NEW USES OF BIG DATA

Caliper®

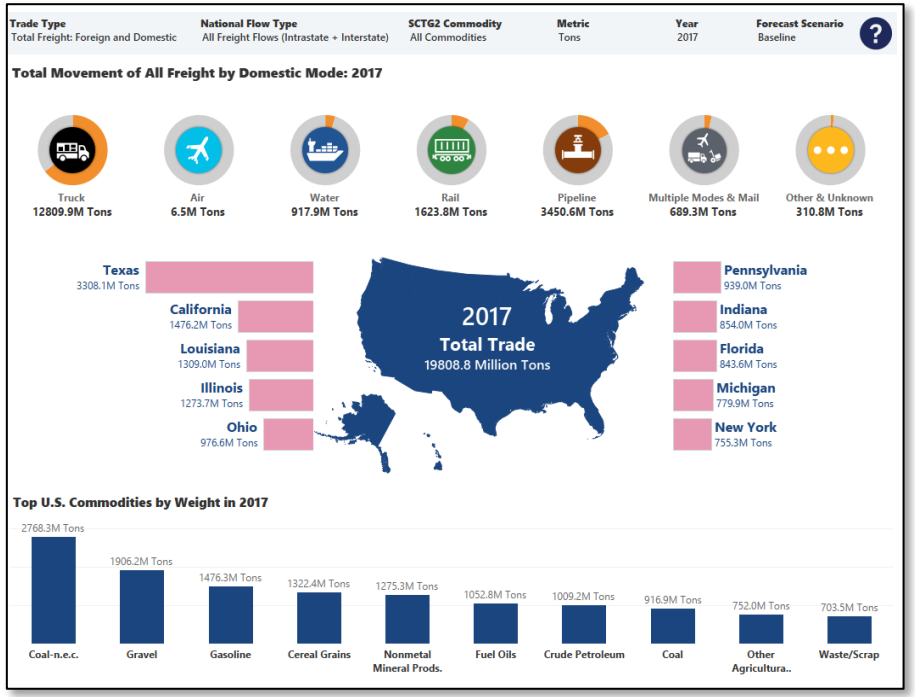
Transportation & Mapping Solutions

Maptitude • TransCAD • TransModeler

FAF5 ROUTE CHOICE

WHAT IS FAF?

FAF5 FHWA Website: https://ops.fhwa.dot.gov/freight/freight_analysis/faf/

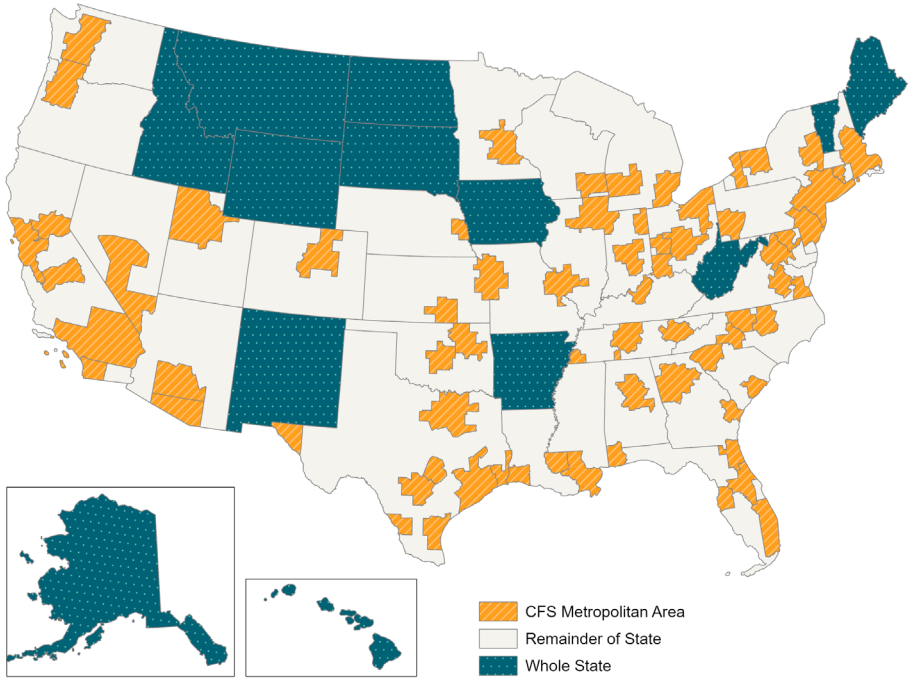


Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework (FAF), version 5.2.

- Attempt to provide a comprehensive picture of the what, where, and how of freight movement in the U.S.
- Joint program of FHWA, BTS, Census Bureau
- Updated every 5 years

WHAT INFORMATION IS INCLUDED IN FAF5?

- What / how much is moving?
  - 42 commodities
  - Tons, ton-miles, value of goods moved
- Where is it moving?
  - 132 FAF / CFS zones
  - Between states, metros, and abroad
- How is it moving?
  - 6 freight modes
- When is it moving?
  - 2017 base year & 3 forecast scenarios



Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework (FAF), version 5.1.

FAF5 NETWORK FLOW OBJECTIVES

- More accurate truck flows
- More transparent process
- Robust querying tools for understanding commodity flows over the national network

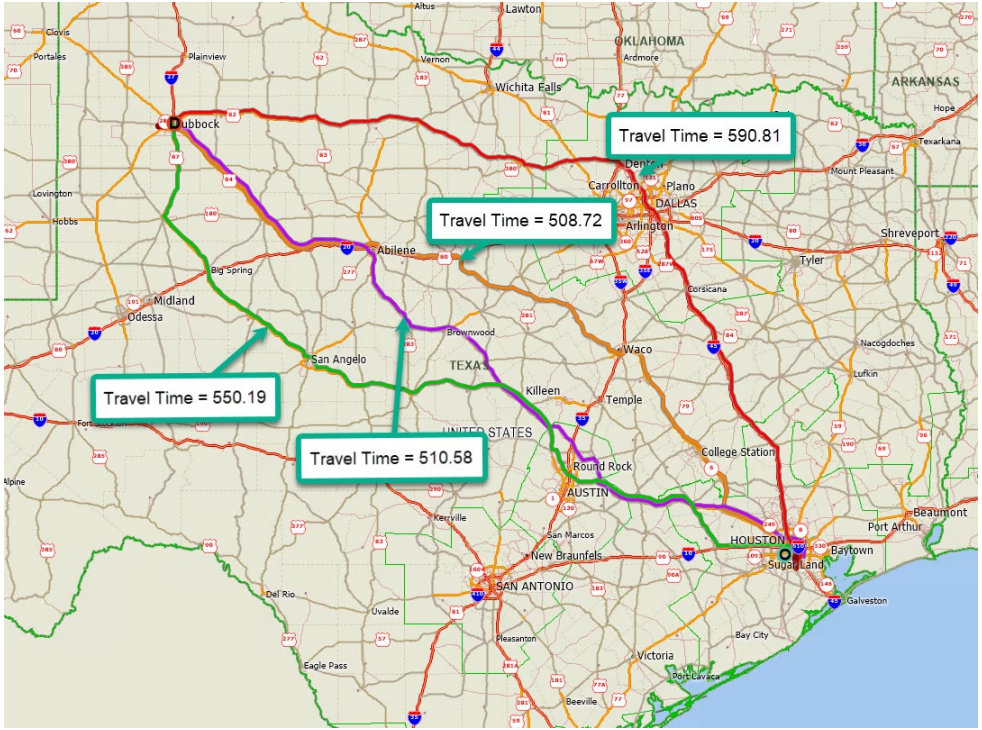
NEW TRUCK ASSIGNMENT BY ROUTE CHOICE

- Intercity truck flows are not based on equilibrium
- Relevant alternative routes are enumerated
  - Routes can be viewed, edited, deleted & added
- Path-size logit is used to allocate shares to routes
- Path choices are based on congested travel times and tolls
- Limited calibration and validation to ATRI data

$$f_p = \frac{e^{\beta \cdot time_p + \gamma \cdot toll_p + \delta ln(S_p)}}{\sum_{p'} e^{\beta \cdot time_{p'} + \gamma \cdot toll_{p'} + \delta ln(S_{p'})}}$$

PATH ENUMERATION

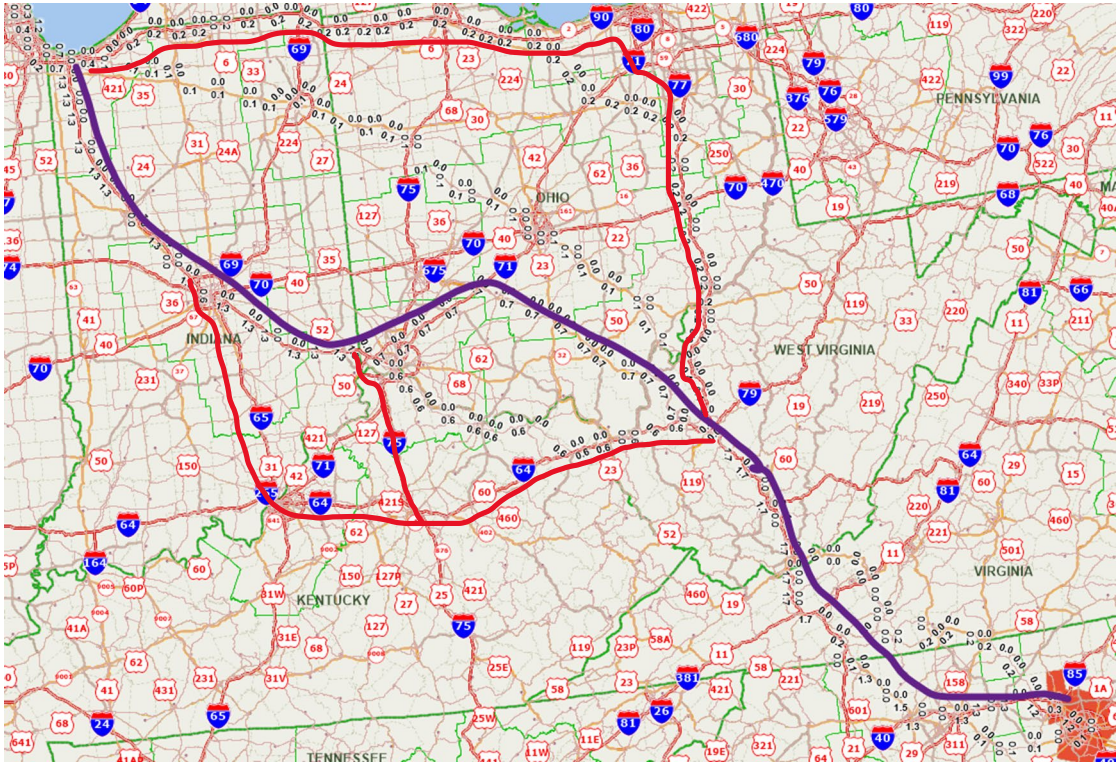
- Up to four paths generated for each OD pair
- Example: Lubbock, TX to Houston, TX



ATRI VALIDATION

- Example: Chicago and Raleigh

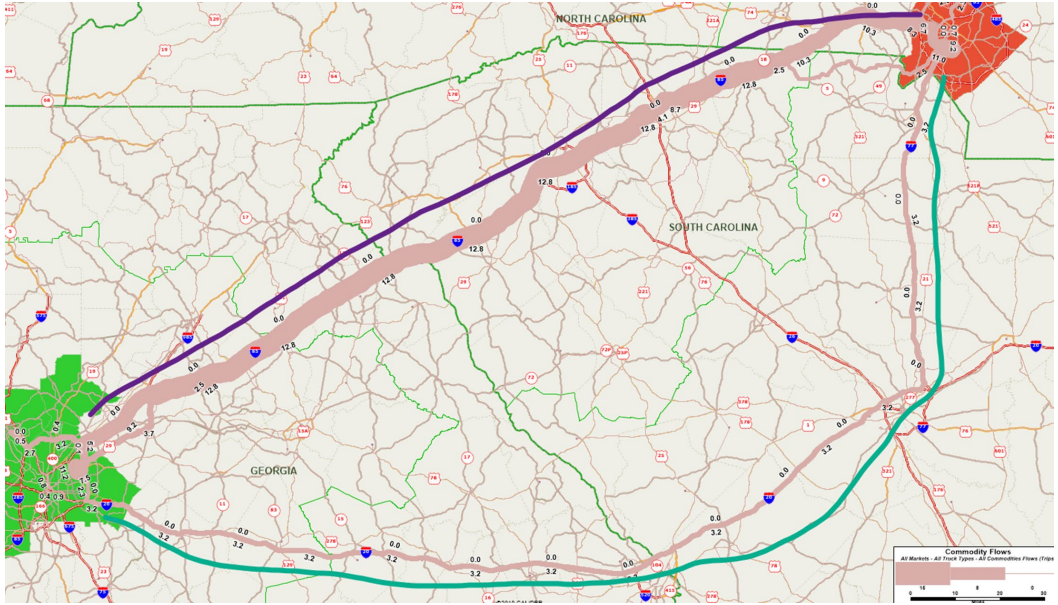
	ATRI	FAF4	FAF5
	70.6%	100%	76.5%
	29.4%	0%	23.5%



ATRI VALIDATION

- Example: Charlotte and Atlanta

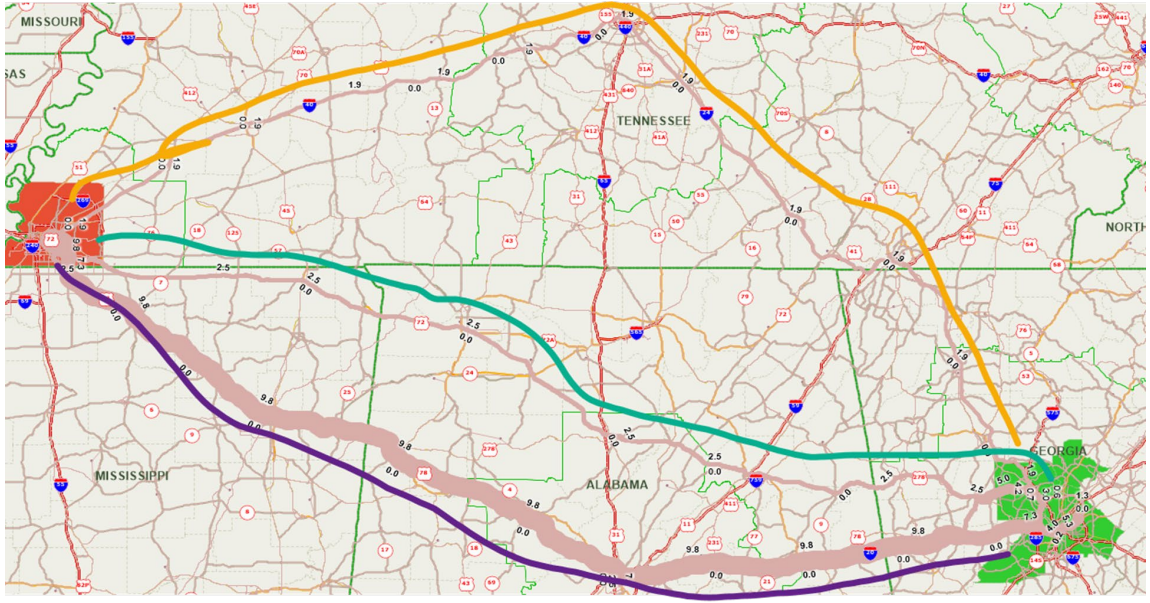
	ATRI	FAF4	FAF5
	89.4%	100%	80.0%
	10.3%	0%	20.0%



ATRI VALIDATION

- Example: Memphis and Atlanta

	ATRI	FAF4	FAF5
	76.7%	100%	69.0%
	15.9%	0%	13.4%
	4.1%	0%	17.6%



NATIONAL TRUCK FLOWS

Estimated Average FAF Daily Volumes for Trucks on National Highway System 2017

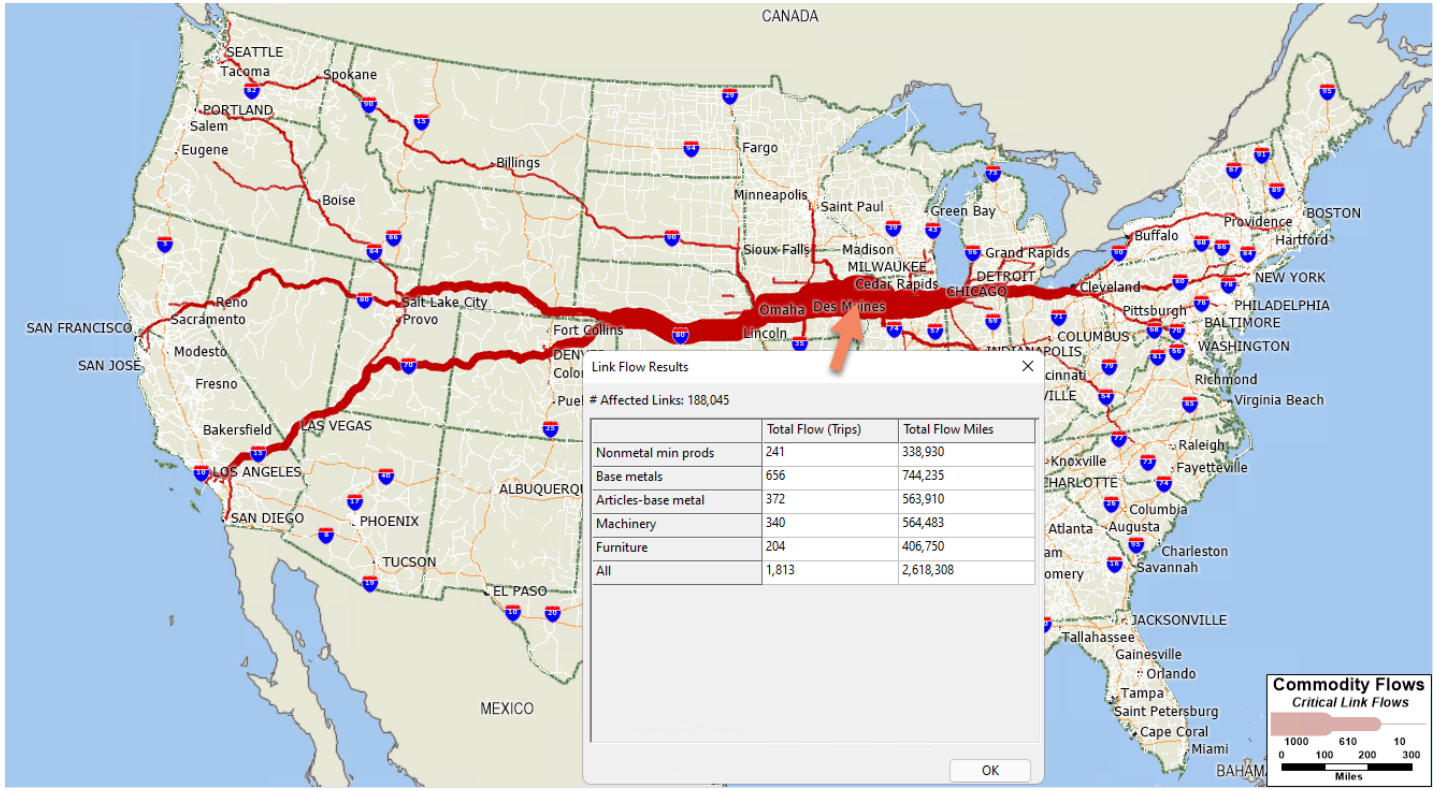
Note: Major flows include domestic and international freight moving by truck on highway segments with more than 25 FAF trucks per day and between places typically more than fifty miles apart.
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework (FAF), version 5.1.
Flows include 42 different commodities represented in FAF.

TRUCKS CARRYING STONE, GRAVEL, ORES

Estimated Average FAF Daily Volumes for Trucks Carrying Solid Stone, Sand, Gravel, and Ores Commodities on National Highway System 2017

Note: Major flows include domestic and international freight moving by truck on highway segments with more than 25 FAF trucks per day and between places typically more than fifty miles apart.
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework (FAF), version 5.1.
Flows include Building stone (SCTG10), Natural Sands (SCTG11), Gravel (SCTG12), Nonmetallic minerals (SCTG13), Metallic ores (SCTF14), and Coal (SCTG15) commodities represented in FAF.

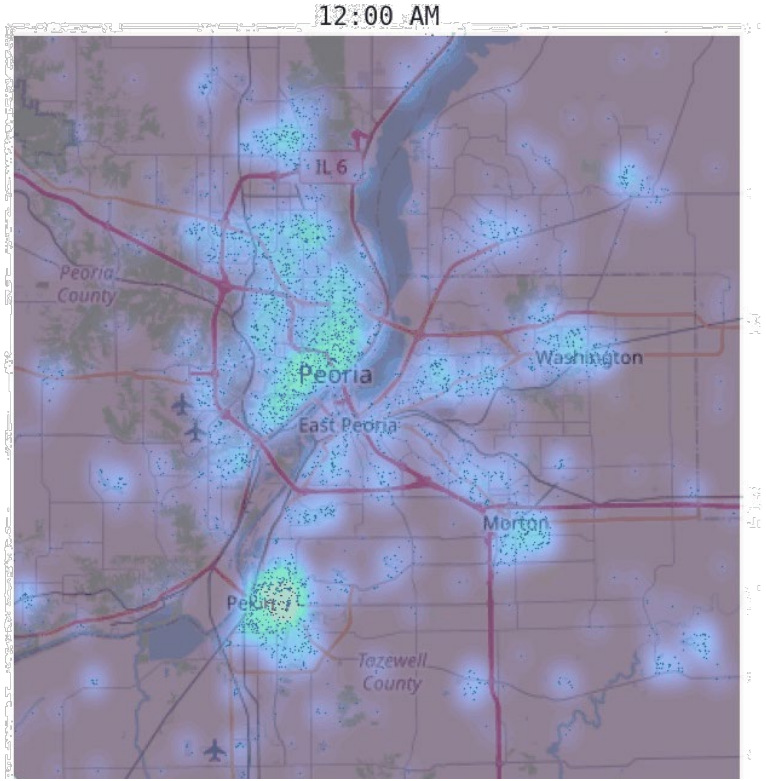
DURABLE GOODS ON I-80 IN IOWA



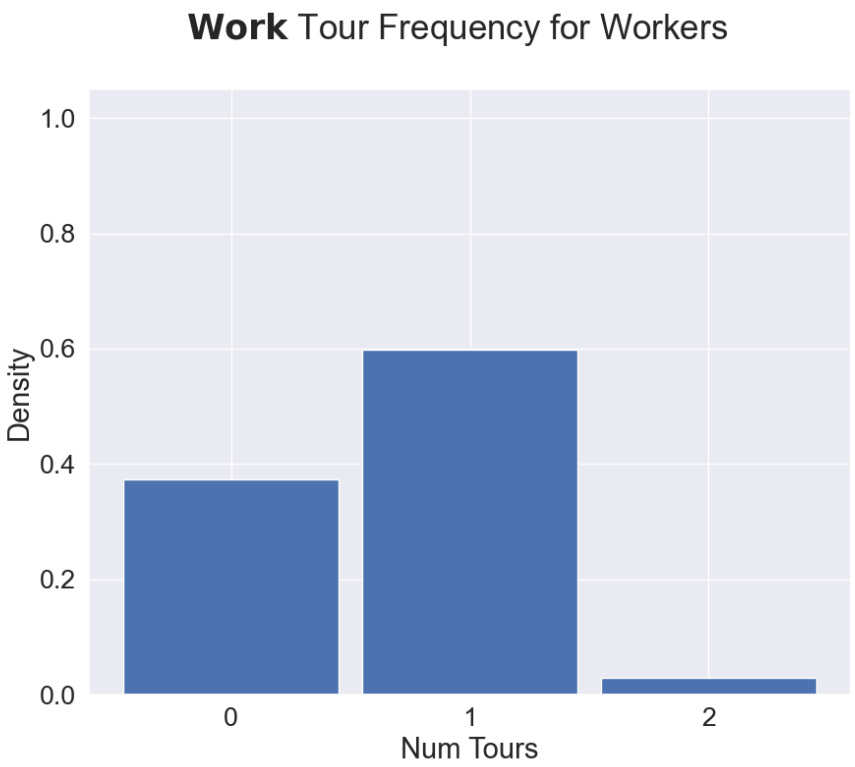
ACTIVITY-BASED METRICS FOR PEORIA

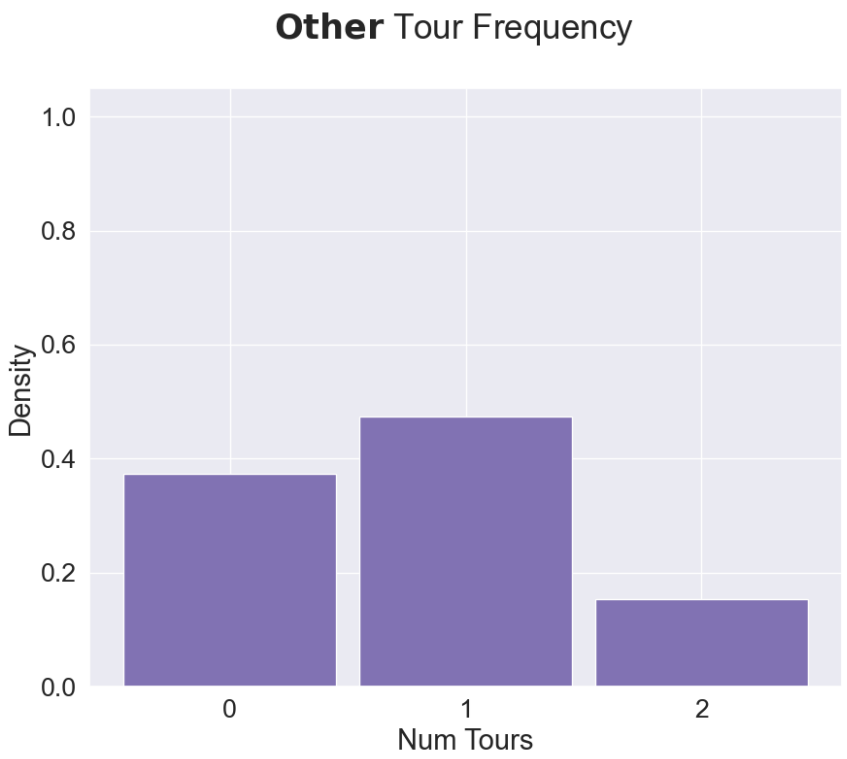
PEORIA ACTIVITY-BASED MODEL

- Peoria got a grant from IDOT to implement an ABM
- Chose to use TransCAD's native ABM
- Did not have survey data
- So, transfer and calibrate to local big data

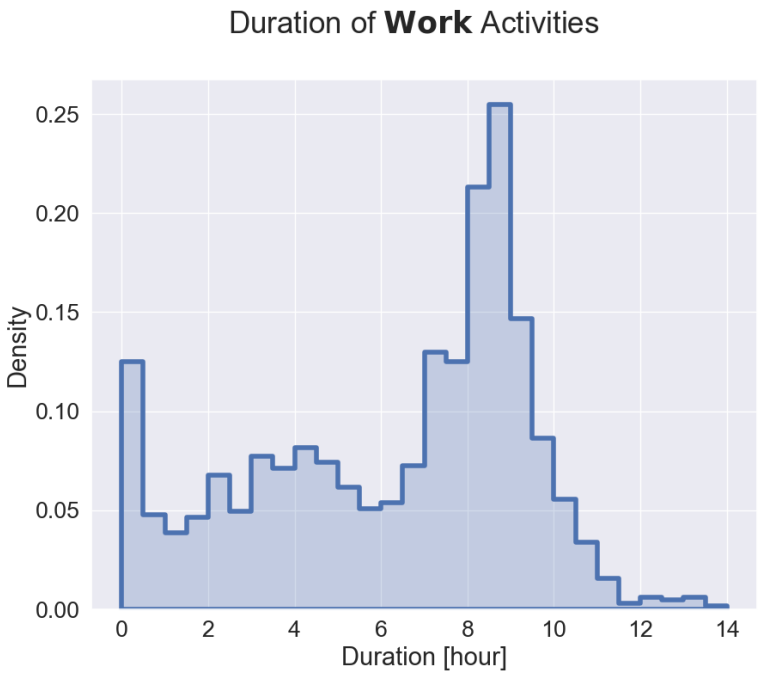


TOUR FREQUENCIES

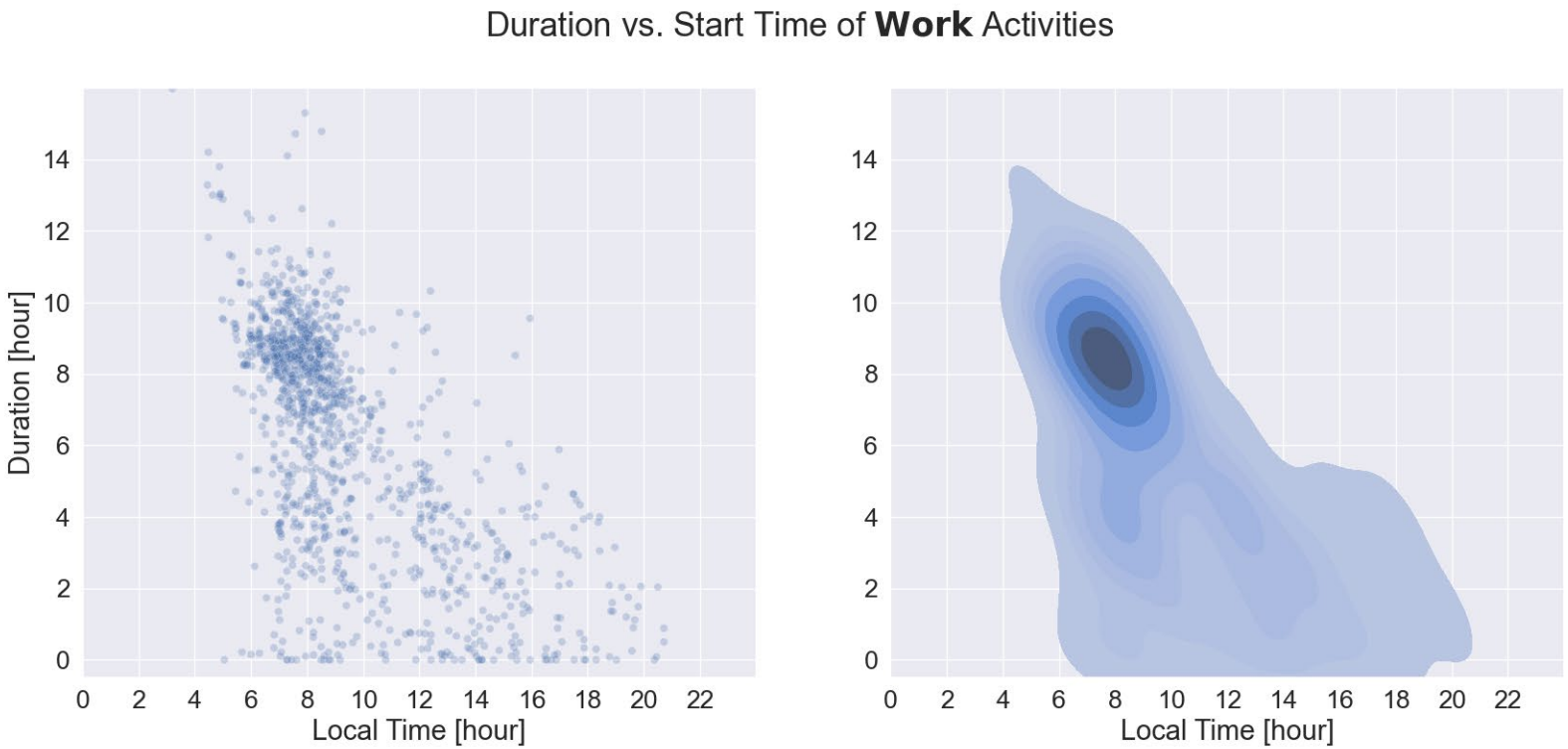




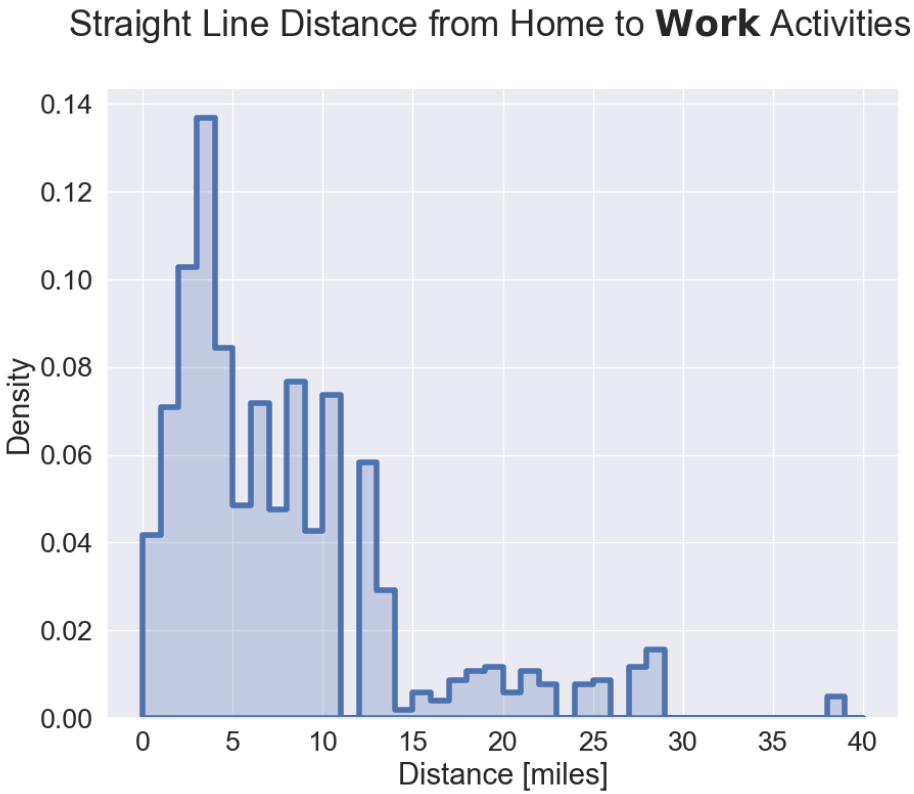
WORK TOUR START TIME AND DURATION



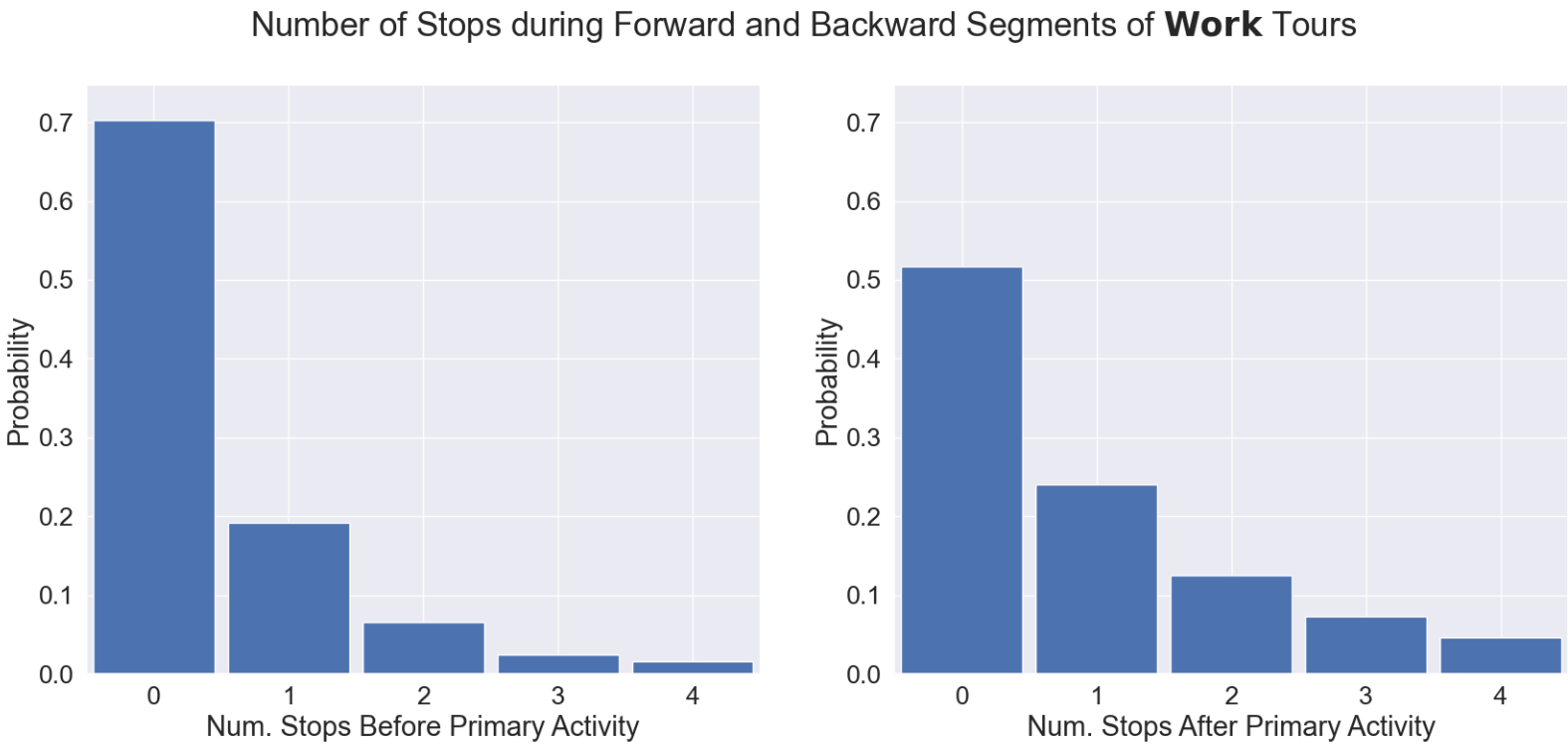
WORK TOUR START TIME AND DURATION



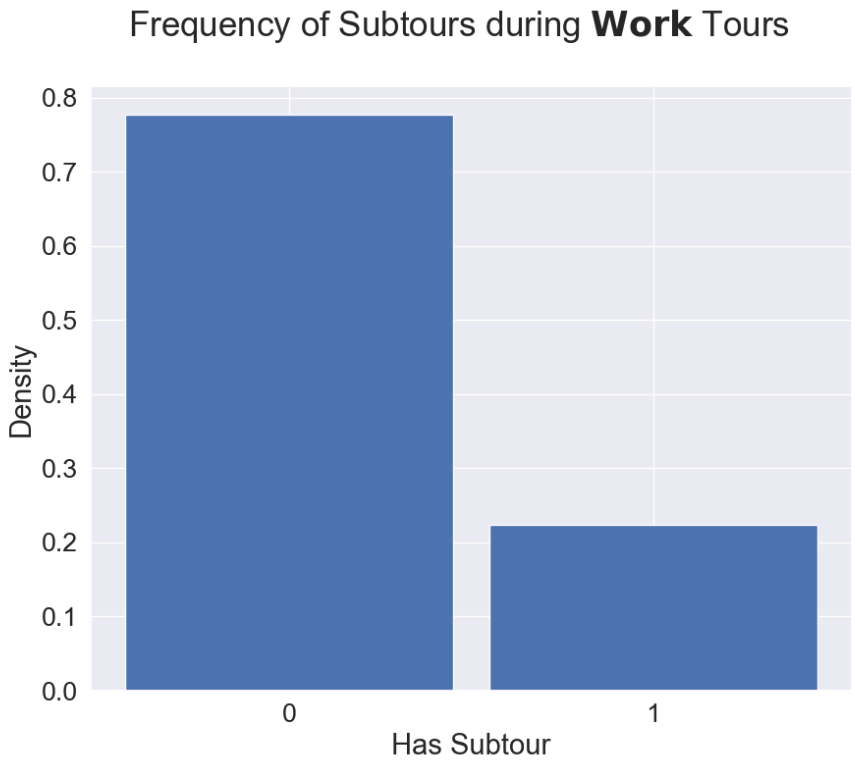
WORK LOCATION CHOICE "TRIP" LENGTHS



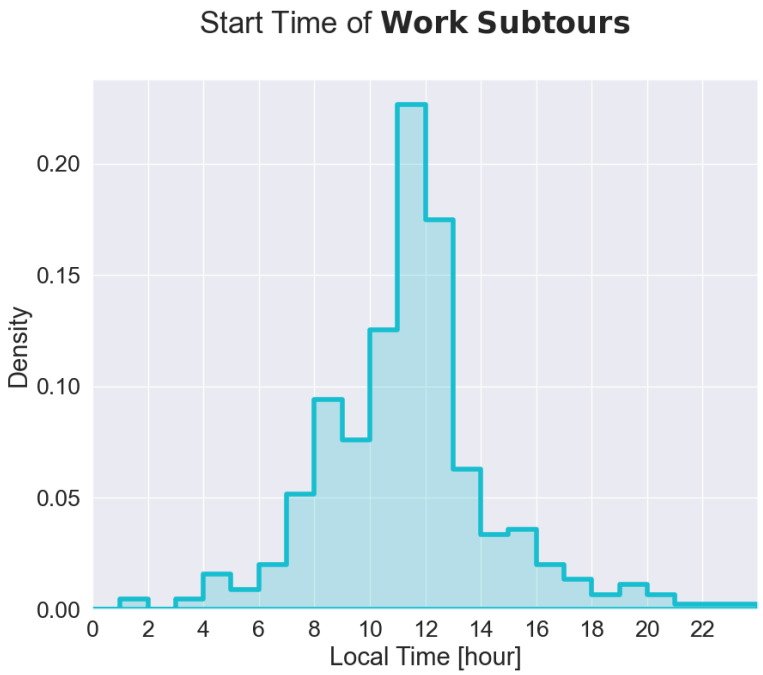
WORK TOUR INTERMEDIATE STOPS

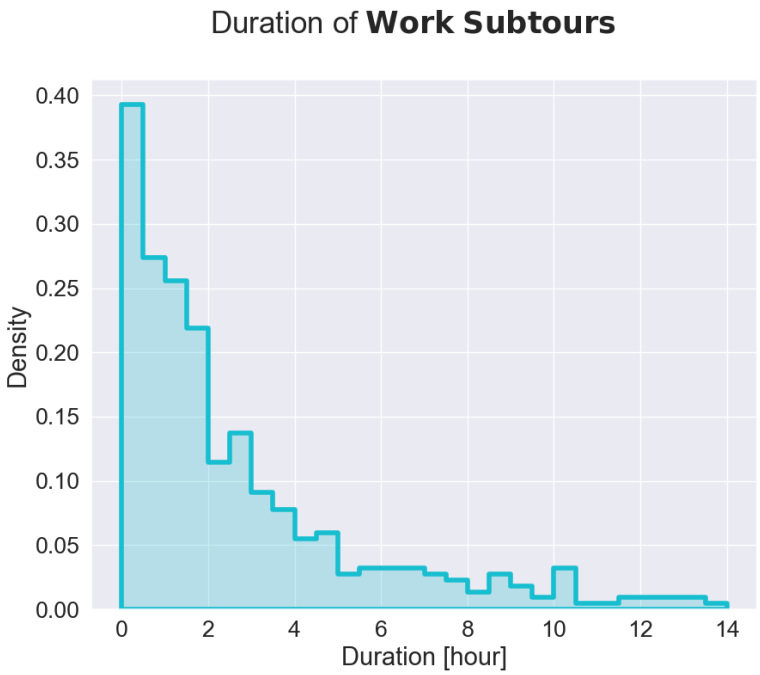


FREQUENCY OF AT-WORK SUBTOURS



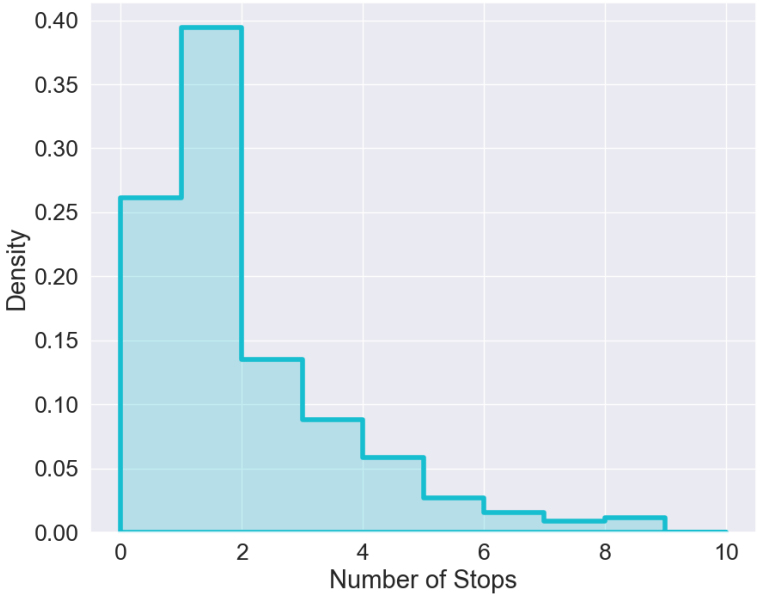
AT-WORK SUBTOURS



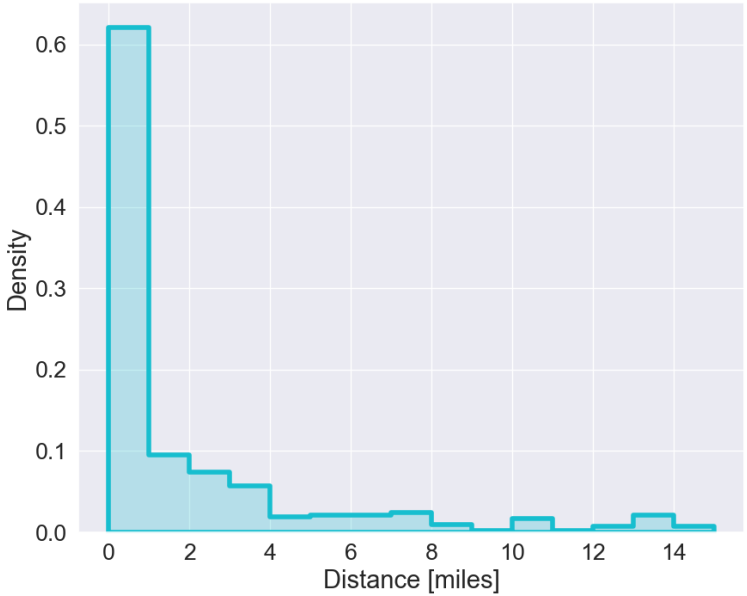


AT-WORK SUBTOURS

Number of Stops during **Work Subtours**

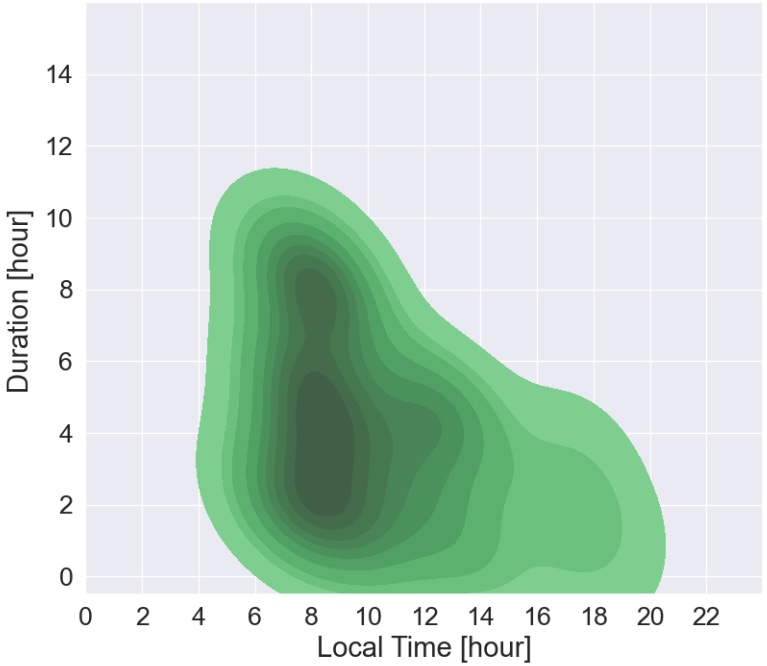


Straight Line Distance from Work to **Subtour Activity**

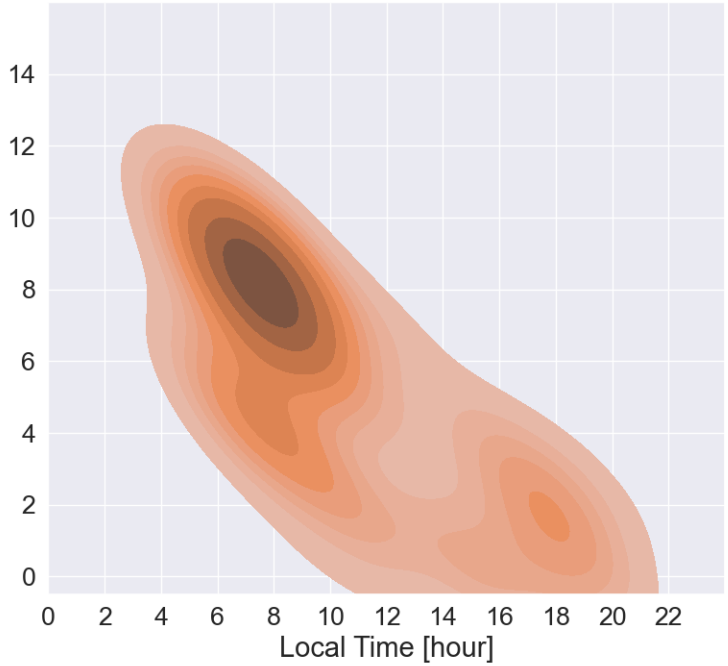


COLLEGE & SCHOOL START TIME & DURATION

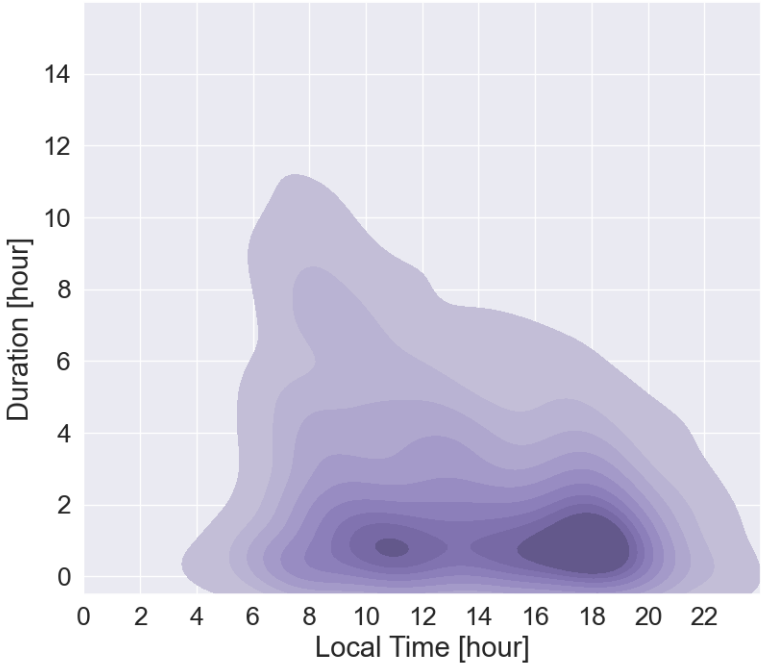
College Activities

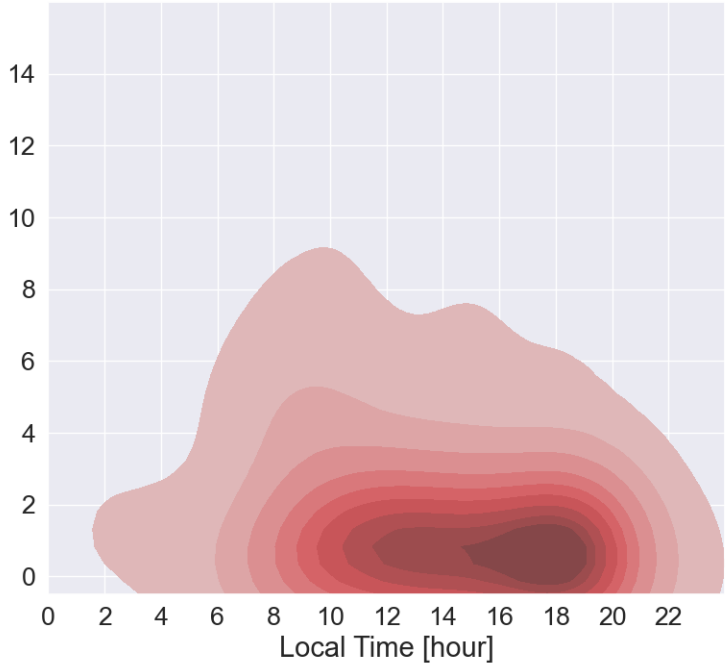


School Activities for Students



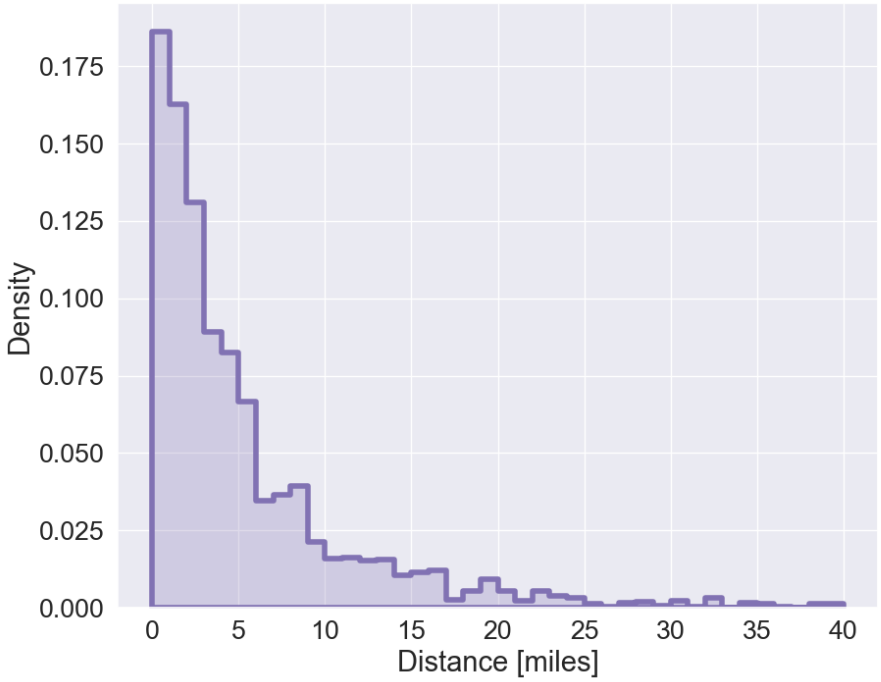
OTHER & SHOP TOURS START TIME & DURATION



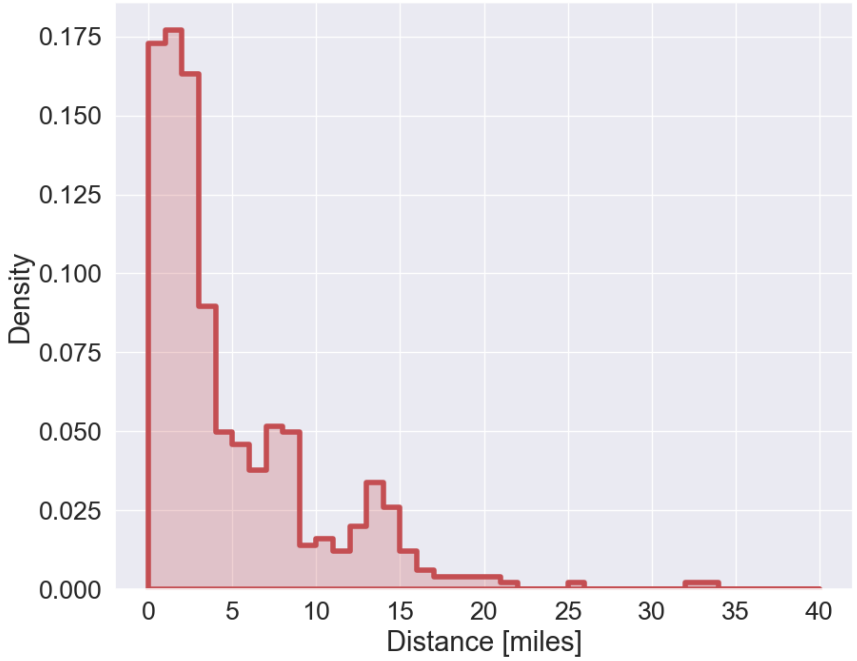


PRIMARY DESTINATION CHOICE

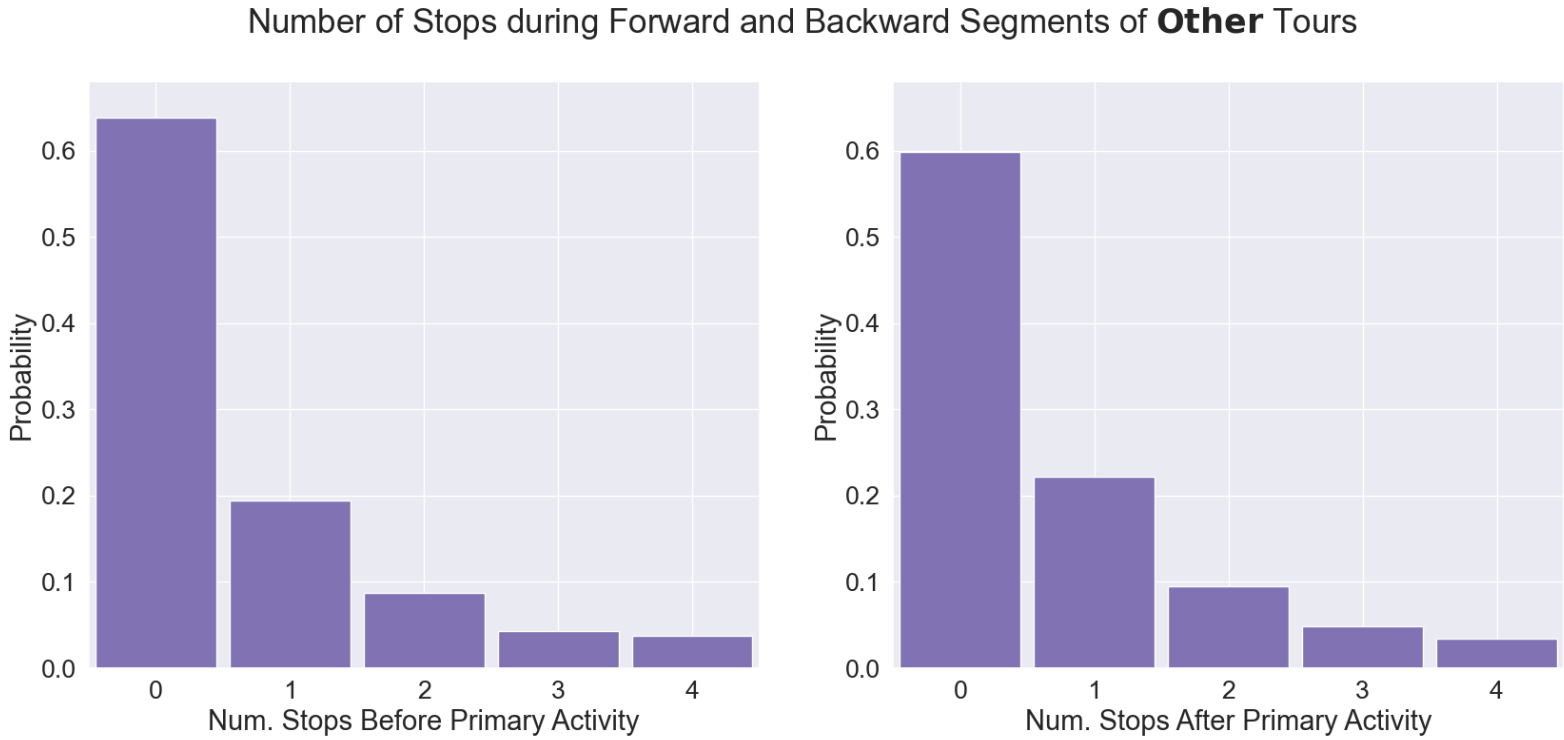
Straight Line Distance from Home to **Other** Activities



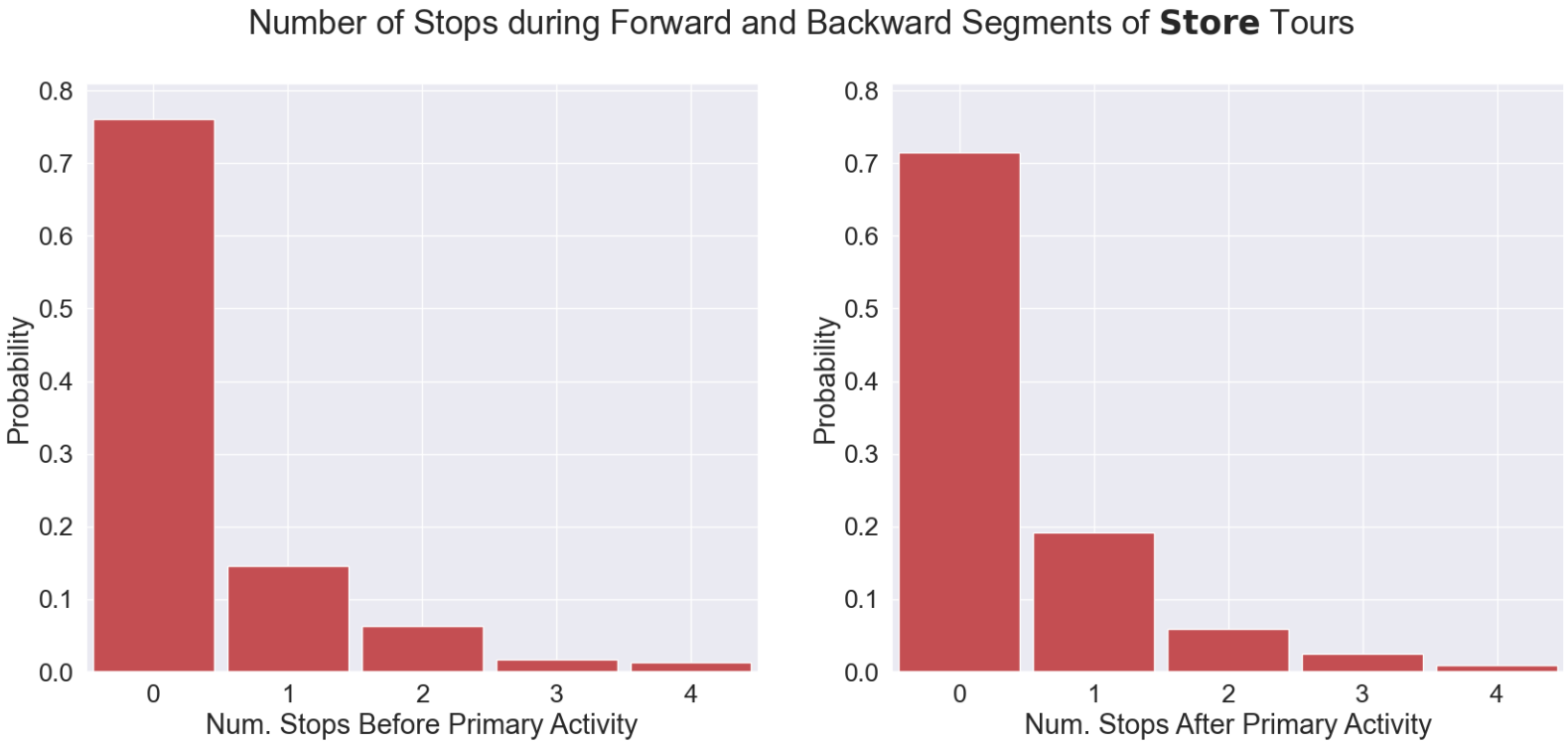
Straight Line Distance from Home to **Store** Activities



OTHER TOUR INTERMEDIATE STOPS

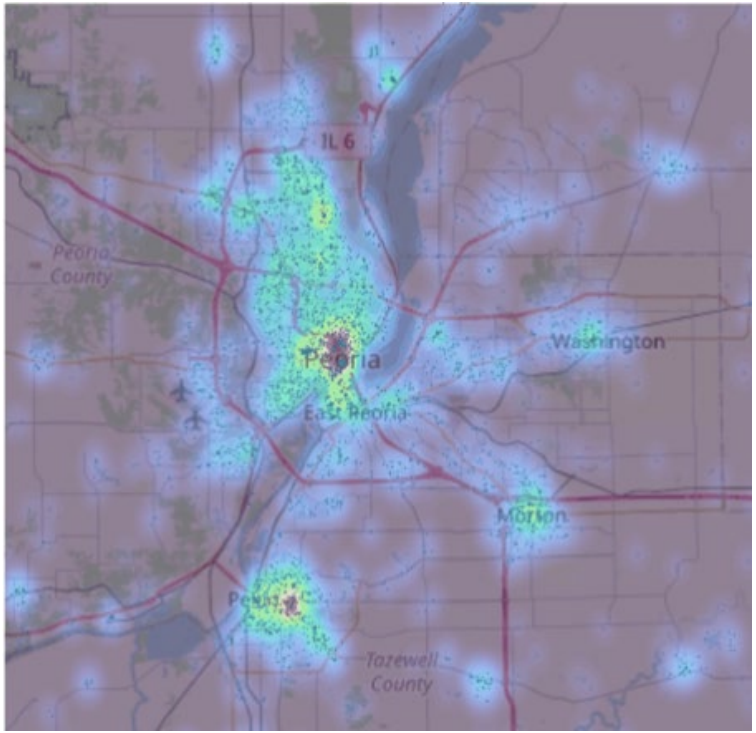


SHOP TOUR INTERMEDIATE STOPS



BIG DATA PROVIDED MOST ABM CALIBRATION TARGETS

- Big Data provided:
  - Tour Frequencies
  - Tour Start Times
  - Activity & Tour Durations
  - Number of Intermediate Stops
  - Trip Length Frequency Distributions
- Big Data did not provide:
  - Tour/trip mode shares
  - Joint/Solo tour statistics



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