Accommodating Oversize and Overweight Loads

Source: Trailblazer Pilot Car
Research Motivation

• MCD experiencing increase in permit activity
  FY07:
  • 554,000 permits (6% over FY06 and 33% over FY03)
  • 821 superheavy permits (6% over FY06 and 337% over FY04)
  • Weight of loads increasing

• Related issues
  Promote commerce
  Ports are often load origins
  Roads with low volume, often thin pavements

• Automated routing program (TxPROS)
Research Objectives

- Identify a set of OS/OW dimension and weight groups and O-D routing needs

- Identify criteria for assigning these OS/OW groups to road networks as they currently exist

- Identify criteria for assigning these OS/OW groups to road networks upgraded to meet projected OS/OW freight demand
Conduct Literature and Internet Review

- Related projects
  - “LCVs and Road Trains...”
  - “Texas Energy Development...”
  - “Overweight Load Routing on Buried Utility...”
Evaluate MCD Historical Data and Gather Stakeholder Input

- Identify OS/OW dimension groups & routing needs
  - a. Analyze MCD historical permitting data
  - b. Stakeholder estimates of future loads/O-Ds
  - c. Gather information from districts, divisions, local govt. and enforcement
## Status of Route Processing

<table>
<thead>
<tr>
<th>Year</th>
<th>Original Tabular Permit Data</th>
<th>Processed GIS Permit Routes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Permits</td>
<td>Permits with Valid Route Descriptions</td>
</tr>
<tr>
<td>2004</td>
<td>444,326</td>
<td>385,912</td>
</tr>
<tr>
<td>2005</td>
<td>447,876</td>
<td>417,263</td>
</tr>
<tr>
<td>2006</td>
<td>522,696</td>
<td>445,976</td>
</tr>
<tr>
<td>2007</td>
<td>554,198</td>
<td>463,621</td>
</tr>
<tr>
<td>2008</td>
<td>580,410</td>
<td>483,136</td>
</tr>
<tr>
<td>2009</td>
<td>527,447</td>
<td>428,920</td>
</tr>
</tbody>
</table>
Review TxPROS

- Develop understanding of TxPROS and OS/OW permitting process:
Identify Criteria for Assigning OS/OW Groups to Existing Road Network

- Develop means of rating each road segment against each OS/OW group
- Candidate criteria
  - Historical data
  - Heights
  - Weights: Axle load spectra or GVW
  - Widths
  - Lengths
  - Stakeholder and PMC input
Vehicle Height Ranges (ft)

- Height < 14: 65.9%
- 14 < Height < 15: 16.0%
- 15 < Height < 16: 13.7%
- 16 < Height < 17: 2.7%
- 17 < Height < 18: 1.4%
- Height > 18: 0.3%
Vehicle Weight Ranges (lb)

- 80K < Weight < 120K: 15.0%
- 120K < Weight < 150K: 8.1%
- 150K < Weight < 175K: 5.7%
- 175K < Weight < 200K: 2.4%
- 200K < Weight < 256K: 1.3%
- Weight > 256K: 0.1%
Vehicle Width Ranges (ft)

- Width < 8.5: 22.4%
- 8.5 < Width < 10: 13.2%
- 10 < Width < 12: 25.7%
- 12 < Width < 14: 23.7%
- 14 < Width < 16: 12.3%
- 16 < Width < 18: 1.5%
- 18 < Width < 20: 0.5%
- Width > 20: 0.7%
Cumulative Distribution - Vehicle Height

Accumulative Percent

Vehicle Height (ft)

75th: 14’8”
85th: 15’5”
95th: 16ft

80%
75%
60%
50%
40%
30%
20%
10%
0%
Cumulative Distribution - Vehicle Weight

Accumulative Percent

Vehicle Weight (lb)

75th: 107klb
85th: 130klb
95th: 168klb

Texas Transportation Institute
Cumulative Distribution - Vehicle Width

Accumulative Percent

Vehicle Width (ft)

75th: 14ft
85th: 14ft
95th: 16ft
## Vehicle Percentiles by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Vehicle Height</th>
<th>Vehicle Width</th>
<th>Gross Weight (lb)</th>
<th>Vehicle Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75&lt;sup&gt;th&lt;/sup&gt;</td>
<td>85&lt;sup&gt;th&lt;/sup&gt;</td>
<td>95&lt;sup&gt;th&lt;/sup&gt;</td>
<td>75&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>2004</td>
<td>14’8”</td>
<td>15’2”</td>
<td>16.0’</td>
<td>14’</td>
</tr>
<tr>
<td>2005</td>
<td>14’8”</td>
<td>15’3”</td>
<td>16’</td>
<td>14’</td>
</tr>
<tr>
<td>2006</td>
<td>14’8”</td>
<td>15’3”</td>
<td>16’</td>
<td>14’</td>
</tr>
<tr>
<td>2007</td>
<td>14’10”</td>
<td>15’6”</td>
<td>16’</td>
<td>14’</td>
</tr>
<tr>
<td>2008</td>
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<td>14’</td>
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<tr>
<td>2009</td>
<td>14’8”</td>
<td>15’5”</td>
<td>16’</td>
<td>14’</td>
</tr>
</tbody>
</table>
Identify OS/OW Groups

<table>
<thead>
<tr>
<th>Category</th>
<th>Height (ft)</th>
<th>Width (ft)</th>
<th>Length (ft)</th>
<th>Gross Wt. (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14.1 to 15</td>
<td>8.1 to 10</td>
<td>60 to 90</td>
<td>80k to 120k</td>
</tr>
<tr>
<td>2</td>
<td>15.1 to 16</td>
<td>10.1 to 12</td>
<td>90.1 to 120</td>
<td>120,001 to 150k</td>
</tr>
<tr>
<td>3</td>
<td>16.1 to 17</td>
<td>12.1 to 14</td>
<td>120.1 to 150</td>
<td>150,001 to 175k</td>
</tr>
<tr>
<td>4</td>
<td>17.1 to 18</td>
<td>14.1 to 16</td>
<td>150.1 to 180</td>
<td>175,001 to 200k</td>
</tr>
<tr>
<td>5</td>
<td>18.1 to 19</td>
<td>16.1 to 18</td>
<td>&gt;180</td>
<td>200,001 to 256k</td>
</tr>
<tr>
<td>6</td>
<td>19.1 to 20</td>
<td>18.1 to 20</td>
<td>N/A</td>
<td>&gt;256k</td>
</tr>
<tr>
<td>7</td>
<td>N/A</td>
<td>&gt;20</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Shaded cells reach maximum at 95th percentile.
Steps Remaining

- Associate load groups with route segments
- Request “restrictions” from TxDOT in GIS format
- Compare subset of routes optimum vs. actual
- Determine criteria for determining improvements (“future road network”)
  - No. loads bypassing per unit time
  - Cost of fixing the problem
  - Length of bypass route
  - Cost of detour (adjacent to obstruction)
  - Other construction being planned nearby
  - Age of obstruction
ArcGIS Analysis Results
Major OS/OW Routes
FY06
Major OS/OW Routes
FY07
Major OS/OW Routes FY09
Major OS/OW OD Pairs
FY05
Major OS/OW OD Pairs
FY06
Major OS/OW OD Pairs
FY07
Major OS/OW OD Pairs
FY09
Develop Statewide Map

- Identifies primary & alternate OS/OW route networks
  - PDF format
  - GIS format
    - ESRI ArcGIS ArcMap document file
    - ESRI ArcGIS shapefile format
    - Allows query of OS/OW route network
    - Compatible with TxDOT’s data & GIS architecture standards

- **Result**: Statewide map
What’s Left?

- **Modification**
  - Request restrictions from ProMiles
  - Complete Task 5
- **Workshop for districts**
- **New research project**
  - 0-6736 “Rider 36 OS/OW Vehicle Frees Study”
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