it is being used beyond its primary purpose to supplement ridership estimation for a variety of needs – transit corridor studies, service planning efforts, system planning studies, etc.
Introduction

Motivation
Florida Department of Transportation (FDOT) District 4 to develop a Simplified Trips on Project Software (STOPS) model for Palm Beach County.

Assisting in ridership forecasting efforts for the ongoing and forthcoming transit projects in the County.

Characteristics
Utilized STOPS version 2.5 (dated 5/23/2018)

Model base year: 2015

Calibration report soon-to-be available (supplements FTA’s STOPS user guide)
Introduction

Characteristics

The model focuses on travel that occurs within Palm Beach County including the Belle Glade area and travel that occurs between Palm Beach and Broward/Miami-Dade counties.

The model represents an average weekday travel in the County.

The incremental approach utilizes the local transit on-board survey data as the basis for representing existing transit travel.
Palm Beach STOPs Model can be applied for:

- **Local and express buses**
  for any fixed-route bus within Palm Beach County

- **Bus rapid transit (BRT)**
  for any fixed guideway projects within Palm Beach County

- **Streetcar, light rail and commuter rail**
  for any fixed guideway projects within Palm Beach County
Key Inputs

1. GTFS
2. MPO Pop / Emp
3. APC Data
4. Transit On - board Surveys

- ACS CTPP Part I, II and III files, Census block boundary files
- ACS TAZ shape file
- Auto skim file
<table>
<thead>
<tr>
<th>Agency/System</th>
<th>Service Pick</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm Tran</td>
<td>2015</td>
<td></td>
</tr>
<tr>
<td>Tri-Rail / shuttles</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>WPB / Delray Trolleys / Boca Shuttles</td>
<td>2018</td>
<td>Manually Coded (simplified coding)</td>
</tr>
<tr>
<td>BCT and MDT</td>
<td>2015</td>
<td></td>
</tr>
</tbody>
</table>

GTFS files also includes all park-and-lots in the region

<table>
<thead>
<tr>
<th>Transit Service</th>
<th>Route Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm Tran Bus</td>
<td>3</td>
</tr>
<tr>
<td>Shuttles</td>
<td>3</td>
</tr>
<tr>
<td>Tri-Rail</td>
<td>2</td>
</tr>
</tbody>
</table>

Proposed BRTs should be coded as Route Type 0 (or 3 in some instances)

0 - Tram, Streetcar, LRT, and (BRT for STOPS)
1 - Subway, Metro
2 - Rail
3 - Bus (short - and long-distance but not BRT in STOPS)
4 - Ferry
5 - Cablecar
6 - Gondola or Suspended Cable Car
7 - Funicular
<table>
<thead>
<tr>
<th>Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 ACS CTTP Year</td>
<td>2010 SERPM 7</td>
</tr>
<tr>
<td>2015 Current Year</td>
<td>2015 SERPM 8</td>
</tr>
<tr>
<td>2040 Horizon Year</td>
<td>2040 SERPM 7</td>
</tr>
</tbody>
</table>

- SERPM 8 TAZ structure
- Palm Beach population and employment data obtained from SERPM 8
<table>
<thead>
<tr>
<th>Agency / System</th>
<th>Availability of stop level data?</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palm Tran</td>
<td>Yes</td>
<td>October 2014 and February 2015 APC data scaled to NTD 2015</td>
</tr>
<tr>
<td>Tri-Rail</td>
<td>Yes</td>
<td>SFRTA's monthly operations reports. Average for April-December 2015 is used to be consistent with reopening of the MIA station in April 2015</td>
</tr>
<tr>
<td>Other Systems</td>
<td>Yes</td>
<td>Not available or needed</td>
</tr>
<tr>
<td>Year</td>
<td>Source</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Palm Tran Surveys</td>
<td>2010 on-board survey utilized for O/D information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2015 on-board survey utilized for county wide targets by purpose, market segment, and transfer rates</td>
<td></td>
</tr>
<tr>
<td>Tri-Rail Surveys</td>
<td>2008 on-board survey utilized for O/D information</td>
<td></td>
</tr>
</tbody>
</table>
29 districts, with smaller districts in corridors with high transit ridership for a more detailed calibration.
Calibration Results

1. Observed and Estimated Transit Boardings
2. Linked Transit Trips by auto-ownership
3. Linked Transit Trips by access mode
4. Linked Transit Trips by route
Calibration Results

Observed and Estimated transit boardings

- Observed:
  - Palm Tran Bus: 36,840
  - Tri-Rail: 7,700
  - Other Buses: 2,950
  - Total: 47,590

- Estimated:
  - Palm Tran Bus: 37,209
  - Tri-Rail: 7,475
  - Other Buses: 2,810
  - Total: 47,594
Linked transit trips by auto ownership

Calibration Results

![Bar chart showing observed and estimated transit trips by auto ownership.

- **Observed**:
  - 0-car: 14,648
  - 1-car: 11,188
  - 2+ car: 10,168

- **Estimated**:
  - 0-car: 14,345
  - 1-car: 11,079
  - 2+ car: 10,056]
Linked transit trips by access mode

Calibration Results

- Observed:
  - Walk: 28,465
  - KNR: 3,791
  - PNR: 3,749

- Estimated:
  - Walk: 27,514
  - KNR: 4,062
  - PNR: 3,903
Calibration Results

Linked transit trips by high ridership routes

<table>
<thead>
<tr>
<th></th>
<th>Observed</th>
<th>Estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route 1</td>
<td>4,417</td>
<td>4,050</td>
</tr>
<tr>
<td>Route 2</td>
<td>5,289</td>
<td>5,498</td>
</tr>
<tr>
<td>Route 3</td>
<td>8,234</td>
<td>8,341</td>
</tr>
</tbody>
</table>
The forecasts developed in these test applications are for demonstration purposes only and should not be utilized as a forecast on the respective projects.
Jupiter Extension Test

Characteristics

- In the existing Tri-Rail service, the northern terminus for all trips is the Mangonia Park station.

- In the proposed test application, half of the trains (25 daily trips) start from Mangonia Park station and the other half (25 daily trips) start from the proposed Toney Penna Station in Jupiter.

- There are five new stations along the Jupiter Extension, all of which are assumed to be park-and-ride stations.

- Details will be available in the calibration report.
Characteristics

- PTX is an enhanced bus/BRT service along the US-1 corridor envisioned in the recent US-1 multimodal corridor study.
- The alternative tested was for a limited stop service between Boynton Beach and Riviera Beach along US-1 using station locations and operating plan from the corridor study.
- Details will be available in the calibration report.
Forecasting with STOPS

**Corridor Related calibration**

- The transit mode or service being evaluated and its potential impact on the default fixed-guideway settings
- Potential refinement of the districts and/or station groups specific to the project corridor
- Potential refinement of the TAZs in the project corridor
- Any major special generators of trips in the project corridor (both existing and future generators) which is not accounted by the transit on-board surveys used in this model

**Alternatives Forecasting**

- Recent service changes and adequacy of the GTFS representation in the project corridor
- No build and build networks, including the project and the background bus changes
- Potential interim and horizon year set up adjustments
PART 2

Visualization of STOPS Forecasts using R
What is it?

- **Rmarkdown** routine that provides a summary of STOPS forecasts
- Reads in STOPS results **PRN** file and generates an interactive **HTML** report
- Customizable for projects using an "**inputs.xlsx**" file