Use of Truck GPS Data to Improve the ArDOT Overnight Truck Parking Survey

Truck parking shortages are a national concern affecting the safety and efficiency of our freight system. Since 2006, the ArDOT has conducted an annual survey of overnight truck parking utilization and capacity to measure the degree of parking shortages in Arkansas. The survey provides data to help design strategies to mitigate truck parking problems, e.g. targeted enforcement of illegal parking or provision of additional parking capacity at public rest facilities. ArDOT staff perform this survey one night (10PM to 6AM) per year by visual inspection of legal and illegal truck parking at over 160 ramps and 250 public and private facilities. There are several limitations of the current method of study: (1) it provides a one-point-in-time sample that does not capture dynamic seasonal or diurnal trends in parking utilization, (2) not all truck parking locations are inspected during the survey since sites located further from on/off ramps are not included, (3) parking capacity in terms of number of spaces is not measured at all locations, and (4) it requires manual field work during nighttime hours which can be unsafe. Given the ever-increasing amounts of truck Global Positioning System (GPS) data collected today, it is possible to supplement or replace the overnight truck parking study. This would allow for more robust and comprehensive analyses of truck parking capacity and utilization. For example, truck GPS data could provide continuous counts that span multiple seasons and times-of-day. This would help with planning efforts to increase parking at strategic locations. Truck GPS data could also help determine the best times to perform manual counting. Lastly, cost savings may be possible considering ArDOT has already acquired truck GPS data from a national vendor for planning studies. Other states, including Kansas and Minnesota, have successfully used truck GPS data to assess parking supply and demand.

1. Prepare a statewide Geographical Information Systems (GIS) inventory of public and private truck parking locations and capacity
   1.1 Geo-code legal parking facilities based on aerial imagery provided by Google Earth (e.g. draw a geographic bounding box around each facility)
   1.2 Verify capacity of select sites in the field to ensure accuracy
2. Analyze truck parking utilization using truck GPS data
   2.1 Pre-process truck GPS data for parking study (e.g. filter records related to parking activity)
   2.2 Perform truck count expansion (e.g. “factor up” the sample to estimate population usage)
   2.3 Summarize of utilization by time of day, season, location, region, county, etc.
3. Identify opportunities to improve parking capacity and services

The purpose of this study is to investigate the potential of truck GPS data to enhance or replace the ArDOT’s overnight truck parking survey. In addition to a final report summarizing the methods and findings, the implementation report will detail the methods and tools needed to process GPS data to determine truck parking usage. Additional deliverables include: (a) GIS files containing locations and capacities of public and private truck parking facilities, (b) preparation of database queries to extract parking usage statistics from the truck GPS data, and (c) high-quality maps depicting parking capacity and usage.
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Project Overview:
The purpose of this study is to investigate the potential of truck GPS data to enhance or replace the ArDOT’s Overnight Truck Parking Survey.

Project Duration: 18 months

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Problem Statement

• In response to national truck parking studies, since 2006, the ArDOT has conducted the **Overnight Truck Parking Survey**

• Measures the degree of parking shortages in Arkansas

• **Current study method**
  • Teams of two to three staff
  • One night (10PM to 6AM) per year
  • Visual inspection of legal and illegal truck parking
  • 160+ ramps
  • 250+ public and private facilities
Proposed Solution

- Given the ever-increasing amounts of **Truck Global Positioning System (GPS) Data** collected today, it is possible to supplement or replace the overnight truck parking study.
- With GPS data we can **perform robust and comprehensive analyses of truck parking** capacity and utilization.
  - Truck GPS data provide continuous counts.
  - Truck GPS data help determine the best times to perform manual counting.
  - Truck GPS data available from a national vendor are already being used for planning studies (TRC 1702)
- Kansas and Minnesota have successfully used truck GPS data to assess parking supply and demand.

<table>
<thead>
<tr>
<th></th>
<th>Overnight Truck Parking Survey</th>
<th>Truck GPS Data</th>
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<tbody>
<tr>
<td><strong>Time Periods</strong></td>
<td>One-point-in-time sample (one day per year)</td>
<td>Continuous counting (seasonal and diurnal)</td>
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<tr>
<td><strong>Spatial Coverage</strong></td>
<td>On/off ramps and nearby locations</td>
<td>Any location that can be seen in Google Earth</td>
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<tr>
<td><strong>Measurements</strong></td>
<td>Counts</td>
<td>Estimated utilization and capacity</td>
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Key Objectives

1. Prepare a statewide Geographical Information Systems (GIS) inventory of public and private truck parking locations and capacity
   1.1 Geo-code legal parking facilities based on aerial imagery provided by Google Earth
   1.2 Verify capacity calculations of select sites in the field to ensure accuracy

2. Analyze truck parking utilization using truck GPS data
   2.1 Pre-process truck GPS data for parking study
   2.2 Perform truck count expansion
   2.3 Summarize of utilization by time of day, season, location, region, county, etc.

3. Identify opportunities to improve parking capacity and services
Anticipated Implementation and Impacts

• Implementation report will detail the methods and tools needed to process GPS data to determine truck parking usage.

• Additional deliverables include:
  • GIS files containing locations and capacities of public and private truck parking facilities,
  • Preparation of database queries to extract parking usage statistics from the truck GPS data,
  • High-quality maps depicting parking capacity and usage.

• Potential cost and efficiency savings
  • No need for manual data collection that may be unsafe
  • Truck GPS data available for use from TRC 1702, so no additional cost of data