SERPM 8 Model Update Progress

presented to

RTTAC-MS

August 15, 2018

presented by

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Connetics Transportation Group: Sujith Rapolu

Outline

- Status overview

- Network / SE data updates

- Validation update

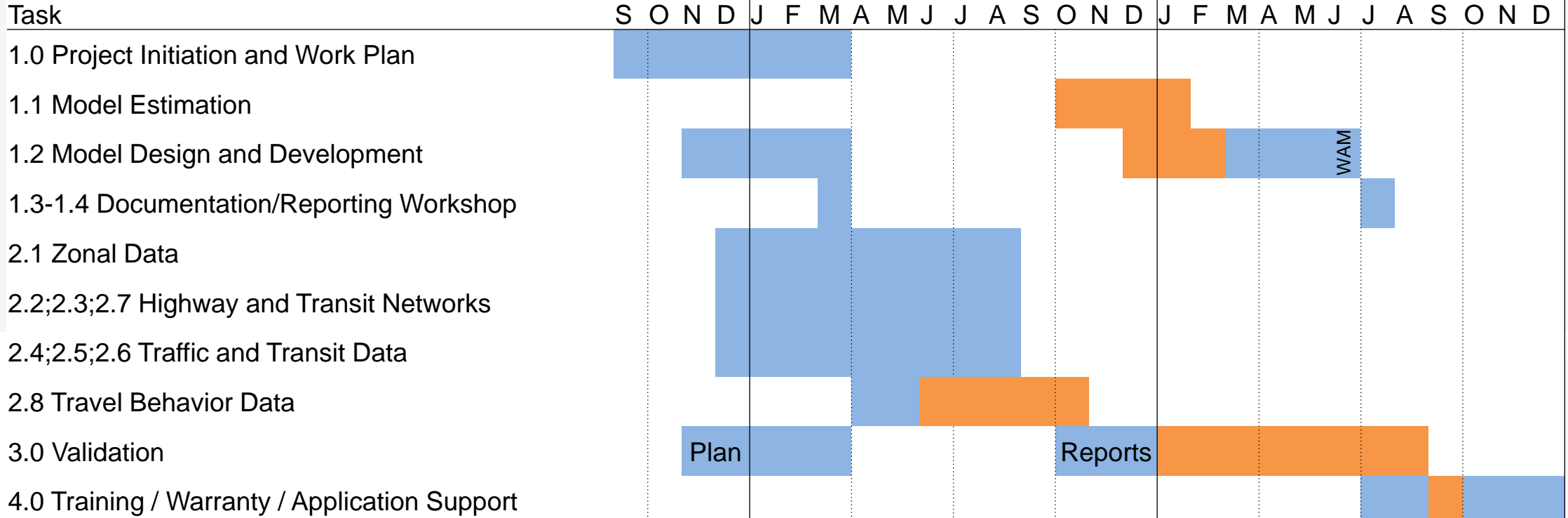- Sensitivity Tests

- Other implementation notes and next steps

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Project status

➤ Input data complete

➤ Model development complete

➤ Model validation in progress

➤ Next steps

» Sensitivity testing
» Model delivery and training

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Project schedule

Validation and delivery schedule

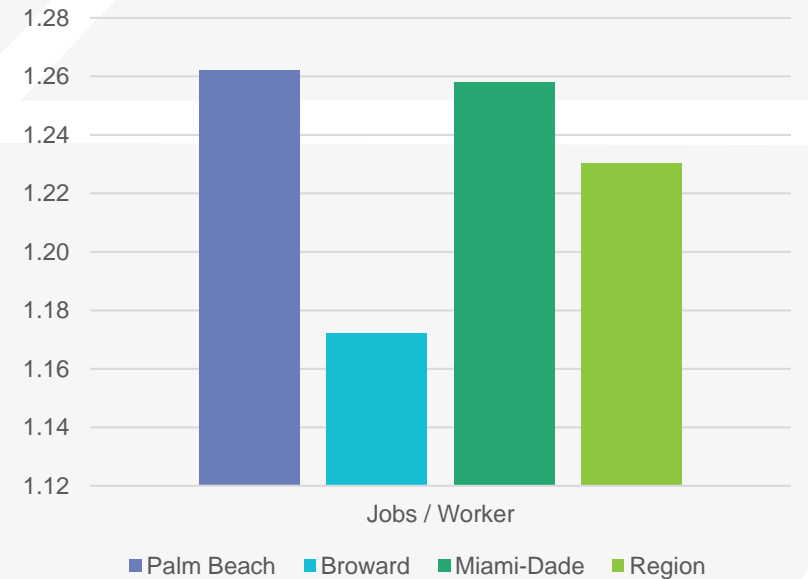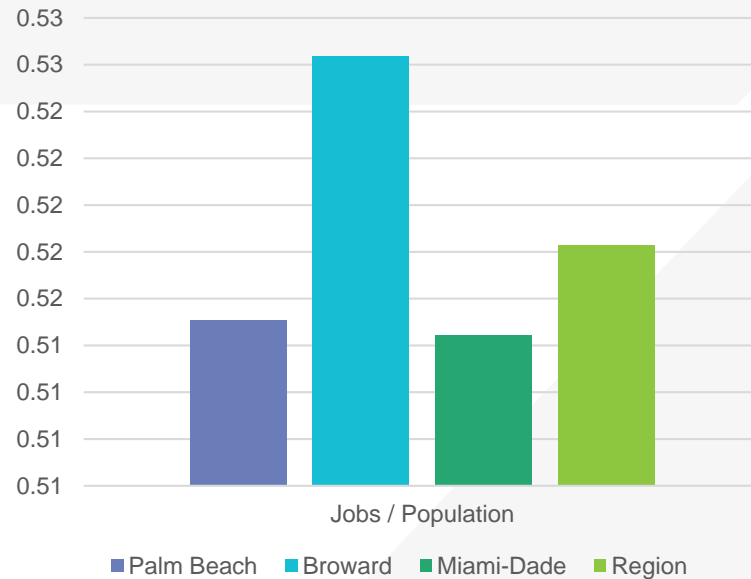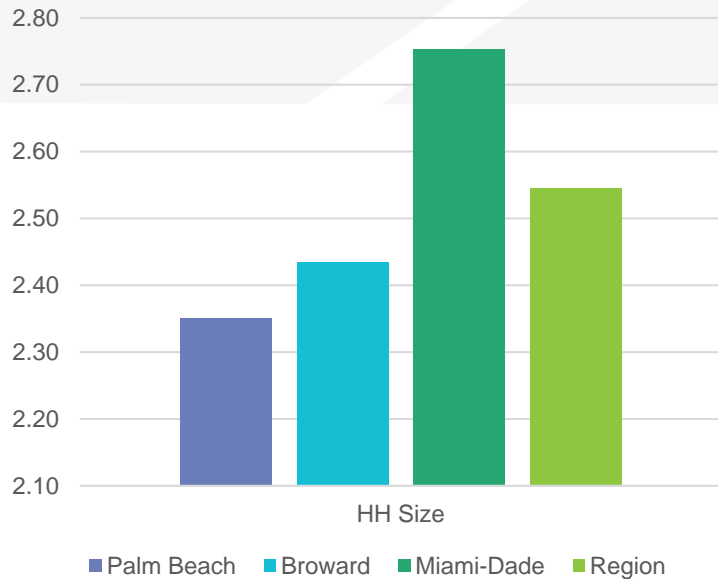| Week ending	Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-O
Countdown to Model Training (RTTAC-MS in Green)	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1
SERPM 8 Validation and Delivery																
Component Validation																
System Validation																
Sensitivity Testing																
Model Delivery																

Input data update request management

➤ Revisions will be applied in a periodic "batch" fashion to maintain focus on implementation and validation

➤ Outstanding requests:

» Networks: SR25, NW 87th Expansion

» SE data: none

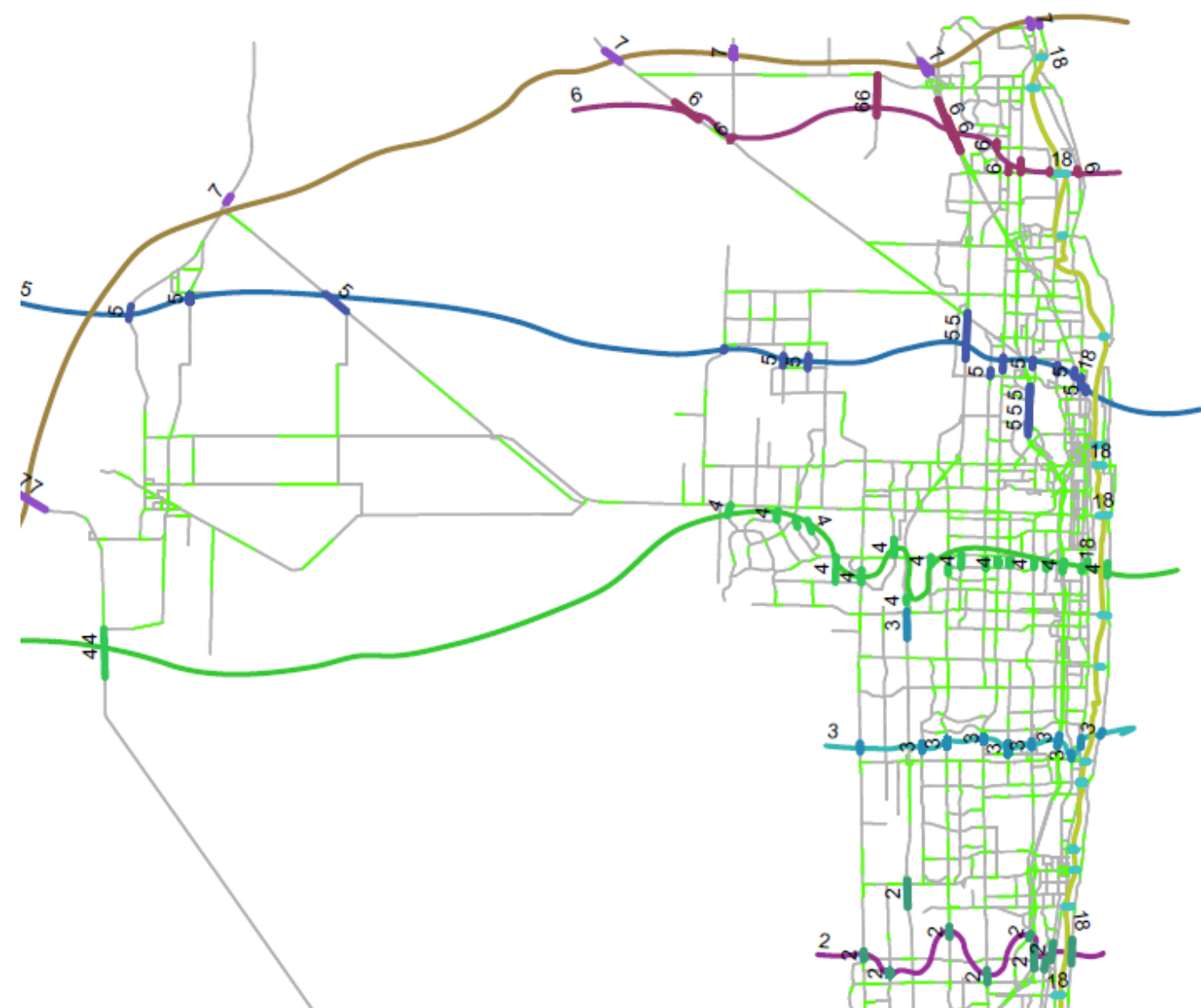» Count data: feedback given as part of screenline review

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SE data summary

County	Households	Population	Workers	Employment
Palm Beach	595,518	1,399,463	571,134	720,801
Broward	750,601	1,826,972	820,285	961,607
Miami-Dade	955,425	2,629,845	1,075,473	1,352,874
Region	**2,301,544**	**5,856,280**	**2,466,892**	**3,035,282**

HH Size

■ Palm Beach ■ Broward ■ Miami-Dade ■ Region

Jobs / Population

■ Palm Beach ■ Broward ■ Miami-Dade ■ Region

Jobs / Worker

■ Palm Beach ■ Broward ■ Miami-Dade ■ Region

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Screen/Cutline review

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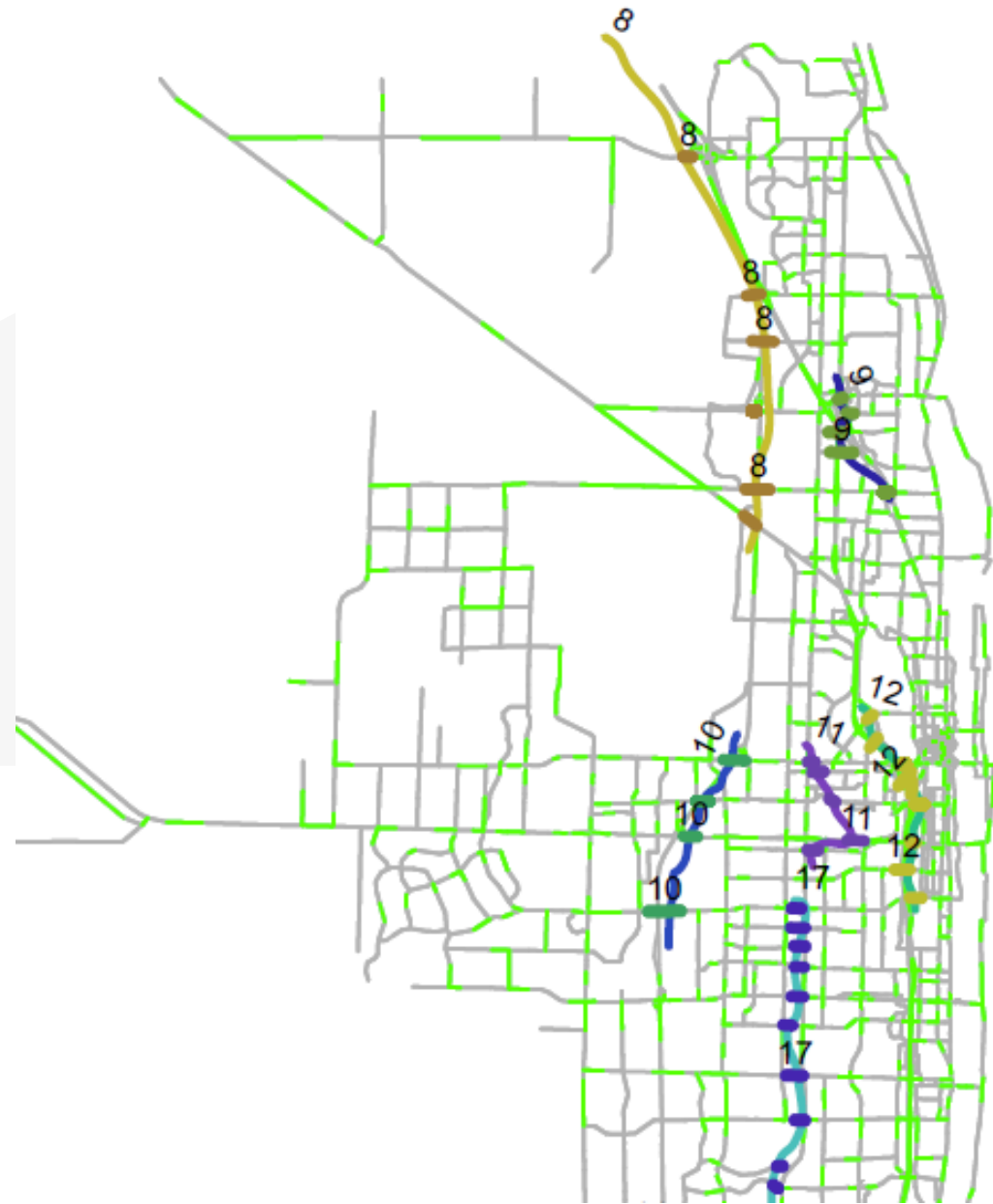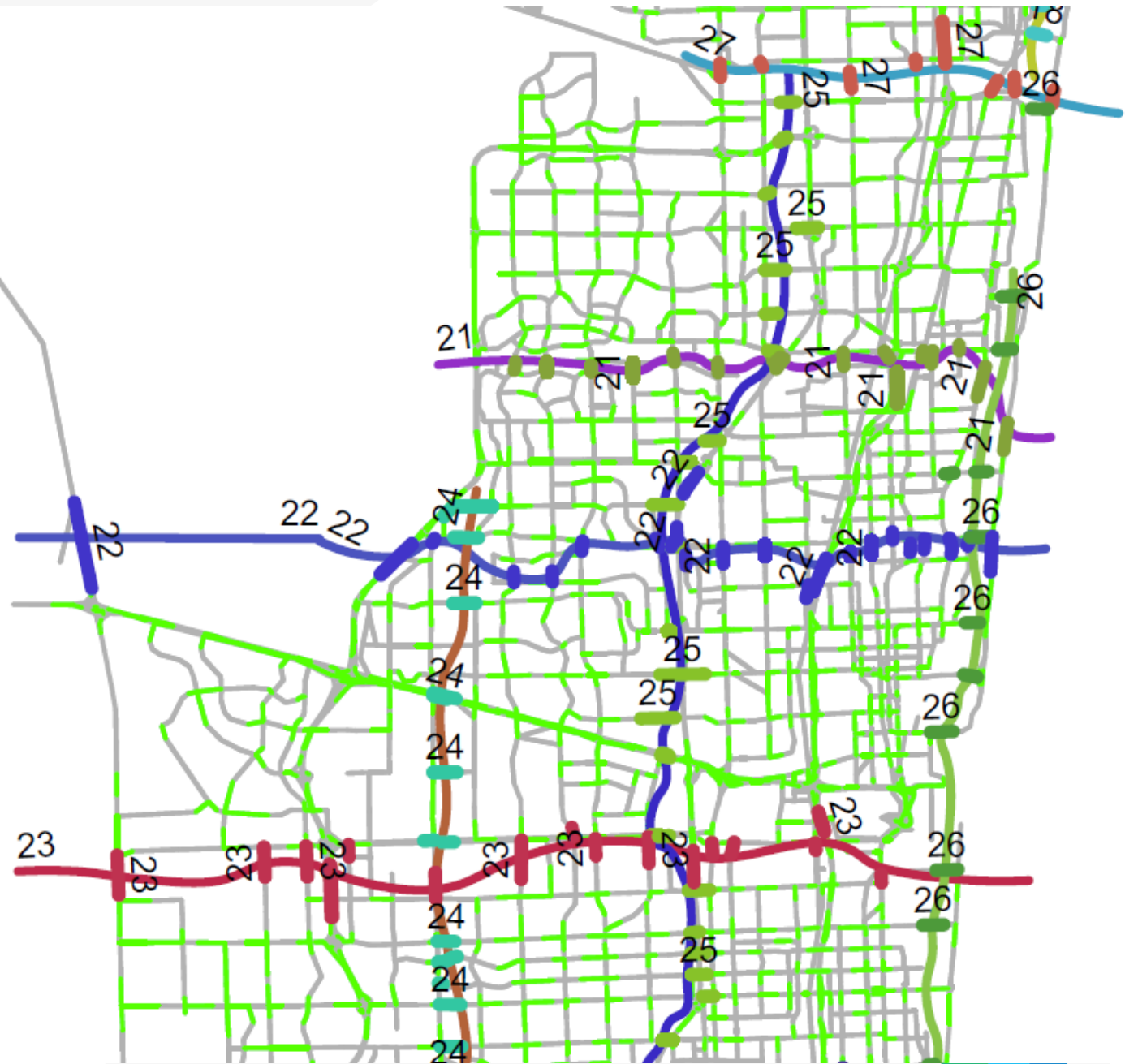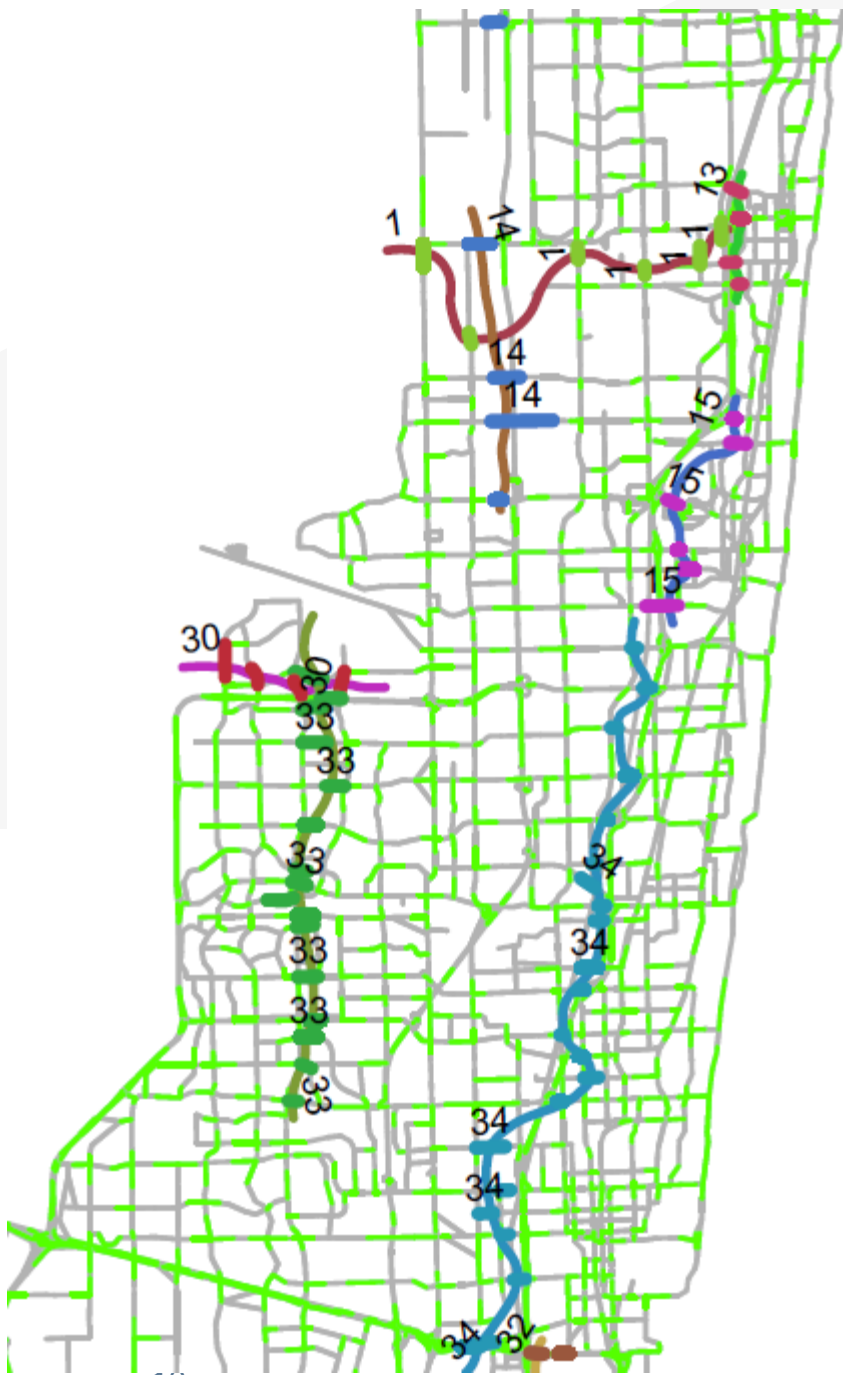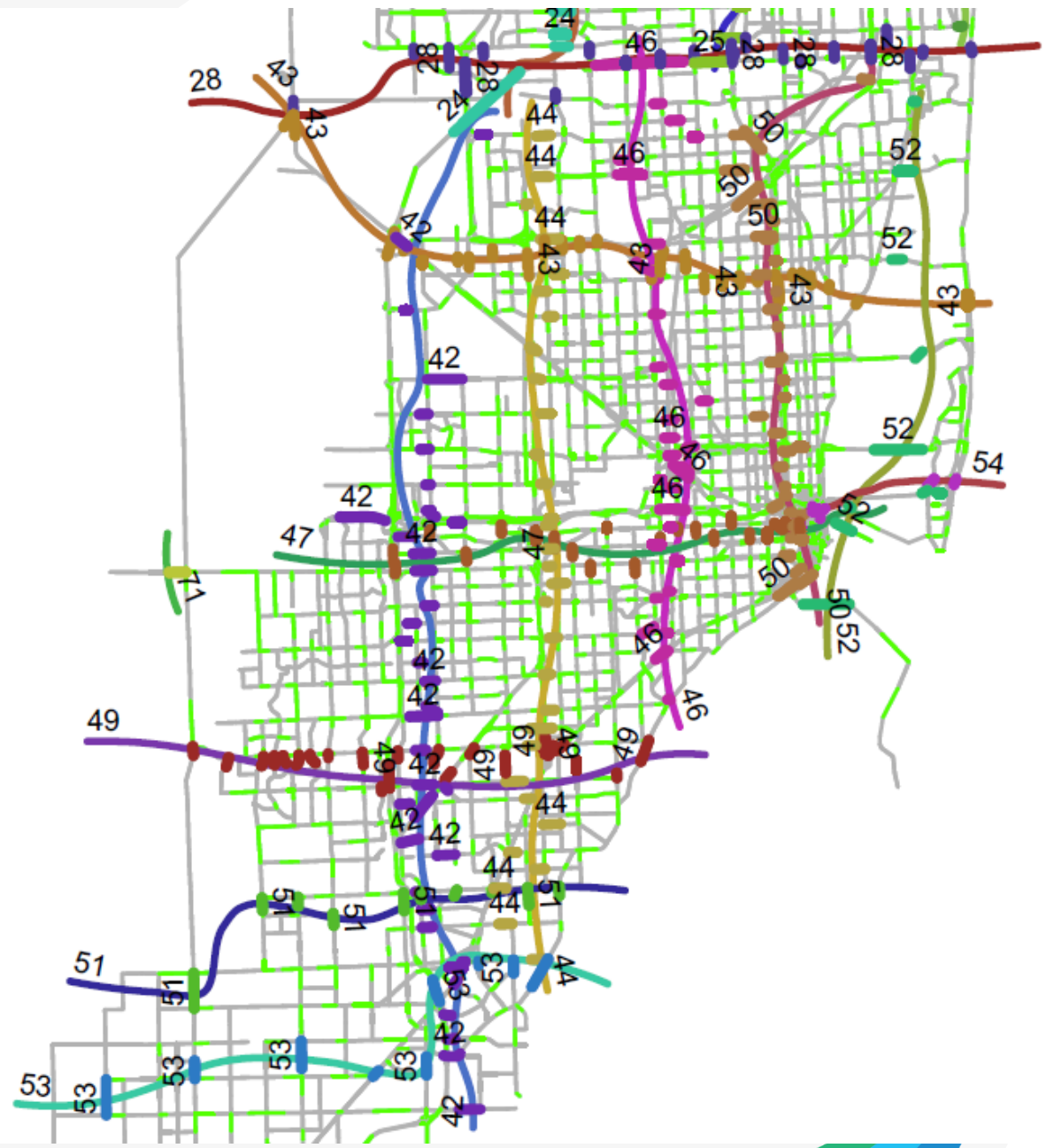
Model development status

➤ Catalog development

➤ ABM functionality

➤ Reports
  » HEVAL
  » R-based summaries

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Validation Status

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Validation approach

➤ Model inputs

➤ ABM components in execution order
  » Resident models
  » Visitor models

➤ Non-ABM components
  » Special generators
  » Externals
  » Trucks

➤ System-level
  » Transit
  » Highway

➤ Sensitivity tests
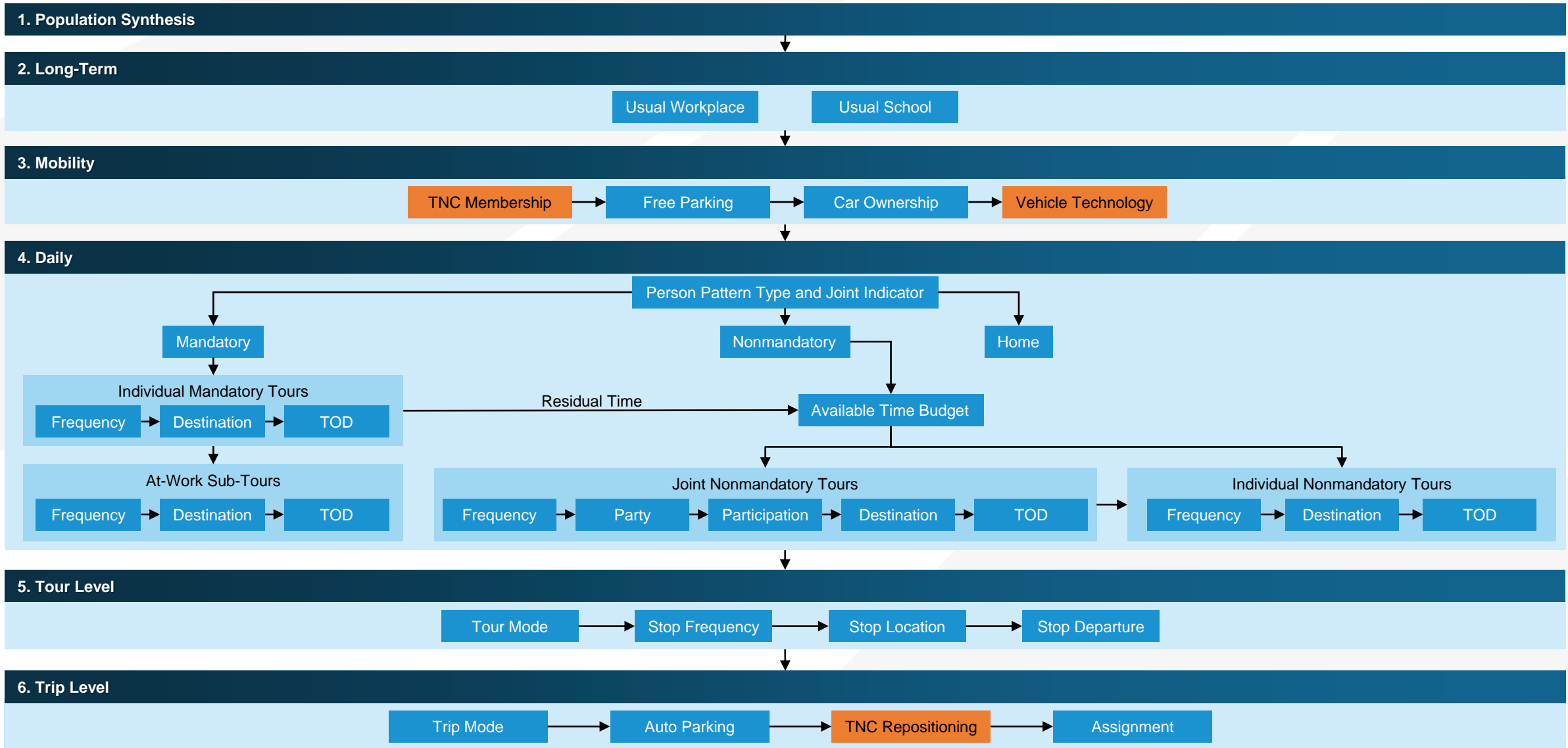
Tour destination: home-based non-mandatory

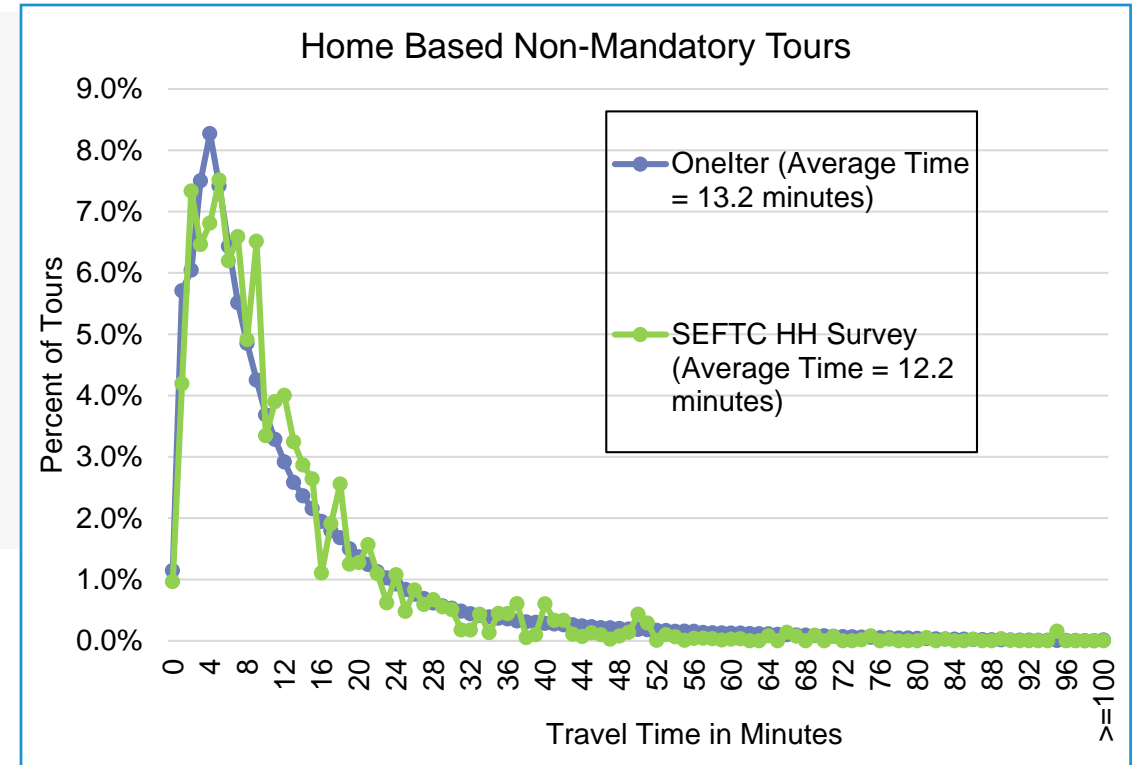|	Average Time in Minutes		Percent Difference [(OneIter - SEFTC HH Survey) / SEFTC HH Survey]
Tour Purpose	**2015 Calibration**	**SEFTC HH Survey**	
Shop	16.6	16.8	-1%
Escort	10.0	9.7	4%
Maintenance	11.4	11.4	0%
Eating Out	12.9	12.8	1%
Visiting	14.3	14.1	1%
Discretionary	12.4	13.5	-8%
Total	13.2	12.2	9%

	Average Time in Minutes		Percent Difference [(OneIter - SEFTC HH Survey) / SEFTC HH Survey]
Household Auto Sufficiency	**2015 Calibration**	**SEFTC HH Survey**	
0 Autos	10.1	8.4	20%
Autos < Drivers	12.9	12.2	6%
Autos = Drivers	13.7	12.5	10%
Autos > Drivers	14.7	12.2	20%
Total	13.2	12.2	9%

Home Based Non-Mandatory Tours

OneIter (Average Time = 13.2 minutes)

SEFTC HH Survey (Average Time = 12.2 minutes)

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Tour time-of-day: home-based mandatory

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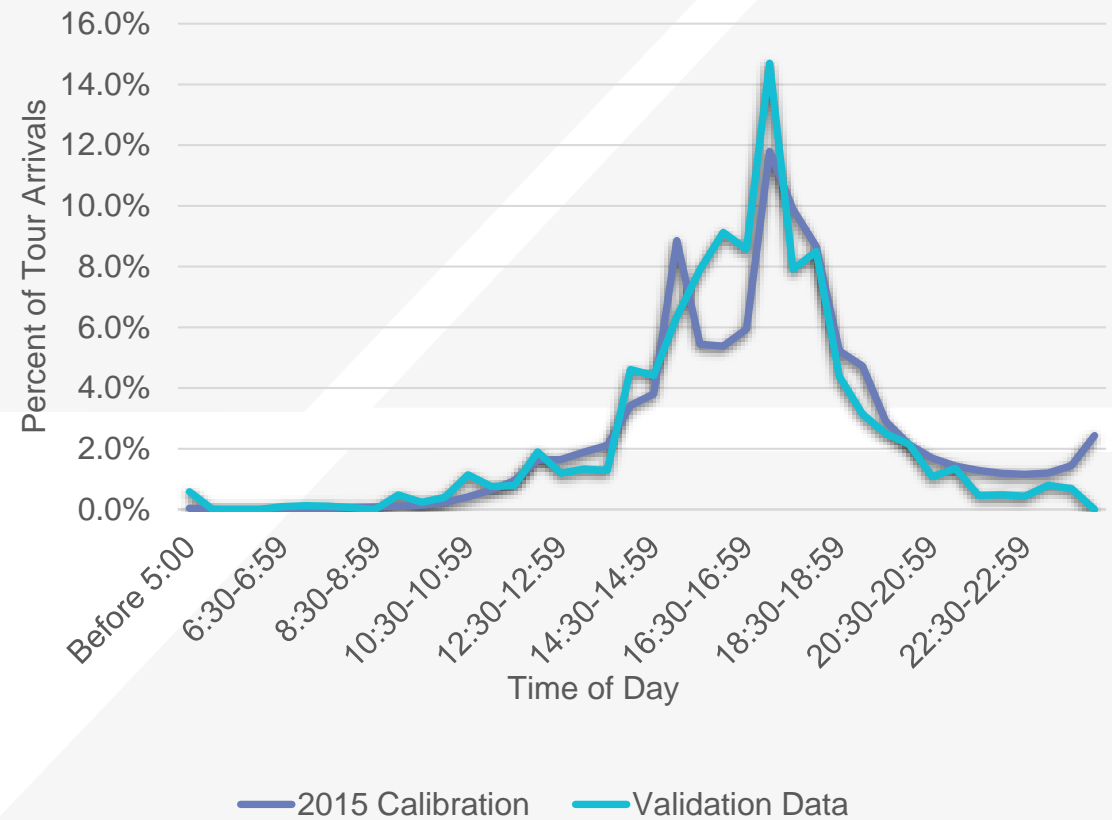
Tour time-of-day: home-based non-mandatory

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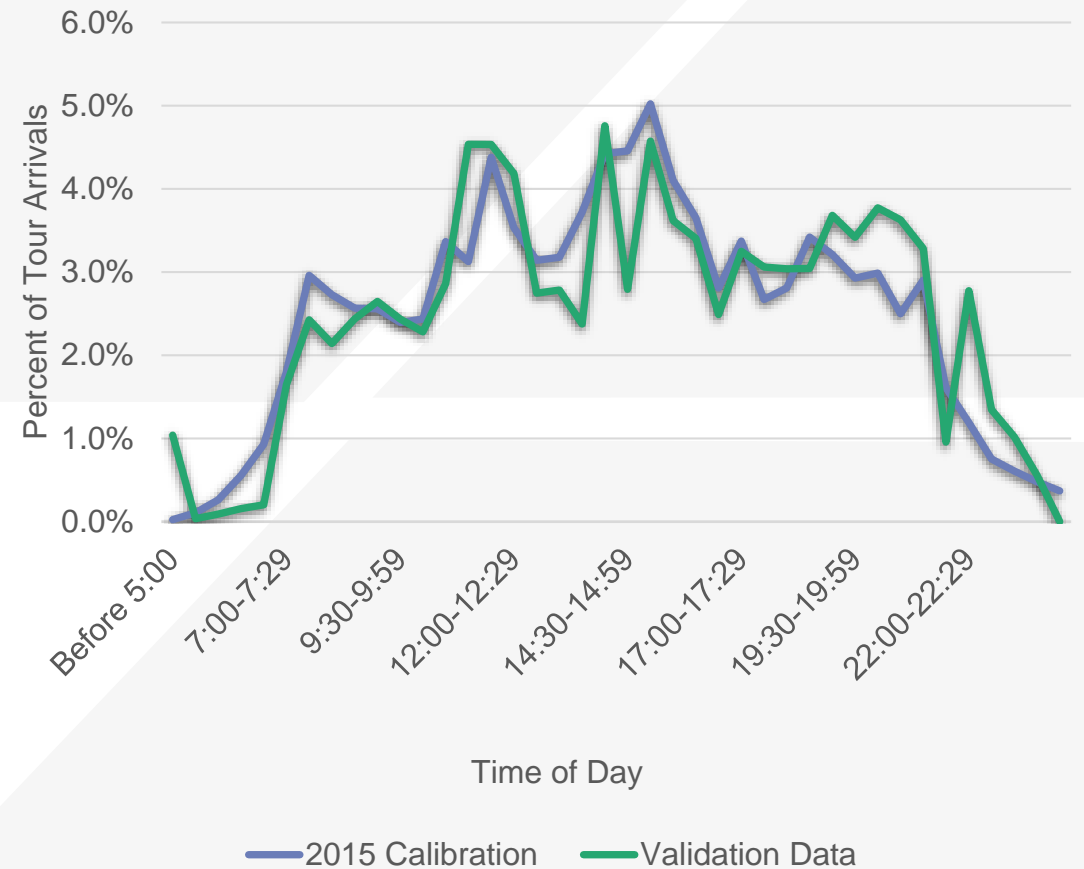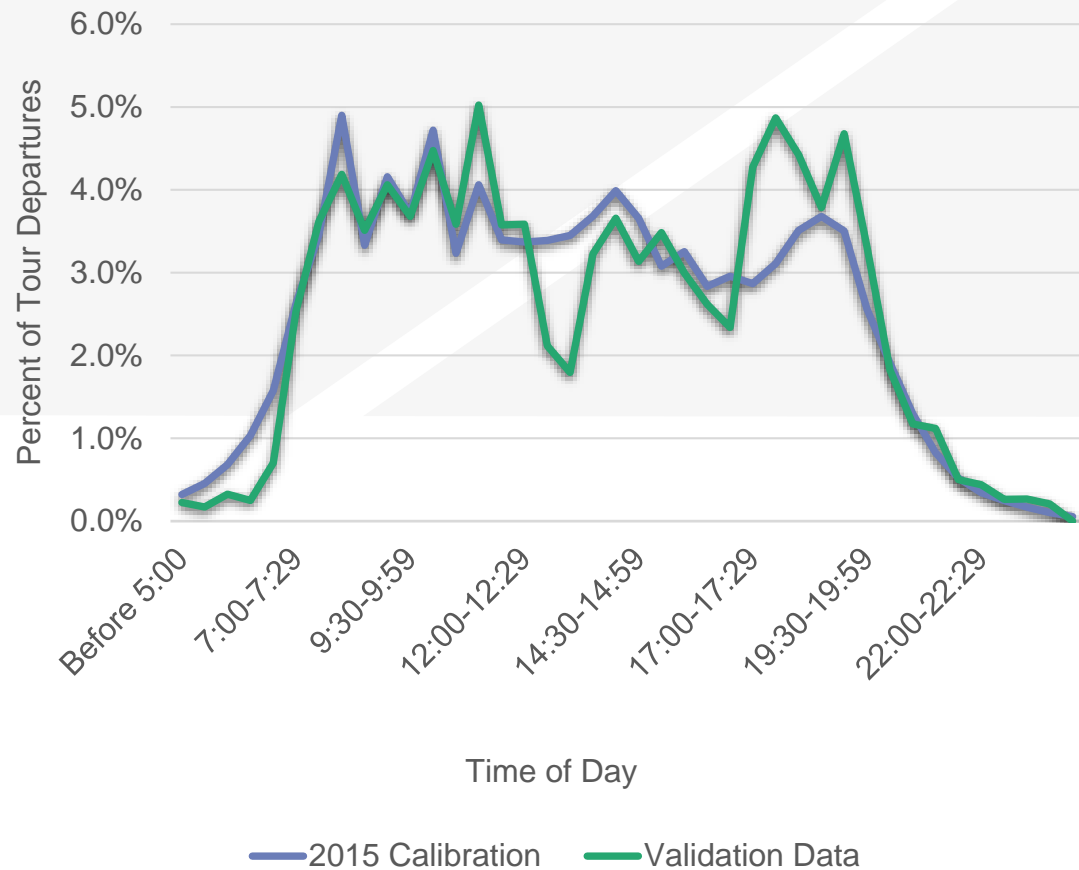
Tour time-of-day: work-based

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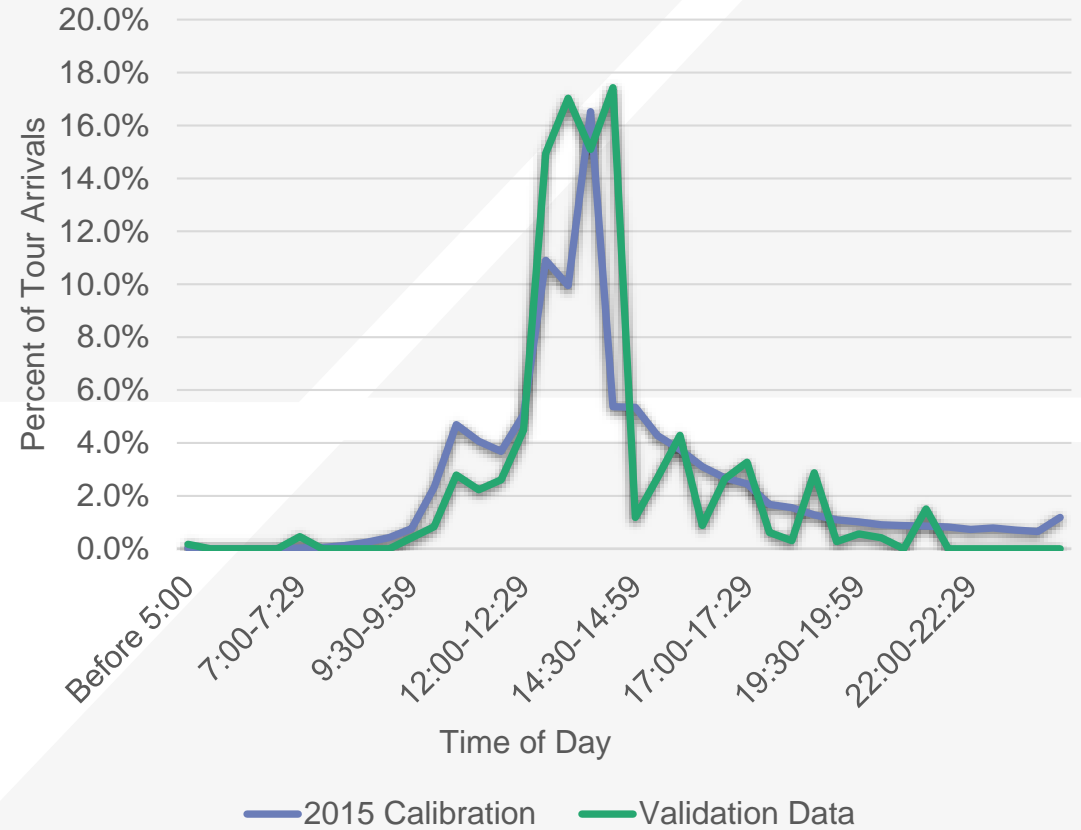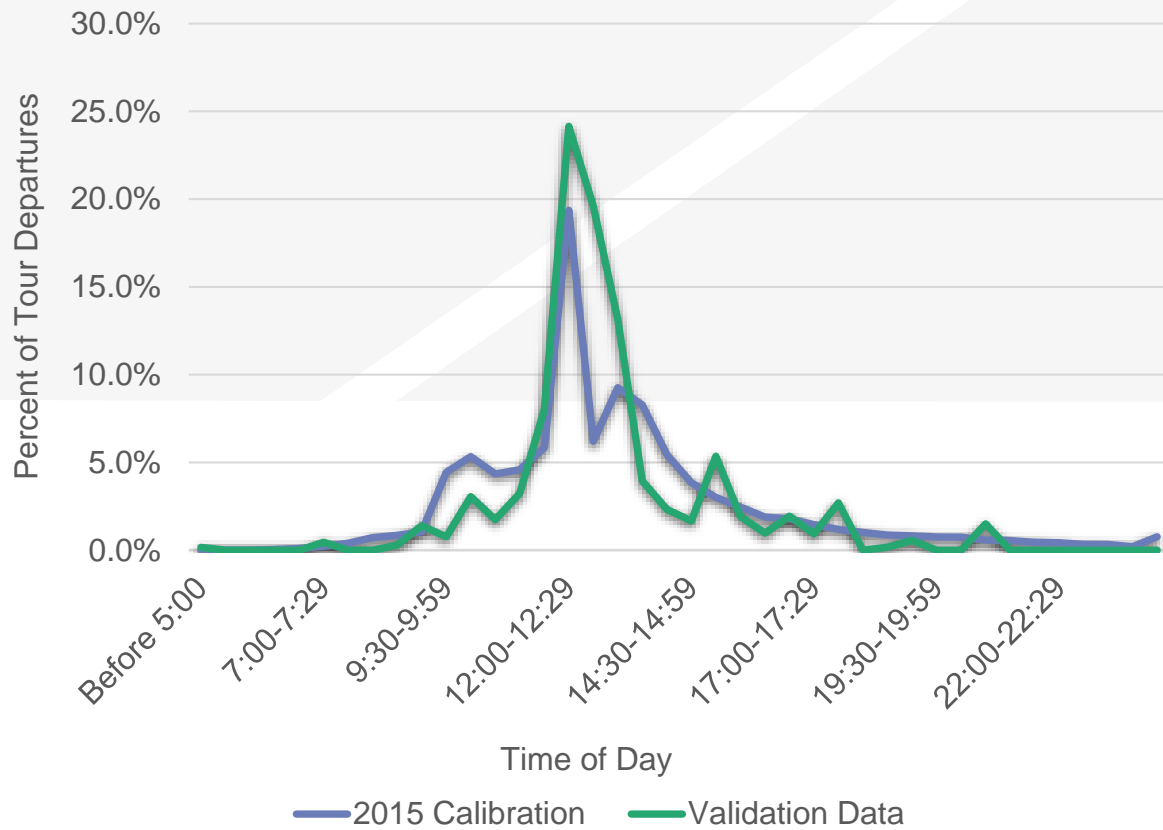
Tour time-of-day: duration

Tour Purpose	Average Duration (Hours)		Difference [Model - SEFTC HH Survey]
	2015 Calibration	SEFTC HH Survey	
Individual Mandatory Tours	**7.90**	**7.46**	**0.4**
Work	8.46	7.82	0.6
University	4.37	3.94	0.4
School	7.40	7.52	(0.1)
Home Based Non-Mandatory Tours	**1.28**	**1.18**	**0.1**
Shop	1.42	1.37	0.1
Escort	0.75	0.37	0.4
Maintenance	1.24	1.20	0.0
Eating Out	1.30	0.96	0.3
Visiting	1.73	1.82	(0.1)
Discretionary	1.38	0.95	0.4
At-Work Sub-Tour	**1.12**	**0.89**	**0.2**

Tour mode choice (transit adjusted)

Tour Purpose	Mode Share		Share Difference [Model - SEFTC HH Survey]
	Model	SEFTC HH Survey	
Work			
Auto	89.9%	88.2%	2%
Transit	5.6%	7.9%	-2%
Non-Motorized	4.5%	3.9%	1%
University			
Auto	84.6%	84.9%	0%
Transit	7.2%	6.3%	1%
Non-Motorized	8.2%	8.8%	-1%
School			
Auto	58.3%	62.2%	-4%
School Bus	33.0%	25.6%	7%
Transit	0.6%	1.8%	-1%
Non-Motorized	8.1%	10.4%	-2%
Home-Based Non-Mandatory			
Auto	91.3%	89.8%	2%
Transit	2.0%	2.7%	-1%
Non-Motorized	6.7%	7.5%	-1%
AT_WORK			
Auto	97.8%	92.6%	5%
Transit	0.0%	1.5%	-1%
Non-Motorized	2.2%	5.9%	-4%

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Transit targets (trip-level)

Transit Trips by Mode

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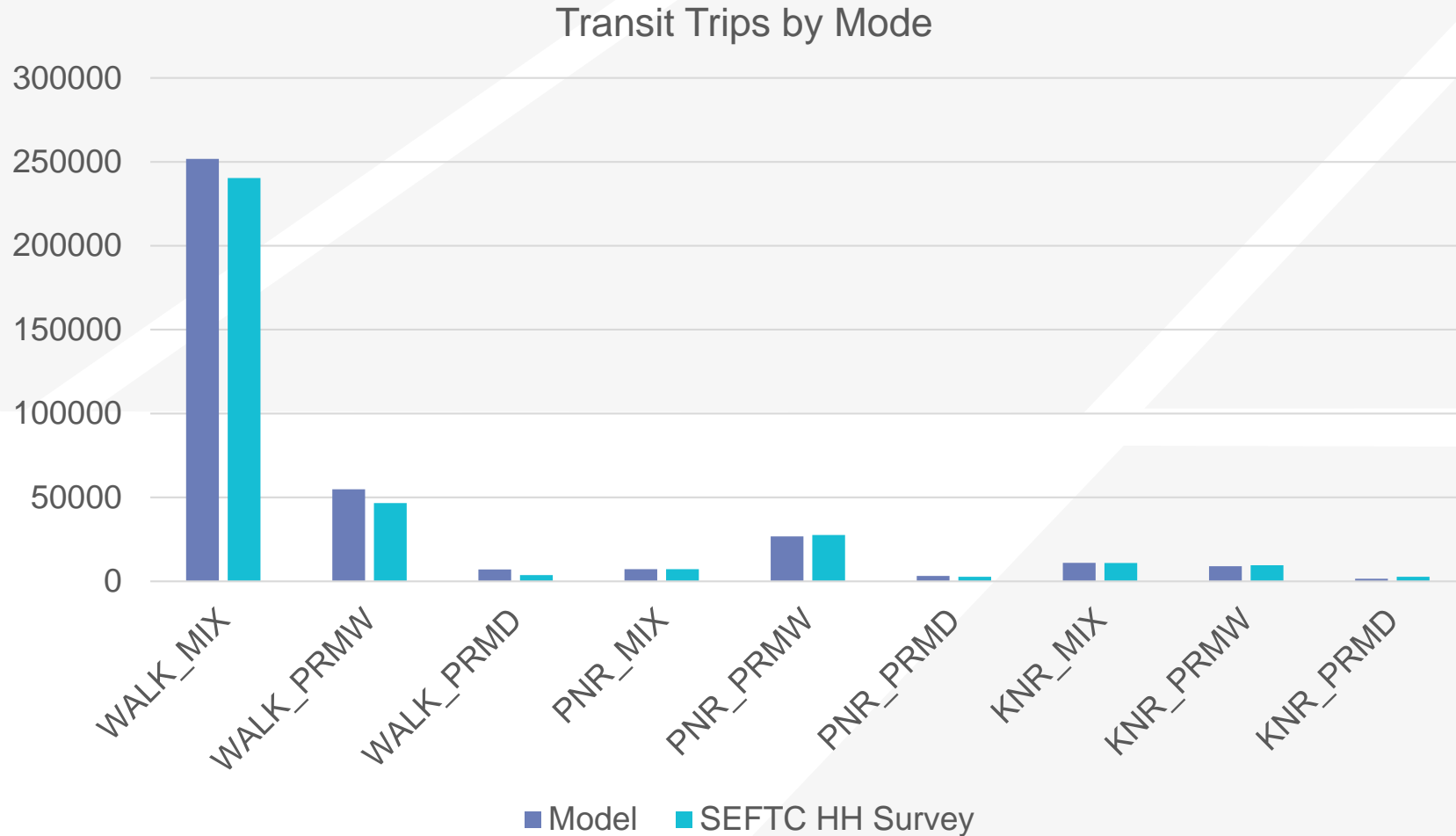
Intermediate stop location – mandatory tours

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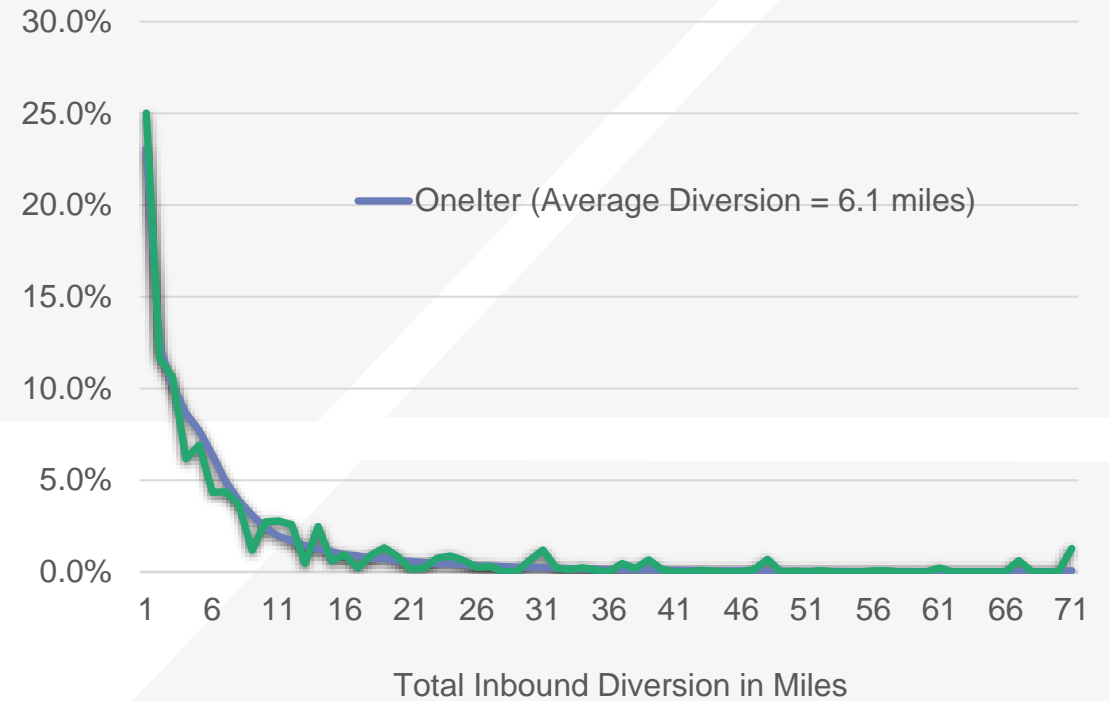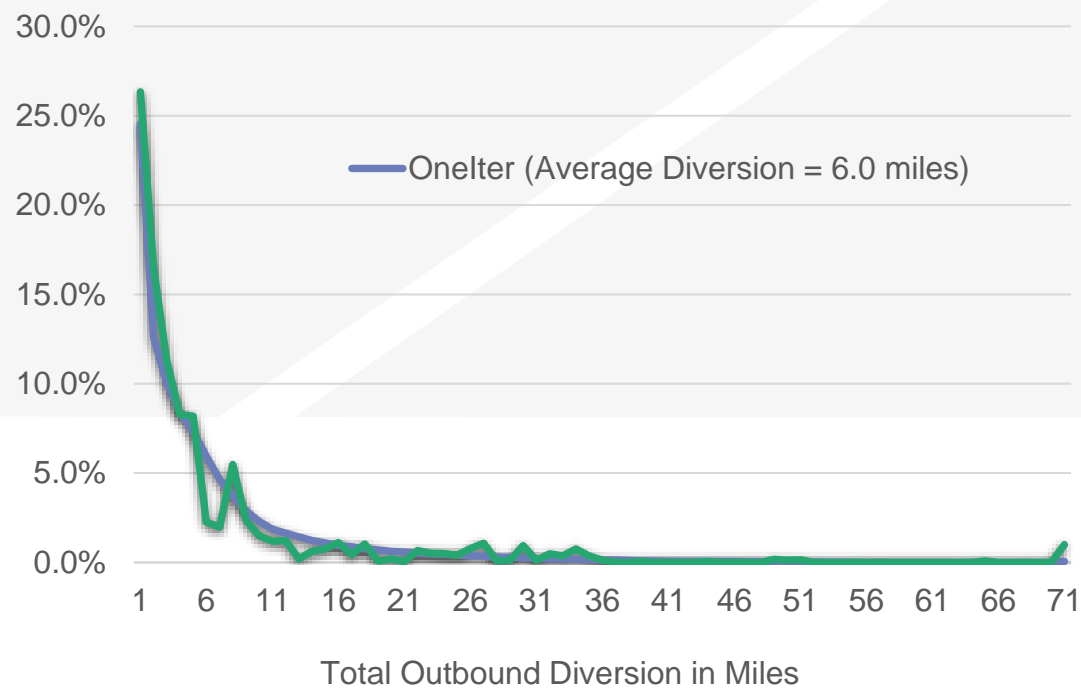
Intermediate stop location – non-mandatory tours

Total Outbound Diversion in Miles

OneIter (Average Diversion = 6.7 miles)

Total Inbound Diversion in Miles

OneIter (Average Diversion = 6.9 miles)

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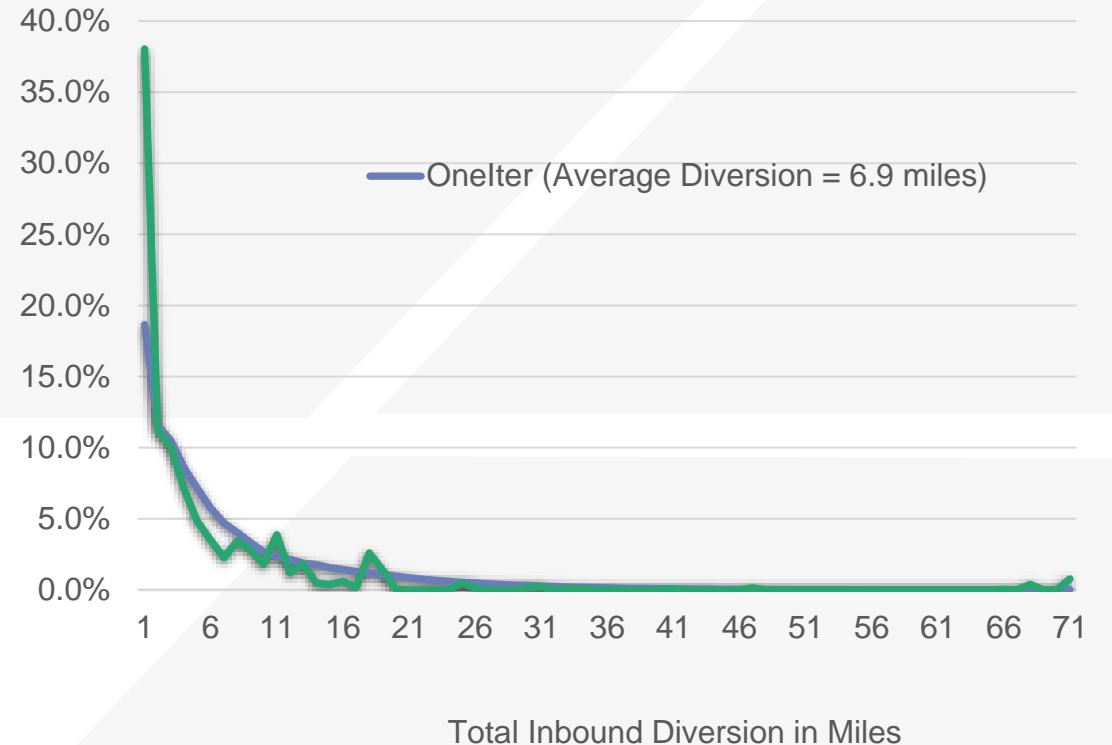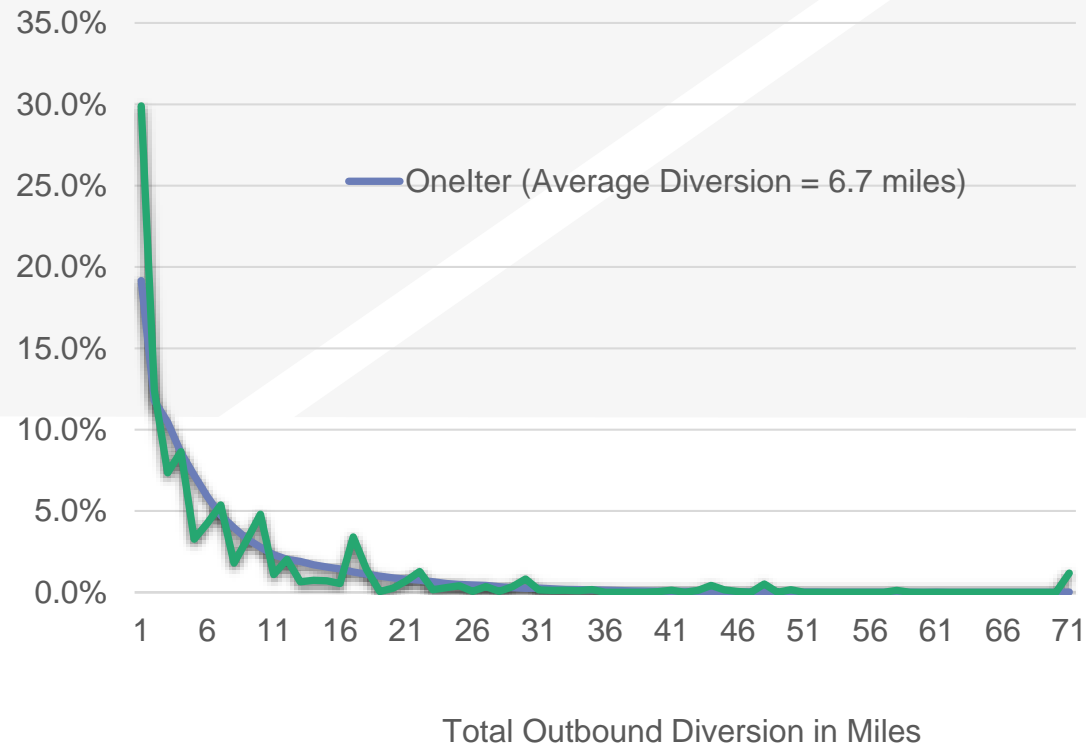
Time of day

Time of Day Share Ratios (Model / Obs)

Legend:
- SEFTC HH Survey
- Streetlight
- Count Data
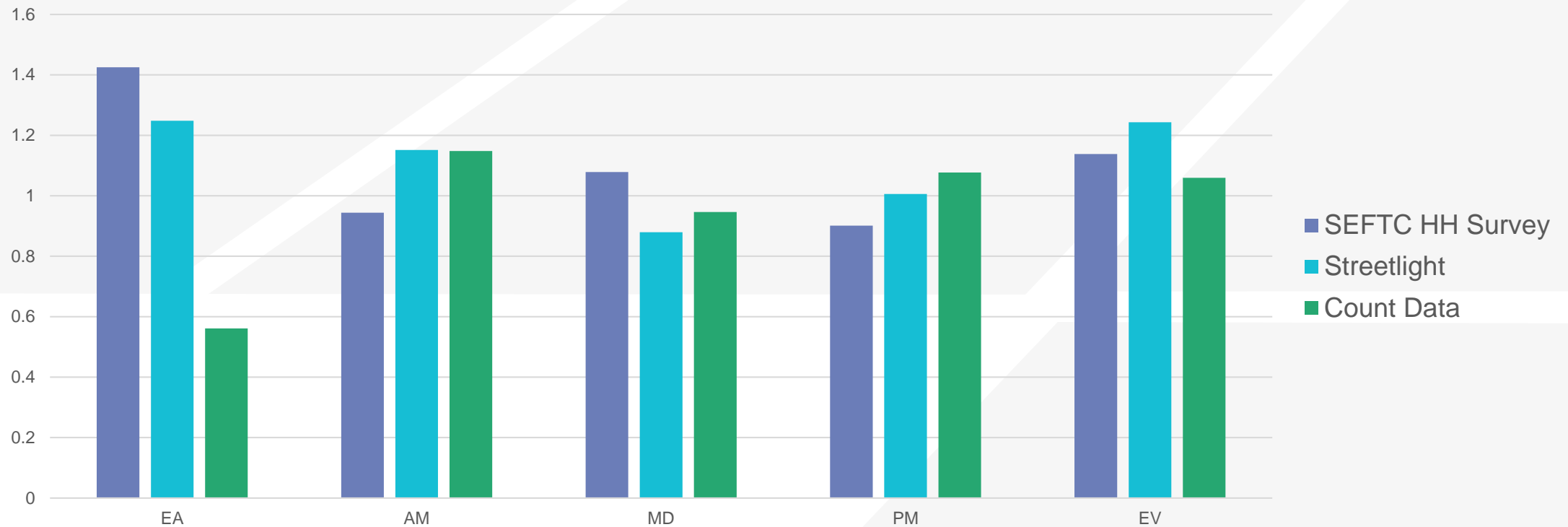
*Streetlight AM Period 6-10AM
(HH Survey and Counts are 6-9AM)*

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System level - highway

VMT Ratio **Onelter/Observed Traffic Count VMT Ratio**

Facility Type	CBD	Fringe	Urban	Suburban	Rural	Total	Miami-Dade	Broward	Palm Beach
Freeways	1.17	1.04	1.27	1.26	1.35	1.25	1.21	1.26	1.27
Uninterrupted Roadways	0.00	0.00	2.66	1.41	1.94	1.74	2.34	2.25	1.52
High Speed Arterials	1.22	1.12	1.19	1.10	1.06	1.13	1.12	1.18	1.06
Low Speed Collectors	0.97	1.00	1.05	1.00	0.74	1.01	1.02	1.03	0.91
Ramps	1.10	1.25	1.06	1.02	1.35	1.06	1.06	1.06	1.06
HOV Lanes	0.00	0.00	0.82	0.93	0.00	0.91	0.64	0.71	1.05
Toll Roads	0.00	0.51	0.79	0.95	0.95	0.92	0.81	1.00	1.10
All Groups	1.12	1.05	1.14	1.10	1.37	1.12	1.06	1.17	1.13

Validation next steps

- Visitor model calibration

- Confirm non-ABM component (with full trip tables)

- Analyze single iteration vs. full feedback

- Implement network and count changes
  - » Resolve Toll/HOT discrepancies

- Build speed comparison summary (NPMRDS data)

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Sensitivity Tests

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SERPM8 model validation plan
Section 5.5.2–Parameter/Variable Sensitivity Testing

➤ Sensitivity testing:

» Adjusting key factors and evaluate impact on forecasts. Adjustments can be made to:

- Model parameters (more for calibration and verifying that model is working properly)
- Model inputs (e.g., land use variables, socioeconomic conditions, fuel costs, etc.).

» Observed data not available for comparison. Rather:

- Review tests for reasonableness–expected outcomes of the tests shaped beforehand.
  - Compare to results from other regions as available.
- Unexpected outcomes should be evaluated & explained.

➤ Tests will be developed in consultation with SEFTC RTTAC-MS.

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SERPM8 model validation plan Section 3.5–Sensitivity Testing

➤ "A subset of the following tests will be undertaken:"

» Socioeconomic and demographic factors
- Alternate growth rates of population, employment
- Alternate growth rates of different market segments
  - Aging of population, presence of more females in the workforce…

» Auto Mode Parameters
- Adjustments to fuel costs.

» Impact of new highway projects
- New managed lanes, or pricing scenarios
- Widening of highways

» Impact of new transit projects
- Extension of rail lines

» Addition of new transit modes like LRT

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SERPM8 model validation plan Section 3.5–Sensitivity Testing

➤ Elasticity tests: Convenient, quantitative measure of travel demand response to price and service changes

» Loose definition: elasticity of demand is the percentage change in quantity of service demand in response to a 1 percent change in price

» LogArc elasticity as defined in TCRP Report 95–Traveler Response to Transportation System Changes (2004) will be used

Proposed sensitivity tests

- **Socioeconomic and demographic change**
  - » Impacts entire modeling process from PopSyn through Assignment

- **Regionwide transportation cost change**
  - » Both direct and indirect impacts on travel

- **Location specific socioeconomic or transportation supply change**
  - » "Dynamic" sensitivity testing
  - » Localized impacts

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Recommended Sensitivity Test 1 Socioeconomic and Demographic Change

- Aging population
  - » Tests impacts of aging population on travel
    - 2016
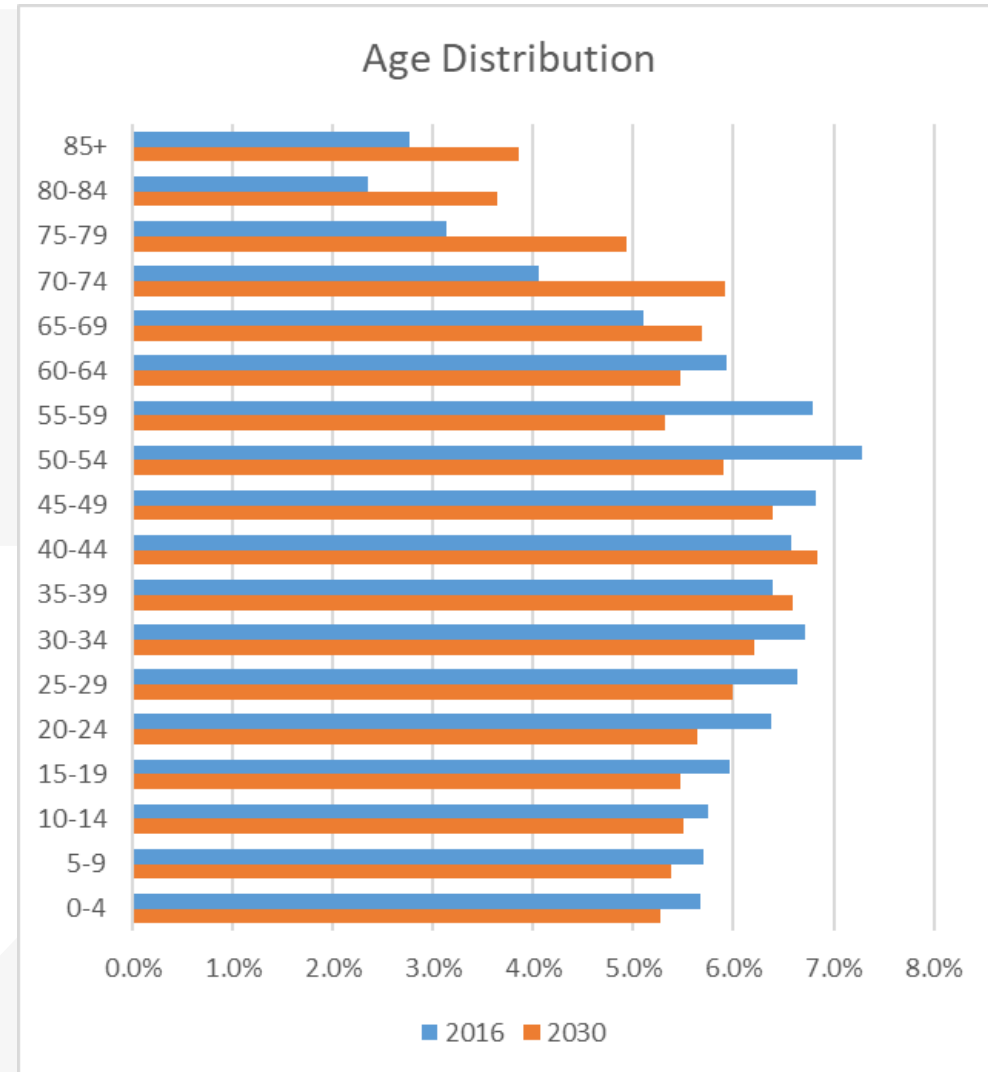   - Median age 41
      - Percent age 65+   17.4%
    - 2030
      - Median age 43
      - Percent age 65+   24.0%
  - » Apply 2030 distribution to base year population
  - » Adjust "retirement age" marginals to ensure sufficient workers for employment

Age Distribution

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Recommended Sensitivity Test 1 Socioeconomic and Demographic Change

➤ **Expected outcomes**

   » More work trips by age 65+ population
- Possible changes…
  - Full-time vs. part-time employees and work at home
  - Tour time-of-day of work tours (shorter work hours if more part-time?)
  - Mode shares

   » More non-work travel
- Possible changes…
  - Increase non-mandatory tours
  - Midday tours
  - Mode shares

➤ **Comparisons**

   » Compare results to
- Houston & Baltimore (previous CS projects)
- Atlanta (CT-Ramp model)

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Recommended Sensitivity Test 2 Regionwide Transportation Cost Change

➤ Reduce transit fares by 50% regionwide

- » Simple implementation
- » Primary impacts should be…
  - Increased transit ridership
  - Decrease in VMT regionwide
  - Don't expect much change on major freeways
    - Auto volumes will fill in for trips taken off the freeways
- » Provides basis for estimating elasticity of transit ridership with respect to fares
  - Typically, elasticity is about -0.3
    - "Simpson-Curtin rule"
    - Implies ridership should increase around 15%

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Recommended Sensitivity Test 3
Location Specific Transportation Supply Change

➤ Add capacity to sections of I-95

» From my trip to SERPM area in November 2017, I know that there were several areas of construction/widening on I-95

- Code all as complete and rerun on base year network

» Simple implementation

» Full-feedback and, possibly, assignment only

» Primary impacts should be…

- Slightly less congestion on I-95 in peak periods
- Less VMT on parallel facilities
- Slightly more VMT on cross facilities with interchanges with I-95
- Very minimal impact on other model components

» Compare results to observed 2017/2018 traffic counts

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Sensitivity Test Summary

- Socioeconomic and demographic change
  - » Impacts entire modeling process from PopSyn through Assignment

- Regionwide transportation cost change
  - » Both direct and indirect impacts on travel

- Location specific socioeconomic or transportation supply change
  - » "Dynamic" sensitivity testing
  - » Localized impacts

- We request the RTTAC-MS' approval of these tests

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Model Delivery

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Model delivery

➤ Project status call schedule

➤ Setup support for RTTAC-MS Members

➤ LRTP Consultant training – on or around 10/17 (scheduled RTTAC-MS)

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Questions

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