Maintenance Decision Support System
Premise: Road maintenance personnel at all levels can benefit from more integrated, rapid, comprehensive and flexible tools that address road-weather conditions. Such a tool will speed decision making, while also making it more uniform and informed.

MDSS Concept: Generate a graphical tool that rapidly depicts in a simple format the state-of-the-art in road-weather condition prediction, especially as it relates to common maintenance activities. Coupled with the displayed road condition is a state-of-practice recommendation for maintenance, including expected outcomes for acceptance or user-selected alternative courses of action.
MDSS (GUI/platform)

Weather
- Ensemble Forecasting, Precipitation Type, Probabilities

Near Surface Environment
- Snow Accumulation/Drifting, Visibility

Road Surface
- Temperature, Chemical Concentration, Mobility Index

Road Subgrade
- Temperature Profile, Frost, Strength

Z (Vertical Dimension)
X (Spatial Dimension)
t (Temporal Dimension)
Road Condition Modules

- Road Surface Temperature
- Chemical Concentration On Road
- Snow Depth And Drift
- Surface Friction

Decision Support

RWFS - Weather Information
RWFS Weather & Environment

ROAD MODULES
Calculate Road Condition

DECISION SUPPORT
Determine Maintenance (recommended)

DOT INTERFACE
Collect Maintenance (actual)

GUI
Display Forecasts

Spatial & Temporal
## Integrated Maintenance Recommendations

<table>
<thead>
<tr>
<th>Call @</th>
<th>Route</th>
<th>Segment</th>
<th>Driver</th>
<th>Truck ID</th>
<th>Dress &amp; Load</th>
<th>Treat. Start Time</th>
<th>Treat. Rate/TLM</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 pm</td>
<td>Monday</td>
<td>A</td>
<td>Sam Salter</td>
<td>Mack X</td>
<td>midnight Mon/Tue NaCl, pw-8g. CaCl</td>
<td>3:15 am Tuesday</td>
<td>400 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,3,4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
<td>Drive reverse route</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 pm</td>
<td>Monday</td>
<td>C</td>
<td>Polly Plowgirl</td>
<td>Mack Z</td>
<td>1:00 am Tuesday Sand (ballast)</td>
<td>3:15 am Tuesday</td>
<td>Plow only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8,9,10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 pm</td>
<td>Monday</td>
<td>B</td>
<td>Gary Grippy</td>
<td>Mack Y</td>
<td>1:30 am Tuesday Sand; Seg. 7</td>
<td>3:30 am Tuesday</td>
<td>1200 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6,7</td>
<td></td>
<td>Ford</td>
<td>NaCl; Seg. 6</td>
<td></td>
<td>400 lbs</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
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</tr>
</tbody>
</table>
GUI Display
Forecasts

ROAD MODULES
Calculate Road Condition

MDSS
Contaminate Build-Up Over Course of Storm
Station #10

- Snow/slush depth no treatment (in)
- Snow/slush depth with treatment (in)

ROAD MODULES
Calculate Road Condition
Salt Concentration Over Course of Storm Station #10

Salt Concentration

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5

0 1 2 3 4 5 6 7

Hours into Event

0 10 20 30 40 50 60

50 100 150

ROAD MODULES
Calculate Road Condition

MDSS
Mobility Index over Course of Storm  
Station #10

- Road Friction without treatment
- Road friction with treatment

ROAD MODULES  
Calculate Road Condition
Purpose of MDSS is

Not to replace experienced road maintenance personnel,

But to provide all levels of road maintenance decision makers with a tool that will quickly and flexibly ...

- Integrate Useful Information
- Integrate Point Analyses
- Integrate Maintenance Recommendations