Recent Model Developments Using Big Data in Fayetteville and Virginia

presented to
NCMUG

presented by
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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
Use of Big Data for
» External Travel;
» Commercial Trucks; and
» Special Generators (Fort Bragg Military Base)
## Fayetteville Region

<table>
<thead>
<tr>
<th>Category</th>
<th>Fort Bragg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Population (2015)</td>
<td>425,000</td>
</tr>
<tr>
<td>Area Total Employees (2015)</td>
<td>180,790</td>
</tr>
<tr>
<td>Active Duty Soldiers</td>
<td>52,280</td>
</tr>
<tr>
<td>Reservists</td>
<td>12,624</td>
</tr>
<tr>
<td>Civilian Employees</td>
<td>8,757</td>
</tr>
<tr>
<td>Army Retirees &amp; Family Members in Area</td>
<td>98,507</td>
</tr>
</tbody>
</table>

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### Legend
- Facility Type
  - Interstate
  - Freeway
  - High-Speed Ramps
  - Low-Speed Ramps
  - Multiple Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - TAZ-Defined Connector

### Military Base and Off-Base Areas
- Fort Bragg Military Base
- Off-Base Areas
- Other TAZs
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.*
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)

Basic Project Metrics

Heatmap of O-D Traffic (StL Index)
Colors indicate the StreetLight Trip Index to each destination Zone during the selected time period.

O-D Traffic (StL Index) Volume by Purpose
Sum of O-D Traffic (StL Index) for Selected Time Period

View as

O-D Traffic (StL Index) values represent relative activity, not the number of trips or vehicles. The volumes are indexed to allow comparison across Projects. Personal and Commercial O-D Traffic (StL Index) values use different indices and therefore are not comparable.
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>Honeycutt 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><strong>176,500</strong></td>
<td><strong>177,282</strong></td>
<td><strong>782</strong></td>
<td><strong>0%</strong></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
Lynchburg Regional Model Development

- 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

Source: StreetLight, StreetLight InSight®
Shares of Trips by Trip Purpose

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

Graph showing the percentage of trips for different purpose categories.
Time of Day Factors

**AM Peak Period**

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

- Existing Model
- NHTS Add-On
- StreetLight LBS

**PM Peak Period**

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

- Existing Model
- NHTS Add-On
- StreetLight LBS
Virginia Statewide Transportation Model

Big data in model development and validation:

» special generators
» external travel
» intra-state truck trips
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

Transit Assignment

Value of Times

Multiclass Assignment
Model Domain (Passenger Travel)
External Travel

Internal-External Share Model
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
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