Weather and Performance Measurement

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Weather and Performance Measures

- Winter Operations sector is the heaviest user of weather information
- We have weather-based analysis tools/measures for:
  - The performance of the RWIS sites themselves
  - Resource usage and monitoring
  - Our impact on traffic flow
RWIS Performance
Data Monitoring Programs

- Essential to detect problems in
  - Sensor accuracy
  - Site communications
  - Information distribution

- Active data monitoring helps us
  - Send for repair/improvement quicker
  - Remedy small problems before they lead to failure
Using *Clarus* for Data Monitoring Programs

- Homemade QC systems
- Create daily/weekly tallies from individual QC flags
  - Catches things that happen when you’re not looking
  - Helps expose intermittent problems
  - Good for quick overviews

*Clarus* subscriptions contain the flags – you just have to summarize them!
Communications Monitoring

• Count the reports a station makes daily to track
  • Server performance
  • Station reliability
  • Intermittent, hard-to-detect communication problems
Winter Operations Resource
Monitoring
Winter Dashboard

- This summer we had to find ways to keep our usage on target because of budget constraints
- The Winter Dashboard!
  - Salt and labor use by garage or district
  - “Time to Normal” measurements
  - Comparisons to Estimated Salt Use
Salt Use Estimations

- Based on salt application guidelines in IM’s
- Storm Type and Pavement Temperature determine Salt Rate
  - Pavement temperature comes from RWIS stations
    - 3 RWIS sites per garage so there are ‘spares’
  - Winter Supplement provides storm type info
  - Assessed in 10-minute periods
- Cleanup period allowed after storms
Salt Use Estimations

<table>
<thead>
<tr>
<th>Pounds of Salt</th>
<th>Roadway Surface Temp- Fahrenheit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heavy Frost Mist</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Light Snow</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Drizzle</strong></td>
<td>75</td>
</tr>
<tr>
<td><strong>Medium Snow</strong></td>
<td>75</td>
</tr>
<tr>
<td><em>(1/2&quot; per hour)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Light Rain</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Heavy Snow</strong></td>
<td>100</td>
</tr>
<tr>
<td><em>(1&quot; per hour)</em></td>
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</tbody>
</table>

- 75 Pounds/LM over 2 hours = 6.25 Pounds/LM in 10 minutes
- Using a 10-minute scale lets the salt rate adjust as temperatures or storm types change
Salt Use Estimations

- Each 10-minute rate calculation is added up to create daily, yearly, or 5-year Salt Rates (lbs/LM)
- A garage’s Salt Rate depends only on their weather
- But their calculated Salt Quantity depends on their lane miles and the service level of each
- Each service level is given a scale where more salt is allowed on an A than a B, and less on a C
The Dashboard helps managers track usage and whether it is staying ‘on target’.
Analyzing Our Impact on Traffic Flow
Traffic Speed Estimations for Winter Performance Measurement

- Traffic slows when roads are bad, speed up when conditions improve
  - But how do you know if the drop was acceptable?
  - A blizzard will bring traffic to a halt but is that the fault of a maintenance supervisor??
- Traffic speeds can be an outcome measurement for winter operations if;
  - You know what the baseline behavior would have been
  - How ‘reality’ compared
Traffic Speed Estimations for Winter Performance Measurement

- IHRB Project TR-491 “Performance Measurement for Highway Maintenance Operations”
  - Estimated average traffic speed for a storm based on weather
  - Easily computed with existing weather data
- We modified the formula to compute instantaneous estimated traffic drops during and after a storm
Traffic Speed Estimations for Winter Performance Measurement

- Preliminary results were very promising
- Hired ISU Statistics department to analyze and modify the prototype models
  - Incorporating statistical ‘fail-safe’ to guard against RWIS sensor blips for real time, automatic calculations
  - Pinpointing areas for improvement
- RFP for contractor to build system for real-time analysis and reporting
Thanks!

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