



105th Purdue Road School



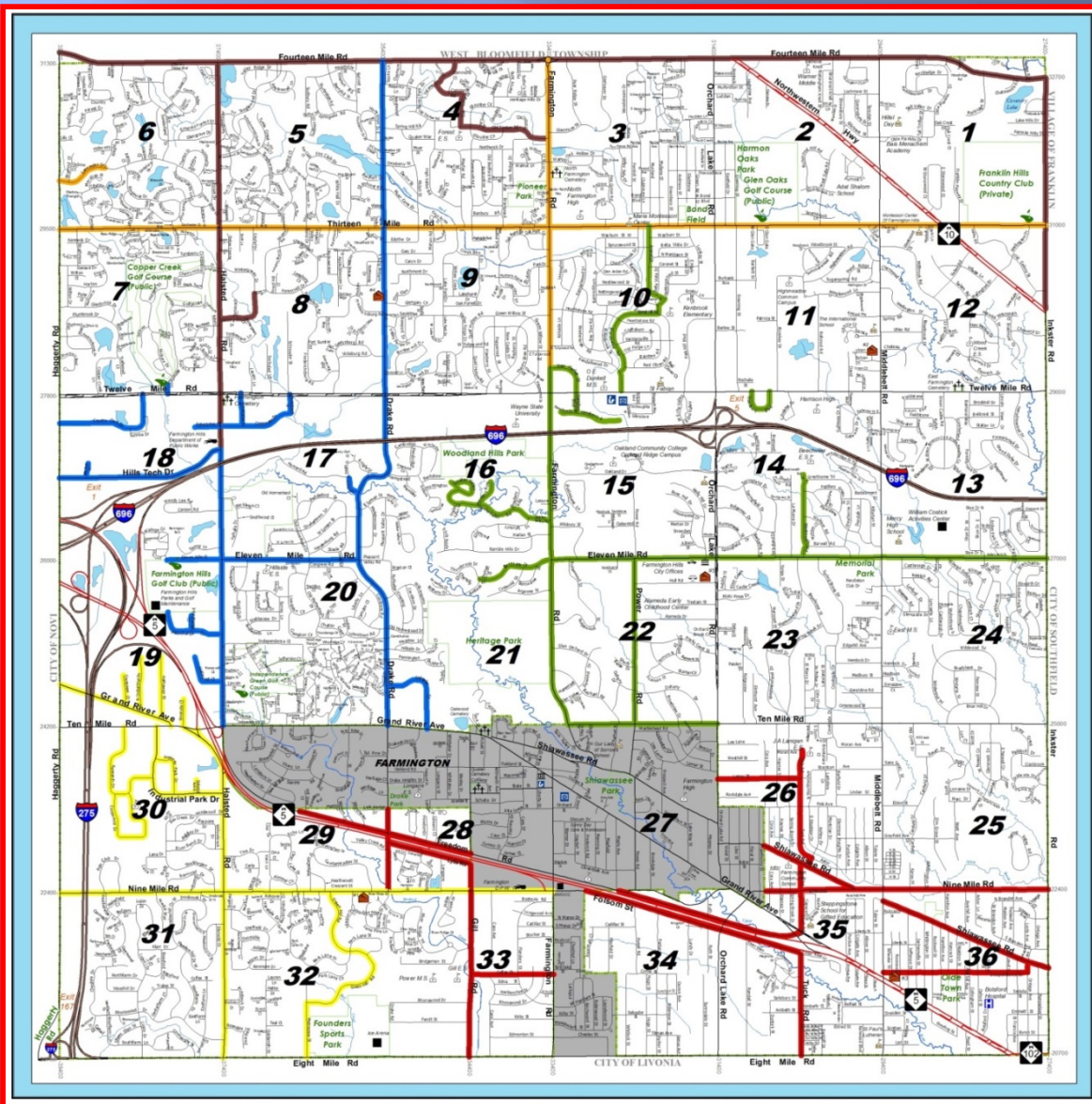
CALIBRATION





- Division of Public Works (DPW) maintains a network of more than 58 miles of major roads and 247 miles of paved and unpaved local roads (centerline)
- 250 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 2017





FH's Road Network

- 58 Miles of Major Road
- 247 Miles of Residential Road
- Includes 22 Miles of gravel
- 750 Lane - Miles



FH's Calibration Program-Why



- 33 sq. miles
- 6 Major Rd snow routes (approx. 28 LM ea.)
- 5,000 tons of salt annual avg.
- 200,000+ gallons of annual liquid useage



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 .



FH's Calibration Program-Why

“YOU DON'T KNOW WHAT YOU HAVE UNTIL YOU MEASURE IT”

- **“Tool” to measure your Materials & Expectations**
- **Consistent LOS (Starting Point for Each Event , #'s per LM , gallons per ton etc.)**
- **Budget (Calibrating should save your agency \$\$)**
- **Resources (“Shared Services” scale purchase)**
- **TRAIN , TRAIN , TRAIN**
- **BUY IN / CHANGE / ACCOUNTABILITY/Better for the Environment**
- **Equipment Build (Staff Input), Technology, Maintenance & SUPPORT**
- **Level Of Service (Everyone on the Same Page from the top down)**
- **In conjunction with AVL.... Equipment not calibrated = not good data**
- **Helps reporting Material usage for operators, inaccurate reports**
- **Pre & Post Winter & Storm Meetings / Campfires**
- **Testing Materials.... Baseline of calibrated applications at different conditions...**
- **Equipment issues, Sensors , Corrosion etc.**
- **Your Thoughts ?**



'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



\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$

25% to 45% Budget
For the average year for Winter
Maintenance

Diminishing Return on Investment other than
Public Safety !

Credit: DWClonch,LLC



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



TRAINING



- VENDORS
- IN HOUSE Staff (Potluck)
- LOCAL SEMINARS
- INTERNET RESOURCES
- " YOUTUBE" ETC.
- TEAM UP WITH YOUR NEIGHBORS TO HIRE A TRAINER OR CONSULTANT
- *"Clear Roads"*
- *"AASHTO"*
- *"Salt Institute"*
- MDOT, IOWA DOT, ODOT, MINN DOT, COLORADO DOT.....



Support from Vendors / Manufacturers



TRAINING - TEAMWORK



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



**REVIEW WITH
MAINTENANCE
STAFF**

Equipment Operator Signature

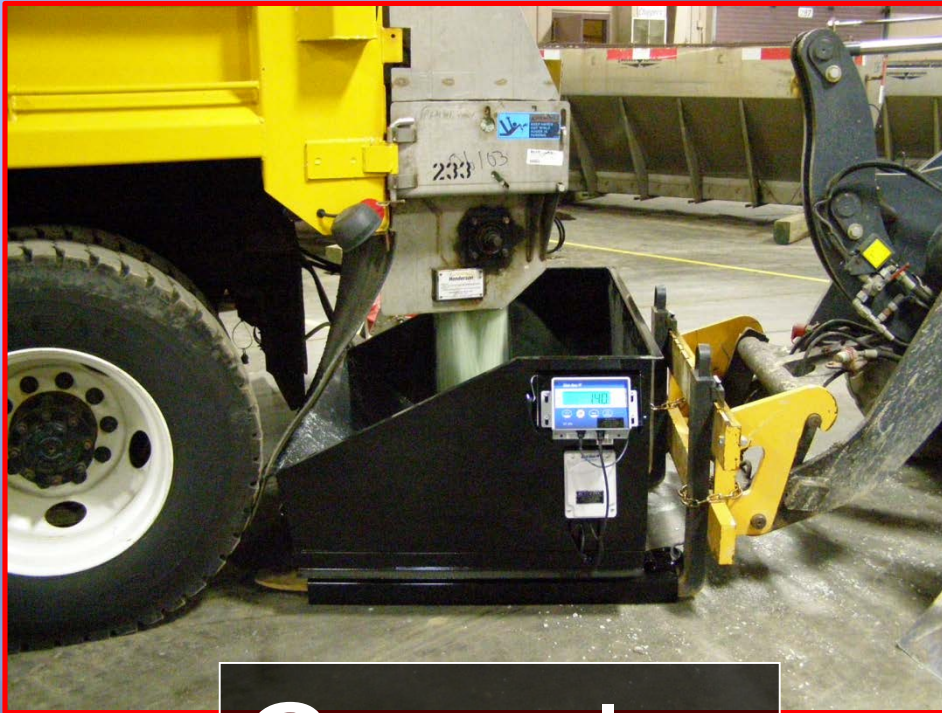
Date

FH's Calibrating History

- Started Calibrating Winter Equipment in 06 '



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 flow and spread differently



Sanding vs Rock Salt

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



CALIBRATION



Wing

**Underbody
Scraper**

Front Plow



Calibration of Joystick for “Feel” & Control



- Controllers / Joystick does has multi functions

Play a Video – Joystick

<https://www.youtube.com/watch?v=cieVpc3VQ3U&t=56s>



CALIBRATION



Pump On / Off



**Calibrate
Liquids
w/sizing of
tips & nozzles**

CALIBRATION



Road Temperature Sensors



CALIBRATION

Infrared Devices to
measure pavement temps.
(Pavement)



Big difference 31 – 33 degrees...



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”

TOOLS IN THE TOOL BOX



Versatile
Flexible
Efficient



BEST PRACTICES



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

Sprinkler Drop Test Calculations Sheet
Rev. 12/1/08

Perform all tests with engine @ 1500-1600 RPM

General Instructions

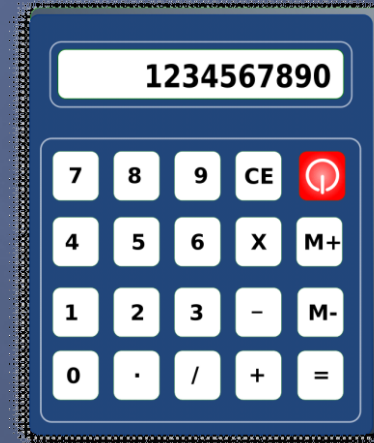
- Determine amount of material dropped in one minute at each feed rate setting and enter into "Lbs per Minute" column.
- Determine Auger RPM at each Feed Rate and enter into "Auger RPM" column.
- Material per revolution should be fairly consistent down entire column.
- To use this chart, find the pounds per min you want to apply at a selected speed, then set the Feed Rate dial to the number in the far left column.

Feeds Per Line Mile @ 8 MPH

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

Example

Feed Rate Dial Setting	Auger RPM	Lbs. per Revolution	Lbs. per Minute	8 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph
4	20	7	140	1,080	840	560	400	300	210	150
5	25	7	175	1,365	1,092	804	567	425	319	236



Calibration chart for Manual Controls



Play a Video – Granular Drop Tailgate

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

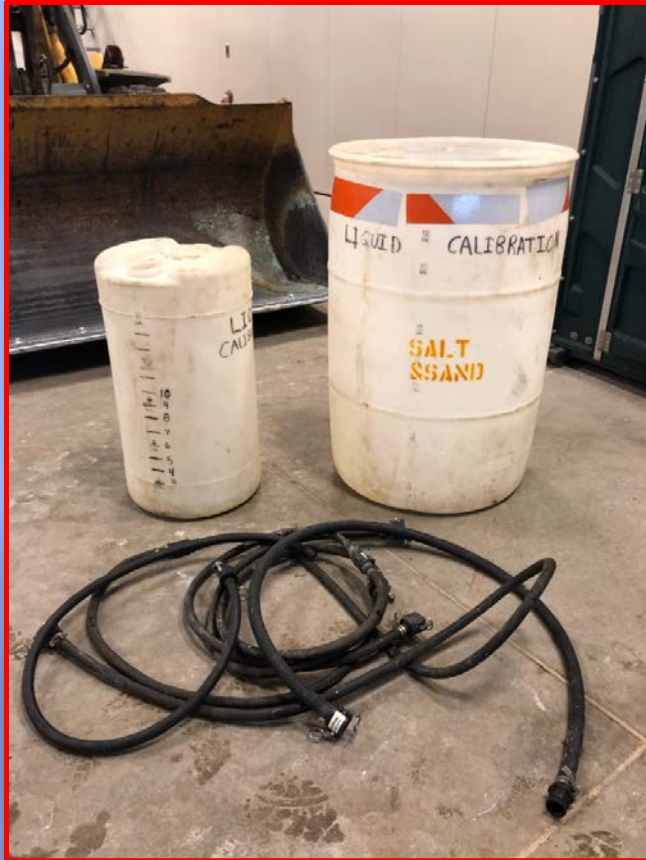


Tools/Equipment Needed for Liquids



Different connections and sizes such as male & female Camlocks, etc.

Tools/Equipment Needed for Liquids



Drop Tailgate Spreaders

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



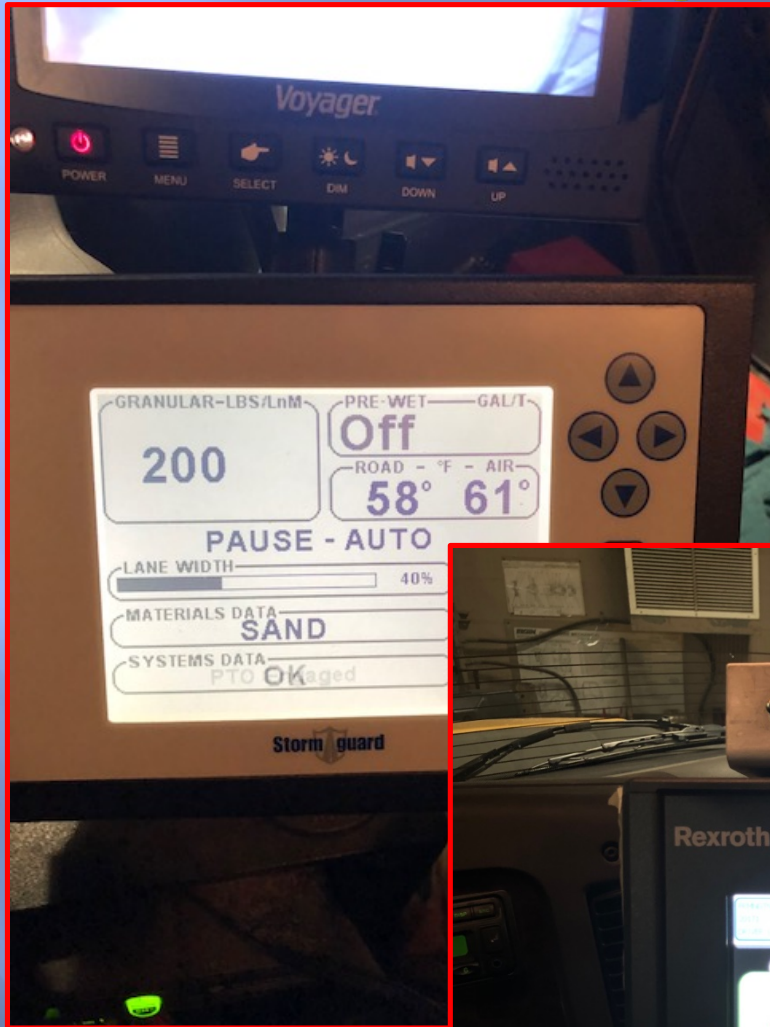
Live - Bottom Sanders



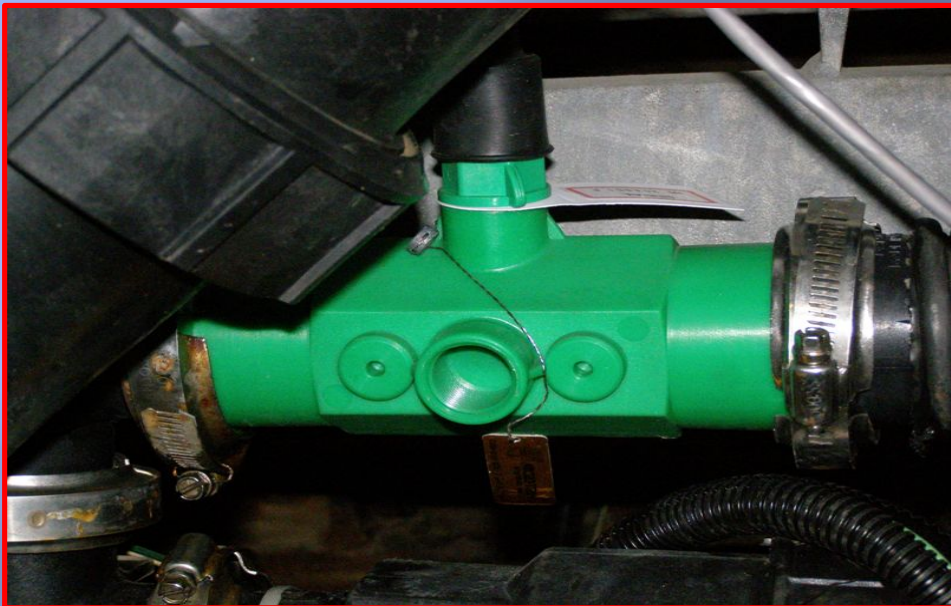
- Huge Difference in adjusting rear door for material flow



Various Types of Controllers



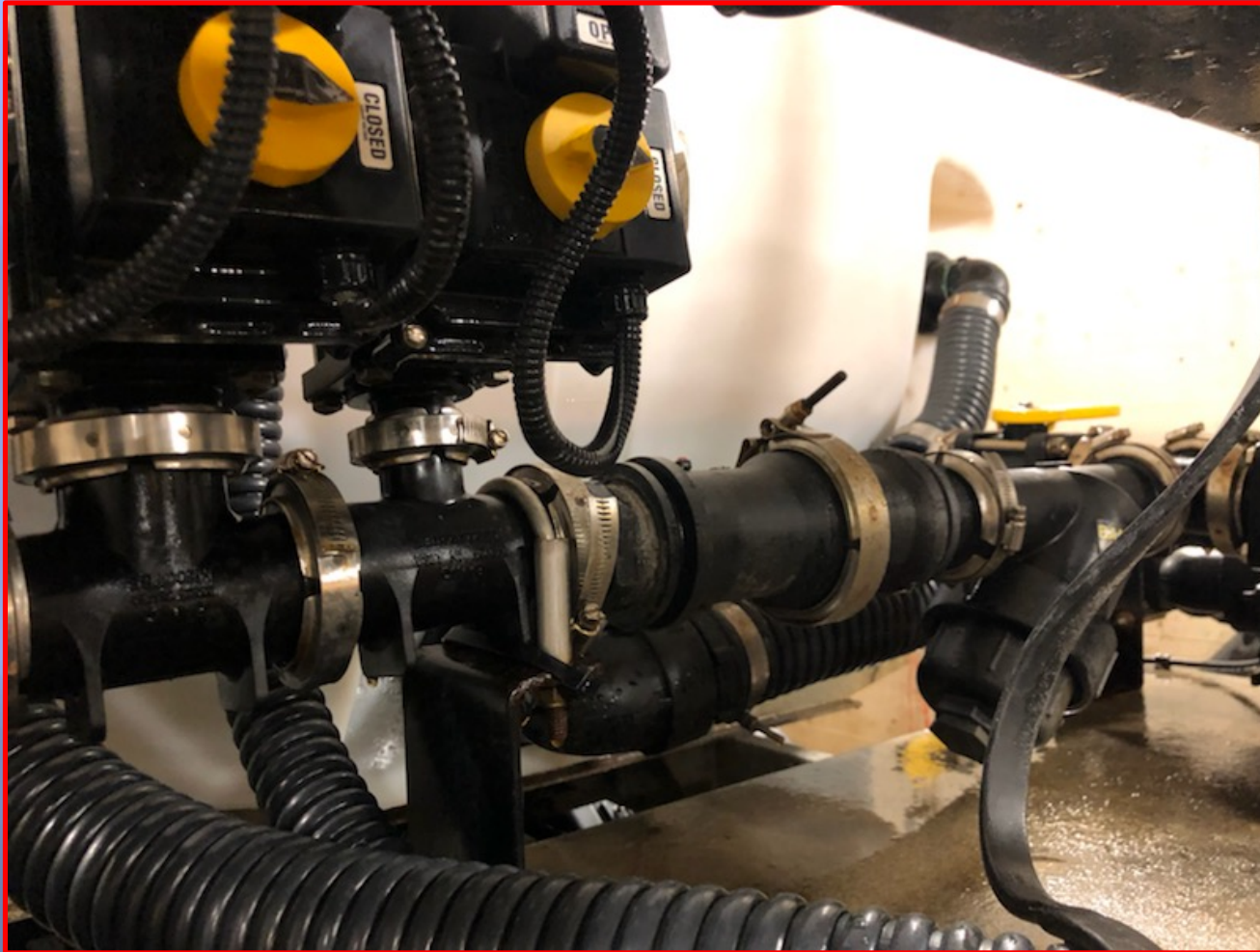
Various Types of Flow Meters



Components Vary by Manufacturer



Liquid Valves Vary by Manufacturer



Feedback Sensors Vary by Manufacturer & by Installation Position



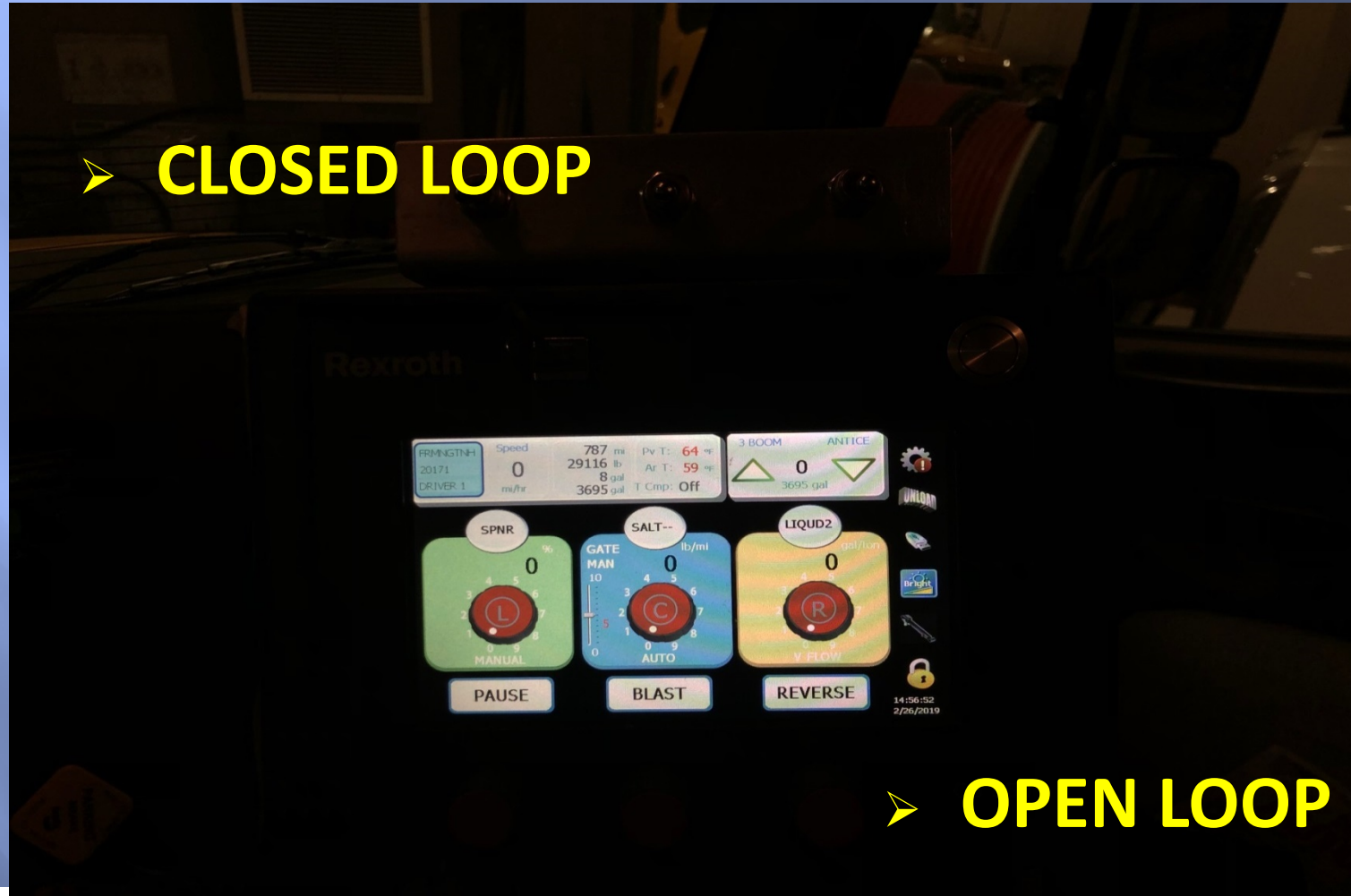
Play a Video - Liquids

<https://www.youtube.com/watch?v=LCERq3wvRoc&t=187s>



CALIBRATION Settings

➤ **CLOSED LOOP**



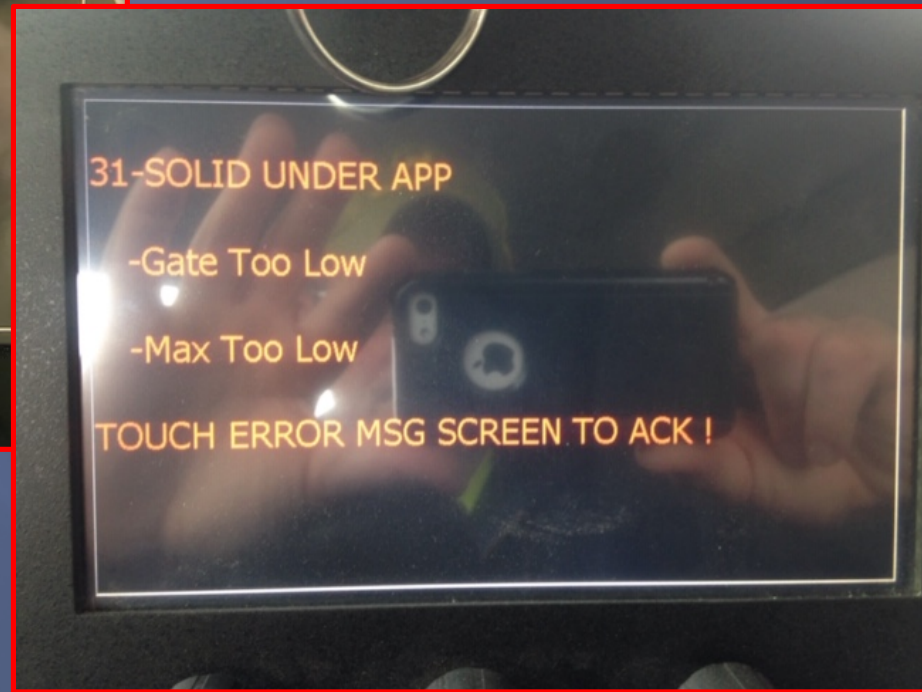
➤ **OPEN LOOP**



Calibration-Issues



Calibration-Issues



➤ Error Messages



Long cable to get the Controller out of cab

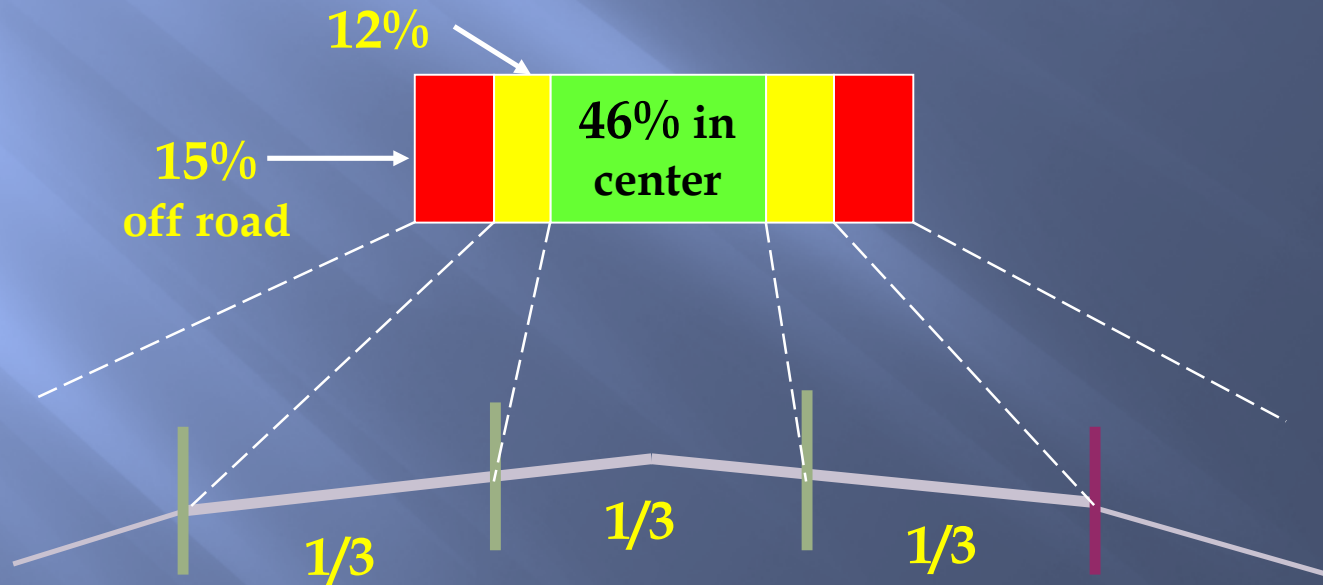


Long cable to
get the
Controller
out of cab



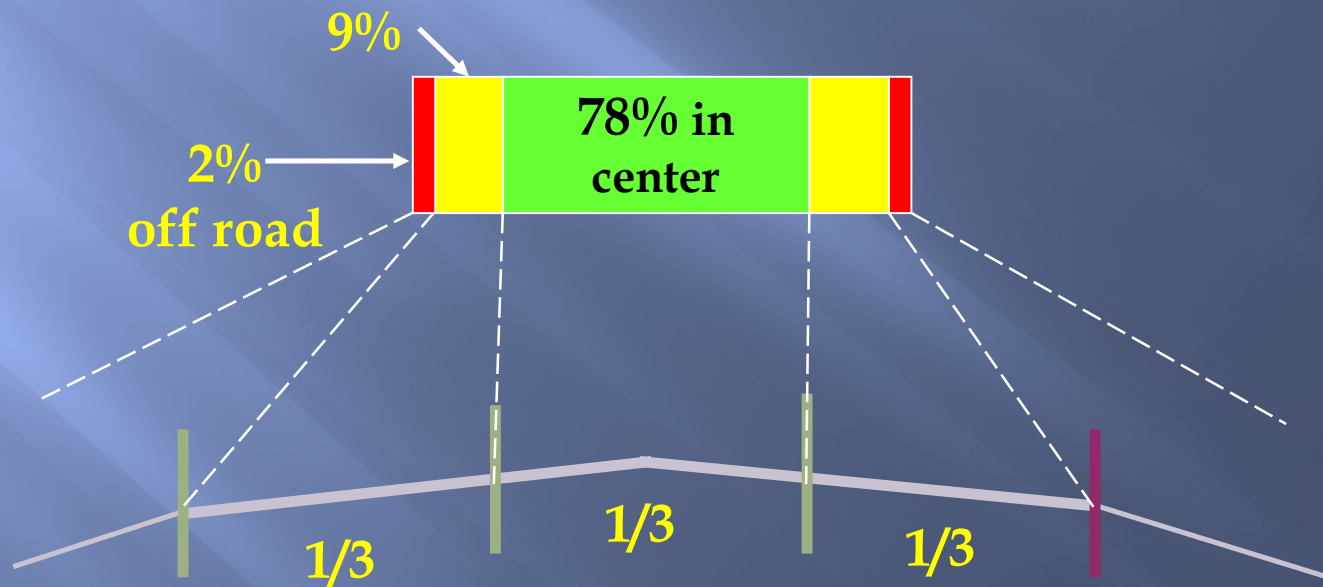
APPLICATION-PRACTICES

Typical Scatter Pattern of Dry Road Salt

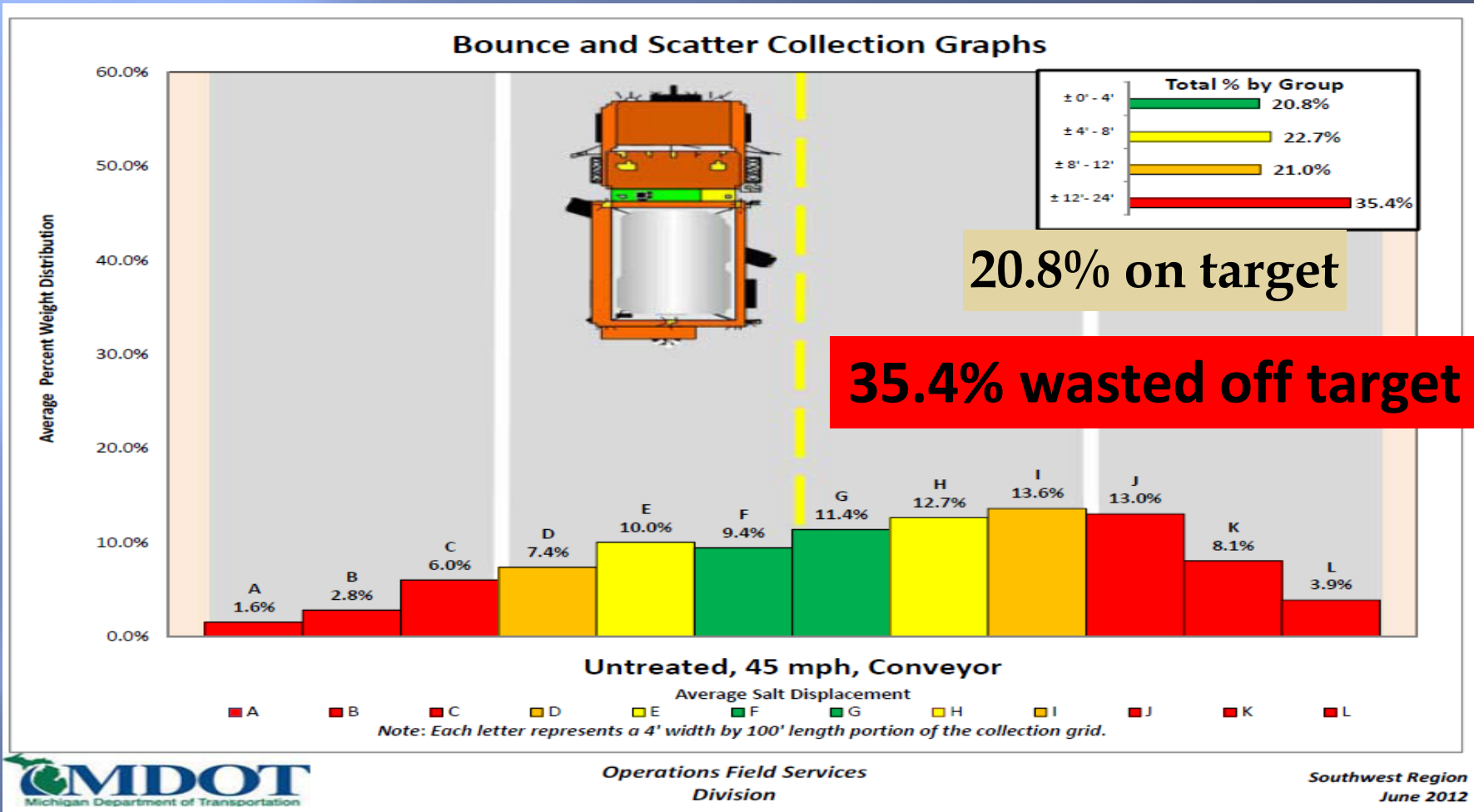


APPLICATION-PRACTICES

Typical Scatter Pattern of Pre-Wet Road Salt



MDOT's Bounce & Scatter Study 1970's / 2012



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...**



Your #1 Resource – The Team!



CALIBRATION LINKS

LINKS TO TRAINING VIDEOS

Last time I checked these worked. If not let me know please. Thanks BP

WINTER MAINT.- (May have to copy & paste links)

Granular Salt calibration w/ manual valves (Drop Tailgate Spreader)

<https://www.youtube.com/watch?v=ilsHluJW-9M>

Granular Salt/Sand calibration w/ manual valves (Live Bottom Truck-Belt)

<https://www.youtube.com/watch?v=zz3JHC9ZhsA>

Rexroth CS 550 calibration (Granular)

<https://www.youtube.com/watch?v=C1DIB3L6fbg&t=17s>

Liquid Calibration w/ a REXROTH CS 550 Controller (PRE-WET & ANTI-ICING)

<https://www.youtube.com/watch?v=LCERq3wvRoc>

Over view of the REXROTH CS 550 Controller

<https://www.youtube.com/watch?v=gkXGLzYul1U>

Micro Trak Calibration

<https://www.youtube.com/watch?v=mXoOhvTiKGQ&t=1s>

Swaploader FH's

<https://www.youtube.com/watch?v=mgqZXaDwAVU>

Minnesota Department of Transportation: Clear Roads Project “How to test De-Icers” Training Video

<https://www.youtube.com/watch?v=cIPTRCXRBDM>

Anti-Icing & De-Icing Products for Parking Lots and Sidewalks

<https://www.youtube.com/watch?v=wxNM6EWjgu0>



QUESTIONS?



Bryan Pickworth

Road Maintenance Supervisor

City of Farmington Hills, MI

Dept. of Public Works

- 27 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 Committee
 - Current Responsibility's include:
 - Snow and Ice control , Liquids production, Stormwater drainage maintenance, Forestry operations, Inventory of Essential Materials , Safety and Various Training , Street sweeping and various other in-house & contracted services.
- bpickworth@fhgov.com or 248-871-2865



➤ •KEVIN MCCARTHY•

- SUPERINTENDENT
 - CITY OF FARMINGTON HILLS, DIVISION OF PUBLIC WORKS
-

- The Superintendent of the Division of Public Works for the City of Farmington Hills.
- Has been with the City for over 33 years. Prior to his current assignment, he held the position of City Traffic Engineer and Senior Engineer for the City.
- 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.
- Current responsibilities include the management of 35 Public Works employees conducting roadway, storm-water maintenance, right-of-way maintenance & repair of 300+ center line miles of public streets, waste collection for a population of approximately 80,000 residents and oversees city-wide fleet acquisition, management and maintenance of over 350 vehicles and heavy equipment.
- kmccarthy@fhgov.com 248-871-2850



THANK YOU

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PUBLIC

"First to Respond, Last to Leave"

WORKS









