Central Data Repository for Traffic Data Collection in Rural Areas and Corridors Supporting Freight Mobility

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International Road Dynamics
Technology to improve **freight safety, operations and information** in rural areas

- Get freight safely from A to B
- Get freight reliably from A to B in a timely manner
- Enhance overall transportation system safety
- Enhance economic competitiveness
- Provide technology framework to support freight mobility
- Improve freight system efficiency and performance
Improvements in
• Freight safety
• Freight reliability
• Freight performance

are critical for freight industry, general traveling public, consumers, and public agencies - from an operational as well as long term planning perspective

Economic growth in rural areas depends on a safe and reliable transportation system that improves freight mobility and efficiency
• Rural economy far more reliant on goods production than urban economy
• Deteriorating infrastructure
• Agriculture and energy extraction activity strain infrastructure (increasing loads)
• Safety Challenges
  • Roadway features that reduce safety
  • Rural non-interstate routes have traffic fatality rate two-and-a-half times higher than all other roads based on VMT (TRIP report 2017)
  • Higher speed limits in States with large rural road networks
• Lack of alternate routes
• Size and weight harmonization across neighboring States (129K routes)
Critical Rural Freight Corridors

- Designation as part of State Freight Plan
- One of several criteria
  - Rural principal arterial roadway with trucks equaling 25% or more of AADT
  - Provide access to energy exploration, development, installation or production areas
  - Connect the Primary Highway Freight System or Interstate system to facilities handling as certain amount of bulk commodity or TEU per year
  - Connect to international POE
  - Provide access to significant air, rail, water or other freight facility
  - Is determined vital to improving efficient moving of freight of importance to state’s economy
- Designation and certification required before National Highway Freight Program funds can be used
Objectives drive measurement needs

- Freight performance measures to determine funding priorities and to indicate ROI on investments
- Freight performance measures contribute to overall efforts to improve travel times (incl. reliability)
- FAST Act calls for freight analysis and data collection to justify eligibility for Federal funding
- Safety related measures
  - Proactive - OS/OW trucks, speed, tire anomalies
  - Reactive – number of truck incidents

Source: FHWA
It’s all about the data!

- Origin-Destination (O-D) of goods by commodity classification, tonnage
- Vehicle lengths to determine turning radii
- Number of OS/OW permits and average weight of OS/OW trucks
- Truck traffic volumes and classification on road segments
- Types of load (e.g. hazmat)
- Number of violations

Ideal world – use of public and private data sources

Source: ATA
Data Challenges

• Multiple disparate data sources
• Multiple interpretations of data
• Statistical relevance (sample size, spot measurements)

• Data holes – reliability of data access
  • Tools can automate monitoring of data source availability

• Data quality
  • Initial checks for data integrity
  • Data quality checks following agency rules
• Spot measurements - Count / Class / WIM require local sensors
• Re-identification requires capturing of unique attribute – e.g. via ALPR, Bluetooth reader, inductive loop signature
  • Sample size
  • Accuracy
• Dedicated Hazmat sensors
• Safety measurements with innovative tire anomaly sensors
  • In Oregon, 13 out of 42 (or 31%) large truck mechanical crashes were due to tire failures in 2017
• Tire Anomaly Detection significantly improves safety by identifying trucks with missing or underinflated tires
• Illinois Deployment of Tire Anomaly Detection (TACS)

<table>
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<th>Date [2018]</th>
<th>Vehicle Count</th>
<th>TACS Count</th>
<th>%</th>
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<td>6 May – 12 May</td>
<td>9129</td>
<td>105</td>
<td>1.15</td>
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<tr>
<td>13 May – 19 May</td>
<td>8546</td>
<td>93</td>
<td>1.09</td>
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<td>20 May – 26 May</td>
<td>9551</td>
<td>117</td>
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<td>27 May – 2 Jun</td>
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<td>67</td>
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<td>10 Jun – 16 Jun</td>
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<td>1.23</td>
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<td>17 Jun – 23 Jun</td>
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<td>24 Jun – 30 Jun</td>
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<td>15 Jul – 21 Jul</td>
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<td>9336</td>
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<td>29 Jul – 4 Aug</td>
<td>7815</td>
<td>78</td>
<td>1.00</td>
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<tr>
<td>5 Aug – 11 Aug</td>
<td>5724</td>
<td>70</td>
<td>1.22</td>
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• Importance of data quality is underappreciated
  • Verify proper equipment operation in a timely manner to ensure good data is being collected
  • Verify the data collected is of a quality that is acceptable for its intended use
  • Key: define intended use to measure and assess data quality

• Example: grades of daily data collected at WIM sites

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Usable for volume, classification, speed and weight reporting</td>
</tr>
<tr>
<td>C</td>
<td>Manual evaluation required before using for volume, classification, speed or weight reporting</td>
</tr>
<tr>
<td>D</td>
<td>Data is not usable for any purpose.</td>
</tr>
<tr>
<td>E</td>
<td>Data is unavailable or corrupt.</td>
</tr>
</tbody>
</table>
• Data Quality tools can automate quality checks
  • Create rules to satisfy agency needs
Central Repository

Local Equipment (e.g. sensors, scales)  →  Integrated Data Quality Control  ←  External Data

Local Operations

Central Data Repository
Remote Monitoring and Reporting
Remote Monitoring of Equipment

- Operational Status of local data collection equipment and communication
Central Data Repository

- Central Repository collects data from multitude of local data sources
  - WIM, Class, Count
  - Tire anomalies
  - Hazmat
  - O-D matches
- Provision of statistical reports and data visualizations
- Standard API to third party systems
  - DOT Enterprise data system
  - Analytics Engines
• Provision of reports targeted to specific needs of agency
Value for Agencies

• Centralized web based data repository:
  • reliable delivery of complete data with integrated and consistent quality control checks

• Intermediary between devices and enterprise systems

• Platform to allow additional data analysis and device centric monitoring

• Modular system allow easy upgrade and enhancements

• Automates time expensive processes to obtain reliable and accurate data and relevant information so that agency can focus on Knowledge Acquisition
• Transportation Intelligence Ecosystem with Central Data Repository as Foundation
Thank You!

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