

Michigan DOT Best Practices and Innovations

2015 Winter Maintenance Peer Exchange
September 24, 2015
Minneapolis, Minnesota

Tim Croze, P.E.
Region Support Engineer
Operations Field Services Division

Steve Cook, P.E.
Maintenance/Operations Engineer
Operations Field Services Division

Dawn Gustafson, P.E.
Newberry TSC Manager
Superior Region

Justin Droste, P.E.
Asset Management Engineer
Operations Field Services Division



MDOT Winter Best Practices

- Salt usage best practices
- AVL/MDSS
- Underbody plows



2012 & 2013 Salt Bounce and Scatter Studies

2012 Findings:

- Slower speeds (25mph) reduces B&S significantly
- Treated salt scatters less than dry salt



2013 Findings:

- Adding a “Boot” decreases B&S
- Zero Velocity & Slurry Generators limit B&S (acceptable up to 35 mph)



Best Practices Advisory

Maintenance Advisory

MA 2013-01
August 27, 2013

From Mark Geib, Engineer of Operations Field Services Division

MDOT
Operations Field
Services Division
4533 Lansing Road
Lansing, MI 48917

Questions regarding
this advisory should
be directed to:

Tom Orze
Engineer Manager
Region Support
Phone: 313-322-3204
CostaT@mdot.state.mi.us

Justin Davis
Roadway Operations
Engineer
Phone: 313-636-0216
DavisJ@mdot.state.mi.us



Best Practices for Applying Deicing Materials

Due to increasing costs and growing environmental concerns regarding the use of deicing materials for winter maintenance operations, it is critical we do everything possible to reduce the use of these materials, while still providing adequate levels of service. A major component of reducing the amount of deicing material required is conducting operations in ways that limit the amount of material that bounces and scatters off the roadway during application. The [2012 MDOT Salt Bounce and Scatter Study](#) concluded that using pre-wet salt and applying deicing materials at slower speeds significantly increases the amount of material that stays on the roadway. Incorporating these practices into MDOT's winter operations program will ensure that as much deicing material as possible remains on the roadway and within the target area (if on either side of the centerline), where it is most effective.

In order to keep the most deicing material on the roadway during the application process, the following guidelines should be followed (for all MDOT maintenance facilities beginning with the 2013/2014 season):

1. The truck's speed should operate between 20-25 mph while applying deicing material. Every effort should be made to maintain as slow a speed as possible while applying deicing material.

Justified exceptions to this practice may include:

- Peak hours on high-speed roads
- Trucks equipped with technology that limits salt scatter, such as zero-velocity spreaders, slurry generators, etc. Based on results from the [2012 MDOT Salt Bounce and Scatter Study](#), these advanced systems should not operate faster than 35 mph.
- Other circumstances approved by the Region Engineer.

2. All salt applied to a roadway should be pre-wet with a liquid chloride product. Rates of pre-wetting should be between 7 to 10 gallons per ton of untreated salt (salt slurry will require more, per manufacturer's recommendations). Salt can be treated at the stockpile, by the truckload, or at the point of application on the truck.



3. For all material delivery systems that allow it, a "bowl" sleeve system, which decreases the amount of drop between the spreader and pavement, should be utilized (between 1-6 inches for a loaded truck). This decreases bounce and scatter, but not enough to maintain acceptable efficiencies at speeds above 25 mph.

4. The updated MDOT salt application rate chart should be followed. The chart has been revised to reflect the use of pre-wet salt at slower truck speeds.

MDOT maintenance facility supervisors must submit written plans for their facility to their Associate Region Engineer of Operations by October 1st of each year, detailing intended actions for implementation. Exceptions to these guidelines must be justified in writing on a case-by-case basis (example: per snow route). Consolidated action plans for each region should be submitted to the Engineer of Operations Field Services by October 15th of each year.

**Automated Vehicle Location
(AVL) Fleet Instrumentation &
MDSS Project**

Project Goals

- **Fleet Management**
 - Accurate reporting of mileage and hours of vehicles
 - Ability to monitor current location of vehicles
 - Light fleet and Winter Maintenance Trucks (WMTs)
- **Winter Maintenance Operations**
 - Accurate reporting of equipment and material usage
 - Route monitoring and optimization
 - Maintenance Decision Support Software (MDSS)

Data Collected

All Vehicles

- Position
- Speed
- Heading
- Time
- Miles driven
- Engine Hours

Additional Info for WMTs

- Air and Pavement Temps
- Blade Up/Down
- Wing/ Plow Usage
- Display screens for MDSS and cameras
- Spreader Information (Dickey-John)
 - Material Type
 - Application Rate
 - Amount Used

AVL Website



Vehicle: 04-4032
Speed: 17 mph
Belly Blade: down
Right Blade: up
Solid Rate: 350.2 lb/mi

- Real time operations information (salting speed compliance)
- Camera images from WMT



MDSS Website



- Website Weather Radar with WMT info.
- MDSS info provided to WMT cab.



FY 2015 Salt Speed Compliance and Efficiency*

1/16 to 2/1/15

Salt Usage and Effectiveness

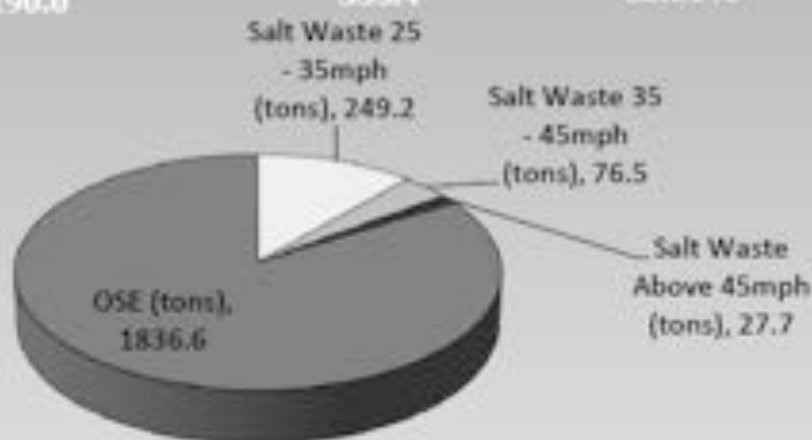
Region: Superior

Date Range: 1/16/2015 to 2/1/2015

Total Salt Spread (tons)
2190.0

OSE (tons)**
353.4

Salting Efficiency
83.86%



□ Salt Waste 25 - 35mph (tons)

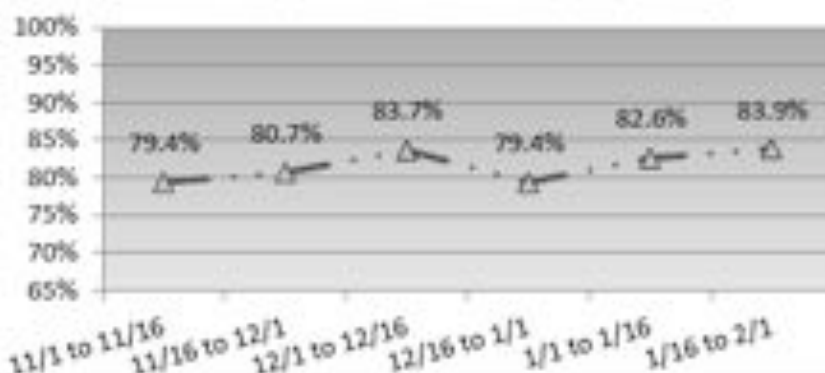
□ Salt Waste 35 - 45mph (tons)

■ Salt Waste Above 45mph (tons)

■ OSE (tons)

Diminished Salt Efficiency (DSE) **
Optimized Salt Efficiency (OSE)

Winter 2014/2015 Salt Efficiency: Superior



Salt Speed Compliance

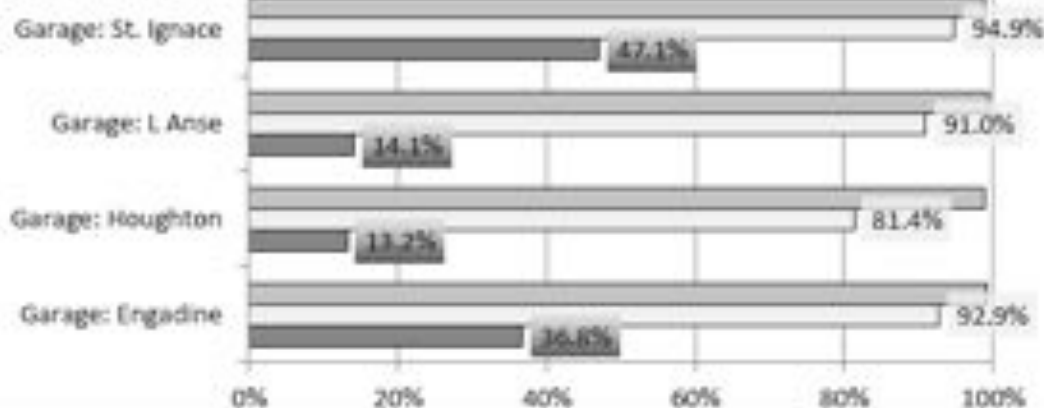
Region: Superior

Date Range: 1/16/2015 to 2/1/2015



* Salt Efficiency is based on AVL salting speed compliance data and empirical data from the MDOT Salt Bounce and Scatter Studies.

** Salt applied at speeds faster than 25 mph can still benefit the traveled roadway. Increased bounce and scatter at faster speeds diminishes salting efficiency.



Garage Speed Data

□ 45mph Compliance
□ 35mph Compliance
■ 25mph Compliance

Front Plow vs Underbody Blade



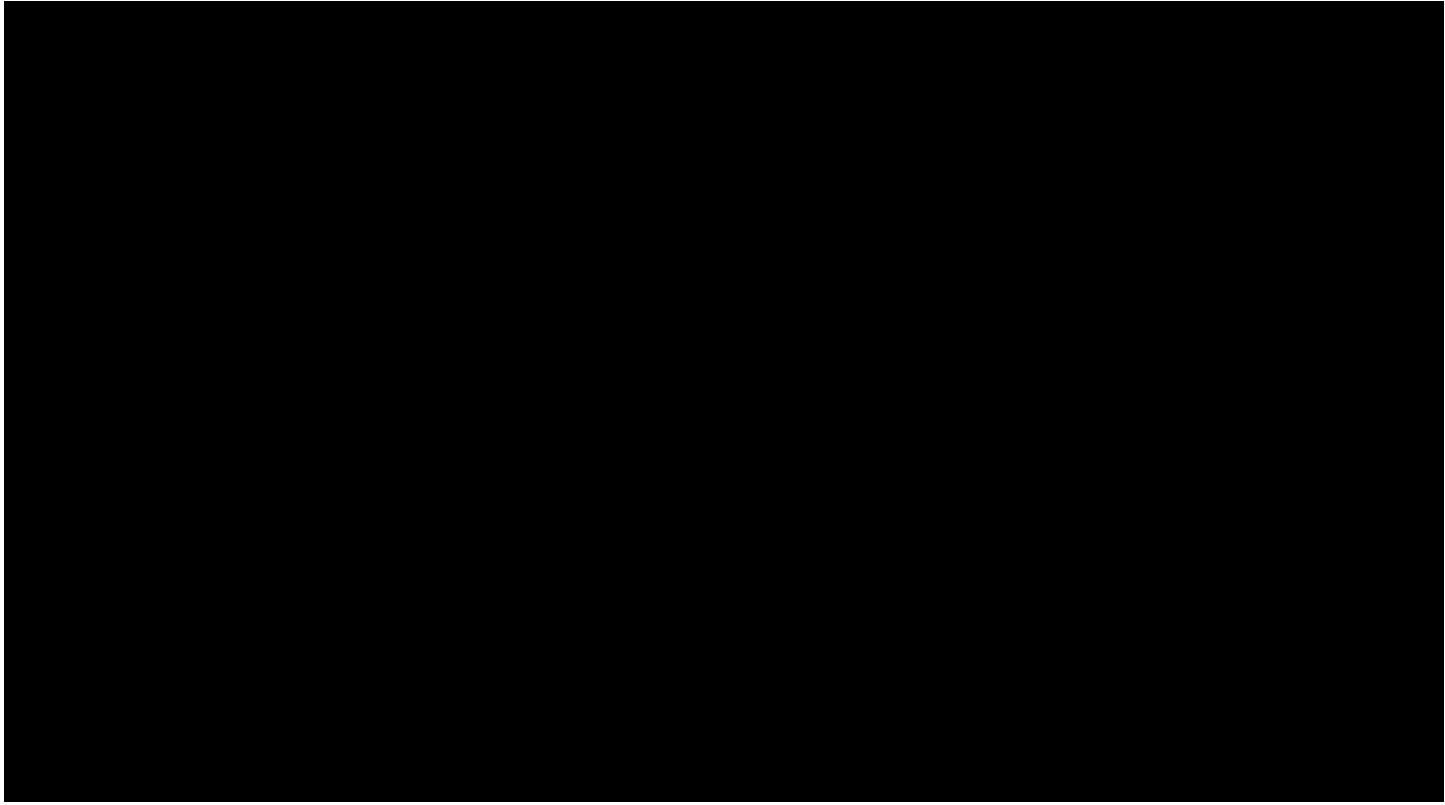
- Able to plow deeper snow
- Throws snow up and over objects



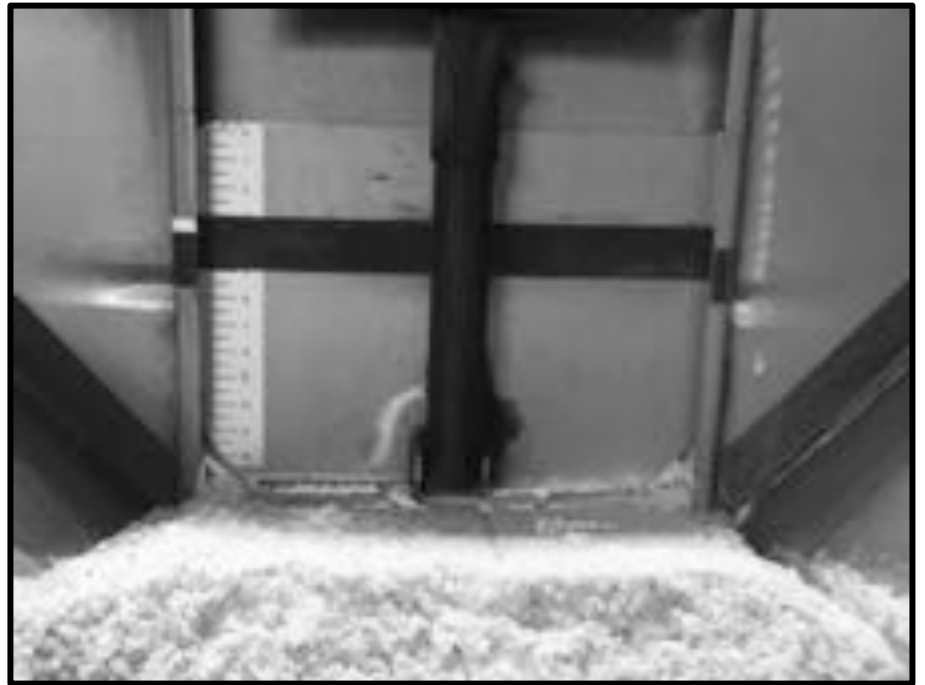
- Easier for driver to maneuver truck
- Provides better visibility to operator
- Ability to use down pressure
- Higher speed plowing

Innovations-L'Anse Salt Spreader





Innovations-Checking Gate Height



Innovations-Salt Calibration Team



Innovations-Superior Stick



Innovations-Superior Stick



Underbody Blade Extension

- 2' extension of underbody
- Mostly used on right side
- Simple inexpensive upgrade



Innovations-Wing Plow Controls



Innovations-Auger/Y-Chute Combo



Questions?

Tim Croze P.E.
Michigan DOT
Operations Field Services
517-322-3394
crozet@michigan.gov

