FHWA’s Freight Fluidity Program

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Public Sector Decision-Making

• National
  – National priorities and investments
  – National Strategic Freight Plan
  – Programs and funding

• State and Region
  – State and regional transportation plans
  – State Freight Plans
  – Investments

• Local
  – Use of highway funding for investments
  – Economic development
  – Local plans and programs
Importance of Analyzing Freight Fluidity

- Provides understanding of multimodal, end to end flow of goods.
- Identifies where bottlenecks are occurring and interrelationship with other modes/total supply chains.
- Connects transportation and economic development discussions.
- Illustrates the global, national and regional nature of freight infrastructure; encourage partnerships.
- Engages the private sector.
- Supports MAP-21 focus on freight.
- Supports Commerce, USACE, Agriculture, Energy and USDOT initiatives.
Public Sector Freight Performance Measurement

• Highway
  – Truck Probe data
  – Highway Performance Monitoring System

• Railroad
  – Waybill sample

• Air Cargo
  -Landing weights at cargo bearing airports

• Marine
  – Tonnage and Value
  – Army Corps data

• Freight Analysis Framework
  – Commodity Flow Survey
  – Truck Counts
Major Flows by Truck To, From, and Within Illinois: 2007

Note: Major flows include domestic and international freight moving by truck on highway segments with more than twenty five FAF trucks per day and between places typically more than fifty miles apart.
Freight Movement Efficiency Index

Freight Mobility Trends
FY 2015
Second Quarter

Intermodal Mobility
22.53 = 3 Year Best
21.53 = 3 Year Average
19.62 = 3 Year Worst

Bottleneck Mobility
1.312 = 3 Year Best
1.376 = 3 Year Average
1.455 = 3 Year Worst

Freight Efficiency Index
100 = High Mobility
0 = Low Mobility

Border Crossing Mobility
3.84 = 3 Year Best
4.17 = 3 Year Average
4.46 = 3 Year Worst

Urban Mobility
1.2251 = 3 Year Best
1.2515 = 3 Year Average
1.2764 = 3 Year Worst

25.0
Example: Truck Flows/ Freight Intensity in Baltimore, MD (1,000 Truck Sample)
Example, Cont.: Same 1,000 Trucks After 24 Hours
Example, Cont.: Same 1,000 Trucks After 48 Hours
Example, Cont.: Same 1,000 Trucks After 72 Hours
Example, Cont.: Same 1,000 Trucks After 5 Days
Example, Cont.: Same 1,000 Trucks After 7 Days
County Intensity Example
What are the Current U.S. Applications?

- FHWA TRB workshop
- North American Transportation Statistics Interchange
- North American Fluidity System implementation
- Border crossing, state level, and regional fluidity analyses
What are the Challenges in Implementation?

• Applicability to USDOT and Others
  – Public sector use for fluidity

• Scaling the Program
  – Significant freight corridors
  – Freight-sheds
  – Industry areas and supply chains

• Data
  – Probe data
  – Data combinations
  – Big Data
  – Modal data

• Standards for Analysis
  – Establishing universal methodology
  – Defining fluidity
  – Data standards
Fluidity Examples
North American Case Study: Automotive Parts Manufacturing

Transit Option 1: trucking

Source: Transport Canada
Truck Trips: Southern Ontario to US-Mexican Border, September 2014

- 424 trucks trips were identified
- The average travel time was 70 hours

Source: Transport Canada, adapted from third-party satellite tracking data provider (Shaw), October 2014.
Transit Option 2: trucking-rail

Southern Ontario -> Brampton, On -> Memphis, TN -> Monterrey, MX

Results Transit Option 2: trucking-rail (expressed in days)

<table>
<thead>
<tr>
<th></th>
<th>Belleville-Napanee-Kingston region to Chattanooga, TN.</th>
<th>Belleville-Napanee-Kingston region to Monterrey, MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck transit time to Canadian railyard</td>
<td>4.5 hours</td>
<td>4.5 hours</td>
</tr>
<tr>
<td>Rail transit time (including dwell)</td>
<td>3.2 days</td>
<td>9 days</td>
</tr>
<tr>
<td>Total transit time</td>
<td>3.4 days</td>
<td>9.2 days</td>
</tr>
</tbody>
</table>

Source: Canadian National Railway Company & Transport Canada, adapted from third party satellite tracking data provider (Shaw)
FHWA Probe Data Representation of the Same Automotive Supply Chain
FHWA Probe Data Analysis of the Same Automotive Supply Chain with Border Crossing

Travel Time: 2 days, 6 hours
Count: 524 Trips Sampled

Travel Time: 3 minutes, 33 seconds
Count: 1,064 Trips Sampled
FHWA/I-95/DOC Corridor Project

Background

• Objective
  – Demonstrate and improve the measurement of freight transportation performance using a supply chain perspective
  ➤ *End to end* conception of performance and measurement, across modes and stages

• Case Study Sponsors
  – I-95 Corridor Coalition, Intermodal Committee
  – FHWA, Office of Freight Management
  – U.S. Department of Commerce, Advisory Committee on Supply Chain Competitiveness
Multimodal Supply Chain Case Studies

- **Autos** – General Motors auto parts
  - From US and NAFTA suppliers to auto assembly plant in Tennessee

- **Retail** – Target® consumer goods
  - From Ports of Los Angeles/Long Beach and Seattle/Tacoma via Chicago to metropolitan New York

- **Electronics** – Panasonic electronics
  - Between manufacturing and assembly facilities in San Diego and Tijuana

- **Agriculture** – Soybean exports
  - From Illinois farms to Louisiana port

- **Food** – Perdue processed chicken
  - From DelMarVa region to Mid-Atlantic markets
## What Data: Performance Measures and Metrics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit time</td>
<td>Travel time in days (or hours)</td>
</tr>
<tr>
<td>Reliability</td>
<td>95% travel time in days (or hours)</td>
</tr>
<tr>
<td>Cost</td>
<td>Dollars</td>
</tr>
<tr>
<td>Safety</td>
<td>Fatality and injury rate</td>
</tr>
</tbody>
</table>
| Risk        | Disruption  
  *(storms, labor, infrastructure failure, political forces...)* |
|             | Capacity expansion delays  
  *(physical, regulatory limitations and delays...)* |
Case Example: Retail Supply Chain (Target)
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