

MICHIGAN **Winter**
Operations Conference



2025 CALIBRATION

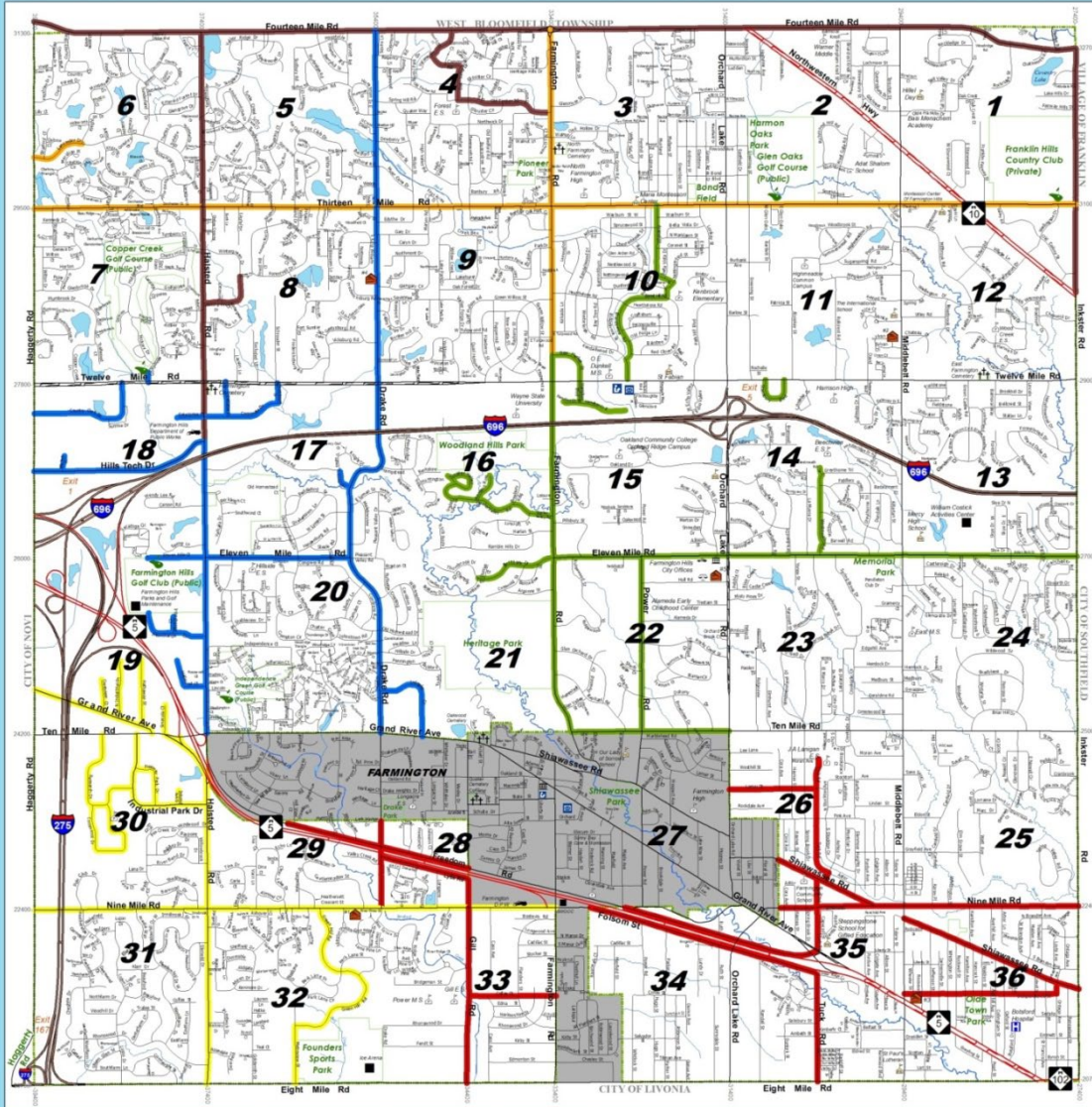


- Division of Public Works (DPW) maintains a network of more than 58 miles of major roads and 245 miles of paved and unpaved local roads (centerline) **Total of 660+ Lane Miles**
- 170+ Major Rd. Lane miles (some are 5 + lanes wide)
- 9TH largest municipal street network in the state of Michigan and the largest in Oakland County
- Area residents and businesses have high expectations for the City's public services LOS (Level Of Service)
- APWA 2011 Excellence in Snow and Ice Control Award
- APWA Accreditation 2016, 2020 & 2024



FH's Road Network

- 58 Miles of Major Road
- 248 Miles of Residential Road
- Includes 20 Miles of gravel
- 660 Lane - Miles



Winter Maintenance/Best Practices

- Before the beginning of each snow fighting season, salt trucks must be calibrated to ensure salt distribution falls within department guidelines. The calibration should be rechecked if there are any mechanical adjustments or changes throughout the remainder of the snow fighting season. A must for safety of the public, consistent goals, target application rates and environmental sustainability .



Calibration Program-Why

- Would you trust a pacemaker that's not calibrated before it inserted into your heart?



- Would you trust a hydrometer for salt brine concentration that's not calibrated to produce the correct salinity 23.3%...!!



- Would you trust your torque wrench to be accurate on the fleet or your family's vehicle....



FH's Calibration Program-Why



- Best Practices – Environmental – LOS (Proactive)
- 6 Major Rd snow routes + Local Rd network
- 4,000 tons of salt annual avg. (was 8,000)
- 200,000+ gallons of annual liquid usage



FH's Calibration Program-Why

"YOU DON'T KNOW WHAT YOU HAVE UNTIL YOU MEASURE IT"

A "Tool" to measure your Materials, Expectations, Level of Service

- **Consistent LOS -Starting Point for Each Event , #'s per LaneMile, gallons per LM**
- **BUY IN / CHANGE / ACCOUNTABILITY/Better for the Environment**
- **Budget (Calibrating should save your agency \$\$)**
- **Level Of Service (Everyone on the Same Page from the top down)**
- **All Equipment not calibrated = bad info/data-ie:Pavement Temps**
- **Helps reporting Material usage for operators, inaccurate reports, Audits –MS4**
- **Testing Materials.... Baseline of calibrated applications at different conditions...**
- **Equipment Build (Staff Input), Technology, Maintenance & SUPPORT**
- **Ground Speed, Sensors=equipment issues, corrosion ☹ etc.**
- **Pre & Post Winter & Storm Meetings / Campfires (Feedback-Buy In)**
- **Resources ("Shared Services" scale purchase)**
- **Train, Network, Lean on your Vendors**
- **You can't Manage what you can't Measure!**



Level Of Service



Images :Courtesy of Duane Amsler

\$

30% to 45% Budget
For the average year for Winter
Maintenance

Diminishing Return on Investment other than
Public Safety-Commerce !



Credit: DWClonch, LLC



FH's Calibrating History



- Started Calibrating in 2006



Single Axle/5 TONS - SALT= \$300+



**EVERYTIME YOU
LOAD UP !!**



Tandem Axle - 10 TONS of SALT= \$600+



**EVERYTIME
YOU LOAD UP !!**



TRAINING



Vendors



Potlucks



Workshops



Preventative Maintenance

- Get the equipment ready for Season / Calibration



PRE-WINTER CHECKLIST--Truck # _____

PLOWS

NOTES

Welds	
Shoe adjustment/blade adjustment	
Wear on blade and shoe	
All nuts tight	
Hook plow onto vehicle	
Hydraulics:	
Couplers—cylinder	
Set pins on plow	
Match plow number to truck	

TRUCKS

Grease all fittings	
Hydraulic leaks—couplers--hoses)	
Welds	
Lights (all).Mirrors –Backup Camera (if equipped)	
Tires (wear)	
Heater. Two-Way-Radio	
Pre-Wet Tank Primed(If Equipped)-Calibrated for proper Gallons Per Ton	
Winter Gauges (“Low Liquid Indicator” “Road Temp.Gauge” Etc.)	

AUGER/BELT

Bearings	
Grease	
Hydraulics—couplers--hoses	
Spill plates	
Spinner—Calibrate Anti/De-Ice Tank (if equipped)	
Proper adjustment for salt—Calibration for pounds per lane mile	
Spinner light	

REVIEW WITH MECHANIC	
----------------------	--

**Is Calibration
part of your
Fall Setup ???**

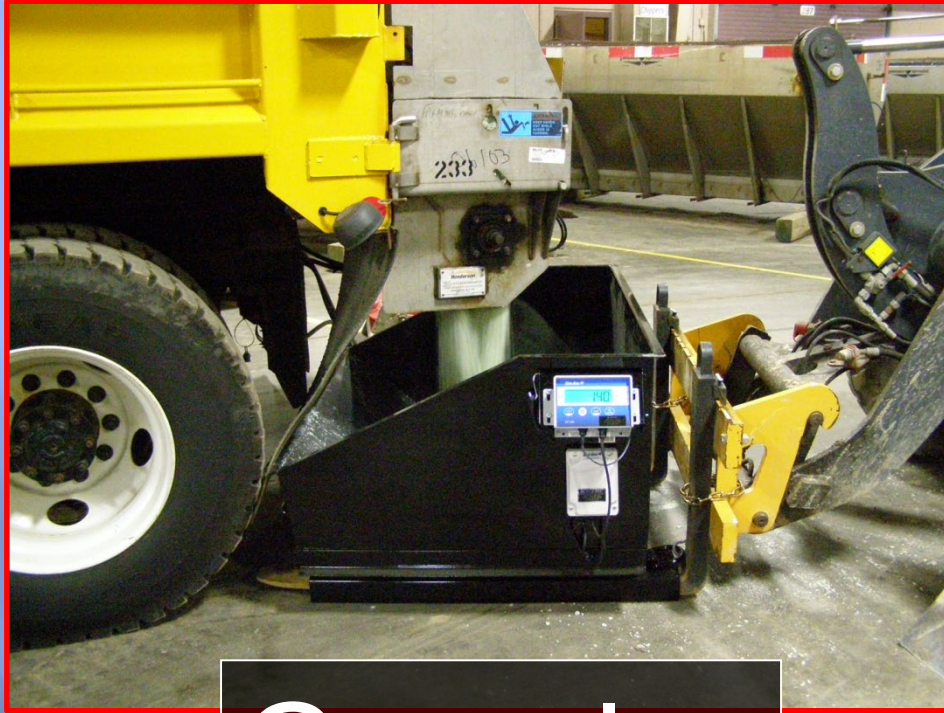


**REVIEW WITH
MAINTENANCE
STAFF**

Equipment Operator Signature

Date

CALIBRATION



Granular



Liquids

MATERIAL SELECTION for CALIBRATION

- Abrasives (Sand, Grit , Millings etc.)
- Granular (Rock Salt, CMA etc.)
- Liquids (Salt or Well Brine, Calcium, Mag. Etc.)
- All materials-liquids flow and spread differently
- Most Controllers have multiple selections for different materials / mixes



Sand vs Rock Salt vs ??

Different flow and weight to consider when calibrating different solids – grit, ash etc.



Tools/Equipment Needed

- Well Maintained Truck/Slip-In/Tailgate Auger, Vee-Box, Live Bottom etc ...
- Fluids in normal operating range &Temp.
- Scale(human, hunting etc.)
- Bucket
- Tarp, Shovel, Wood, clipboard, forms, watch, calculator (Smartphone)
- Salt, Sand (materials)
- Operation manual of specific equipment



Tools/Equipment Needed

Spreader (Emp) Feed Calculations Sheet
Rev. 1/27/10

Perform all tests with engine @ 1500-1600 RPM

General Instructions:

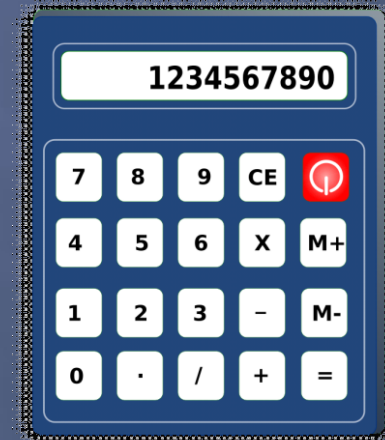
1. Determine amount of material dropped in one minute at each feed rate setting and enter into "Lbs. per Minute" column.
2. Determine proper rpm at each feed rate setting and enter into "Auger RPM" column.
3. Amount per revolution should be fairly consistent (check under notes).
4. To use this chart, find the pounds per mile you want to apply at a selected speed, then set the Feed Rate dial to the number in the far left column.

Feeds: For Less Mile @ 5 MPH

Feed Rate Dial Setting	Auger RPM	Lbs. per Revolution	Lbs. per Minute	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph
1				0	0	0	0	0	0	0
2				0	0	0	0	0	0	0
3				0	0	0	0	0	0	0
4				0	0	0	0	0	0	0
5				0	0	0	0	0	0	0
6				0	0	0	0	0	0	0
7				0	0	0	0	0	0	0
8				0	0	0	0	0	0	0
9				0	0	0	0	0	0	0
10				0	0	0	0	0	0	0

Example

Feed Rate Dial Setting	Auger RPM	Lbs. per Revolution	Lbs. per Minute	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph
4	20	7	140	1,100	2,200	3,300	4,400	5,500	6,600	7,700
5	25	7	175	1,375	2,750	4,125	5,500	6,875	8,250	9,625



Calibration chart for Manual Controls

TYPES OF-COMPONENTS “Old School” Vs. New Technology



- Manual controllers / Joystick does most of the functions

COMPONENTS “Old School” with New Technology



- Manual controllers in combination with modern controller, safety concerns of touchscreen vs “Feel”

Feedback Sensors Vary by Manufacturer –Auger Shaft-Chain



Drop Tailgate Spreaders/Augers

- Huge Difference in a 6" vs. 9" Auger
- May have some issues achieving lower rates (200#'s plm) at slower vehicle speeds.



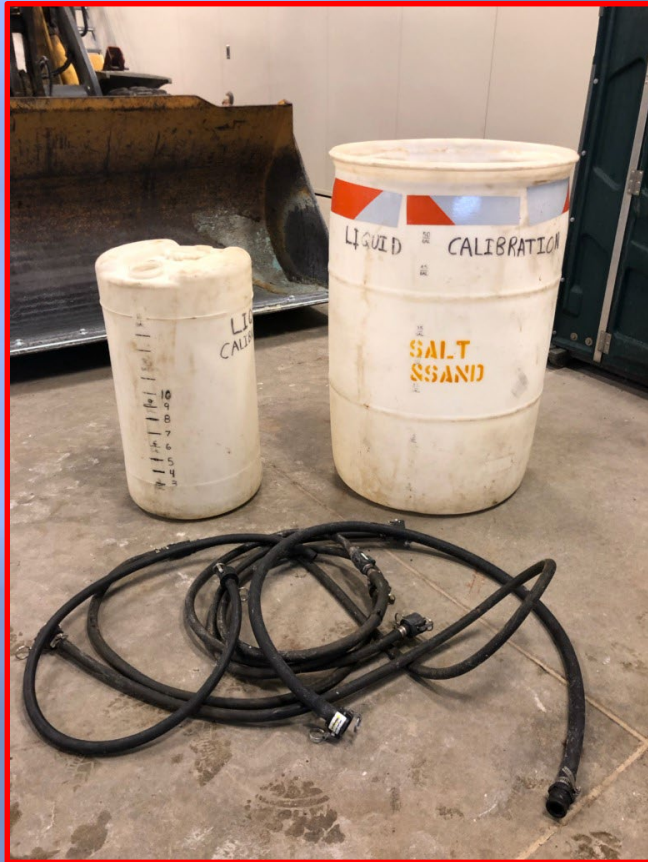
Live - Bottom Sanders-V Boxes



➤ Huge Difference in adjusting rear door for material flow



Tools/Equipment Needed for Liquids



Tools/Equipment Needed for Liquids



Different hose & connections and sizes.. male & female camlocks for easy connection... graduated containers etc.

CALIBRATION-Liquids

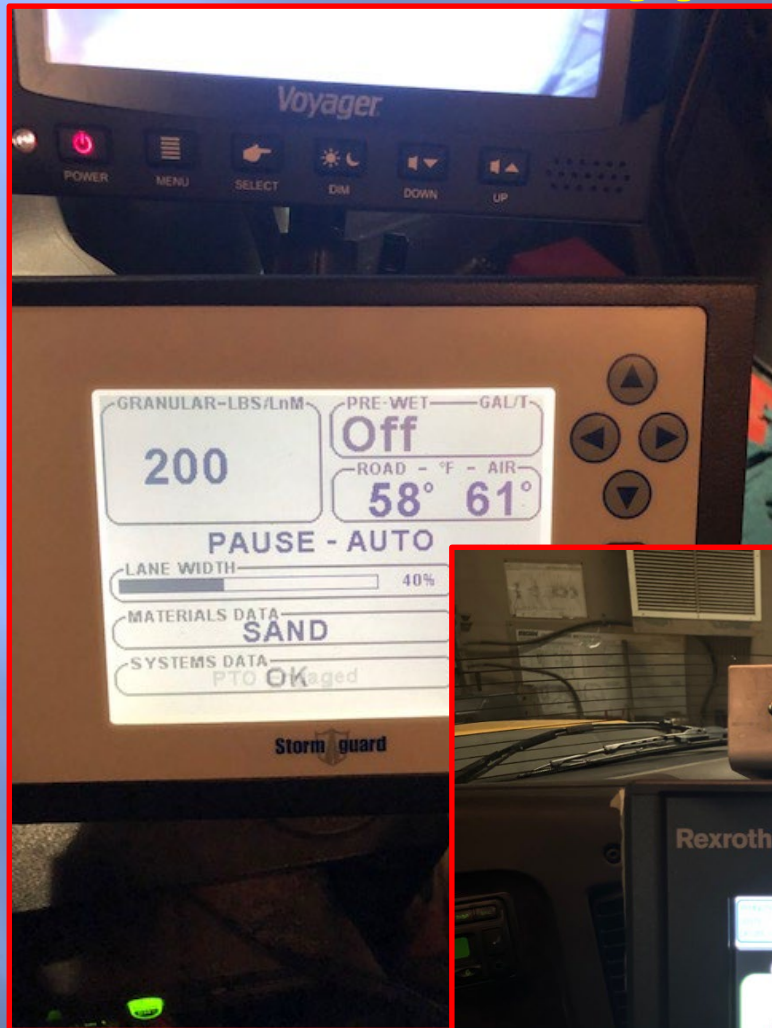


Pump On / Off

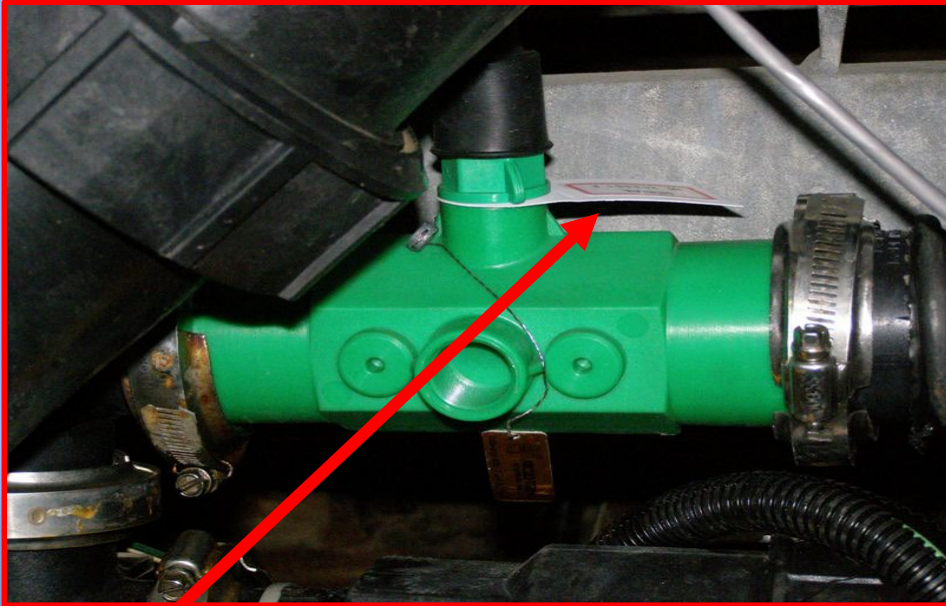


**Calibrate Liquids
w/sizing of tips
& nozzles
(Volume/Flow)**

Various Types of Controllers



Various Types of Flow Meters

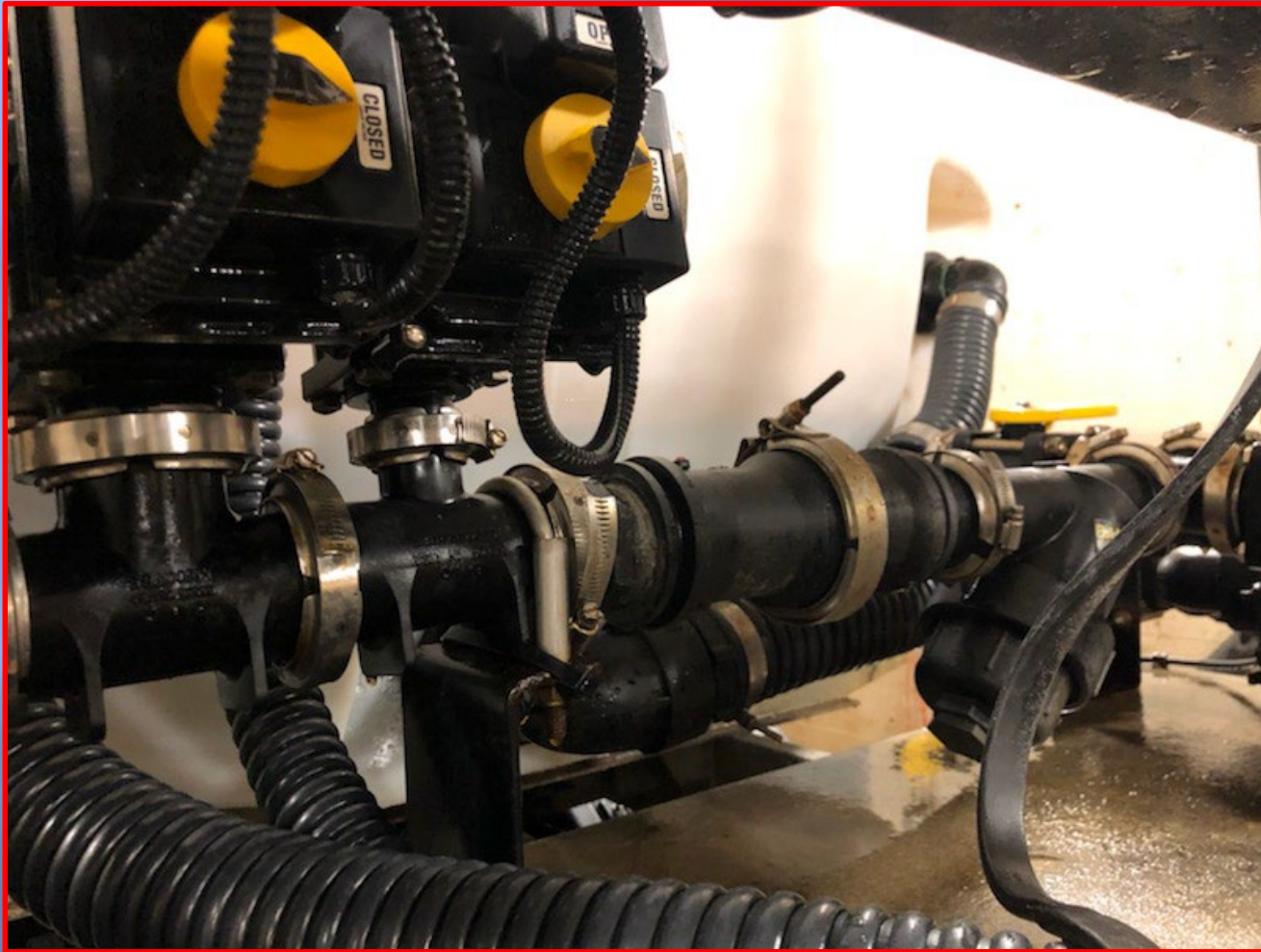


**Tags on Flow
meters-Info for
controllers**

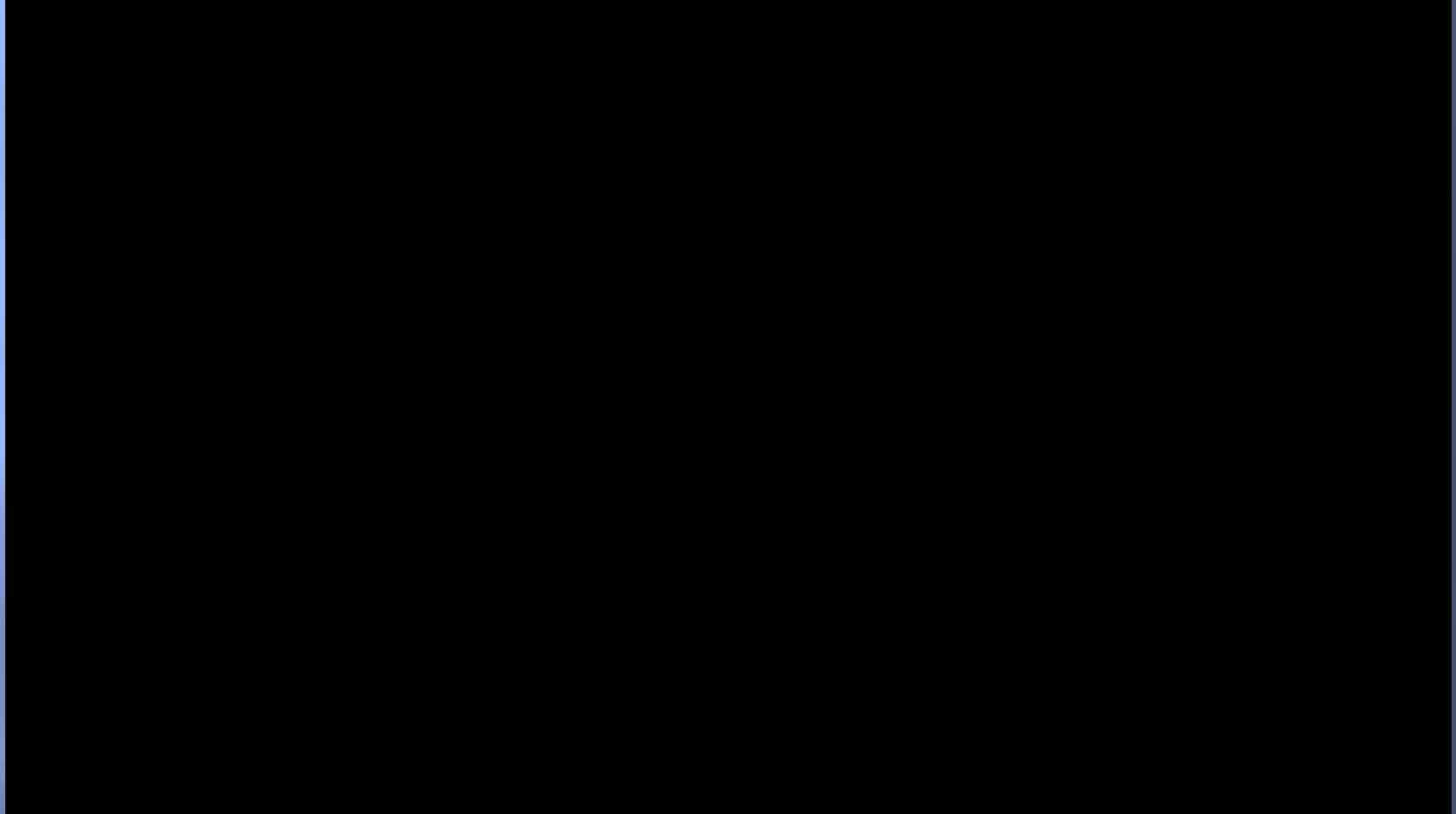
Components/Enclosures Vary by Manufacturer



Liquid Valves Vary by Manufacturer



Video - Liquids Calibration



Overlooked CALIBRATION



Wing

**Underbody
Scraper**

Front Plow

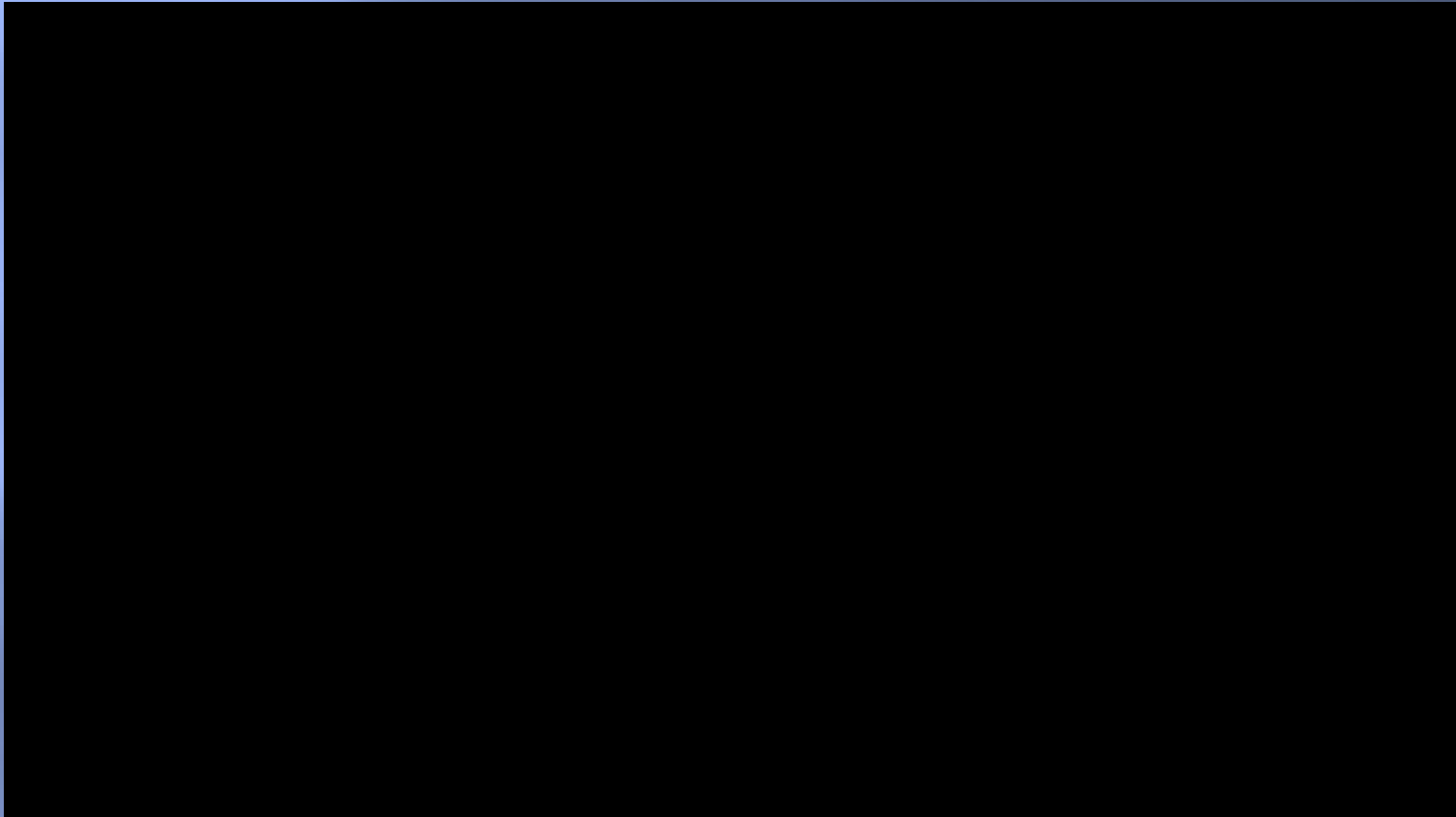


Calibration of Joystick for “Feel” & Control



- Controllers / Joystick does has multi functions

Calibration Video – Joystick



Overlooked CALIBRATION



Road Temperature Sensors



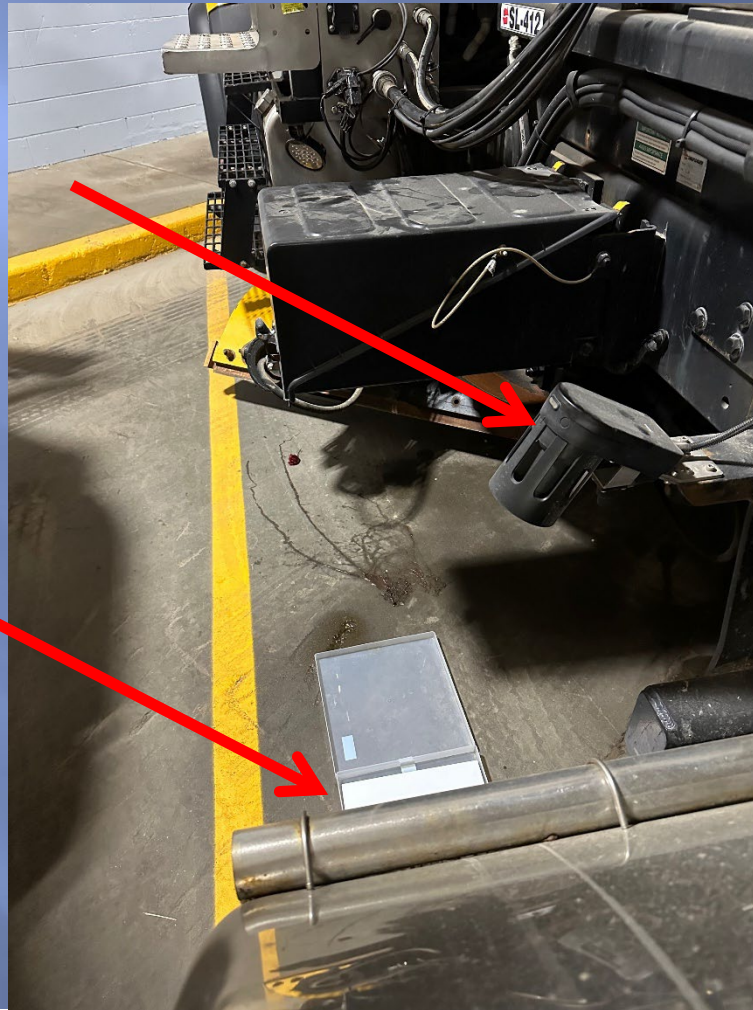
CALIBRATION

Infrared Devices to
measure pavement temps.
(Pavement)



Big difference 31 – 33 degrees...

CALIBRATION-MD30



Pavement Temp, Friction etc...

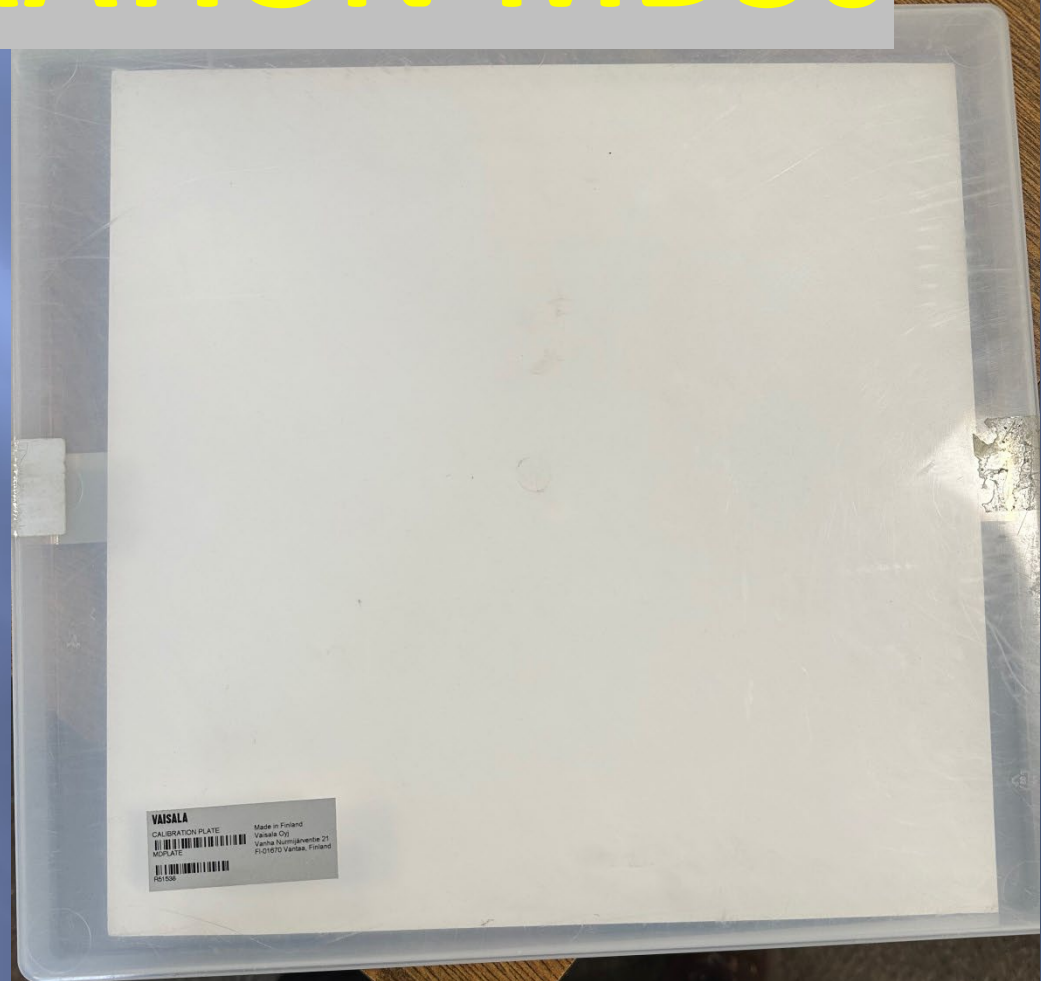
CALIBRATION-MD30



Pavement Temp, Friction etc...



CALIBRATION-MD30



Pavement Temp, Friction etc...

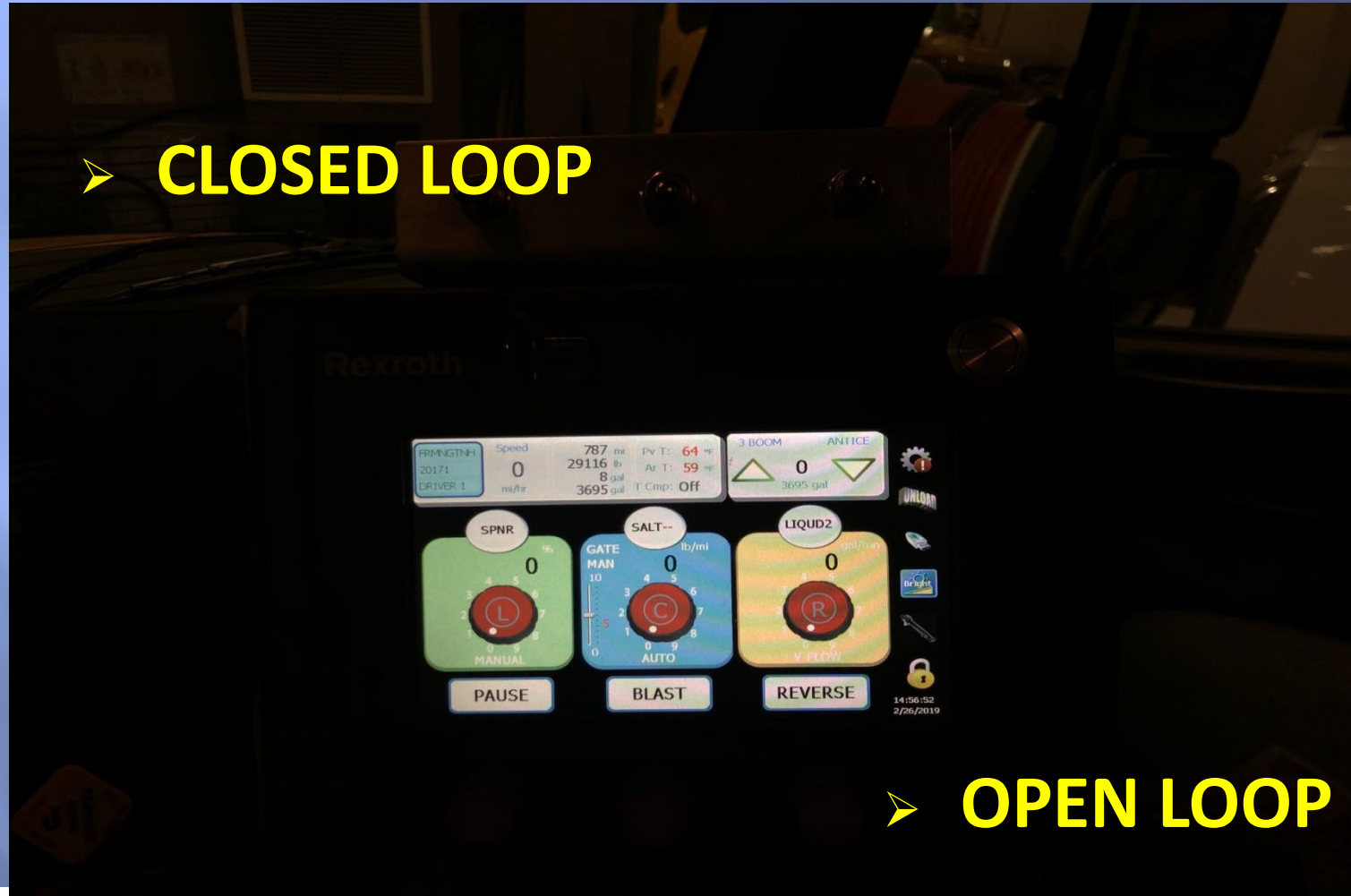




Calibration-Issues

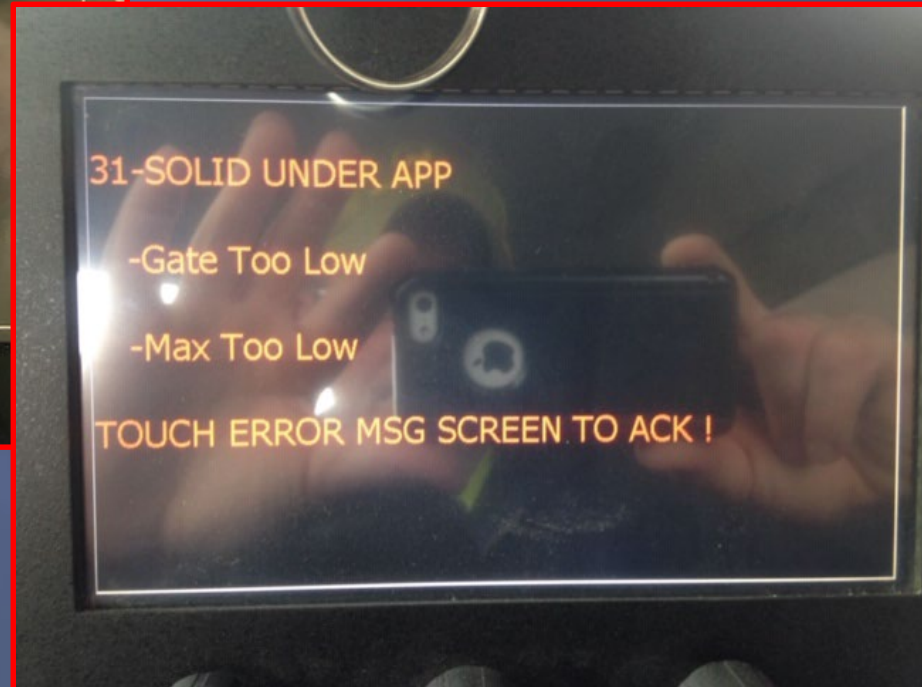
CALIBRATION Settings

➤ **CLOSED LOOP**



➤ **OPEN LOOP**

Calibration-Issues



➤ Error Messages

Long cable to get the Controller out of cab



Long cable to
get the
Controller
out of cab



Calibration-Grid Test



Utilize a paved area for a grid
Consider safe speeds in testing

Grid Test



Operators run and watch the tests
Visually see for themselves...

Case Study

CITY OF STEVENS POINT, WI



Calibrating Winter Operations

Operations Background

Maintain

- Maintain approximately 325 miles of road total

Salt

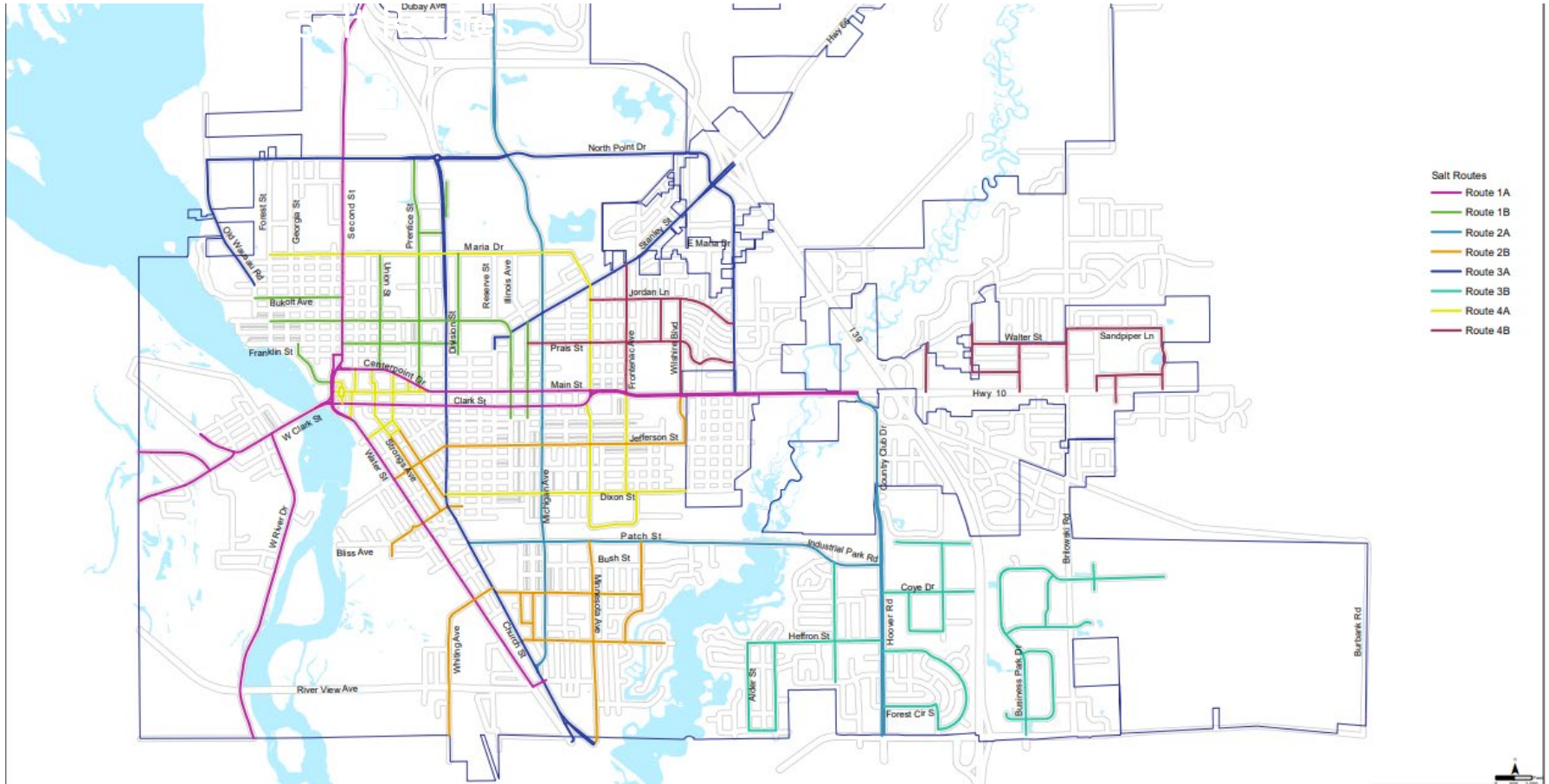
- Salt route 71.5 miles (defined)

Brine

- Brine route 10.6 miles



Routes



Stevens Point's Story

- Started Calibrating in 2014 after Snow Rodeo (highly Recommended for crews)
- Phased in new trucks with Ground Speed control spreaders
- Polled our drivers, asked what works best?

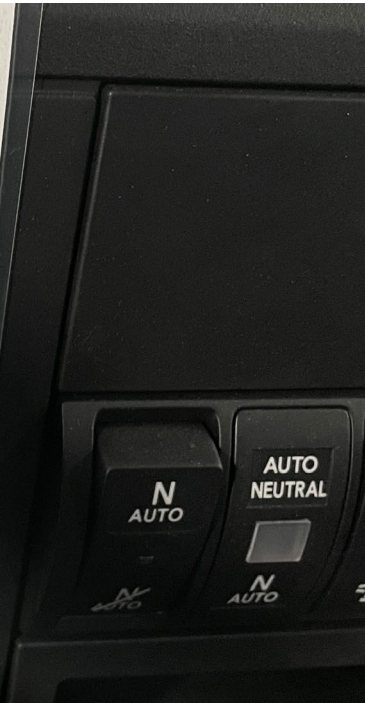


What we Found

Pre-Calibration:
Ranged from 441#
to 1584# per lane
mile

APWA Guidelines
80#-320# *prewet

PRE-WET SALT SETTINGS	
ROAD TEMP	SETTING 2-LANE APPLICATION
SPINNER 20%	
SETTING	
30°+	120 LBS
29°-25°	160 LBS
24°-20°	240 LBS
19°-15°	280 LBS
14°-05° (20% MIX GEO-MELT BRINE)	320 LBS



Stages of Usage Decline

Year	Salt Usage	Average
2008-2009		3919
2009-10		4100
2011-12		4232
2012-13		6111
2013-14		4340
Average pre calibration		4540.4
2014-15		3794
2015-16		2488
2016-17		3299
2017-18		3897
Average w/calibration		3369.5
2018-2019		2083
2019-20		1430
2020-21		1212
21-22		1700
Average w/calibration and Ground speed control		1606.25



Budget Impacts

- Reduced budget of \$100,000 a year on average over the last 8 years since calibrating (includes introduction of salt brine & pre-wetting)
- Average salt use declined approximately 2000 tons a year from 2008-2022
- Infrastructure “The real cost of road salt adds up to about five times the initial cost of the road salt and labor to apply it” –Credit WI Salt Wise
- Thanks to Stevens Point, WI 😊



‘Sustainable’ Solutions Include More Than Just the Environment

- NOT JUST environmental awareness!
- Again a balancing trick
 - Social
 - Economic
 - Environmental
- No one sustainable solution
- One size ***emphatically*** does not fit all
- But sustainability does impact all aspects



“EGLE”

Michigan Department of Environment, Great Lakes, and Energy

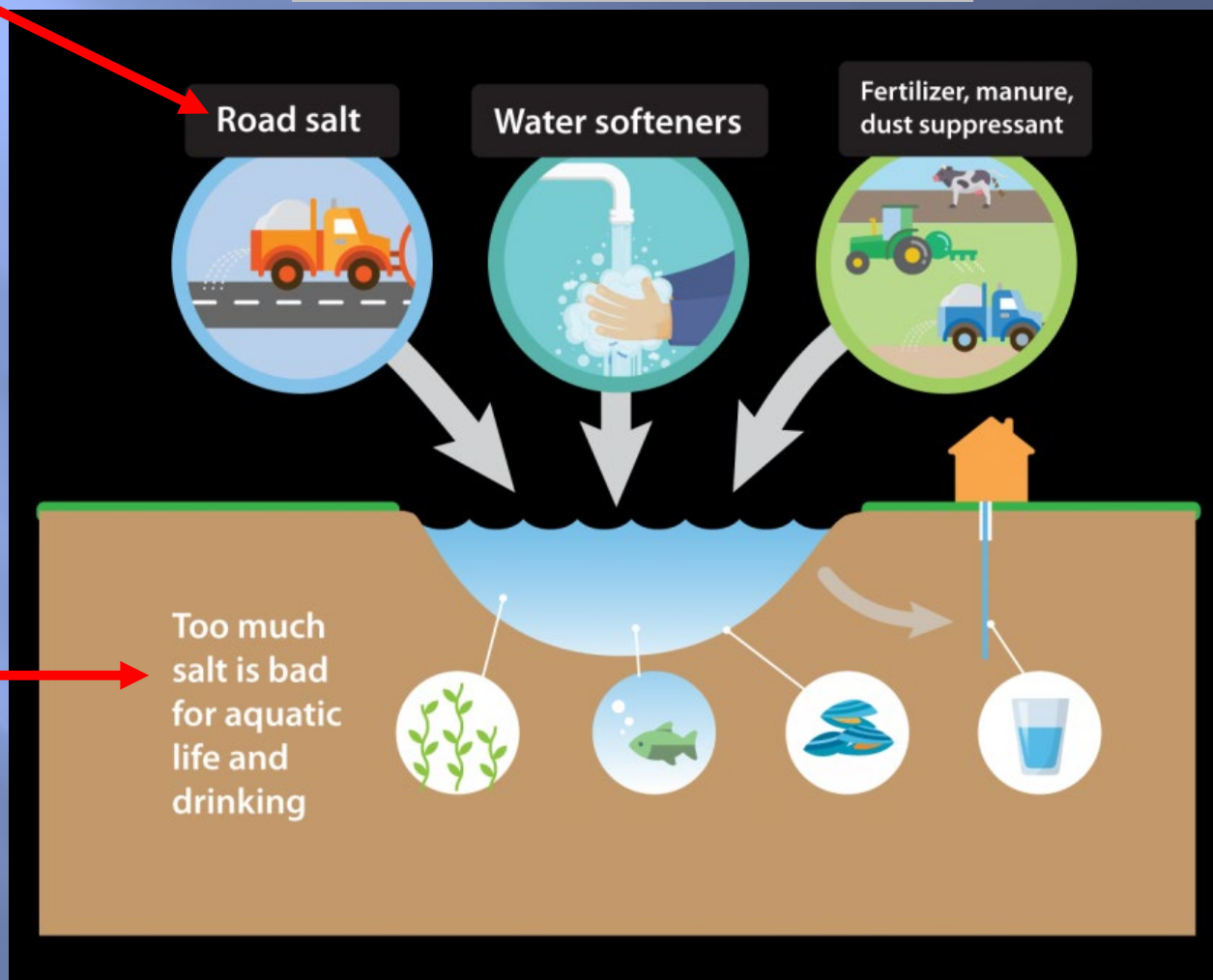
**Chloride and Sulfate Water Quality Values Implementation Plan 10/20/20
– Revised February 2021**

*"We've actually reduced by about half the salt spread rates on our trucks, from 400 pounds of salt per lane mile to 200 pounds of salt per lane mile," he said.
Craig Bryson, spokesman for the Road Commission for Oakland County.
Detroit Free Press April 2017.*

MS4 permits currently include requirements to reduce the discharge of pollutants associated with cold weather operations, including salt application, salt storage, and strategic street sweeping to remove excess salt.

Based on recent data, the current procedures developed and implemented by an MS4 permittee may not be sufficient to address the impacts of existing and future elevated chloride levels on aquatic life.

Team Effort



Source: Minnesota Pollution Control Agency

BEST PRACTICES



Calibration a TOOL IN THE TOOL BOX



Safety-Efficiency-Environmentally Friendly-
Budget\$\$

Support from Vendors – Manufacturers / Neighbors



Your #1 Resource – The Team!



QUESTIONS?

Thanks for your time 😊



Bryan Pickworth

Safety & Projects Coordinator

City of Farmington Hills, MI

Department of Public Works

- **34+ 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 Supervisor in 2004. Currently Safety & Projects**
- **2009 graduate of Michigan APWA's Michigan Public Service Institute**
- **Member of national APWA Snow & Ice Committee-LTAP-SPOT-Planning...**
- **Current Responsibility's include:**
 - Coordination of in house or contracted Safety Training. Safety Data Sheet inventory, write specifications for bids various in-house supplies & contracted services for all things public works☺. Pilots for RWIS, AVL, Liquid De-Icers. Clear Roads projects. Accreditation Etc Etc.....**



□ bpickworth@fhgov.com or **248-871-2863**





Play a Video – Granular Drop Tailgate

[https://www.youtube.com
/watch?v=ilsHIuJW-9M](https://www.youtube.com/watch?v=ilsHIuJW-9M)



Play a Video – Joystick

[https://www.youtube.com
/watch?v=cieVpc3VQ3U&t
=56s](https://www.youtube.com/watch?v=cieVpc3VQ3U&t=56s)



Play a Video - Liquids

[https://www.youtube.com
/watch?v=LCERq3wvRoc&t
=187s](https://www.youtube.com/watch?v=LCERq3wvRoc&t=187s)



