PUBLIC WORKS

"First to Respond, Last to Leave"
2018
PURDUE ROAD SCHOOL

WINTER SOLUTIONS IN
PURE MICHIGAN

MARCH 7, 2018
Area residents and businesses have **HIGH** expectations for the City’s public services LOS (Level Of Service)

- Division of Public Works (DPW) maintains a network of more than 58 miles of major roads and **220** miles of paved and **24** miles of unpaved local roads (centerline)

- **170+ Major Rd. Lane miles** (some are 5+ lanes wide)

- **9TH** largest municipal street network in the state of Michigan and the largest in Oakland County. Population **80,000 +**

- APWA 2011 Excellence in Snow and Ice Control Award
FH’s Road Network MDOT, RCOC & City ROW’s
FH’s History

- 33 sq. miles
- Bedroom Community w/Industrial Parks
- Asphalt, Concrete & Gravel surfaces to maintain
- 6 Major Rd snow routes (approx. 28 LM ea)
- 5,000 tons of salt annual avg. (10k + prior to 2002)
FH’s History

- Began using Pre-Wet ‘87
- Began using Brine & Blends ‘05-’06 (Wixom)
- Anti-ice, Pre-wet, Direct Liq. Application
- 9,000 gal to anti-ice majors per application
CHALLENGES
CHALLENGES of WINTER

- Weather / Event Changes
- Level Of Service
- Expectations
- Staff / Labor-Part Time / Seasonal / Fatigue
- Salt / Materials
  - Supply of Cutting Edges
- Staff “BUY IN”
- Morale
- Equipment Issues
CHALLENGES
Snow and Ice Control
FREEZING RAIN/
TEMP DROP
ICE STORMS
ICE – FOG
ICE STORM – OOPS
TOOLS IN THE TOOL BOX

Versatile
Flexible
Efficient
WEATHER FORECASTING

- Frost
- Light Snow
- Heavy Snow
- Ice Storm

- Building a Weather Plan
- Weather Information Service
- Local Forecasts / Internet/Social Media
- RWIS / Weather Station
- Lean on your neighbors “network”
- Cameras / PD / Gut
FH’s have added swap loaders to the fleet to increase versatility and increase usage.
Swap Loaders/Hooklifts
The most efficient upgrade we've added to the fleet for Mechanically Removing Snow/Ice.
**Pre-Wetting** ---- 30% savings Minimum!
- The application of brine, calcium, or a mixture directly to the salt
- Lowers working temperature of salt
- Reduces salt bounce and scatter
- Reduces amount of salt required
- Achieves ‘wet pavement’ faster
- Accelerates the brine process

**Anti-Icing**
- A pro-active measure of applying liquid chemicals to the road surfaces before a snow event
- Prevents bonding of ice or hard pack to road
- Best results are achieved with 35 - 50 gallons per lane mile
- Ineffective if storm comes in as rain

**De-Icing**
- The application and combination of rock salt and/or liquids directly
- “DLA” to the pavement (rock salt still has a place in solid ice events)
- De-Icing fluid is already in solution (brine process)
- Proven to be efficient and economical
- 900 gals of brine/ 1 ton salt
TOOLS TO HELP THE DECISION PROCESS
(Pavement vs. Ambient TEMP)

- Simple Handheld Infra-Red, Equipment-Mounted
- Weather Reports/Service/Network with Agencies
- RWIS-VENDORS-MDOT
- How is the event trending < >
TOOLS TO HELP THE DECISION PROCESS

(Pavement vs. Ambient TEMP)
MATERIALS
EVERY TIME YOU LOAD UP !!
EVERY TIME YOU LOAD UP!!

Tandem Axle-10+ TONS- SALT= $600+
Pre-Calibration meeting: refresher for procedures and “game plan”, including operator input.

Training of personnel (PowerPoints, Videos/In-House, Webinars, etc.)

Involve your vendors (site visit)

Calibration of liquid and granular equipment. (Utilizing “catch” tests and scales, grid)

Do your best to get BUY IN...
Save time, larger quantities for drop tests and contain and dump materials more efficiently.
TRAINING & NETWORKING
TRAINING

Potlucks

Support
TRAINING

Workshops

Vendors
The City of Farmington Hills formed a local Winter Maintenance Team made up of representatives from southeast Michigan communities to network, collaborate, and learn about new techniques. The Committee meets regularly to hear from vendors and private contractors about new products and methods. It gives participants the chance to see what is working for other communities, establish goals, view research, and collect data. The team moves the meeting site to different facilities each time.
COLLABORATION-TEAMWORK

S.E. MI. Wint. Maint. Team - DLA PROJECT

S.E. Michigan Winter Maintenance Team

City of Novi

City of Wixom

Farmington Hills, Michigan
MATERIALS Testing / Evaluating

Totes

2-3 gallon Spray Bottles
PRO-Active / RE-active

ANTI-ICING

DE-ICING
LIQUIDS IN OUR PRE-WET PROGRAM PRE 2004

- PRE-WET METHODS:
- Overhead spray bar (for older equipment, trucks w/small tanks or pre-wet pump failures)
- Colder Events, Better Saturation w/ each bucket
The application of brine, organics, calcium, or a mixture directly to the salt at the spinner - Atomizing? - Try a slurry bar and/or chute.

- Reduces salt bounce and amount required
- Best results are achieved with 10 + gallons per ton applied
- Achieves ‘wet pavement’ faster
- Accelerates the brine process
Pre-Wet / Slurry Bar / DLA
Factoid:
It Takes 10 Times More Resource to De-Ice as to Anti-Ice!

ADD UP ALL THE INTANGIBLES-SAFETY, WEAR and TEAR on EQUIP., LABOR, SALT, FUEL, etc. $$$
Review/monitor weather forecast.

- Is snow or frost predicted within the next three days?
  - Yes
  - Is rain predicted before the snow?
    - Yes
      - Do not apply anti-icing materials.
    - No
      - Is the pavement temperature 15 degrees or greater?
        - Yes
          - Do not apply anti-icing materials.
        - No
          - Is the dewpoint at least 3 degrees below the air temperature?
            - Yes
              - Is the relative humidity level 70% or less?
                - Yes
                  - Is the pavement dry?
                    - Yes
                      - Are winds less than 15 miles per hour if loose snow is present?
                        - Yes
                          - Has a visual inspection or RWIS confirmed sufficient anti-icing material residue does not exist on the pavement?
                            - Yes
                              - Apply anti-icing material (brine or brine blend) at 30-50 gallons per lane mile or follow agency policy.
                            - No
                              - Do not apply anti-icing materials.
                        - No
                          - Do not apply anti-icing materials.
                - No
                  - Do not apply anti-icing materials.
            - No
              - Do not apply anti-icing materials.
      - No
        - Do not apply anti-icing materials.
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                        - No
                          - Do not apply anti-icing materials.
                      - No
                        - Do not apply anti-icing materials.
                - No
                  - Do not apply anti-icing materials.
          - No
            - Do not apply anti-icing materials.
      - No
        - Do not apply anti-icing materials.
  - No
    - Do not apply anti-icing materials.
ANTI-ICING RESULTS
12-29-11  8AM @ +27F

- 3 Events that had no De-Icers applied except for Non-Treated/ Anti-Iced area’s the day before (tested these areas with DLA)
- We were able to accomplish other tasks: Grading, Cold Patching, Forestry Etc.
ANTI-ICING  Parks Dept.

Parks Dept. anti-Iced Day Before w/cars parked, they were able to use there resources at other parking lots.
Organics – PRO’S 😊

- **Anti-Icing**
  - RESIDUAL / Less “Brine Fade” GLUE
  - Less Corrosive
  - Lowers Melting Point
  - Carb

- **Pre-Wet**
  - RESIDUAL, Less Corrosive, Melting Point

- **DLA “De-Icing”** (if conditions favorable, cycle times etc.)
  - Faster-Efficient-De Icing
  - Less Chlorides

- **Non-Chloride De-Icers**
  - Sensitive Area’s
  - “Green Concrete”
  - RESIDUAL
  - No or Less Chlorides
  - Good De-Icing performance
Organics – CON’S 😞

- COST / BUDGETS
- “Learning Curve” / Training
  - Product Support
- Staff “Buy In”
- Odor Issues
- Foaming when blending
- Recirculation / Spoil
- Indoor Storage
- Availability ??
# Materials Testing / Evaluating Data Logs -- Very Important

<table>
<thead>
<tr>
<th>Date-Pave Type-Weather-Day Light-Wind-Dew point- Pave Temps-GPLM-Materials Used-Qty.</th>
<th>Results, Comments, Observations, Residuals, Comparative Data ETC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/10/2023 Pave 2 Road</td>
<td>Overcast 80% Wind 15 mph Dew point 50°F Pave temps 45°F GPLM Materials Used Qty.</td>
</tr>
</tbody>
</table>
| 11/10/2023 | Concrete | Clear 100% | 0 mph | No traffic | Low traffic | Mixed | No | 150 | Worked well, melted well. Waiting 30 minutes.
| 12/10/2023 | Concrete | Clear 100% | 0 mph | No traffic | Low traffic | Mixed | No | 150 | Worked well, melted well. Waiting 30 minutes.
| 1/10/2023 | Concrete | Clear 100% | 0 mph | No traffic | Low traffic | Mixed | No | 150 | Worked well, melted well. Waiting 30 minutes.

*Note: All conditions were the same as above.*

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Commitment-Support
Equipment-Condition
Consider low volume areas, parking lots- Shallow ditches
Boulevard-Divided Roads
Different types of Pavements
Spot Test areas
Temp. Parameters
“Error on side of Caution”
FH’s DLA - DE-ICING APPLICATIONS
LIQUIDS DE-ICING - DLA
7:30AM @ +27F

12-29-11
“Green Concrete” DLA utilizing a Corn/Alcohol based organic w/50% H20 (Product Tested 2013)
TRUCK was BLADING before application of DLA

1335 Gallon “Slip-In” Single Axle Truck Used on the DLA Test-South East Route
25 mins-after app.

1.5 YD’s of salt to produce the Brine vs. 5-7 YD’s Granular Salt to do Red route
DLA for a light dusting or freezing fog.

Can use Brine Mixtures depending on pave-temps. FH used 9k Gallons of liquid instead of 50-60+ tons of salt.
DLA-Efficiency

(1) 5 YD cap. Truck = 4k+ Gallons Brine
The Old

- 800 gal/hr. (12-15 hrs. to recover from anti-icing)
- Fully manual operation & cleanout
- 1 fill point (2,600 gal/hr.)
- Stop operation to clean or truck fill
- Blend in 1-3,000 gal tank and transfer
- 3,000 gal storage for anti-icing fluid
- 9,000 gal storage (6,000 outside)
- Issues with elements
- Draining & De-Icing Containment Tub
- Looking for ways to improve
- Blending in one tank, limiting options
Here Comes the Water Tower

- Loss of 1,200 tons of salt storage
- Loss of covered off-season storage
- Construction = Disruption of operations
- 30 in. water main cutting through the site
10,000 SQ FT ADDITION
- 30,500 gal of brine storage
- 36,000 gal storage for anti-icing fluid’s / blends
- 6,000 gal storage for offloading / avoid contamination
- 72,500 gallons total storage as of Spring of 2018
- Blend at 3 the fill points - 3 products (for weather)
- 4,400 SF Secondary containment
The New

- Indoor Secondary containment
The New

- Off-season equipment storage
The New

- Log of vehicle, user and product or blend
- Plumb all fixtures to 3” from 2 “ to fill and blend more efficiently
The New

- Integral Salt bin, efficient supply
4,000 gal/hr. (7,000 gal/hr. **test equip.)

Automated
- Tests salinity
- Transfers to storage
- Pings phones when needs salt and visual beacon’s for anyone in yard to fill salt hopper
Michigan TEAM APPROACH for COLLABORATION on Public Works Maintenance
QUESTIONS?
Bryan Pickworth
Road Maintenance Supervisor
City of Farmington Hills, MI
Dept. of Public Works

26 years as an employee of the City beginning as a Laborer in 1991, moving up the ranks to Equipment Operator III/Crew Leader and promoted to Road Maintenance Supervisor in 2004.

2009 graduate of Michigan APWA’s Michigan Public Service Institute

Member of national APWA Snow & Ice Comittee

Current Responsibility’s:

- Snow and Ice control, Liquids production, Stormwater drainage maintenance, Forestry operations, ROW mowing maintenance, Irrigation, Gravel road and shoulder maintenance, Street sweeping and various other in-house & contracted services.

bpickworth@fhgov.com  248-871-2850
Superintendent of the Division of Public Works.
He has been with the City for over 32 years. Prior assignments include, City Traffic Engineer and Senior Engineer.

A licensed Professional Engineer in the State of Michigan and holds a Bachelor of Science degree in Civil Engineering from Michigan State University. Also a 2014 graduate of the Michigan Public Service Institute.

kmccarthy@fhgov.com  248-871-2850
### Brine Cost - Winter 16/17

#### Unit Costs

<table>
<thead>
<tr>
<th>Material</th>
<th>$/1000 cft</th>
<th>gal/cft</th>
<th>$/gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>$36.43</td>
<td>7.48</td>
<td>$0.005</td>
</tr>
<tr>
<td>Salt</td>
<td>$58.61</td>
<td>900</td>
<td>$0.065</td>
</tr>
<tr>
<td>Beet</td>
<td>$1.38</td>
<td>$0.21</td>
<td>$0.28</td>
</tr>
<tr>
<td>Liq Calc. Chloride</td>
<td></td>
<td></td>
<td>$0.63</td>
</tr>
</tbody>
</table>

| Labor             | $44.73     | 5000    | $0.002|

#### Pure Brine Cost

- **85/15 Blended Brine**: $0.07
- **80/20 Blended Brine**: $0.33

#### Cost per 1 Application 85/15

<table>
<thead>
<tr>
<th>Operator, #/gal/hr</th>
<th>Cost per Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>#221/hr</td>
<td>$103.89</td>
</tr>
<tr>
<td>#223/hr</td>
<td>$103.89</td>
</tr>
<tr>
<td>#224/hr</td>
<td>$60.46</td>
</tr>
<tr>
<td>#261T/hr</td>
<td>$27.65</td>
</tr>
<tr>
<td>$/hr</td>
<td>$295.89</td>
</tr>
<tr>
<td>$/Application</td>
<td>$4,565.95</td>
</tr>
</tbody>
</table>
Don’t be Intimidated
Start out simple
Do you’re homework
Ask questions
Be ready to fail