Special Projects Engineer?

- Bridge Scour Evaluation and Mitigation
- Manage Overhead Structure Inspection Program
- Manual Writing and Upkeep
- Transportation Asset Management Plan (TAMP)
- Bridge Life Cycle Cost Analysis and Planning
- Over legal Permitting
ITD Over-legal Permitting Journey

Since we built bridge to 1990’s - check heavy trucks over trouble bridges.

1990’s to 2021 - DMV screens by factor to determine which permits need bridge analysis. Bridge office puts bridge speed and lane restrictions on permit based on BrR analysis. Process 50-70 permits a week, 300-400 bridges analyzed. Bridge hours 60-80 a week.
ITD Over-legal Permitting Journey

Starting August 4 2021- All over-legal permits analyzed on every bridge on route. Truckers can create routes, and enter truck configurations. The full bridge analysis and self issue permits takes about 5 minutes.

First 6 months weekly average
- 270 permits
- 23,000 bridges analyzed
- Bridge hours 20-30 hours

Types of Loads

- Legal Loads
- Divisible Over Legal Loads - Annual Permits
- Indivisible Over Legal Loads - Single Trip Permits
Bridge Design Loads

• HL-93

Potential Bridge Loads
Routing or Rating
Pennsylvania

Routing or Rating
Idaho

Pennsylvania

Routing or Rating
Idaho
What type of permitting does your Agency need?

Rule Based
• Faster
• Conservative
• Set it and forget it

Analysis Based
• Slower
• More effort on data
• Can get trucks over with less restrictions
Truck Factors / Bridge Factors

- Quick screening tool for Bridge Capacity and Truck Loads
  - Combines axle weights and spacing
- At ITD the truck factor is based on Federal Formula B

\[ u = 500 \left( \frac{m}{n-1} + 13n + 36 \right) \]

- \( u \) = the maximum weight in pounds that can be carried on a group of two or more axes to the nearest 500 pounds (230 kg).
- \( n \) = spacing in feet between the outer axes of any two or more consecutive axes.
- \( m \) = number of axes being considered

- Factor developed for all axle groupings use highest

Bridge Factors

- Bridge Factor is based on Rating Factors for Legal trucks

<table>
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<tr>
<th>Type</th>
<th>Trk</th>
<th>USL</th>
<th>Axle</th>
<th>Rating Factor</th>
<th>L/T</th>
<th>Capacity</th>
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Factor 580
\[ 2.04 \times 580 = 1183 \]

Factor 552
\[ 2.10 \times 552 = 1159 \]
\[ 2.04 \times 494 = 1007 \]

Bridge Factor is 1007
Know Your Inventory

• Bridges not Load Rated in AASHTOWare BrR
  • Tables
  • Rules
  • Excel sheets
  • Engineering Judgement (no plans)
• Bridges Load Rated in AASHTOWare BrR
  • Load Rating Tool
  • LFD Member Alternative
  • LRFR
  • Check out to run
Tables, Rules, Excel, Engineering Judgement

<table>
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<tr>
<th>Length (ft)</th>
<th>VWenet (kip)</th>
<th>VWlab (kip)</th>
<th>VWlab/kip (kip)</th>
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<table>
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<th>Weight (kip)</th>
<th>Requirement</th>
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<td>225 to &lt;250</td>
<td>Slow to 45 mph</td>
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<td>275 to &lt;325</td>
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<tr>
<td>325 to &lt;400</td>
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</tr>
<tr>
<td>400 to &lt;600</td>
<td>Slow to 5 mph</td>
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AASHTOWare BrR

- Load Rating Tool
- LFD Member Alternative
- LRFR
- Check Out To Run
- 3D FEM
History of Load Rating Tool

- AASHTOWare BrR
  - Gold standard for Load Rating
  - Too slow for permitting - ratings take 5+ minutes for each bridge

- Load Rating Tool
  - Uses pre-processed influence lines to quickly determine rating - 100 ratings / second
  - Began upgrade to BrR 10 years ago
  - First included in 6.8.2 with limited capabilities
  - 7.2 released last week includes LRFR

Load Rating Tool Rules
Managing Data
Managing Load Rating Tool Files / Data

- We review Load Rating Tool files monthly
  - Create for new structures
  - Update for changed structures
  - Delete for structures no longer in inventory
Other Considerations

- Max weight (other) for self issuance
- Max weight (other) to go through system
- Non Standard Gauge Vehicles
Data Updates

- ITD updates bridge and load rating information quarterly
  - Backup of BrR database
  - Zip file of Load Rating Tool files
  - Spreadsheet with inventory information
- Able to make emergency changes via 511 restrictions system
- Can update bridge models and inventory information in between but testing is cumbersome

Data Testing

- 1) 121k Test - Run the 121k Truck over all State bridges through system. Match rating method and Operating Rating result.
- 2) 240k Test - Run the 240k Truck over all State bridges through system. Match speed and lane requirements
- 3) Side by Side - Run permits manually and make sure they match bridges on route, ratings, and requirements.
Data Testing

- Initial system setup - 121k Test, 240k Test, Side by Side
- Data updates - 121k Test, 240k Test
- Ongoing QA - Side by Side

System Monitoring

- Real Time monitoring for error bridges. Bridge where results are expected but system returns none.
- Monitoring of Failed and Manual results for bridges that are causing problems
Questions

jake.legler@itd.idaho.gov
208) 334-8129