Introduction

• This project replaces the trip-based truck model with a truck touring model.

• Truck touring model uses GPS truck data to update truck model parameters

• This model is designed to reflect decisions by shippers, receivers, and truck operators.
Introduction

• Commercial travel GPS survey
  • Conducted by RSG with a smartphone app and
  • Supplemented with truck GPS data (EROAD & INRIX).

• Processed and analyze the GPS survey data
  • GIS methods
  • ESRI geoprocessing tools

• Geospatial results will be presented on truck route patterns.
Model Region Overview
Survey Data & rMove
Survey Data Collection

- In-house smartphone app (rMove)
  - Collects series of GPS waypoints for each trip.
  - Waypoints stamped with the data and time.

- After each trip the app prompts the user with questions.

- Trips are identified with
  - A driver id,
  - Trip id, and
  - A sequence of longitude and latitude coordinate pairs
# Survey Data Analysis

- Light • Medium • Heavy

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>II</th>
<th>IX</th>
<th>XI</th>
<th>XX</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>189</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>209</td>
<td>35%</td>
</tr>
<tr>
<td>Medium</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>2%</td>
</tr>
<tr>
<td>Heavy</td>
<td>215</td>
<td>10</td>
<td>14</td>
<td>29</td>
<td>268</td>
<td>45%</td>
</tr>
<tr>
<td>Other</td>
<td>102</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>103</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>513</td>
<td>16</td>
<td>18</td>
<td>45</td>
<td>592</td>
<td></td>
</tr>
<tr>
<td><strong>Percent</strong></td>
<td>87%</td>
<td>3%</td>
<td>3%</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Survey Data Analysis Cont.

Trips by Vehicle Type
- Light: 209
- Medium: 12
- Heavy: 268
- Other: 103

Trips by Movement Type
- II: 220
- IX: 10
- XI: 1
- XX: 1

Categories: Heavy, Light, Medium, Other
Survey Data Analysis Cont.

**Average Trip Duration**

<table>
<thead>
<tr>
<th></th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>27</td>
</tr>
<tr>
<td>IX</td>
<td>75</td>
</tr>
<tr>
<td>XI</td>
<td>84</td>
</tr>
<tr>
<td>XX</td>
<td>36</td>
</tr>
</tbody>
</table>

**Average Trip Distance**

<table>
<thead>
<tr>
<th></th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>4.6</td>
</tr>
<tr>
<td>IX</td>
<td>46.8</td>
</tr>
<tr>
<td>XI</td>
<td>50.1</td>
</tr>
<tr>
<td>XX</td>
<td>14.8</td>
</tr>
</tbody>
</table>
GPS Point Data
GPS Survey Point Data

- Each trip start and trip end were located within the sequence of GPS points.

- Trip end coordinate pairs were used to create points.

- Trip ends points were spatial joined with model zone structure and tagged with zone id (to get movement type)
Trip Origins

Origin Points

Origin Density
Trip Destinations

Destination Points

Destination Density
Trip Density
GPS Route Data
Model Roadway Network
GPS Survey Route Data

- GPS Survey formatted to include
  - Trip id, sequence, lon, lat

- Points To Line geoprocessing tool was used to create route feature class

- Network link mid-point feature class created
  - Calculate x and y coordinate of link mid-point
  - Create point feature class

- Link points spatial joined with routes to get route frequencies
Survey Routes

Model Network - Survey Routes
- Survey Routes
- Primary
- Secondary
- Tertiary

0 3 6 Miles
Survey Route Frequency
Employment Data
Employment Overview

• Model zone structure consists of:
  • 2,147 Internal Zones – Portland Metro Area
  • 536 External Zones – North America

• Internal zones contain employment data

• Freight Related Employment Segments
  • Manufacturing
  • Wholesale Trade
  • Transportation Warehousing & Utilities
  • Retail & Consumer Services
Freight Related Employment

Manufacturing

Wholesale Trade
Freight Related Employment

Transport Warehouse & Utilities

Retail & Consumer Service
Total Freight Employment
Total Freight Employment

![Total Freight Employment Map](image)

Legend:
- <= 100
- 101 - 250
- 251 - 500
- 501 - 1,000
- > 1,000

Miles

07.13.2018
RSG
Conclusion

• By Applying GIS methods and spatial analysis we were able to verify the quality and accuracy.

• Routes align with roadways where we expect to see freight movement (Interstates and Major routes).

• Trip ends align with model zones that have a higher number of freight related jobs.

• Trips in the dataset can be used to calibrate model parameters.
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