Regional Travel Modeling Conducted by the Boston Region MPO

November 19, 2018

Boston Region Metropolitan Planning Organization

Key Points

- Very important tool in the tool box
- Not the only tool in the tool box
- Continuously improved and updated
- Well established approach (peer reviewed)
- Allows for a consistent and impartial approach to understand how land use, infrastructure projects, and policies affect the region

Transportation Analysis Tools

- Strategic Planning Model
- Regional Dynamic Model
- Regional Travel Model
- Activity Based Model (ABM)
- Traffic Analysis Tools
- Microsimulation

Regional Travel Model Development

- Build multimodal transportation networks
- Develop base-year land-use assumptions
- Construct models from surveys and other data sources
- Calibrate model to observed data and travel patterns
- Validate model to ensure it is successfully responding to changes to its inputs
- Produce a future no-build scenario by updating land-use assumptions and transportation networks

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Strengths

- Regional travel model best at examining regional flows across multiple modes of transportation
- Provides an analytical method that has been peered reviewed to answer what-if questions
- Allows for a consistent and impartial approach to understand how land use, infrastructure projects, and policies impact the region using multiple metrics
- Sensitive to many transportation and land-use variables
- Developed from multiple large data sets and surveys
- Covers a large geographic area to account for super commuters and all of the MBTA service area

Limitations

- Model is as good as the data feeding it
- Spatial and temporal resolution
- Weekday versus weekend or special events
- Some travel behavior is not easily modeled, such as comfort, security, and convenience
- Some transportation services are not included
- Land-use should be a constant, not a variable
- Transit capacity constraints not included

Dealing with Uncertainty

- Using the appropriate tool for the level of analysis
- Proper model preparation
  - Calibration and validation
  - Sensitivity testing
- Scenarios vary major inputs
- Characterization of outputs
  - Make assumptions clear
  - Provide ranges when possible
  - Likely outcomes, not absolutes

Next Steps

- Develop an Activity Based Model to better understand policy decisions that involve different markets of users
- Update surveys to include information on TNC's
- Incorporate transit capacity constraints methodology into the travel model
- Understand how Autonomous Vehicle Technology will affect travel behavior
- Explore new modeling tools

Thank You!

Contact
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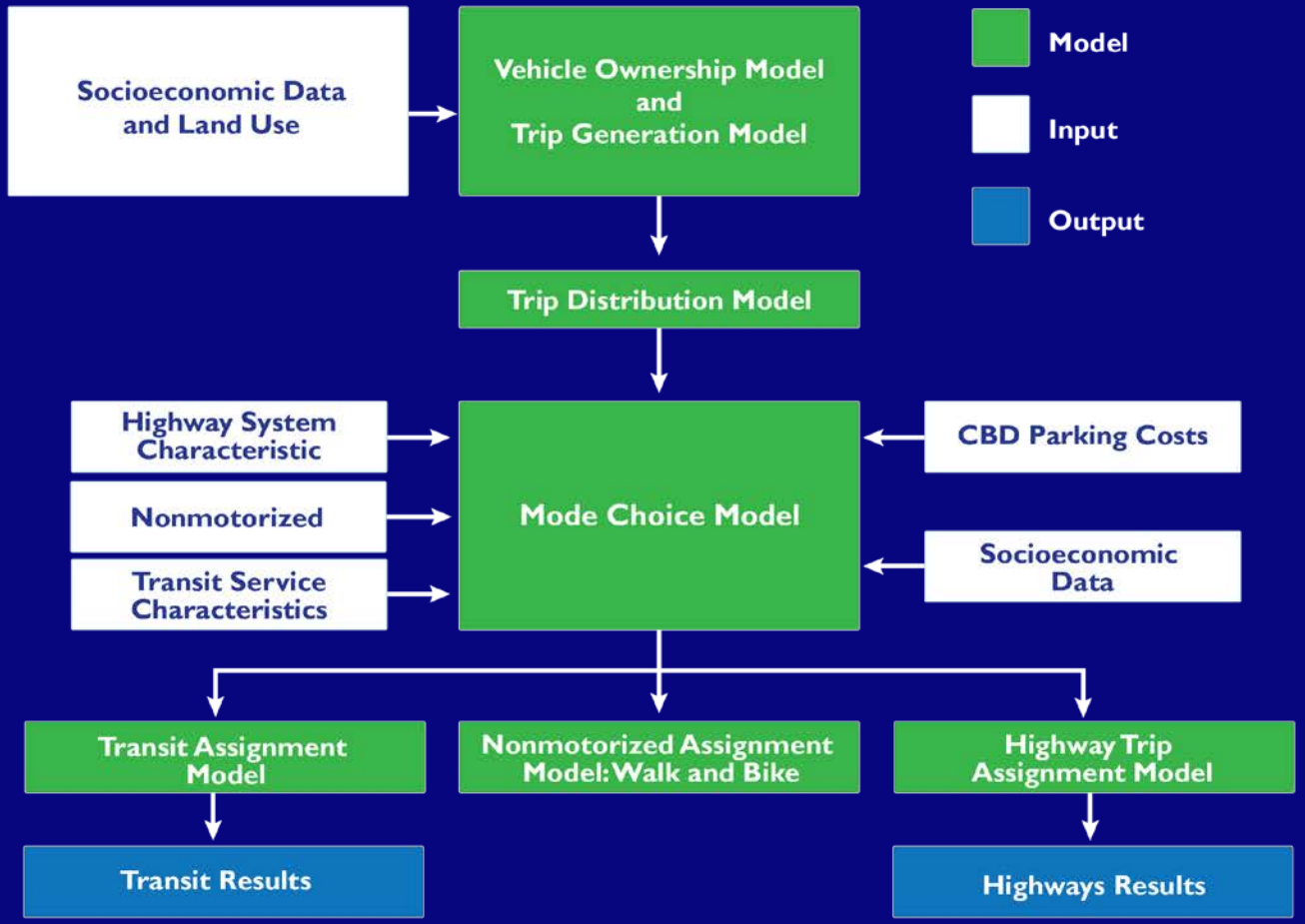
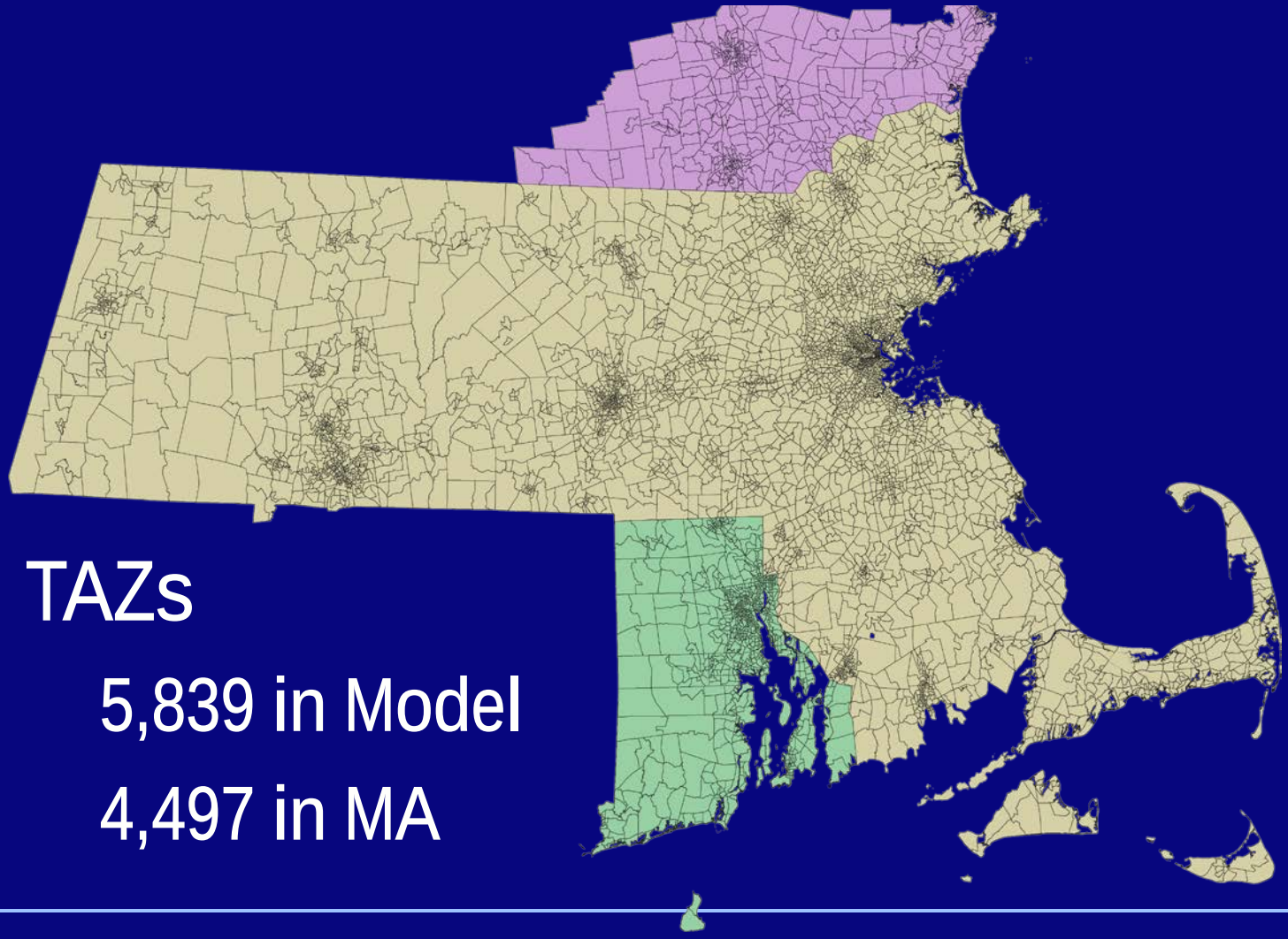
Appendix

Regional Travel Model



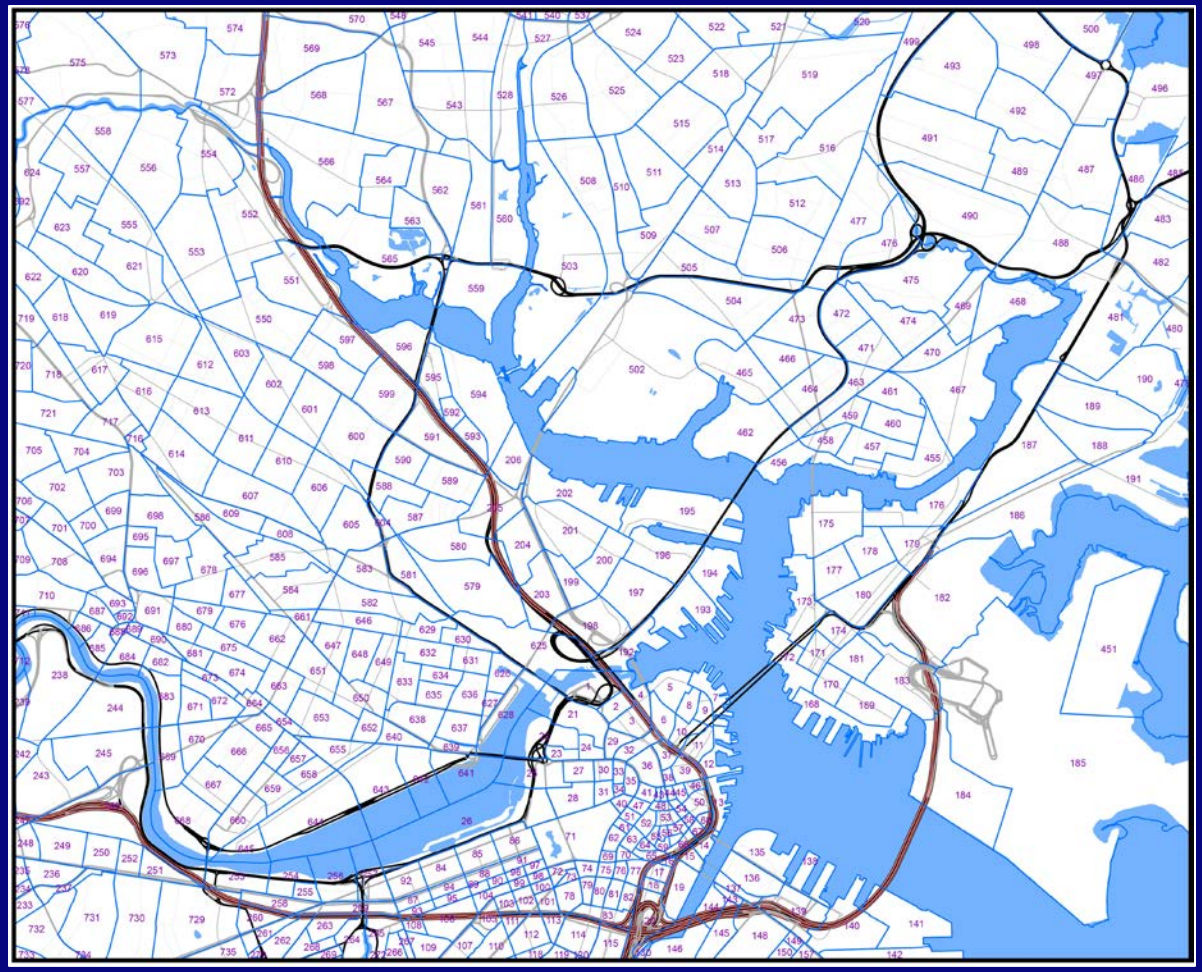
Geography



TAZs

- 5,839 in Model
- 4,497 in MA

Transportation Analysis Zones (TAZs)



Time Periods

Average Weekday

Peak

- 6:00 AM -9:00 AM
- 3:00 PM -6:00 PM

Off-Peak

- 9:01 AM -2:59 PM
- 6:01 PM -6:00 AM

Trip Purposes

Person Trips by TAZ

- Home-Based Work
- Home-Based School
- Home-Based Other
- Non-Home-Based Work
- Non-Home-Based Other

Regional Travel Model: Inputs

Demographics developed by RPA (by TAZ) used to generate person trips

- Auto ownership
- Households (by size, workers, autos, & income)
- Population (by age cohort)
- Employment (by sector)

Regional Travel Model: Inputs

Costs of Travel

- Fares
- Tolls
- Parking costs
- Auto operating costs
- Value of time

Regional Travel Model: Inputs

Roadway Characteristics

- Roadway speeds and travel times
- New roads, lanes, and connections
- Roadway capacity
- Turning lanes
- Signal timings
- HOT/HOV Lanes
- Truck restrictions

Regional Travel Model: Inputs

Transit Characteristics

- Alignment
- Frequencies
- Wait times
- Station Location
- Park-and-ride lots (size & cost)
- Travel times (used to examine signal priorities)

Assignment


EXIT 27
NORTH
1
93
Tobin Br
1/2 MILE
TOLL
EXIT 28
TO
99
Sullivan Sq
Somerville
1 MILE
SPEED LIMIT
55


SL1 SOUTH STATION

Regional Travel Model: Outputs

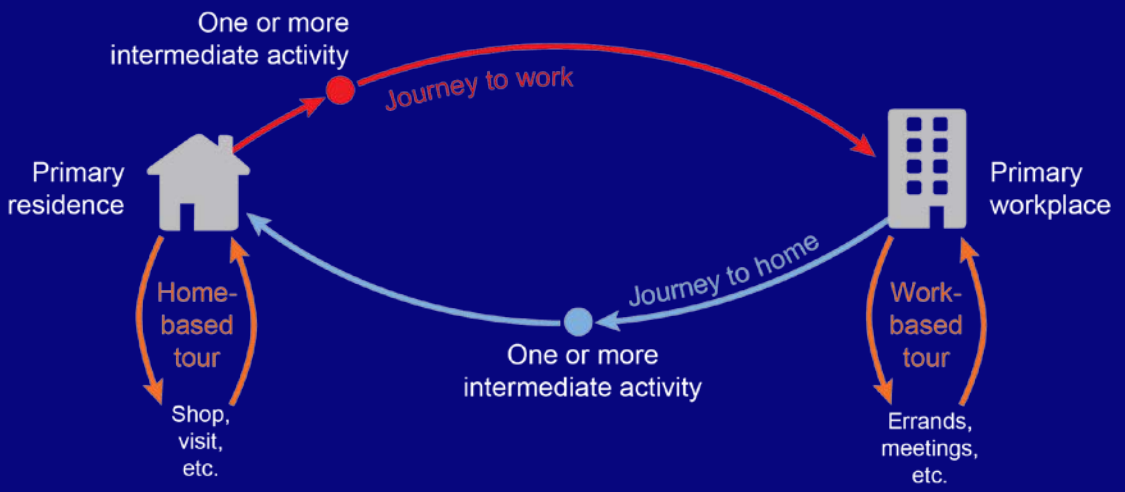
Revenue

- Fare revenue by transit agency
- Park-and-ride-lot fees
- Toll revenue

Regional Travel Model: Outputs

Trip Activity

- Trip ends by TAZ
- Trip length
- Mode shares
- Distribution patterns of trip flows
- Travel time by mode and component



Regional Travel Model: Outputs

Roadway Activity

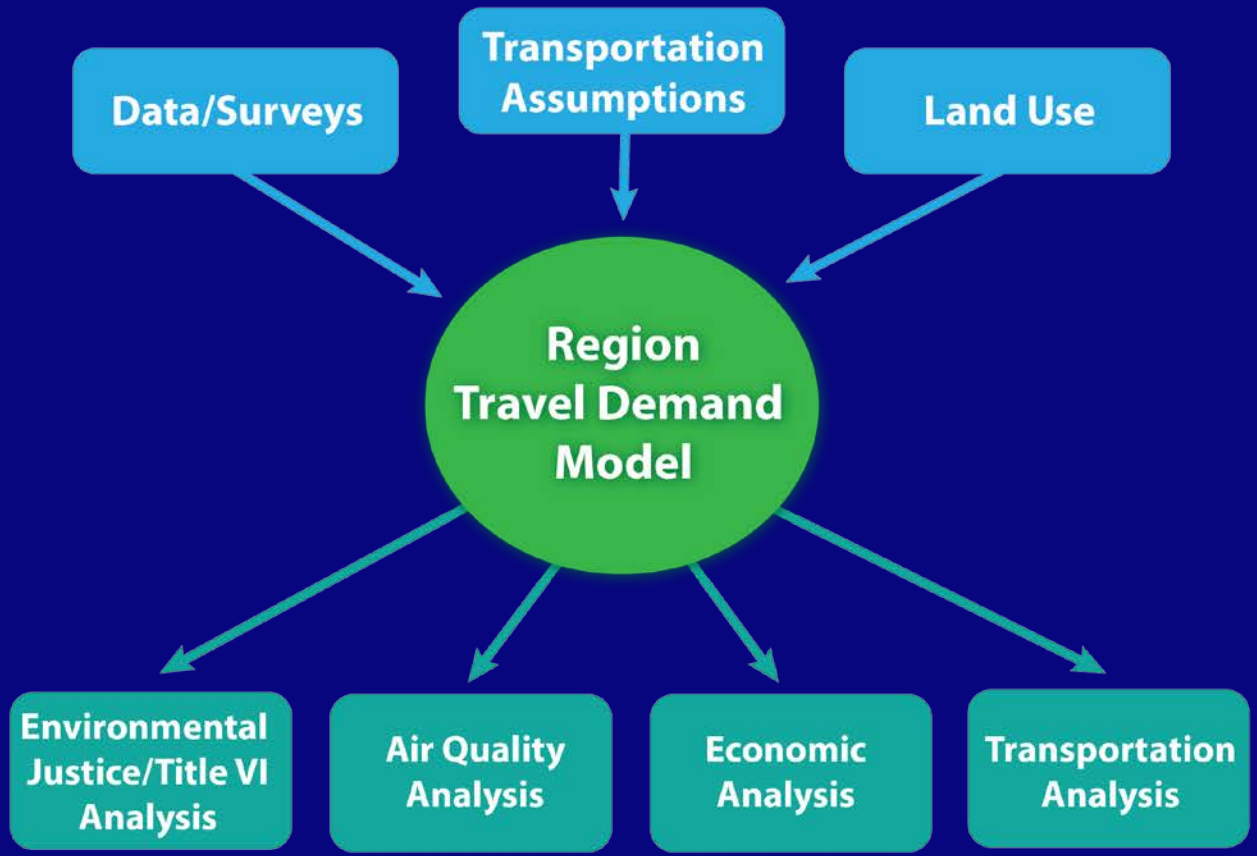
- Roadway volumes by time period
- Average speeds (congested or free-flow)
- Levels of congestion (V/C)
- Vehicle-miles of travel (VMT)
- Vehicle-hours of travel (VHT)
- Level of service
- Delay

Regional Travel Model: Outputs

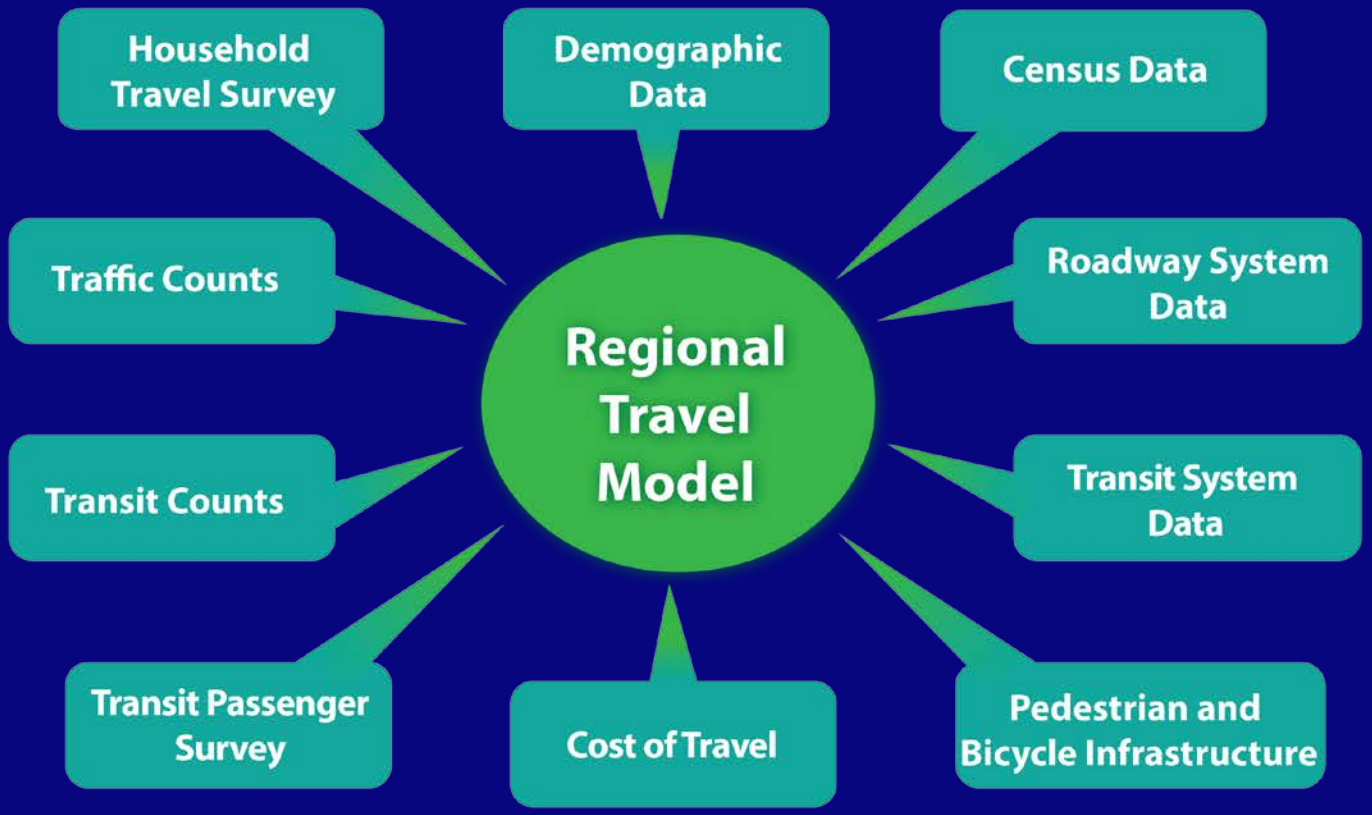
Transit Activity

- Ridership by line and boardings and alightings by time period
- Passenger miles
- Passenger hours
- Transfer rate
- Mode of access
- Fare and parking revenue

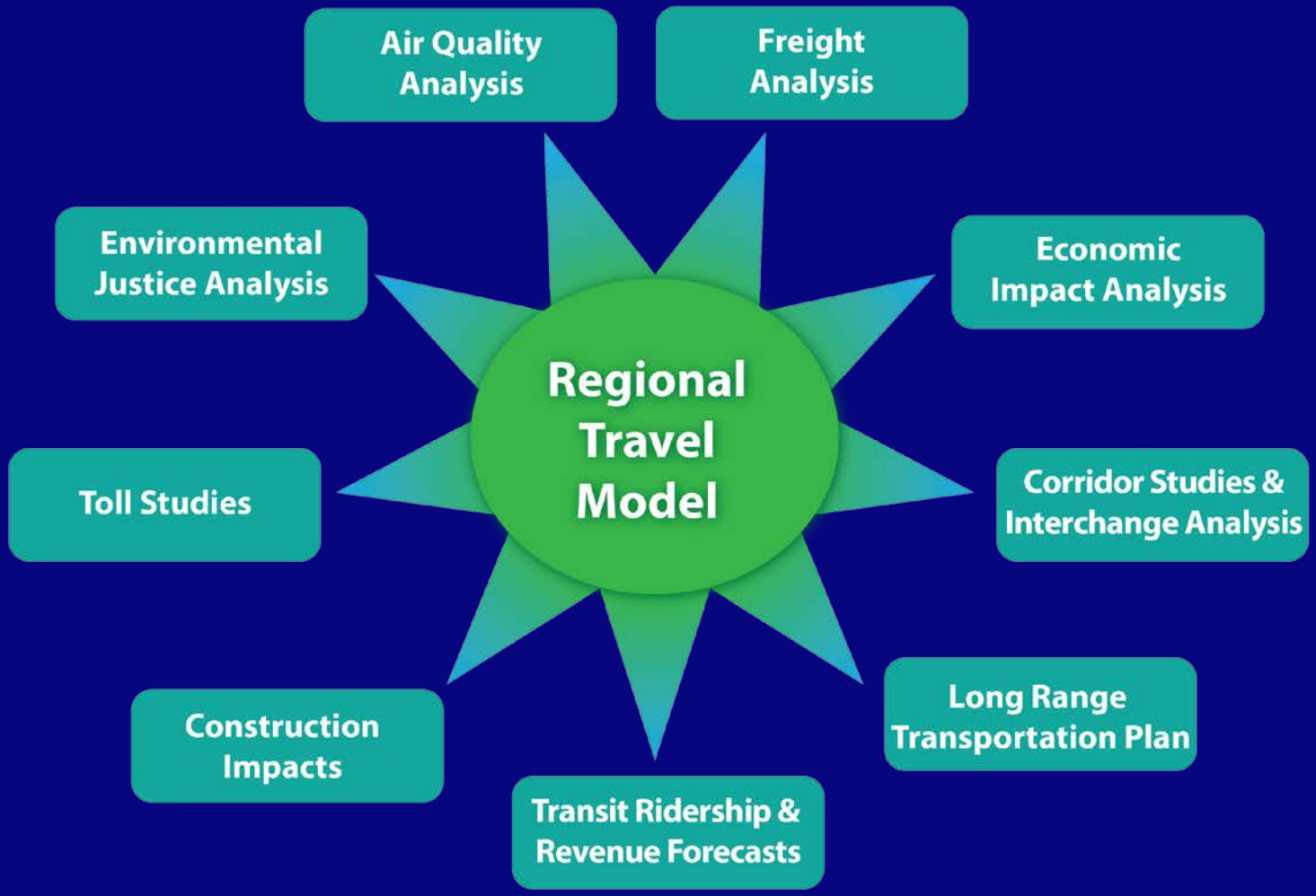
Overview of Regional Travel Model



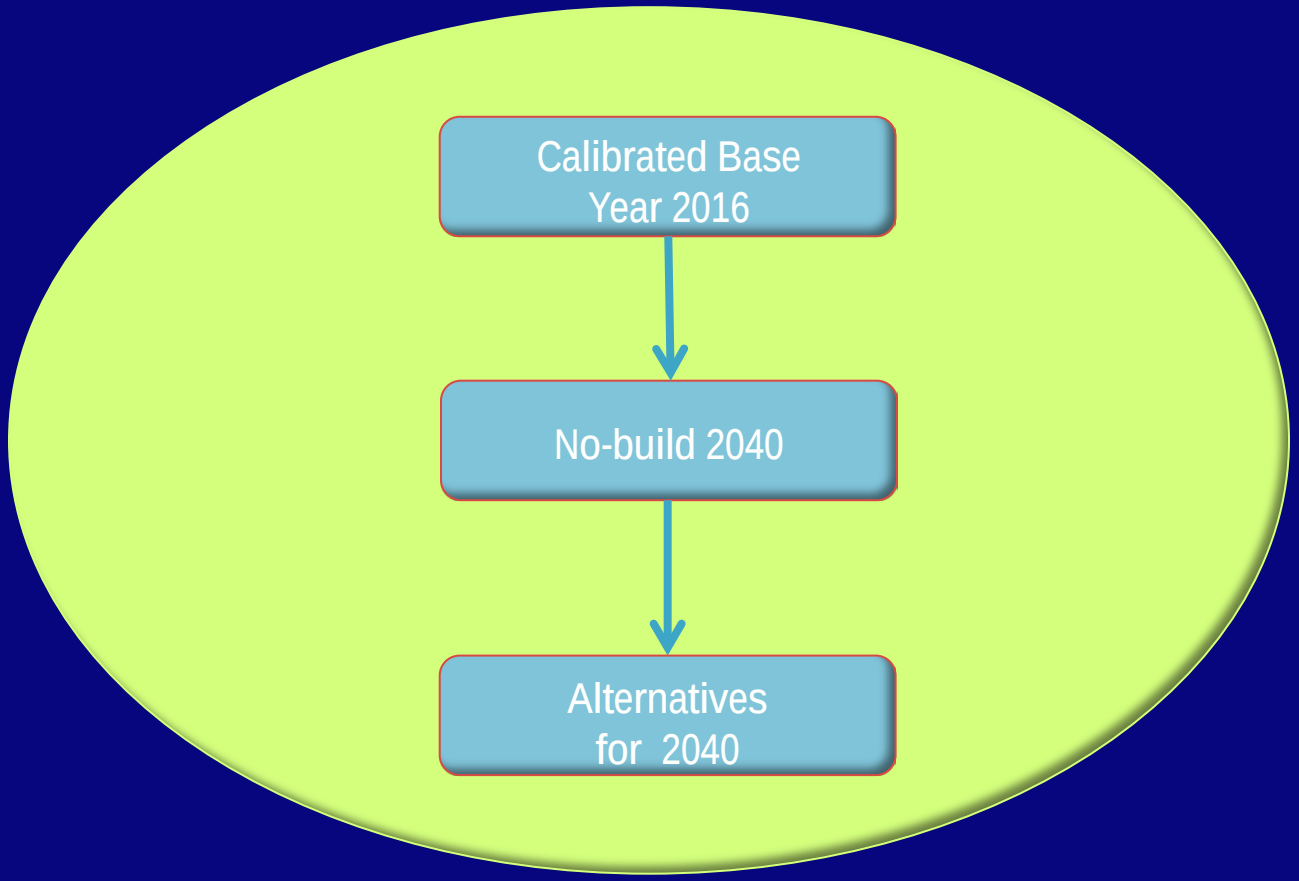
Input Data used in Regional Travel Model



Regional Travel Model Uses



Regional Travel Model Application Process



Regional Travel Model Application Process

Variable		Calibrated Base Year	No-Build	Build 1	Build 2	Build 3
Transportation						
	Existing	■	■	■	■	■
	Future		■	■	■	■
	Future Build			■	■	■
Land Use						
	Existing	■	■	■	■	■
	Future No-Build		■	■	■	■
	Future Build			■	■	■
Project						
	Build 1			■		
	Build 2				■	
	Build 3					■
Other Assumptions						
	Gas prices	■	■	■	■	■
	Fare prices	■	■	■	■	■
	Toll costs	■	■	■	■	■

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