Accommodating Oversize and Overweight Loads

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Source: TxDOT
Project Motivation

- **NETx Working Group Recommendations**
  - Improve communications
  - Improve route options for OS/OW loads
  - Reduce seal coat damage

- **MCD permit trends**
  - Wts & sizes increasing

- **Promote commerce**
  - Keep routes open
Research Objectives

- Identify a set of OS/OW dimension and weight groups and O-D routing needs
- Identify restrictions impacting the movement of OS/OW and quantify their impacts
Research Activities

- Literature review
- Acquire historical data from MCD
- Gather stakeholder input
- Review TxPROS
- Develop deliverables
Research Findings

Source: Trailblazer Pilot Car
## Major Permit Types (2009)

<table>
<thead>
<tr>
<th>Permit Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>General (single trip permits)</td>
<td>62.3%</td>
</tr>
<tr>
<td>Manufactured housing</td>
<td>12.5%</td>
</tr>
<tr>
<td>Over-axle weight tolerance (1547)</td>
<td>5.8%</td>
</tr>
<tr>
<td>Portable buildings</td>
<td>3.9%</td>
</tr>
<tr>
<td>30/60/90 day width</td>
<td>3.6%</td>
</tr>
<tr>
<td>HUB</td>
<td>3.5%</td>
</tr>
<tr>
<td>Temporary Registration</td>
<td>2.9%</td>
</tr>
<tr>
<td>30/60/90 day length</td>
<td>1.5%</td>
</tr>
<tr>
<td>Concrete Beam/Girder (HB2093)</td>
<td>1.1%</td>
</tr>
<tr>
<td>All others</td>
<td>&lt;1% each</td>
</tr>
</tbody>
</table>
## Description of Loads – Heights

<table>
<thead>
<tr>
<th>FY</th>
<th>&lt;12</th>
<th>&gt;12 but &lt;14</th>
<th>&gt;14 but &lt;16</th>
<th>&gt;16 but &lt;18</th>
<th>&gt;18</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>358 (0.2%)</td>
<td>64,326 (39.7%)</td>
<td>91,672 (56.6%)</td>
<td>5,051 (3.1%)</td>
<td>697 (0.4%)</td>
</tr>
<tr>
<td>2005</td>
<td>418 (0.2%)</td>
<td>67,704 (39.9%)</td>
<td>95,352 (56.2%)</td>
<td>5,463 (3.2%)</td>
<td>647 (0.4%)</td>
</tr>
<tr>
<td>2006</td>
<td>373 (0.2%)</td>
<td>76,940 (41.2%)</td>
<td>100,252 (53.7%)</td>
<td>8,407 (4.5%)</td>
<td>713 (0.4%)</td>
</tr>
<tr>
<td>2007</td>
<td>282 (0.1%)</td>
<td>71,310 (36.7%)</td>
<td>111,778 (57.5%)</td>
<td><strong>10,220 (5.3%)</strong></td>
<td>646 (0.3%)</td>
</tr>
<tr>
<td>2008</td>
<td>427 (0.2%)</td>
<td>71,772 (35.7%)</td>
<td>115,929 (57.7%)</td>
<td><strong>12,114 (6.0%)</strong></td>
<td>821 (0.4%)</td>
</tr>
<tr>
<td>2009</td>
<td>537 (0.3%)</td>
<td>66,482 (37.7%)</td>
<td>97,412 (55.3%)</td>
<td><strong>10,976 (6.2%)</strong></td>
<td>792 (0.4%)</td>
</tr>
</tbody>
</table>

*Transportation Operations Group*
### Description of Loads – Widths

<table>
<thead>
<tr>
<th>FY</th>
<th>&lt;9</th>
<th>&gt;9 but &lt;11</th>
<th>&gt;11 but &lt;13</th>
<th>&gt;13 but &lt;15</th>
<th>&gt;15 but &lt;17</th>
<th>&gt;17</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>3,173</td>
<td>12,498</td>
<td>36,369</td>
<td>64,962</td>
<td>39,091</td>
<td>6,011</td>
</tr>
<tr>
<td></td>
<td>(2.0%)</td>
<td>(7.7%)</td>
<td>(22.4%)</td>
<td>(40.1%)</td>
<td>(24.1%)</td>
<td>(3.7%)</td>
</tr>
<tr>
<td>2005</td>
<td>2,878</td>
<td>12,368</td>
<td>40,039</td>
<td>66,798</td>
<td>41,122</td>
<td>6,379</td>
</tr>
<tr>
<td></td>
<td>(1.7%)</td>
<td>(7.3%)</td>
<td>(23.6%)</td>
<td>(39.4%)</td>
<td>(24.2%)</td>
<td>(3.8%)</td>
</tr>
<tr>
<td>2006</td>
<td>4,374</td>
<td>14,376</td>
<td>42,456</td>
<td>76,361</td>
<td>42,135</td>
<td>6,983</td>
</tr>
<tr>
<td></td>
<td>(2.3%)</td>
<td>(7.7%)</td>
<td>(22.7%)</td>
<td>(40.9%)</td>
<td>(22.6%)</td>
<td>(3.7%)</td>
</tr>
<tr>
<td>2007</td>
<td>4,523</td>
<td>16,768</td>
<td>46,622</td>
<td>78,193</td>
<td>41,066</td>
<td>7,064</td>
</tr>
<tr>
<td></td>
<td>(2.3%)</td>
<td>(8.6%)</td>
<td>(24.0%)</td>
<td>(40.3%)</td>
<td>(21.1%)</td>
<td>(3.6%)</td>
</tr>
<tr>
<td>2008</td>
<td>5,733</td>
<td>17,860</td>
<td>47,926</td>
<td>78,114</td>
<td>43,851</td>
<td>7,579</td>
</tr>
<tr>
<td></td>
<td>(2.9%)</td>
<td>(8.9%)</td>
<td>(23.8%)</td>
<td>(38.9%)</td>
<td>(21.8%)</td>
<td>(3.8%)</td>
</tr>
<tr>
<td>2009</td>
<td>7,573</td>
<td>16,714</td>
<td>41,097</td>
<td>66,021</td>
<td>37,771</td>
<td>7,023</td>
</tr>
<tr>
<td></td>
<td>(4.3%)</td>
<td>(9.5%)</td>
<td>(23.3%)</td>
<td>(37.5%)</td>
<td>(21.4%)</td>
<td>(4.0%)</td>
</tr>
</tbody>
</table>
# Description of Loads – Lengths

<table>
<thead>
<tr>
<th>FY</th>
<th>&lt;80</th>
<th>&gt;80 but &lt;100</th>
<th>&gt;100 but &lt;120</th>
<th>&gt;120 but &lt;140</th>
<th>&gt;140</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>20,105 (12.4%)</td>
<td>99,463 (61.4%)</td>
<td>39,659 (24.5%)</td>
<td>2,151 (1.3%)</td>
<td>726 (0.4%)</td>
</tr>
<tr>
<td>2005</td>
<td>21,068 (12.4%)</td>
<td>105,157 (62.0%)</td>
<td>39,500 (23.3%)</td>
<td>2,881 (1.7%)</td>
<td>978 (0.6%)</td>
</tr>
<tr>
<td>2006</td>
<td>21,693 (11.6%)</td>
<td>109,899 (58.9%)</td>
<td>48,896 (26.2%)</td>
<td>3,879 (2.1%)</td>
<td>2,318 (1.2%)</td>
</tr>
<tr>
<td>2007</td>
<td>20,896 (10.8%)</td>
<td>109,271 (56.3%)</td>
<td>56,076 (28.9%)</td>
<td>3,944 (2.0%)</td>
<td><strong>4,049 (2.1%)</strong></td>
</tr>
<tr>
<td>2008</td>
<td>20,723 (10.3%)</td>
<td>108,464 (53.9%)</td>
<td>61,036 (30.4%)</td>
<td>4,976 (2.5%)</td>
<td><strong>5,864 (2.9%)</strong></td>
</tr>
<tr>
<td>2009</td>
<td>19,029 (10.8%)</td>
<td>94,503 (53.6%)</td>
<td>52,055 (29.5%)</td>
<td>4,269 (2.4%)</td>
<td><strong>6,343 (3.6%)</strong></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 to 175k (168k)</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 (17)</td>
<td>&gt;180</td>
<td>200,001 to 254k</td>
</tr>
<tr>
<td>6</td>
<td>19.1 to 20</td>
<td>18.1 to 20</td>
<td>N/A</td>
<td>&gt;254,300</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. (indicated in red)
Load Categories

- Wind Energy: 3.3%
- Military: 0.8%
- Miscellaneous: 16.0%
- Oversize: 7.5%
- Oil Field: 14.0%
- Heavy Equipment: 16.8%
The Rest of the Challenge

Origins for Top 5% OS Loads (FY09)

Destinations for Top 5% OS Loads (FY09)
Most Common Commercial Vehicle vs. 95% Vehicle vs. “Super-Heavy”

95% Common CMV

8.5 ft W, 14 ft H, 65 ft L, 80,000 lb vs. 17 ft W, 18 ft H, 120 ft L, 168,000 lb vs. 33.5 ft W, 45 ft H, 256 ft L, 1.8 M lb
Planned Energy Production in Texas

Oil and Gas Production

Source: TxDOT
Research Project 0-6498

<table>
<thead>
<tr>
<th>Siemens 2.3 MW</th>
<th>Quantity</th>
<th>Truck Hauls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete for Pad</td>
<td>600–710 T</td>
<td>35</td>
</tr>
<tr>
<td>Base Material for Pad</td>
<td>5,000 T</td>
<td>223</td>
</tr>
<tr>
<td>Service Road</td>
<td>1,000–2,250 T</td>
<td>78</td>
</tr>
</tbody>
</table>

Wind Energy Production

Source: TxDOT
Research Project 0-6513

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Spatial Analysis Using ArcGIS

Source: Trailblazer Pilot Car
Major OS/OW Destinations (FY09)

Intra-State Trips: 55%
Inter-Texas Trips: 45%
To Texas: 19%
From Texas: 19%
Passing Texas: 7%

Major OS/OW Origins (FY09)

Frequent OS/OW Destinations (FY09)
- 9,000
- On-System Highway
- City
- TxDOT District

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Top 50 OS/OW Corridors by Hwy Type
Restriction Analysis

• Apply “restrictions” from ProMiles
  ◦ Compare actual vs. optimum routes

• Criteria for determining improvements
  ◦ Number of loads bypassing per unit time
  ◦ Difference in optimal route and actual route
  ◦ Cost to motor carriers for extra mileage
Major “Road-Locking” Height Restrictions

Major “Road-Locking” Weight Restrictions
Road-Locking Weight & Height Restrictions
### Actual vs. Optimal Routes

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Actual Route Distance (Miles)</th>
<th>Average Optimal Route Distance (Miles)</th>
<th>Average Difference</th>
<th>Median Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Miles</td>
<td>Miles</td>
</tr>
<tr>
<td>2004</td>
<td>58.8</td>
<td>41.5</td>
<td>17.2</td>
<td>5.7</td>
</tr>
<tr>
<td>2005</td>
<td>84.3</td>
<td>60.0</td>
<td>24.3</td>
<td>8.8</td>
</tr>
<tr>
<td>2006</td>
<td>82.1</td>
<td>61.7</td>
<td>20.5</td>
<td>9.3</td>
</tr>
<tr>
<td>2007</td>
<td>80.3</td>
<td>53.5</td>
<td>26.8</td>
<td>10.5</td>
</tr>
<tr>
<td>2008</td>
<td>73.1</td>
<td>49.9</td>
<td>23.2</td>
<td>11.3</td>
</tr>
<tr>
<td>2009</td>
<td>70.3</td>
<td>50.1</td>
<td>20.2</td>
<td>9.2</td>
</tr>
<tr>
<td>Total</td>
<td>74.0</td>
<td>52.2</td>
<td>21.8</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29.5%</td>
<td>11.5%</td>
</tr>
</tbody>
</table>
Summary: Actual vs. Optimal Routes

- Average difference of about 24 miles per trip
- OS/OW loads traveled about 504 million ton-miles more per year
- Additional cost of about $73 million per year
- Additional CO$_2$ Emission of about 75,000 tons
Continued Analysis Using TxPROS Digital Data

- Vehicle-Miles Traveled
- Pavement and bridge construction schedules
- Evolving corridors of choice
Contact Information

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