



Think  Forward

# Recent Model Developments Using Big Data in Fayetteville and Virginia

*presented to*  
NCMUG

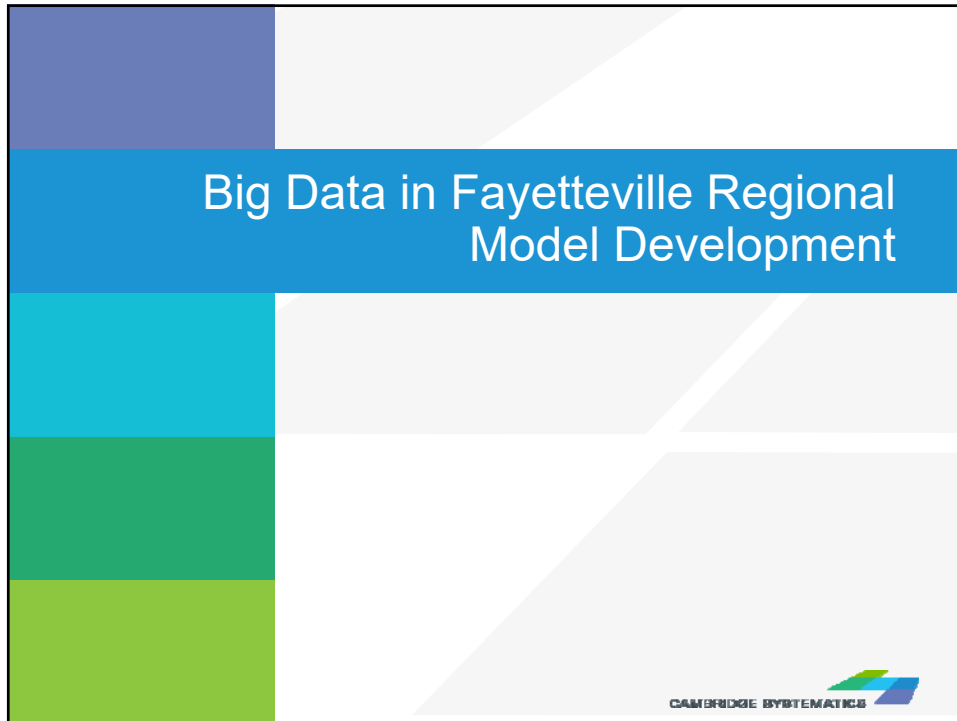
*presented by*  
Cambridge Systematics, Inc.  
Feng Liu, Ph.D.  
John Lewis

11/1/2018


## Presentation Outline

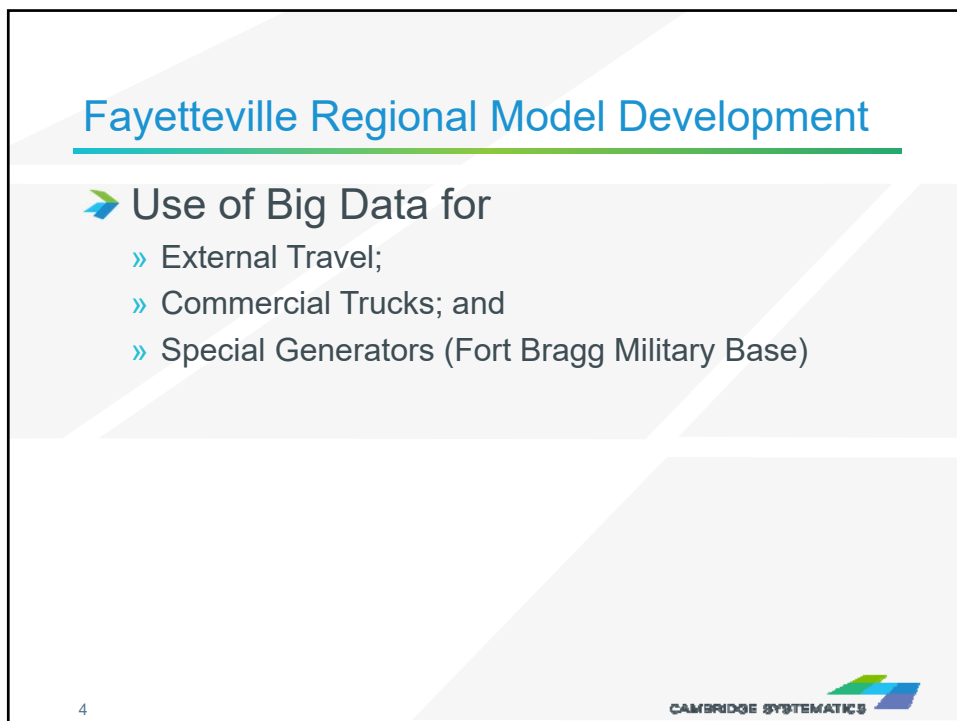
---

- Use of Big Data in the Fayetteville Regional Model Development
- Big Data in Lynchburg Regional Model Development and Virginia Statewide Transportation Model Development
- Recent Progress and Studies



# Big Data in Fayetteville Regional Model Development


CAMBRIDGE SYSTEMATICS 



## Fayetteville Regional Model Development

- Use of Big Data for
  - » External Travel;
  - » Commercial Trucks; and
  - » Special Generators (Fort Bragg Military Base)

4

CAMBRIDGE SYSTEMATICS 

## Fayetteville Region



Category	Fort Bragg
Area Population (2015)	425,000
Area Total Employees (2015)	180,790
Active Duty Soldiers	52,280
Reservists	12,624
Civilian Employees	8,757
Army Retirees & Family Members in Area	98,507

5

CAMBRIDGE SYSTEMATICS

## Fort Bragg Modeling

- Capture the unique travel dynamics related to Fort Bragg Military Base
- Sensitive to changes in socio-economic data
- Sensitive to changes in transportation supply



*Treat the military base as a special market with at least three person trip purposes including HBW, HBO, and NHB and at least one commercial vehicle trip purpose.*

6

CAMBRIDGE SYSTEMATICS

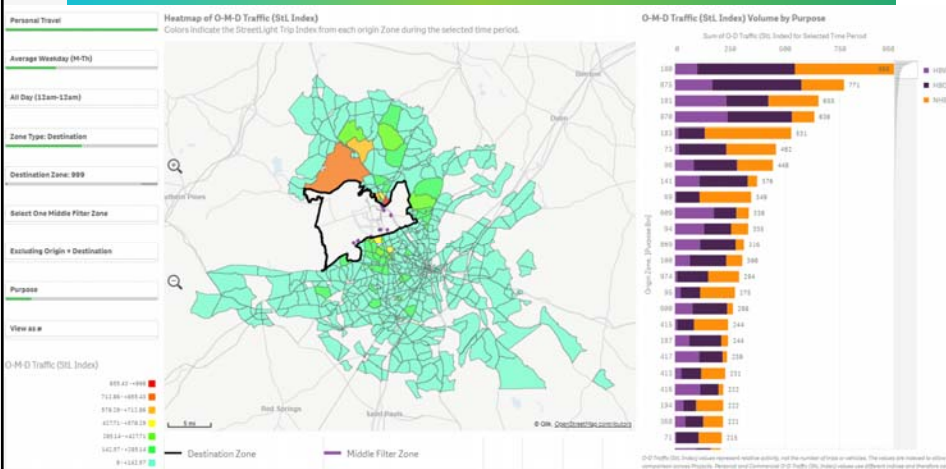
## Observed Data

- Reviewed local observed data for the development of parameters including the Household Travel Survey
- Reviewed additional outside sources for information about the trip making characteristics of Military Bases
  - » ITE Trip Generation Rates
  - » El Paso MPO Travel Model – Fort Bliss model(s)
- Acquired Streetlight Data for MPO Region

7



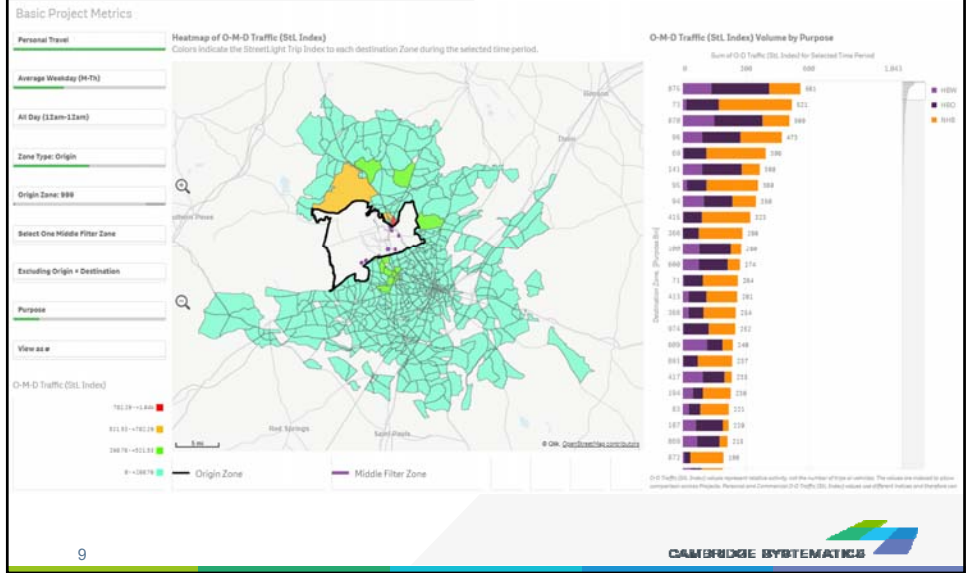
## Military Base Origins (Streetlight data)



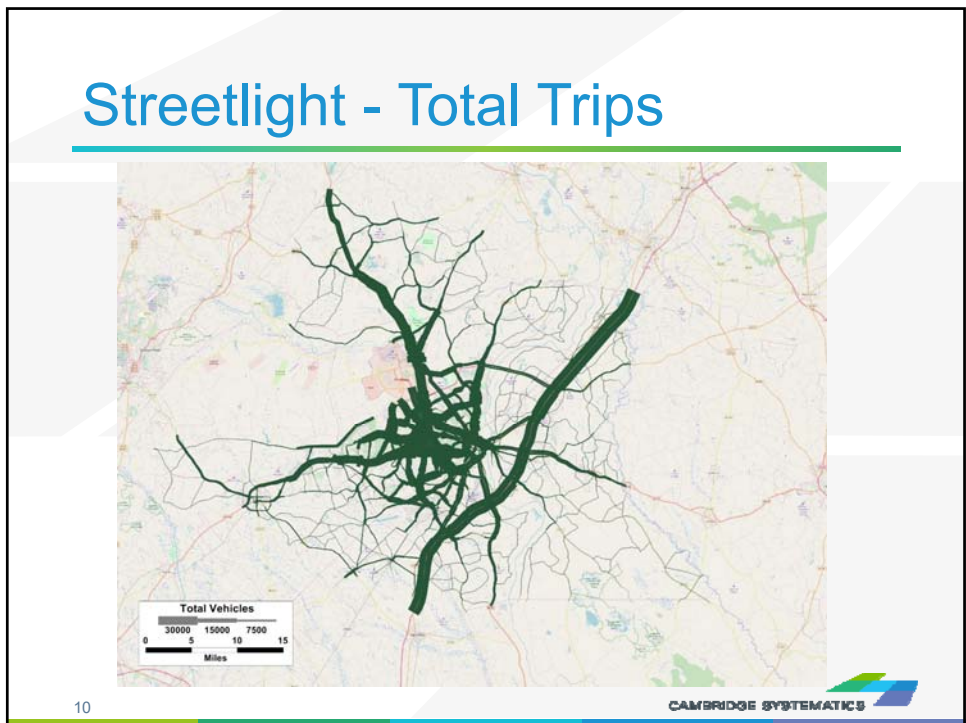
8



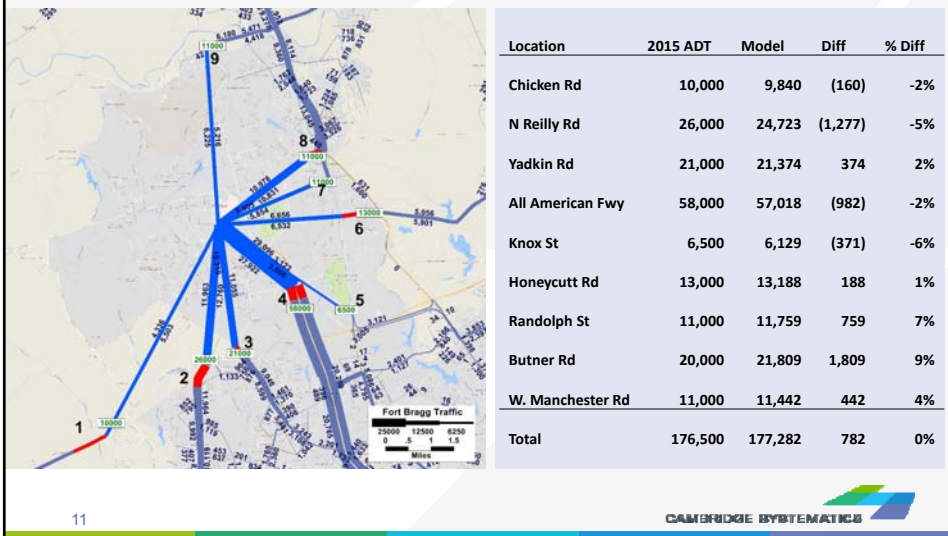
# Military Base Destinations (Streetlight data)



# Streetlight - Total Trips



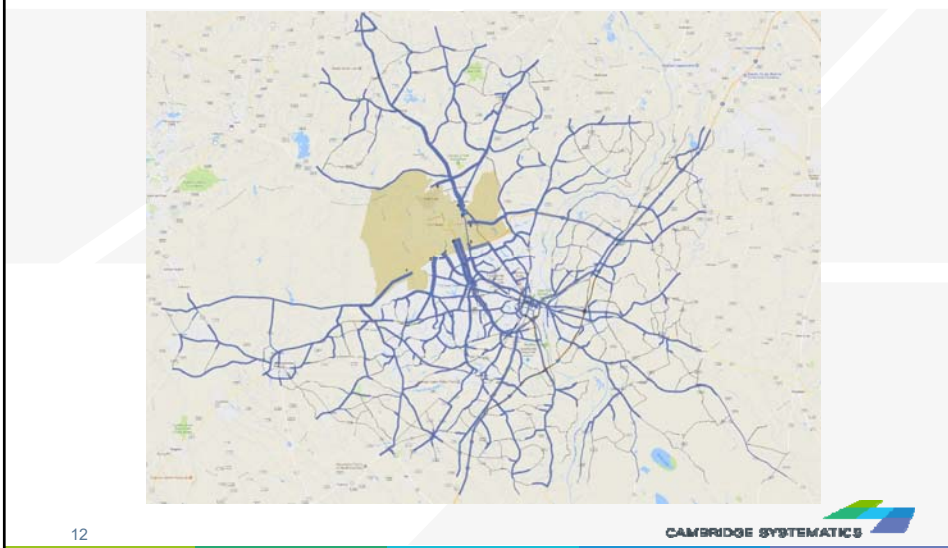
## Calibrated Daily Traffic to/from Military Base



11



## Military Base Daily Passenger Vehicle Trips



12





## Model Components Based on Streetlight Data

- Base Year External Vehicle Trips
  - » Trucks and Passenger Vehicles
- Base Year Internal Truck Trips
- Base Year Military Base Trips

15



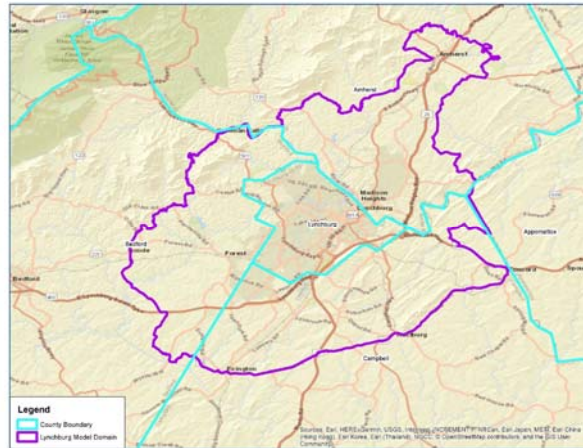
## Big Data in Model Developments in Virginia





## Lynchburg Regional Model Development

- Use of Big Data for External Travel and Commercial Trucks



17

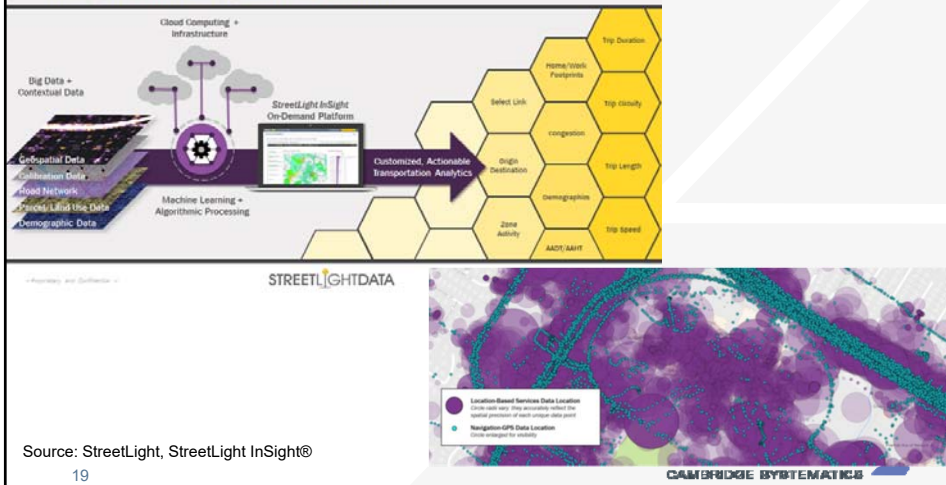
## Lynchburg Regional Model Development

- External Travel
  - » StreetLight LBS
- Commercial Trucks
  - » StreetLight GPS
- Develop trip tables using Origin Destination Matrix Estimation (ODME)

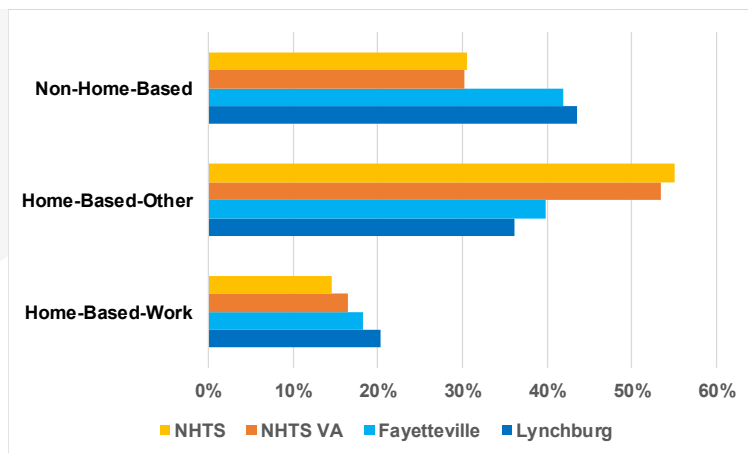
18

# Location-Based Services and GPS-Based

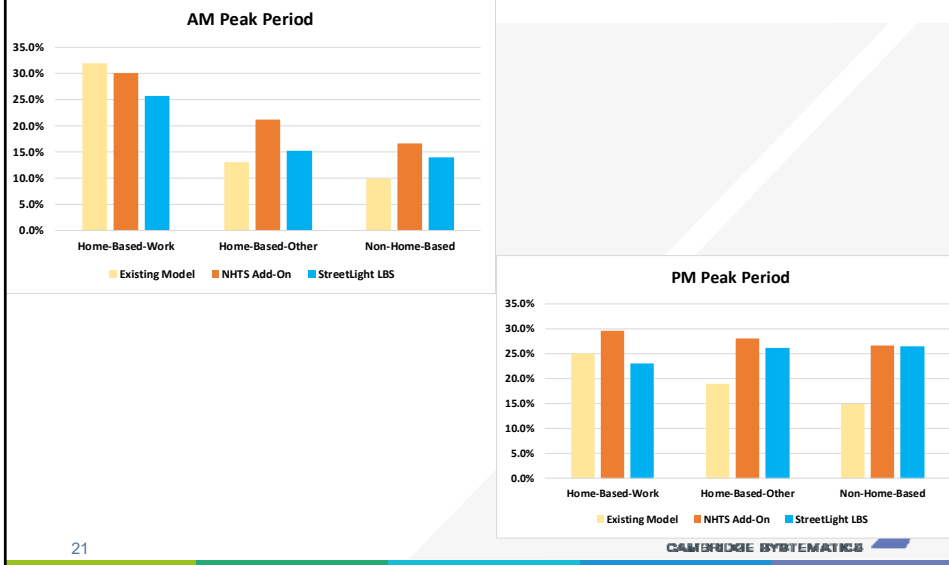
StreetLight InSight Turns Big Data into Actionable Transportation Analytics On Demand



# Shares of Trips by Trip Purpose



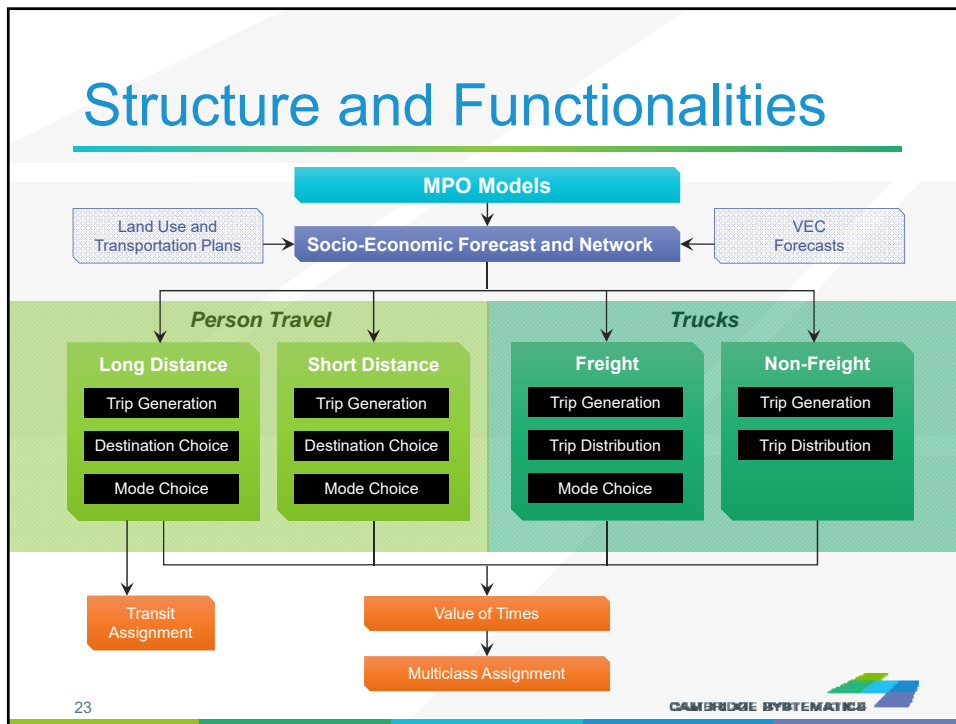
## Time of Day Factors



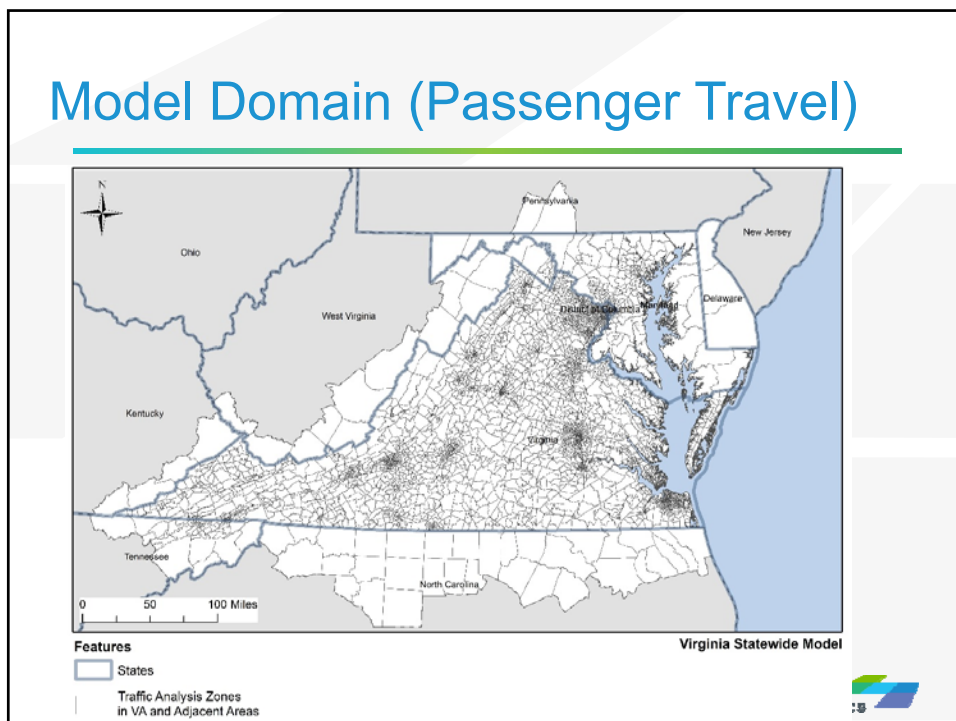
## Virginia Statewide Transportation Model

- Big data in model development and validation:
  - » special generators
  - » external travel
  - » intra-state truck trips

# Structure and Functionalities

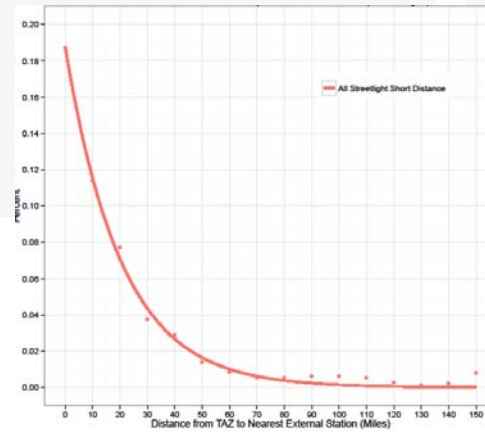


# Model Domain (Passenger Travel)



## External Travel

### ➤ Internal-External Share Model



25

CAMBRIDGE SYSTEMATICS

## Special Generators

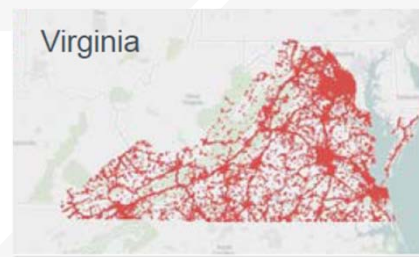
- Airports
  - » ITE Airport Trip Generation Rates
  - » StreetLight OD tables
- Recreational Travel
  - » Visitation
  - » StreetLight OD tables

26

CAMBRIDGE SYSTEMATICS

## Intra-State Truck Trips

- Non-Freight Truck Travel
  - » ATRI Data
  - » Developed truck trip tables using Origin Destination Matrix Estimation (ODME)



27

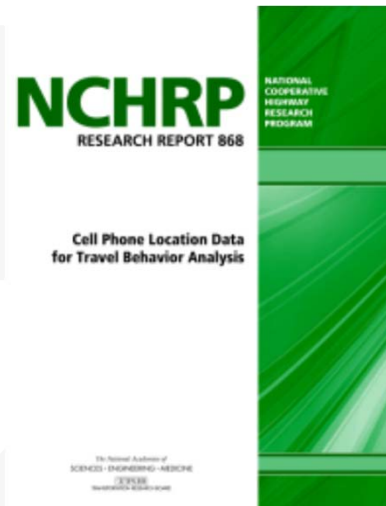


## Recent Progress



## NCHRP 08-95: Cell Phone Location Data for Travel Behavior Analysis

- » Cambridge Systematics
- » MIT



29

CAMBRIDGE SYSTEMATICS

## CS Research

- Location-Based Services
  - » LA Metro
  - » Caltrans Next-Gen
- Shared Mobility
  - » Rideshare
  - » Bikeshare
- Visitor
  - » Taxi data
  - » Airbnb

30

CAMBRIDGE SYSTEMATICS

## Acknowledgments

---

- Cambridge Systematics, Inc.
  - » Kimon Proussaloglou, Ph.D.
  - » Jay Evans, P.E.
- NCDOT
  - » Tae-Gyu Kim, Ph.D.
  - » Soon Chung, Ph.D.
- VDOT
  - » Peng Xiao, P.E.
  - » Yifang Yuan, P.E.
- StreetLight
  - » Kim Harrison

31



## Contact Information

---

- |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>➤ Feng Liu<ul style="list-style-type: none"><li>» fliu@camsys.com</li><li>» +1.301.347.9100</li></ul></li><li>➤ John Lewis<ul style="list-style-type: none"><li>» jlewis@camsys.com</li><li>» +1.919.741.7698</li></ul></li></ul> | <ul style="list-style-type: none"><li>➤ CS Raleigh Office<ul style="list-style-type: none"><li>» 1201 Edwards Mill Road,<br/>Suite 130<br/>Raleigh, NC 27607</li></ul></li></ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

32

