



# University of Michigan Winter Maintenance

# U of M Campus Statistics

Roads	2,448,040 sf	39 miles 12' wide
Sidewalks	4,443,266 sf	168 miles 5' wide
Steps/handicap ramps	149,593 sf	14 miles 24" wide
Surface lots/docks	8,804,531 sf	202 acres
Parking Structures	16	
Total Acres	3200	
Buildings	584	
Students	50,000	
Faculty	7000	
Staff	38,000	

## Average Materials Used per Year

Rock Salt	2,400 tons
50 lb bagged material	4,000 bags
Liquid de-icer	300,000 gallons

# Winter Maintenance Challenges at the University of Michigan

Operational 24/7/365

Intertwined with the City of Ann Arbor

Diverse surface areas to maintain

Increasing expectations

Microclimate's

Environmental & Infrastructure Sensitivity

# Campus Service Level Goals

Keep the University of Michigan campus open to vehicle traffic during any winter storm event.

Pedestrian routes clear of snow 24 hours after typical snow event has ended 48 hours for larger snows ( 4 inches or more )

Hospital Community and Child Care Centers— Patients, Staff and Visitors are highest priority

# Campus Winter Maintenance – Who does What?

Custodial and Grounds Services maintains all general fund building entryways and surrounding walks as well as most other customer accounts (Michigan Medicine, Northwood Community Apartments, NCRC, etc.)

Parking Services maintains all parking structures and about 75% of the parking lots on campus.

Athletics handles their own sidewalks, building entryways and parking lots with some assistance from Grounds.

Some remote sites are contracted (East Ann Arbor Health Center, Wolverine Towers, Varsity Drive, Argus, etc.)

# Campus Winter Maintenance – Communication

Facilities Service Center has all of the information on winter maintenance and contact information for each unit

Always contact FSC at 647-2059

- We do not need to be notified that it is snowing...
- We do want to hear about large events or areas that need additional attention

Weather Advisories Email Group

- Used by DPSS (Brad Walvort - Director of Emergency Management) to communicate severe weather forecasts and potential impacts to campus
- Used by F&O (Rob Doletzky - Grounds and Paul Clark - Parking) to send out operational response updates including winter storm warnings
- Contact any of the people above to be added to the email list

# Custodial Services

## Entryways, steps and ramps

Winter staffing consists of 20 FTE working 6am - 2:30pm as Hybrids.

Hybrid staff work in teams of 2 to 4 people and are responsible for entryway winter maintenance at assigned buildings. This includes entryways, steps and ramps out to the main walk or where the Grounds equipment can access.

Additional support from custodians on afternoon and midnight shifts as needed.

Getting people safely in and out of buildings is the top priority during snow events so building cleaning will be delayed to allow staff to focus on winter maintenance.

Salt is applied as necessary after mechanical removal is performed. Buckets of salt stored at select entryways to allow custodians easy access.

- If there are issues with the placement of buckets or use of salt, please contact your custodial supervisor

# Grounds Services

## Roads, Sidewalks and Plazas

Winter staffing consists of 60 FTE and +/- 10 student/temp workers.

Campus is divided into 5 zones with 2 lead people per zone.

75% of crew is 6am – 2:30pm, 25% skeleton crew off hours and weekends. Overtime prior to shift and/or after shift is scheduled as necessary.

Additional skeleton crew available afternoons, nights and weekends.

Zone routes are prioritized by building hours, events, density of people, special needs and microclimates.



# Grounds Staffing and Equipment

## Assigned equipment routes across campus

- 18 Bobcat Tool Cat utility vehicles with rotary brooms, plows, and liquid deicer
- 16 Toro Polortrac with rotary broom, plow and snow blower
- 3 Kubota Tractors with rotary brooms and salt spreaders
- 10 Kubota RTV 1100 utility vehicle with plow and salt spreader or sprayer
- 11 Truck routes for roads and lots with plows and spreaders
- 3 Large articulating wheel loaders
- 2 Skid loaders

# Parking Services - Lots and Structures

Parking Services has 23 FTE's

- 14 dedicated to structures (7 on midnights, 7 on days)
- 7 dedicated to lots (all on afternoons)

Equipment:

- 12 Trucks (2 are small dumps)
- 6 Toolcats
- 1 Skidsteer

Deicing Materials Used:

- 14 Structures
  - 8 - Sodium Formate/Acetate blend
  - 6 are coated which allows the use of bulk rock salt
- 200 Lots – Bulk Road Salt

50% of the surface lots are contracted

# Training - Snow Rodeo

- Staff are trained each fall using a competitive style rodeo.
- Each zone trains and competes as a team.
- 6 teams total



# Training - Snow Rodeo

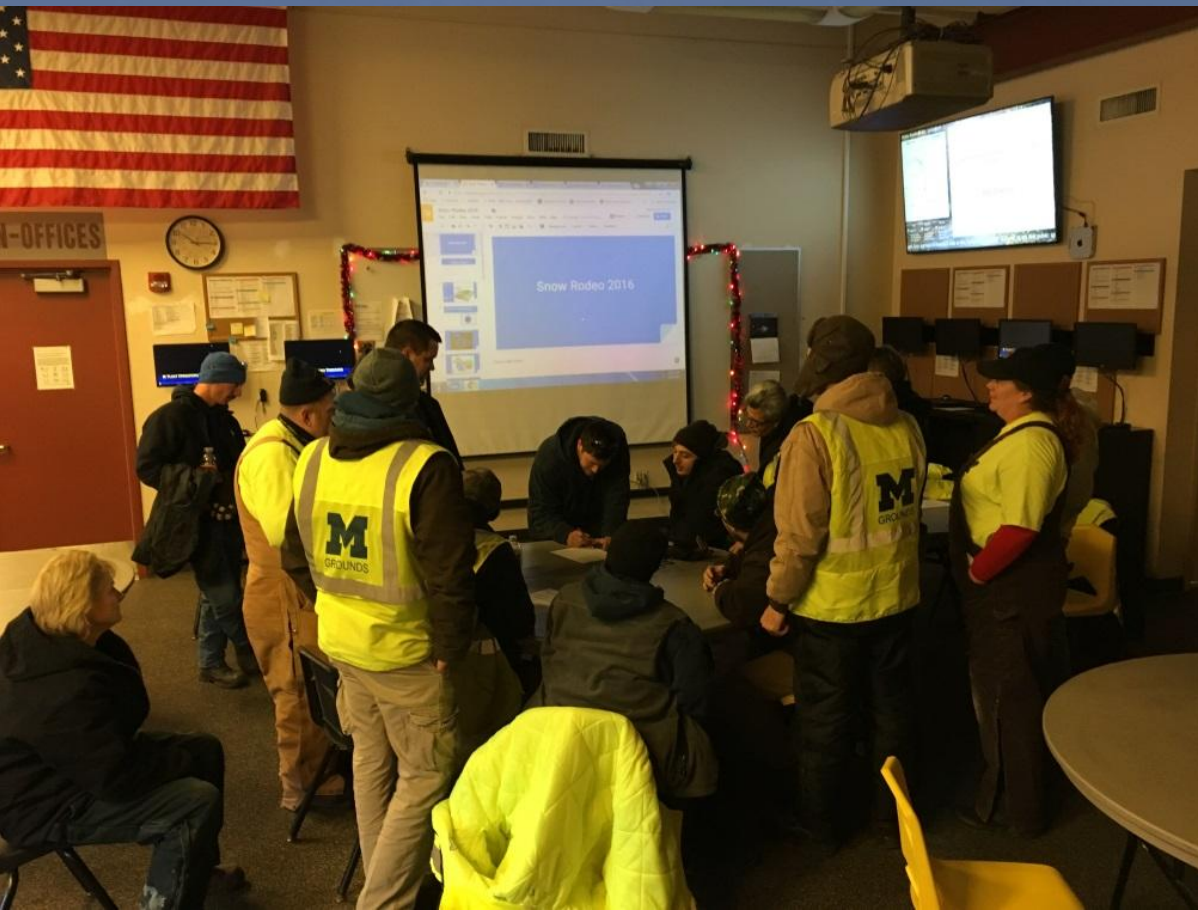
Equipment training consists of:

- Obstacle courses for various types of equipment
- Scoring is based on accuracy and safety (not speed)
- Refresher training on all snow removal equipment



# Training - Snow Rodeo

- Salt and the environment refresher presentation
- Knowledge test including weather scenarios - decision making 24/7
- Salting rate and proper application



# Best Management Practices for Sidewalks and Entryways

Mechanical removal with rotary Brooms, plows or shovels.

Anti-icing and de-icing using liquids

Eliminate melt and refreeze by placing the snow correctly



# Melt and Refreeze areas



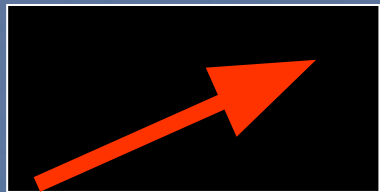
# Why Liquid Deicers on Sidewalks ?

## Increased Service levels

- Proactively anti-icing before the snow falls.
- Allows for easier and more thorough mechanical removal.
- Even distribution of deicer on walkways.

## Protecting the environment and infrastructure

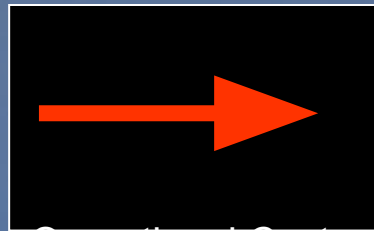
- Using the appropriate amount of deicer limits the amount that enters the environment and damages infrastructure.



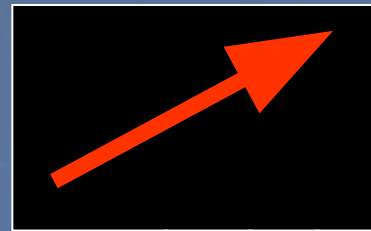
Liquids Use



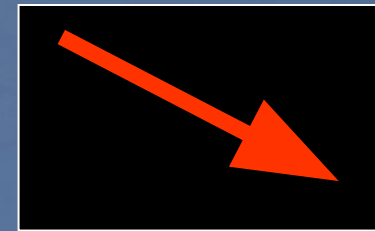
Salt/Sand Use



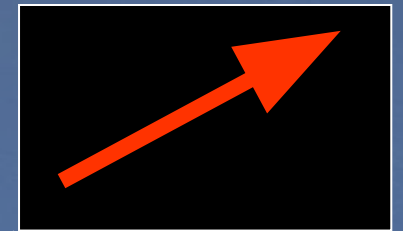
Operational Cost



Useful Life of  
infrastructure



Environmental Impact



**Safety!**



# Current Liquids in use:

## **Salt Brine (23% sodium chloride in solution)**

- Used when ground temperatures are above 20 degrees as a de-icer after brooming or direct applications for dustings (1/4 inch or less)

## **90% Salt Brine / 10% Purchased Product**

- Engineered corn byproduct mixed with Magnesium Chloride
- Used for all anti-icing and most other de-icing applications
- Works at a lower temperature than straight salt brine
- Less corrosive

# Brine Making and Liquid Storage



2 locations (North and Central)  
Total storage of 18,000 gallons

# Current Granular Bagged Material in use

## **For Entryways: Blended products are used**

- Blend of Magnesium, Sodium and Potassium Chloride
- Good all purpose de-icer used at entryways.
- Less likely to track into buildings and cause slippery floors.
- Blue or Green color for visual appearance.

## **Non Chloride option: Sodium Formate/Acetate blend**

- Non Chloride de-icer used on sidewalks and entryways.
- Used on new concrete for first season if possible
- 8 to 10 times the cost of traditional products

# Challenging weather scenarios

## Freezing rain - <https://spark.adobe.com/page/O8Ev9Uq0c2WZw/>

- Salt dilutes and refreezes in 30 minutes (salting routes take 4 hours)
  - Would take 8 times the resources (staffing, equipment and salt) to keep sidewalks ice free

## Large snow events

- Piles of snow in parking areas and plazas
  - Two step process – pile the snow and then haul
  - Running out of areas to pile and haul too
- It just takes longer...

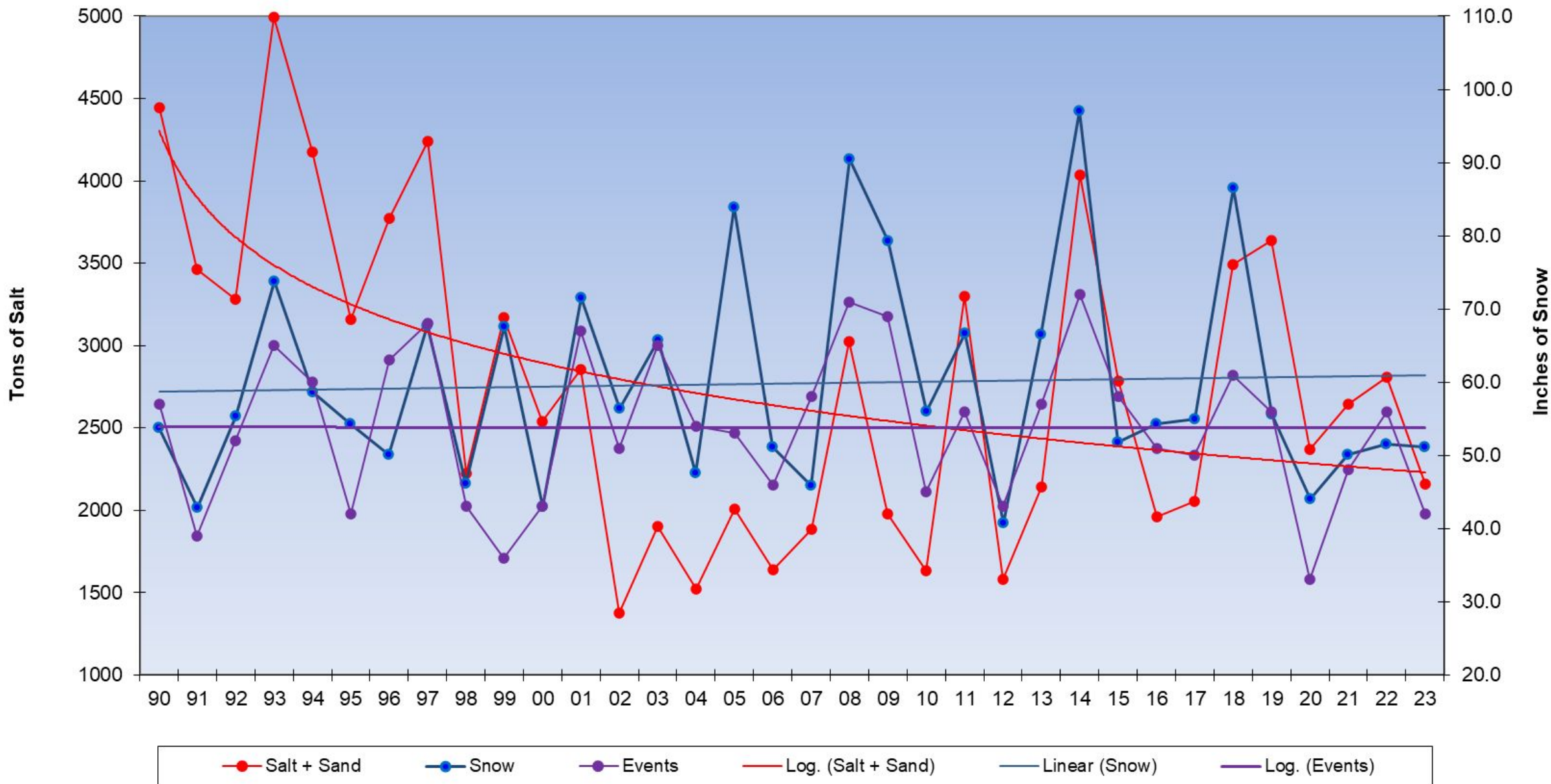
## Early and late season snow events

- Most small equipment is also used for lawn care or leaf removal
- Takes 8 hours to “change over” each piece of equipment

## Consecutive days of precipitation

- Staff can work 16 hours
- Some staff are put up in Executive Residence
- Equipment needs service or break down

# Salt and Sand use vs Snowfall and Events





BUSINESS & FINANCE  
**FACILITIES & OPERATIONS**  
UNIVERSITY OF MICHIGAN

**Questions?**

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