Recent Model Developments Using Big Data in Fayetteville and Virginia

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

Fayetteville Regional Model Development

» Use of Big Data for
  » External Travel;
  » Commercial Trucks; and
  » Special Generators (Fort Bragg Military Base)
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 | 8,707
Army Retirees & Family Members in Area | 98,507

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.*
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

Military Base Origins
(Streetlight data)
Military Base Destinations
(Streetlight data)

Streetlight - Total Trips
Calibrated Daily Traffic to/from Military Base

<table>
<thead>
<tr>
<th>Location</th>
<th>2015 ADT</th>
<th>Model</th>
<th>Diff</th>
<th>% Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Rd</td>
<td>10,000</td>
<td>9,840</td>
<td>160</td>
<td>-2%</td>
</tr>
<tr>
<td>N Reilly Rd</td>
<td>26,000</td>
<td>24,723</td>
<td>1,277</td>
<td>-5%</td>
</tr>
<tr>
<td>Yadkin Rd</td>
<td>21,000</td>
<td>21,374</td>
<td>374</td>
<td>2%</td>
</tr>
<tr>
<td>All American Fwy</td>
<td>58,000</td>
<td>57,018</td>
<td>982</td>
<td>-2%</td>
</tr>
<tr>
<td>Knox St</td>
<td>6,500</td>
<td>6,129</td>
<td>371</td>
<td>-6%</td>
</tr>
<tr>
<td>Honeycut Rd</td>
<td>13,000</td>
<td>13,188</td>
<td>188</td>
<td>1%</td>
</tr>
<tr>
<td>Randolph St</td>
<td>11,000</td>
<td>11,759</td>
<td>759</td>
<td>7%</td>
</tr>
<tr>
<td>Butner Rd</td>
<td>20,000</td>
<td>21,809</td>
<td>1,809</td>
<td>9%</td>
</tr>
<tr>
<td>W. Manchester Rd</td>
<td>11,000</td>
<td>11,442</td>
<td>442</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>176,500</td>
<td>177,282</td>
<td>782</td>
<td>0%</td>
</tr>
</tbody>
</table>

Military Base Daily Passenger Vehicle Trips
Approach to Future Year ODs

- Use Calibrated Streetlight OD data for Base Year
- Develop Origin and Destination Growth Factors for Fort Bragg Trips and External Travel
  - Use MPO model trip rates to estimate trip ends for TAZs
  - Estimate trip ends for Fort Bragg Military Base TAZ
- Estimate Future Year Trip Ends by Purpose
  - Fratar Base Year ODs to match future trip-ends.

Streetlight Trucks
### 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**

### Big Data in Model Developments in Virginia
Lynchburg Regional Model Development

- Use of Big Data for External Travel and Commercial Trucks

External Travel
  » StreetLight LBS

Commercial Trucks
  » StreetLight GPS

Develop trip tables using Origin Destination Matrix Estimation (ODME)
Location-Based Services and GPS-Based

StreetLight InSight Turns Big Data into Actionable Transportation Analytics On Demand

Shares of Trips by Trip Purpose

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

NHTS, NHTS VA, Fayetteville, Lynchburg
Time of Day Factors

Virginia Statewide Transportation Model

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

Source: FHWA Overview of Capital Investment Grant Program
Structure and Functionalities

MPO Models

Land Use and Transportation Plans
Socio-Economic Forecast and Network
VEC Forecasts

Person Travel

Long Distance
- Trip Generation
- Destination Choice
- Mode Choice

Short Distance
- Trip Generation
- Destination Choice
- Mode Choice

Trucks

Freight
- Trip Generation
- Trip Distribution
- Mode Choice

Non-Freight
- Trip Generation
- Trip Distribution
- Mode Choice

Transit Assignment
Value of Times
Multiclass Assignment

Model Domain (Passenger Travel)

Virginia Statewide Model
External Travel

- Internal-External Share Model

![Graph showing distance vs. frequency of trips]

Special Generators

- Airports
  - ITE Airport Trip Generation Rates
  - StreetLight OD tables

- Recreational Travel
  - Visitation
  - StreetLight OD tables
Intra-State Truck Trips

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

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

» Cambridge Systematics
» MIT

CS Research

» Location-Based Services
  » LA Metro
  » Caltrans Next-Gen

» Shared Mobility
  » Rideshare
  » Bikeshare

» Visitor
  » Taxi data
  » Airbnb
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

Contact Information

- Feng Liu
  - fliu@camsys.com
  - +1.301.347.9100
- John Lewis
  - jlewis@camsys.com
  - +1.919.741.7698

- CS Raleigh Office
  - 1201 Edwards Mill Road, Suite 130
  - Raleigh, NC 27607