Efficient, Effective and Innovative Water Quality BMPs

CEE by AASHTO Stormwater Community of Practice
May 2, 2018
Center for Environmental Excellence

• Promotes environmental stewardship and encourages innovative ways to streamline the transportation delivery process.

• Provides technical assistance, training, information exchange, partnership-building opportunities, and quick and easy access to environmental tools.

• Provides a variety of products and services to assist transportation agencies in achieving environmental excellence including:
  • Peer Exchanges
  • Practitioner’s Handbooks
  • Communities of Practices
  • Webinars
  • Databases

https://environment.transportation.org/
AASHTO and FHWA

Melissa Savage
AASHTO Center for Environmental Excellence

Eric Kopinski, PE
AASHTO Center for Environmental Excellence

Susan Jones, PE
Federal Highway Administration
Community of Practice Forum Overview

- Open Graded Friction Courses (OGFC)
  - Bhaskar Joshi, CALTRANS
- Innovative Roadside BMPs
  - Jana Ratcliff, Washington State DOT
- Winter Storm Management
  - Nick Tiedeken, Minnesota DOT
- Community of Practice Forum
  - Scott McGowen, Michael Baker International
- Closing
Open Graded Friction Courses (OGFC)

Bhaskar Joshi, PhD, PE, PMP
Chief, Office of Stormwater Program Development
California Department of Transportation
Open Graded Friction Courses (OGFC)
OPEN GRADED FRICITION COURSE
USAGE GUIDE

California Department of Transportation
Division of Engineering Services
Materials Engineering and Testing Services-MS #5
Office of Flexible Pavement Materials
5900 Folsom Boulevard
Sacramento, CA 95819-4612

February 8, 2006
OPEN GRADED FRICTION COURSE

- Sacrificial wearing course
- Aggregate with relatively uniform grading
- Little or no fine aggregate and mineral filler
- High void space in the compacted mix
BENEFITS

- Roadway Safety
  - Stopping distance
  - Visibility
  - Contrast in pavement markings
  - Drainage
  - Surface friction

- Environmental
  - Noise reduction
  - Stormwater Treatment
OGFC Usage

• New construction
• Major Rehab
• Maintenance overlays
• High Traffic volumes
# OGFC USAGE

<table>
<thead>
<tr>
<th>✔️</th>
<th>✗</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet and nighttime accidents</td>
<td>Over unsound pavement</td>
</tr>
<tr>
<td>Skid resistance</td>
<td>Fuel or Oil Spill Areas</td>
</tr>
<tr>
<td>Lane widening next to existing OGFC</td>
<td>Paving Air Temperature &lt; 45°F</td>
</tr>
<tr>
<td>Cross slope &lt; 2%</td>
<td>Routine surface seal</td>
</tr>
<tr>
<td>Bleeding pavements</td>
<td>Snowy/icy areas ??</td>
</tr>
<tr>
<td>Delay aging of DGAC in desert areas</td>
<td>Severe Turn Areas ??</td>
</tr>
</tbody>
</table>
STORMWATER QUALITY HANDBOOKS

PPDG
PROJECT PLANNING AND DESIGN GUIDE

JULY 2017 | CTSW-RT-17-314.24.1

CONSTRUCTION
DESIGN POLLUTION PREVENTION
TREATMENT
MAINTENANCE

Project Planning and Design Guide (PPDG)


Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual
OGFC for Stormwater Treatment

- OGFC considered a flow-through treatment device
- Calculate and claim Credit for stormwater treatment
- **Recommended Usage**
  - No offsite sediment laden stormwater flows
  - Contributing Impervious Drainage areas
  - Consistent with Pavements Usage Guidance
- **Pollutant Removal Mechanism**
  - Straining
  - Reduction in splash and spray
OGFC Pilot Study – Water Quality

- 2007: Pilot Study Initiated
- 3 Sites – Hwy 101, I-5, CA 70
- Study conducted for 4 years
Study: Performance Summary

TSS (mg/L)

Total P (mg/L)

Total N (mg/L)
Study: Performance Summary

- **Total Cu (μg/L)**
  - 208-1: HMA, OGFC
  - 209-2: HMA, OGFC
  - 209-4: HMA, OGFC

- **Total Pb (μg/L)**
  - 208-1: HMA, OGFC
  - 209-2: HMA, OGFC
  - 209-4: HMA, OGFC

- **Total Zn (μg/L)**
  - 208-1: HMA, OGFC
  - 209-2: HMA, OGFC
  - 209-4: HMA, OGFC
Study: Performance Summary

Diss. Cu (µg/L)

Diss. Pb (µg/L)

Diss. Zn (µg/L)

208-1  209-2  209-4

HMA  OGFC

208-1  209-2  209-4

HMA  OGFC

208-1  209-2  209-4

HMA  OGFC
Study: Performance Summary

Comparison (mg/L)

TSS
- ASF (Eff)
- OGFC

Comparison (mg/L)

Total P
- ASF (Eff)
- OGFC

Total N
- ASF (Eff)
- OGFC
Study: Performance Summary
Specifications

- Existing Caltrans practice
- Caltrans Standard Specifications
  - 39-2.04 Open Graded Friction Courses
- Service Life:
  - Shown to last: 2 to 10 years
  - More common: 4 to 6 years
  - Function of several factors
Maintenance and Rehabilitation

• Existing Caltrans practice
• No additional maintenance requirements:
  ▪ Caltrans Maintenance Manual Volume I
    ❖ Chapter A, Flexible Pavement
    ❖ Chapter D1.04, Debris and Sediment Removal
  ▪ Caltrans Maintenance Technical Advisory Guide
    ❖ Chapter 8 Thin Maintenance Overlays
Study Conclusions

• General
  • TSS, Total Phosphorus
  • Total Copper, Total Lead, Total Zinc

• OGFC vs Austin Sand Filter Effluent
  • Nutrients, Metals (total and dissolved)
  • Total N concentrations are not significantly different
## BMP SELECTION CHECKLIST

<table>
<thead>
<tr>
<th>Tier</th>
<th>Infiltration &lt; 20%&lt;sup&gt;2,3&lt;/sup&gt;</th>
<th>Infiltration 20%–50%</th>
<th>Infiltration &gt; 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Austin Media Filter with AA</td>
<td>Austin Media Filter with AA</td>
<td>Austin Media Filter with AA</td>
</tr>
<tr>
<td></td>
<td>Austin Sand Filter&lt;sup&gt;4&lt;/sup&gt;: Both Bioretention</td>
<td>Austin Sand Filter&lt;sup&gt;4&lt;/sup&gt;: Both Bioretention</td>
<td>Austin Sand Filter&lt;sup&gt;4&lt;/sup&gt;: Both Bioretention</td>
</tr>
<tr>
<td></td>
<td>Delaware Filter</td>
<td>Delaware Filter</td>
<td>Delaware Filter</td>
</tr>
<tr>
<td></td>
<td>Detention Basin</td>
<td>Detention Basin</td>
<td>Detention Basin</td>
</tr>
<tr>
<td></td>
<td>MCTT</td>
<td>MCTT</td>
<td>MCTT</td>
</tr>
<tr>
<td></td>
<td>OGFC</td>
<td>OGFC</td>
<td>OGFC</td>
</tr>
<tr>
<td></td>
<td>Strip&lt;sup&gt;5&lt;/sup&gt;: As/Ad &gt; 0.2</td>
<td>Strip&lt;sup&gt;6&lt;/sup&gt;: All Swales Wet basin</td>
<td>Strip&lt;sup&gt;6&lt;/sup&gt;: All Swales Wet basin</td>
</tr>
<tr>
<td></td>
<td>Strip&lt;sup&gt;5&lt;/sup&gt;: As/Ad &lt; 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wet Basin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>Detention Basin: Lined</td>
<td>Detention Basin: Lined</td>
<td>Detention Basin: Lined</td>
</tr>
</tbody>
</table>
Implementation Challenges

- Demonstration of treatment efficiency
- Treatment BMP Ranking
- Tracking of treatment credits
- Maintenance operations and equipment
Innovative Roadside BMPs

Jana Ratcliff
Stormwater and Watersheds Program Manager
Washington State Department of Transportation
Need for Innovative Roadside BMPs

- Long linear BMPs that fit well in transportation corridors
- Can treat a large amount of pavement with a relatively small footprint
- Construction ease of access from the roadway
- Low-cost, well performing, low maintenance BMPs
Vegetated Filter Strip (VFS)

Description: Densely vegetated areas of land with a flat cross slope. Designed to maintain sheet flow which slows runoff and traps sediment and pollutants coming directly off the pavement.

Geometry Limitations
- Resultant Slope ≤ 9.4%
- Contributing Flow Path ≤ 150'
- Embankment Slope 2%-33%

BMP Function
- LID
- Flow Control
- Runoff Treatment
  - Oil Control (CAVFS E. WA Only)
  - Phosphorus
  - TSS - Basic
  - Dissolved Metals - Enhanced (CAVFS Only)

Effective Life (Years)
- 20-50

Capital Cost
- Low

O & M Cost
- Low

Additional Constraints/Requirements
- 4-5 Infiltration Design Criteria (CAVFS only)
- Setback
- Landscaping/Planting
- Wetland Planting and Plant Establishment
- Inlet and Outlet Spacing
- Overflow
- Multidisciplinary Team
- WSDOT Pavement Engineer Approval

TMDL/303(d) - Considerations
- Soil Amendments/Compost
- Energy Dissipater/Level Spreader
- 5-4.3.3 Facility Liners
- 5-4.3.7 Signings
- Fencing
- Presettling/Pretreatment
- Underdrain
- Soil Preparation

Maintenance Requirements
- Access Roads or Pullouts
- Vacator Truck Access
- Mowing
- Valve Access
- Specialized Equipment
- Specialized Training

Further Requirements: See Sections 5-3.6.1 and 5.5.
VFS Limitations
Compost Amended Vegetated Filter Strips (CAVFS)
CAVFS Limitations
Modified VFS
Media Filter Drain (MFD)

Description: Linear flow-through stormwater runoff treatment device along highway side slopes and medians. Also has end-of-pipe configurations.

Geometry Limitations
- Contributing Flow Path ≤ 150'
- Embankment Slope 2%-25%

BMP Function
- LID
- Runoff Treatment
  - Phosphorus*
  - TSS - Basic
  - Dissolved Metals - Enhanced

Effective Life (Years)
- 25

Capital Cost
- Low

M & O Cost
- Low to Moderate

Additional Constraints/Requirements
- 4-5 Infiltration Design Criteria
- Setback
- Landscaping/Planting
- Wetland Planting and Plant Establishment
- Inlet and Outlet Spacing
- Overflow
- Multidisciplinary Team
- WSDOT Pavement Engineer Approval
- Soil Amendments/Compost
- Energy Dissipater/Level Spreader
- 5-4.3.3 Facility Liners
- 5-4.3.7 Signing
- Fencing
- Presettling/Pretreatment
- Underdrain (Where Permitted)
- Soil Preparation

TMDL/303(d) – Considerations

Avoid
- Fecal Coliform
- Phosphorus*
- Nitrogen
- Temperature
- Dissolved Metals
- Total Suspended Solids/Turbidity
- Dissolved Oxygen
- pH
- Oil/Grease
- PAHs
- Pesticides

Preferred

Maintenance Requirements
- Access Roads or Pullouts
- Vehicle Truck Access
- Mowing
- Valve Access
- Specialized Equipment
- Specialized Training

Further Requirements: See Sections 5-3.7.1 and 5.5. Also, see Table 5-21.

*if a compost blanket is used on the media filter drain mix then this BMP is not approved for phosphorus control.

1. See Table 3-1 and Section 2-4.2 for additional guidance.
Type 1 MFD

Gravel - Grass Strip - MFD Mix

NOTE:
1. SEE "STRUCTURAL DESIGN CONSIDERATIONS"
Type 4 MFD

Gravel – Grass Strip – MFD Mix

Note the flow spreader on the left.
MFD Limitations
Getting credit for what’s already in the roadway prism - embankments

- Runoff treatment and flow control
- Natural dispersion BMP
- Research supporting embankments as BMPs
- Research to develop better method of estimating infiltration rates (Ksat)
Winter Storm Management
AASHTO Community of Practice

Nick Tiedeken – Minnesota DOT
Conventional Snow and Ice Fighting
Goals

- Safety
- Cost Effective
- Environment
Chloride Reduction: strive for the most efficient and effective methods of snow and ice control to prevent road salt from entering lakes and rivers.

- Right Material
- Right Amount
- Right Time
- Right Place
2016-17
Winter Maintenance Report
At A Glance

Total Cost of Winter $97 Million

30,517 Snow and Ice Lane Miles

87% Frequency Achieving Bare Lanes

54” Statewide Snowfall Average

150 Truck Stations

1,779 Full-time and Backup Drivers

843 Plows

46,000 Tons Sand
197,417 Tons Salt
## Snapshots of Winter: 2-Year Comparison

<table>
<thead>
<tr>
<th>Category</th>
<th>Measure</th>
<th>2015-16</th>
<th>2016-17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Lane Miles</td>
<td>30,632</td>
<td>30,517</td>
</tr>
<tr>
<td><strong>Weather</strong></td>
<td>Snowfall, near MSP Airport</td>
<td>36.7&quot;</td>
<td>45.5&quot;</td>
</tr>
<tr>
<td></td>
<td>Snowfall, statewide across districts</td>
<td>52.6&quot;</td>
<td>54.0&quot;</td>
</tr>
<tr>
<td></td>
<td>Number of winter events, statewide average</td>
<td>27</td>
<td>22</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td>Salt used</td>
<td>157,812 tons</td>
<td>197,417 tons</td>
</tr>
<tr>
<td></td>
<td>Average weighted cost of salt per ton</td>
<td>$75.79</td>
<td>$73.99</td>
</tr>
<tr>
<td></td>
<td>Salt brine used</td>
<td>2.2 million gallons</td>
<td>3.0 million gallons</td>
</tr>
<tr>
<td><strong>Costs and Performance</strong></td>
<td>Total plowing, salting and sanding costs</td>
<td>$94.2 million*</td>
<td>$97 million*</td>
</tr>
<tr>
<td></td>
<td>Total plowing, salting and sanding costs per lane mile, statewide average</td>
<td>$3,074</td>
<td>$3,180</td>
</tr>
<tr>
<td></td>
<td>Frequency of achieving bare lane after winter event (70% target)</td>
<td>89%</td>
<td>87%</td>
</tr>
<tr>
<td><strong>Labor and Services</strong></td>
<td>Regular labor hours</td>
<td>510,147</td>
<td>465,798</td>
</tr>
<tr>
<td></td>
<td>Overtime winter labor hours</td>
<td>78,111</td>
<td>54,933</td>
</tr>
</tbody>
</table>

*Based on fiscal year
Best Management Practices

- Training
- Storage and Loading
- Equipment - Calibration and Upgrades
- Liquids-Anti-icing, Prewetting
- Alternative Deicers
- Blowing Snow Control
- Road Weather Technology
- Innovation
- Research
- Traveler Information
Training

Snow & Ice Event/Bare Lane Training
2014-2015
### Table 2-8.01.01A
Application Rate Guidelines
(lbs/2-lane mile)

<table>
<thead>
<tr>
<th>Pavement Temp. (°F) and Trend (°F/h)</th>
<th>Weather Condition</th>
<th>Maintenance Actions</th>
<th>Salt Precrusted/ Pretreated With Salt Brine</th>
<th>Salt Precrusted/ Pretreated With Other Blends</th>
<th>Dry Salt*</th>
<th>Winter Sand (abrasives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30°†</td>
<td>Snow, most intersections only</td>
<td>80</td>
<td>70</td>
<td>100*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>80 - 160</td>
<td>70 - 140</td>
<td>100 - 200*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>30°↓</td>
<td>Snow, flow if necessary</td>
<td>150 - 200</td>
<td>130 - 180</td>
<td>180 - 240*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>120 - 160</td>
<td>100 - 140</td>
<td>150 - 200*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>25 - 30°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>150 - 200</td>
<td>130 - 180</td>
<td>180 - 240*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>120 - 160</td>
<td>100 - 140</td>
<td>150 - 200*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>25 - 30°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>150 - 200</td>
<td>130 - 180</td>
<td>180 - 240*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>150 - 200</td>
<td>130 - 180</td>
<td>180 - 240*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>20 - 25°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>200 - 240</td>
<td>175 - 250</td>
<td>250 - 300*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>240 - 320</td>
<td>210 - 280</td>
<td>300 - 400*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>15° to 20°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>200 - 280</td>
<td>175 - 250</td>
<td>250 - 300*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Frt. Rain</td>
<td>Apply chemical</td>
<td>240 - 320</td>
<td>210 - 280</td>
<td>300 - 400*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>15° to 20°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>240 - 320</td>
<td>210 - 280</td>
<td>300 - 400*</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>0 to 15°†</td>
<td>Snow, flow &amp; apply chemical</td>
<td>Not recommended</td>
<td>300 - 400</td>
<td>500 - 750 spot treat as needed</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>&lt; 0°</td>
<td>Snow, flow &amp; apply chemical</td>
<td>Not recommended</td>
<td>400 - 600**</td>
<td>500 - 750 spot treat as needed</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
</tbody>
</table>

Notes: *Dry salt is not recommended. It may blow off the road before the melting process can begin.
**Applied at the centerline of the roadway.
A blend of 6 - 8 gallon MgCl₂ or CaCl₂ added to NaCl can melt ice as low as -10°.
Salt brine should be mixed to a 23.3% concentration which is a salinity reading of 85% on the hydrometer reading of 1.176.

How to use Table 2-8.01.01A:

1. Select the row with the appropriate pavement temperature, temperature trend and weather conditions.
2. Select the column that is appropriate for the type of material being used.
3. Find the box where the row and columns intersect to find the application rate.
4. Compare values to the calibration chart for the appropriate truck.
5. Use the correct setting for the rate indicated on the application rate guidelines.

---

**MINNESOTA LTAP**
CENTER FOR TRANSPORTATION STUDIES
UNIVERSITY OF MINNESOTA

**Minnesota Department of Transportation**

**Minnesota Local Road Research Board**
Covered Storage
Plows and Blades
Brine Tank and Spinner
Anti-icing
## Winter Chemicals

### 2017-2018 Mn/DOT Winter Chemicals – Approved Product List

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Manufacturer</th>
<th>Date Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArtiClear Gold</td>
<td>Compass Minerals</td>
<td>10/09/2013</td>
</tr>
<tr>
<td>LCS Concentrate</td>
<td>Envirotech Services</td>
<td>4/30/2015</td>
</tr>
<tr>
<td>Geomelt 55</td>
<td>SNI Solutions</td>
<td>9/30/2011</td>
</tr>
<tr>
<td>Headwaters 10F(1)</td>
<td>Rivertop, Inc.</td>
<td>Provisional Approval</td>
</tr>
<tr>
<td>Headwaters(1)</td>
<td>Rivertop, Inc.</td>
<td>10/08/2013</td>
</tr>
<tr>
<td>Beet55(1)</td>
<td>Smith Fertilizer</td>
<td>Provisional Approval</td>
</tr>
<tr>
<td>AMP</td>
<td>Envirotech Services</td>
<td>Provisional Approval</td>
</tr>
</tbody>
</table>
## Non Chloride Chemicals

### Acetates (liquid or solids)

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Manufacturer</th>
<th>Date Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF7 (liquid) potassium acetate</td>
<td>Cryotech Deicing</td>
<td>9/06/2013</td>
</tr>
<tr>
<td>NAAC (pellets) sodium acetate</td>
<td>Cryotech Deicing</td>
<td>9/06/2013</td>
</tr>
<tr>
<td>Alpine Ice Melt (liquid)(^{(1)})</td>
<td>Compass Minerals</td>
<td>Provisional Approval</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/05/2010</td>
</tr>
<tr>
<td>Geomelt GEN3 (liquid)</td>
<td>SNI Solutions</td>
<td>9/30/2011</td>
</tr>
</tbody>
</table>
Blowing Snow Control
Snow Fence
Earthwork for Drift Control

NW Quadrant TH 10 and TH 32 Interchange

NW Quadrant TH 10 and TH 32 in March 2013
Compare
Road Weather Information System

- Air (Temp, RH, Dew)
- Wind (Speed, Gust, Dir)
- Precip (Type, Int, Rate)
- Precip period
- Accumulation
- Surface Data
  - Status
  - Pavement Surface Temperature
  - Pavement Temperature
  - Subsurface Temperature
Weather Stations
Maintenance Decision Support System and Automated Vehicle Location

- Modem
- Data
- Communications Server
- Radio Tower
- Base Station Controller
- GPS Satellites
- One-Way GPS Location Information
- Two-Way Data Message

Dispatch Communications Center
Wireless Network

MDSS/AVL
Sustainability Target (5 year)

- <10% Salt Use Above MDSS Recommendation
Innovation – Slurry Truck
Innovation - Plow

MNDOT Plow Drivers Invent New, Hybrid Plow Design

February 25, 2015 by Shannon Fiecke

If the plow pictured above looks like two different plows welded together, it's because they are.
Research Examples

- Clear Roads – Best Practices Manual, Deicer Toxicity
- MnDOT – Optimizing Deicing and Anti-Icing Performance, KAc Field Study
- LRRB – Salt Accumulation and Movement, Field Usage of Alternative Deicers
- NCHRP – Toxicological Effects, Cl Mitigation
Traveler Information - 511
Weather Stations

US 71: Jeffers near Jeffers

26° F

- Precipitation: Light Snow
- Visibility: 0.55 miles
- Wind Direction (avg): SE
- Wind Speed (avg): 17.4 mph

More Data
Last updated: Today at 1:40 pm

Disclaimer

US 71: Roadway is completely covered with snow.

Between 100th Street; Iowa State Line (5 miles south of the Jackson area) and US 14 (Sanborn). The roadway is completely covered with snow.

Last updated: Today at 10:16 am
Plow Cams

April 8, 2018 13:31:25
MN 60: Heron Lake to Windom
Chloride Impaired Waters

Figure 1. 2014 Chloride Assessment Results in the TCMA
Chloride TMDLs - TCMA

- 23 lakes, ponds and wetlands
- 15 streams
Performance Based Approach

- Priority on improving winter maintenance practices
- Minimizing Use of Salt
- Performance based
- WMAt
- MPCA continue to monitor WQ
- Future
- Statewide Chloride Plan
Assessing Operations

Green/Yellow/Red for 180 BMPs
MS4 Permit

Winter Maintenance Assessment Tool (WMAt)

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To learn more about road salt and water quality in Minnesota, visit MPCA’s Road Salt and Water Quality Website.
AASHTO/ASDWA Road Salt Webinar
March 8, 2018

MnDOT Salt Sustainability Program

- Literature Search – Salt Reduction Strategies
- Compilation of BMPs
- Training Materials and Guides
- Annual Salt Reduction Measurement Tool
- Final Report
Thank You
Nick.Tiedeken@state.mn.us
Submit your questions
Type in the Q&A box on the panel on your screen.
  • Select ‘Host & Presenter’ in the drop down.
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- A recording of this webinar will be available on the Center for Environmental Excellence by AASHTO Website.

http://environment.transportation.org
Products & Programs > Communities of Practice > Stormwater Management
Efficient, Effective and Innovative Water Quality BMPs

THANK YOU FOR ATTENDING

CEE by AASHTO Stormwater Community of Practice
May 2, 2018