Weather Delay Costs to Trucking

Road Weather Management Stakeholder Meeting
September 9, 2011
Commercial vehicles main mode of freight transportation

- $500 billion freight sector
- 70% of total value and 60% of weight moves by truck
- Estimates that adverse weather is responsible for 12% to 25% of all delay
- Trucking delays due to weather = $3.1 billion/yr for the 50 largest cities
- Lost commerce due to snow closures = $10 billion/day

Other economic impacts of adverse weather

- More than $2 billion/yr is spent on snow and ice control by State DOTs
- Weather accounts for 25% of non-recurring congestion
Fiscal Impacts of Storm-closed Roads
One-day costs, including lost wages and taxes on incomes, retail sales, gas station & restaurant closures

Storm Season:
Winter 2009-10
$3.82B Economic Impact – 15 States

Source: American Highway Users Alliance
Project Objective

- Quantify the Impact of Adverse Weather on U.S. Roadway Freight Operations

  » Key Questions

  • What is the overall level of delay in the system?
  • What portion of delay is incurred by CVs?
  • What portion of delay is caused by adverse weather?
  • What is the value of commercial shipments?

  » Various data sources available

  » Important to select the realistic level of detail
Weather Delay Costs to Trucking

WORK PLAN
Review previous related work

Analytical techniques are focus
  » Congestion delays on a national, or broad geographic basis
  » Impacts of weather on roadway delay
  » Impact of delay on freight movements and costs

Build on previous lit reviews
  » Weather Data Mining and Gap Analysis
  » Strategic Highway Research Program 2 L08 Reliability

New sources – DHS, others
Data Sources

Congestion

» Urban Mobility/Congestion Report
» Highway Performance Monitoring System (HPMS) and Highway Economic Requirements System (HERS)
» Statewide Traffic Management Centers
» State DOT “dashboard” summaries
» Private sources (Inrix, NavTeq)
Data Sources

- Weather
  - NCDC
  - MADIS
  - Clarus
  - Private

- Summaries such as Places Rated Almanac
Weather

Event Classification

- Tradeoff between level of detail and ability to process
- Classification scheme

Table 3. Sample Consolidated Classification System

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>Weather Events</th>
<th>Freight Cost Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Limited Access</td>
<td>Catastrophic – Major hurricane, regional floods</td>
<td>Long-distance time delay</td>
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<tr>
<td></td>
<td></td>
<td>Local time delay</td>
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<tr>
<td></td>
<td></td>
<td>Incident-related delay</td>
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<td></td>
<td></td>
<td>Indirect operating costs, insurance, maintenance, etc.</td>
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<tr>
<td></td>
<td>Severe – Annual events with major impact, blizzards, localized flooding</td>
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<td>Localized – Snowstorm, severe thunderstorms</td>
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<td></td>
<td>Background – Moderate events (rain at peak hour)</td>
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<tr>
<td></td>
<td>which only impacts certain roadway</td>
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</tr>
<tr>
<td></td>
<td>(heavy recurring congestion, steep grades, etc.)</td>
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<tr>
<td>Rural Limited Access</td>
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<tr>
<td>Urban Major Arterial</td>
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<tr>
<td>Rural Major Arterial</td>
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<tr>
<td>Minor Arterials,</td>
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<tr>
<td>Collectors and Local Road</td>
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Freight

» FTR Model Database
  • Total truck tons, loads and ton-miles by 3-digit STCC code and length of haul segment
  • Productivity model translates freight volumes into truck work estimates
  • Models of truck cost data
  • Models of national logistics costs for supply chain implications
1. Develop weather and congestion parameters
2. Identify key supply chain locations with weather impact
3. Estimate delays for base year using classification scheme
   - Weather event, facility type and freight cost impact
4. Convert weather related delay to delay/truckload
5. Use FTR model to estimate $$/truckload
6. Estimate truckloads impacted by weather events
7. Calculate and annualize costs
8. Develop risk profile
9. Develop future year forecasts
Work Plan Option #1

1. Select Weather Event Categories
2. Select Weather Event Parameters
3. Calculate Weather Event Occurrence
4. Consolidated Delay Parameter Table
5. Calculate Weather Delay Factors by BEA Region
6. Apply Weather Delay Factors by BEA Region to HPMS Truck Volumes
7. Calculate Total Delay by BEA Region
8. Aggregate to National Delay and Cost
9. Add Additional Variables (Road Type, Region)
10. Sort HPMS File by BEA Region
11. Assign Cost from FTR Model by BEA Region
Work Plan Option #2

1. Compile Weather Data Summary
2. Calculate Weather Event Occurrence
3. Calculate Weather Index
4. Select Weather Event Categories
5. Select Weather Event Parameters
6. Consolidated Delay Parameter Table
7. Add Additional Variables (Road Type, Region)
8. Develop Weather Index/Delay Factor Relationship
9. Estimate Truck Movement by BEA Region Using FTR Model
10. Calculate Delay Factors for BEA Regions
11. Assign Delay Factors to Freight Movements by BEA Region
12. Aggregate to National Delay and Cost
13. Add Cost Factors from FTR Model
Questions
or
Comments