WINTER
MAINTENANCE
SUPERVISOR
CERTIFICATE
APWA

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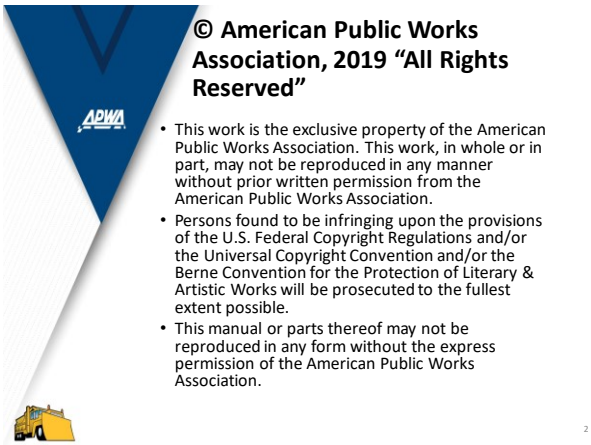
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Why this Course?
Expand Knowledge of Planning & Preparation
Increase Understanding of Winter Weather
Better Use Traditional & Alternative Chemicals
Consider What Equipment Is Available & What to Do With It
Enhance Communications with the Public
Improve Training
RESULTING IN:
More Effective, Efficient, Equitable & Environmentally-friendly Snow & Ice Control.
APWA

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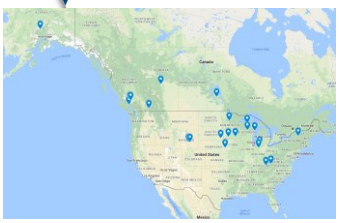
Certificate History



- First workshop was in 2011 in Spokane at the APWA North American Snow Conference.
- 40 workshops to date
- Almost 4,500 attendees to date

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Impacts of Winter Storms

Image :Courtesy of Bret Hodne

INCREASED-ACCIDENTS
DANGER
TRAFFIC-DELAYS
TRAVEL-POSTPONED
OTHER-ACTIVITIES-CANCELLED
INCREASED-COST-TO-AGENCIES
ENVIRONMENTAL-DAMAGE
COMMERCE-DISRUPTED
SCHOOLS-CANCELLED
EMERGENCY-RESPONSE-DELAYS

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Winter Operations has Greatly Evolved in 20 Years:

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Workshop Segments

0. Introduction
1. Policy & Planning
2. Weather
3. Materials
4. Equipment & Fleet
5. Snow & Ice Control

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POLICY & PLANNING

Image :Courtesy of David Bergner

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Policy & Planning Learning Objectives

- **Determine Planning Cycle for Winter Maintenance Activities**
- **Develop** Well-defined **Levels of Service**
- **Improve Resource Allocation**
- **Determine** the Reasons & **Benefits** for Having a **Comprehensive Winter Operations Plan**
- **Incorporate Sustainability** Measures

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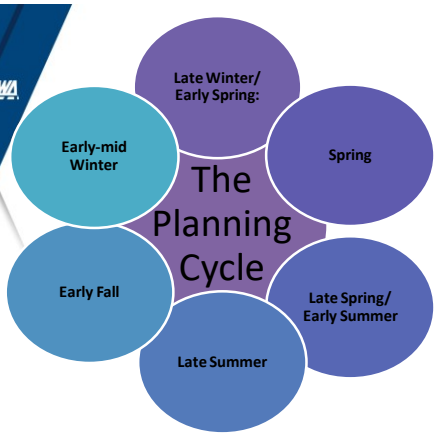

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Late Winter/ Early Spring

Gather Final Reports Of Past Season's Activity

- Number Of Events; Precipitation Per Event
- Personnel Hours Spent; Payroll Total
- Amount Of Materials Used By Type
- Equipment/Vehicle Hours; Fuel Units Consumed
- Equipment/Vehicle Maintenance And Repair Costs By Type
- Contractor Hours and Costs
- Total Route-miles Per Event; Season Total
- Accidents/ Damage Claims
- Complaints…and Compliments

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Spring

Post-Season Wrap-Up	Objective critique: Lessons Learned
	Include all stake holders
	Determine action items for next season
	Preliminary assignment of tasks and due dates
	Set schedule for follow-up meetings next 6 months

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Spring-Key Tasks

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Late Spring/Early Summer

Mid-year check	*First revisions to Winter Maintenance Operations Plan* *Levels of Service, Priorities, Jurisdictional Agreements* *Route changes (traffic patterns, construction, growth, etc.)*
Forecasting personnel staffing needs	*Operators* *Contractors* *Part-time Staff*
Estimating vehicle/ equipment requirements	*Status report of vehicle/ equipment condition*

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Late Spring/Early Summer

- Develop Tentative Training Schedule
- Conduct Facilities Repairs, Upgrades, Relocations
- Place Material Orders/Determine Deliver Dates
- Draft Contracts/Issue if Possible

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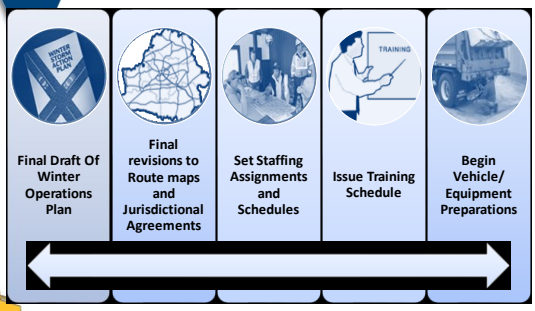
Late Summer



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Late Summer

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Early Fall

- Issue new Winter Operations Plan and maps
- Briefing for Officials
- Commence Public Outreach program
- Conduct Training for Employees and Contractors
- Issue personal-use items (ex; winter coats, PPE, pagers)
- Route inspections (dry-runs) by assigned operators
- Vehicle/ equipment repairs/ adjustments from dry-run

Geared up & Ready to Go!

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Getting Ready for Winter

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Early-mid Winter

If no snow events yet:	If snow events have occurred:
• Regular vehicle/ equipment inspections • Routinely check material storage and dispensing units • Conduct another dry-run to refresh knowledge of routes • Periodically check communications/ notification systems	• After-Action Reviews • Priority on vehicle/ equipment repairs • Replenish material stocks as needed • Adjust material application tactics if needed • Provide additional training as needed

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During the Storm

Progress reports	• Operator call-in by radio • Tracking by AVL • Supervisor/ inspector checks
Reporting	• Accidents, • Blockages • Breakdowns
Responding	• To requests from police • Or fire
Adjusting operations (due to changing conditions)	• Typical storm standard plowing & spreading procedures • Dealing with blizzards • Heavy snow fall rate • Freezing rain/ ice

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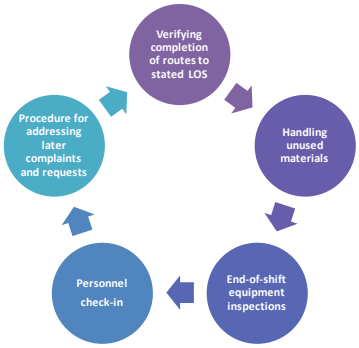
End of Storm



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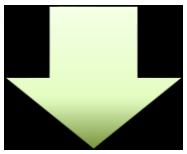
Policy vs. Procedure

Policy – Guide top management in decision making – **Your Winter Maintenance Plan**



Procedures – Guide employees in practical application of the policy – **How you implement your Winter Maintenance Plan**

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Reasons for a Written Plan

1. **Establishes Reason & Authority**
2. **Identifies Responsibilities & Roles**
3. **Stipulates Service the Agency Will Provide**
4. **Outlines Strategies, Tactics & Resources**
5. **Offers Protection from Liability**

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3 Resources for Creating Your Winter Operations Plan

USA Winter Weather Operations Plan Template

The Canadian Winter Operations Plan Template

West Des Moines, IA Winter Maintenance Plan Example

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The WMP Planning Process

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Developing the Plan

- Determine Capability for Typical Situations
- Match to Resources & Restraints
- Project 2-5 Years Ahead
- Be Realistic
- Worst-case Scenarios: State Likely Options
- **Don't Say What You Can't or Won't Do!**
  This Can Lead to Liability

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The Essential Components

Legal

- Reference the statutes, ordinances, regulations and official policies that assign authority and responsibility for snow and ice control.
- Exclusions, Disclaimers
- Mutual Aid Agreements, Memoranda of Agreements with other agencies and jurisdictions.
- Description & Map Of Jurisdiction's Road And Street System
- Description Of Jurisdiction's Characteristics

Organizational

- Organization charts (internal and external)
- Chain-of-command; identify those in charge
- List of key positions and people
- Staffing Summary

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Operational Components

- Goals and Objectives
- Levels of Service defined
- Strategy
- Snow and Ice Control Protocols
- Performance Measures
- Routes: explain basis of route configurations
  - Cycle-time, lane-miles/km, traffic, topography, critical services access, etc.
  - Attach maps showing routes (some agencies list every street and road segment per route)

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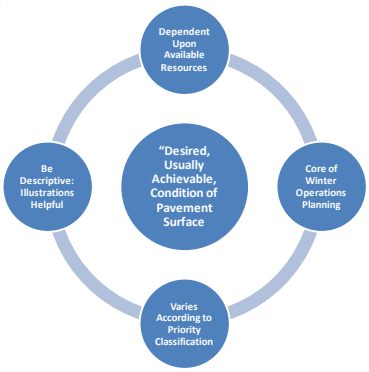
Levels of Service



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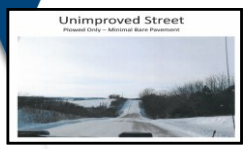
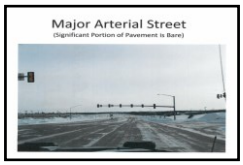
Levels of Service





Images :Courtesy of Bret Hodne

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Strategy and Tactics

Preparing for a Storm

- Alerting Staff, Officials And Public
- Equipment Readiness
- Check Materials And Facilities
- Pre-treatment

Activation

- Notifications That You Are "In Storm Mode"
- Report For Duty By Shift
- Devise Plan For Snow And Ice Control
- Personnel And Contractor Check-in

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Staff Considerations

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Training – But Why?

All training should be documented, who attended, when and what was presented.

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Training

- Review Policy with ALL staff
  - Extensive for New Employees
  - "Refresher" for All Veterans
  - "Remedial" for Accident – Prone
  - Contractors
- Pre-season practice runs on routes
- Competitive Events (Roadeo)
- Update Annually
- Computer Based Training (CBT)
- SPOT Training
- Simulators

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Contracting

- Used as Regular Element or as "Reserves"
- Contracts Need to Be Very Specific
- Pre-qualification Recommended
- Bonding, Insurance, Indemnification
- Quality Control; Objective Standards
- Dispute Resolution

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Liability & Risk Management

- BE PROACTIVE ! FOCUS ON SAFETY
- STATE DISCLAIMERS & EXCEPTIONS
- GENERALLY - NO IMMUNITY
- ACTIONS DEFENSIBLE IF REASONABLE & IN WRITTEN PLAN
- HAVE GOOD RECORDS OF ACTIVITIES

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Safety

Continual Vigilance
- Vehicle Inspection & Operation
- Personal Fitness & Awareness
- Facilities

Check Roads
- Pre-Season & Between Storms

Extensive Review of Accidents
- Determine What Happened & What Can Be Done to Prevent Them In the Future

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Shift Work & Sleep Deprivation

- What is reasonable & safe?
- Risk vs. current practice
- Exempt vs. reasonable expectations
- Changing shifts can be "hard"

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Supervisors

- Varying leadership styles
- In an extremely challenging position
- Deal with a lot of "issues"
- Highly influential with regards to morale
- Usually are in the middle of the "sandwich"

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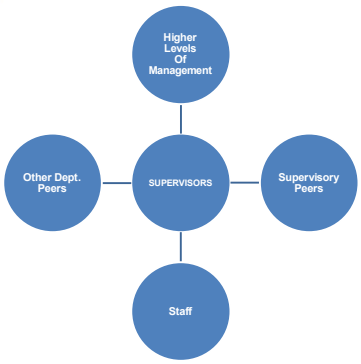
The "Sandwich"



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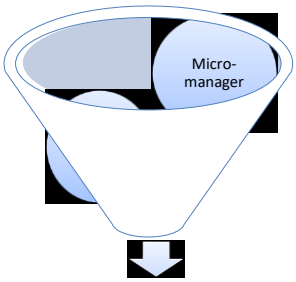
Styles of Management



Blend Of Both

- No "perfect" style
- Expectations are evolving

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Management Trends

- More empowerment of staff
- Delegating more responsibilities
- Rewarding/recognizing achievers
- Encourage staff involvement
- Willingness in adapting to change

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Keys to Success

- Effective communicator
- Honest and fair
- High level of integrity
- Ability to handle stressful situations
- Pro-active approach to issues
- Ability to motivate staff
- Develops and promotes training

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Developing Teamwork

- Fair and cordial work environment
- Promote/explore teamwork building activities
- Communicate frequently and effectively
- Develop/effectively communicate common goals

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Motivation Techniques

- Show a personal interest
- "Sincere" praise and recognition
- Effective delegation
- Objective performance reviews
- Open and honest communicating with employees

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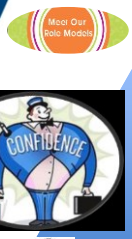
Some "Tips" for Success



- Recognize accomplishments
- Provide support
- Individualized supervision
- Exhibit confidence
- Recognize improvement
- Critique behavior – not people
- Positive reinforcement
- Be a role model

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Interaction with the Public

- Listen carefully
- Thank them for providing information
- Acknowledge their rights to an opinion
- Engage them in finding solutions
- Keep a cool head, even if they don't

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Interaction (cont.)

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Complaints, Claims, Comments

Pre-storm "Requests" or "Reminders"

Acknowledge the Positive Comments

In-storm Complaints

Claims from Public

Post-storm Complaints, Criticism

Damage Reports from Operators

It's essential to follow up on every complaint in a timely manner.

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Media Relations

Avoid	Avoid using "no comment"
Be	Be honest and straightforward within your limits
Answer	Answer what is asked
Be	Be pro-active - invite them to "see what you do"
Anticipate	Anticipate the questions – practice your interview
Do not get	Do not get too comfortable and let your guard down
Don't say	Don't say what you don't want reported
Be	Be cautious of "off the record"

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Be Pro-Active

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Winter Operations & Emergency Management

- **Snow And Ice Storms Are Emergencies!**
- Preparations Made Each Season
- Onset, Duration, Intensity Often Difficult To Predict
- Affects Entire Jurisdictions; Involves Many Personnel
- Operations Continue For Long Periods
- Similarities To Other Disaster Operations
- Use As Basis For Handling Other Events, Incidents

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Sustainability

Like it or not – winter maintenance practices have a direct impact on the environment

Air particulates
Soil, long-term accumulation, degradation
Plants, direct contact
Water, through run-off & over-spread
Pavement & metal infrastructure
Vehicle corrosion

It's in everyone's best interest if we work to reduce the environmental impacts.

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Excess Salting

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Policy & Planning - What Now…

- Ensure Procedures Match the Policy Stated in Winter Operation Plan
- Focus On Defining & Delivering Realistic Levels of Service
- Expand Training
- Make Sustainability an Important Element
- Improve Communication with Staff, Public & Officials

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Planning & Policy Quiz

Please find your test and complete Section 1: Planning and Policy.

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WEATHER BASICS

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Weather Objectives

Learning About Weather Basics Will Allow Us To…

- **Understand Weather Terminology** And Get The Most Out Of The Weather Forecasts And Observations
- **Predict, Analyze And Identify** The Changes In A Storm's Progress Which Require Different Strategies To Reduce Driving Hazards
- **Utilize Resources:** Equipment, Material, And Labor **Efficiently**
- **Apply Technologies** In An Effective And Timely Manner Now And In Future Planning

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Weather Terminology

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Definitions & Basic Weather

Weather Variables

- Air temperature
- Dew point
- Wind speed, gusts and direction
- Visibility
- Cloud cover

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Air Temperature

- Critical in telling us the type of precipitation.
- How do we measure it?
  - Measured from 6ft off the ground
  - In a white vented enclosure
- Combined with wind it has an impact on our road surface

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Atmospheric Moisture

Moisture In The Atmosphere Is One Of The Most Powerful **Influences** On ***Weather*** And On ***Road Conditions***

Relative Humidity

- Is The Amount Of Water Vapor In The Air As A Percentage Of What It Could Hold At That Temperature

Dew Point

- Is The Temperature To Which An Air Mass Must Be Cooled To Become Saturated And Condense
  - **Above 0° C (32° F)** Result, Rain, Fog, Dew
  - **Below 0° C (32° F)** Result Snow, Frost, Ice

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The Beverage Effect

Why Does A Cold Beer Sweat ?

Because the glass is colder than the Dew Point outside.

Air Temperature 85 F°
Dew Point 60 F°

Can Temperature 45 F°

Air Around The glass Is **Cooled Causing Water Vapor** In The Air **To Condense** On The Glass Surface –
Just Like Water Vapor Condensing On Dust Particles In The Air To Form Clouds.

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Effects of Cloud Cover and Wind

- Clouds @ night
  - Keep heat in
  - **No** frost
- No clouds @ night
  - Objects and air cool
  - Frost is possible

Wind

- Critical piece of information for storm location relative to you!
- Lack of wind at night means further cooling
- Wind chill does not equal pavement temps!

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Definitions & Basic Weather Observations

Large Scale Weather

- **Barometric / Atmospheric Pressure**
- **Air Masses**
- **Weather Fronts**
- **Storm Systems**

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Barometric (Air) Pressure

The Force Exerted By The Earth's Atmosphere

Average Pressure At Sea Level Is:

- 101.325 kPa (1013 Millibars)
- or
- 14.7 Pounds Per Square Inch (29.92 Inches Of Mercury)

Pressure =

Pressure =

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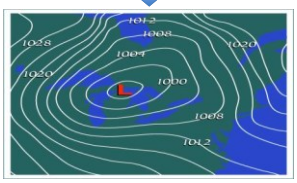
Barometric and Atmospheric Pressure

Simultaneously **Take Barometer Readings** From Around The Area → **Plot** Them On A Map → **Draw Lines Connecting** Stations With The Same Air Pressure Together (Isobars) → You Get A **Picture Of The Atmospheric Pressure**



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Atmospheric Pressure

Trough
Low Pressure Area

- A Pressure MINIMUM At Its Center
- Air Will Spiral COUNTER-CLOCKWISE In Our Hemisphere
- Associated With RISING Air Ahead Of It & *STORMY OR DETERIORATING Weather*

Ridge
High Pressure Are..

- A Pressure MAXIMUM At Its Center
- Wind Will Blow CLOCKWISE Outward From The Center Of The High Pressure
- Generally Associated With *FAIR OR IMPROVING WEATHER*

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Air Masses

A Bubble Or "Blob" Of Air That Has 2 Similar Characteristics

Air Temperature	Moisture - Humidity (Dew Point - Relative Humidity)

Air masses can be as small as covering a few states, or as large as covering ½ of the U.S.

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Weather Fronts

Fronts

- Are the **BOUNDARIES BETWEEN AIR MASSES**
- Signified by having a change in wind direction and pressure.
- Types:
  - ✓ Cold Front
  - ✓ Warm Front
  - ✓ Stationary Front

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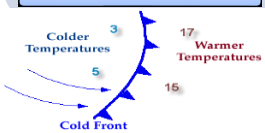
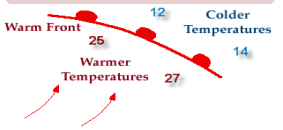
Weather Fronts

Cold Front	Warm Front
Temperature And Dew Point **Drop**	Temperature And Dew Point **Rise**
Significant Wind Shift	**Light** To Moderate **Wind** Shift
Rising Pressure - After	**Precipitation Ahead** Of Front
Precipitation along front	**Skies** Usually **Clear** After Passage
Relatively **Short** Duration	Relatively **Long** Duration





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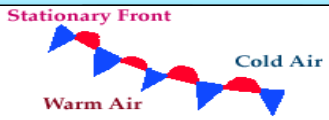
Weather Fronts

- **Unsettled Weather** May Linger On For A **Prolonged Spell**
- May Cause **Prolonged Hazardous Road Conditions** As Weak Waves Of Low Pressure Travel Along It
- **Zone Between Two Air Masses**, Where Neither Is Moving Significantly On The Other
- **Long Duration**, Weak To Moderate Rate, Banded-area Precipitation Shield
- Moe **Similar** In Strurcture And Impact **To A Warm Front** Than A Cold Front



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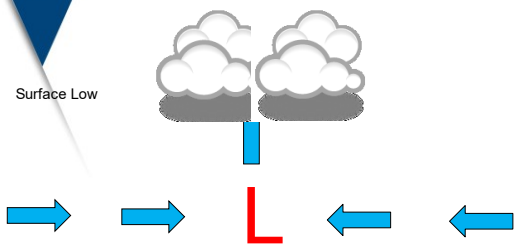
All Storms Must Contain… Lift! (and moisture)



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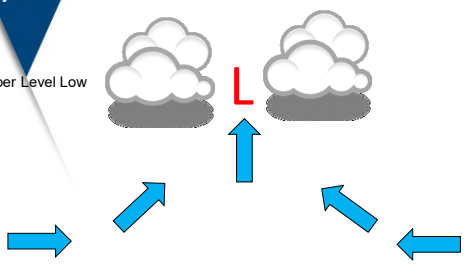
Second Lift Mechanism



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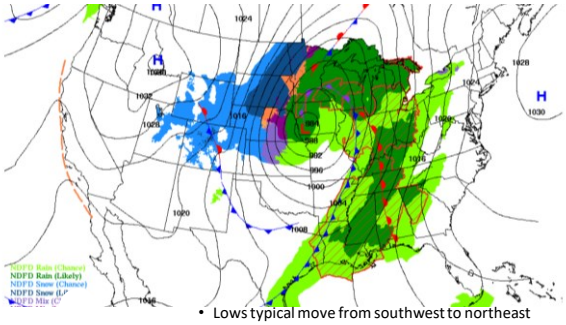

Surface Low

- Lows typical move from southwest to northeast
- System may not always contain all of the precipitation types
- Best snow is usually approx. 250 miles/ 400 Kilometers north of Low
- Greatest uncertainty with forecast is located near center of low

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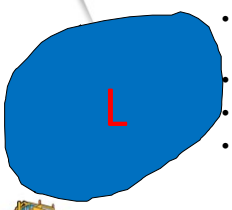
Upper Level Low

- Very little surface feature
- Usually move from west to east (or a version of that)
- May contain only one precipitation type (at most two)
- Lighter in precipitation
- Faster moving
- Timing more challenging to forecast



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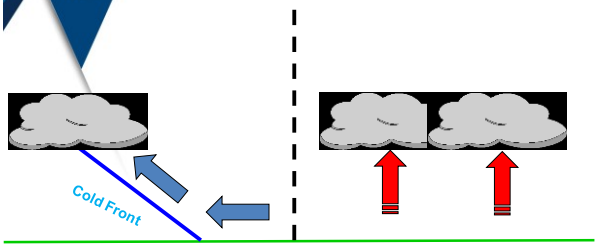
It All Comes Down to **Lift**!



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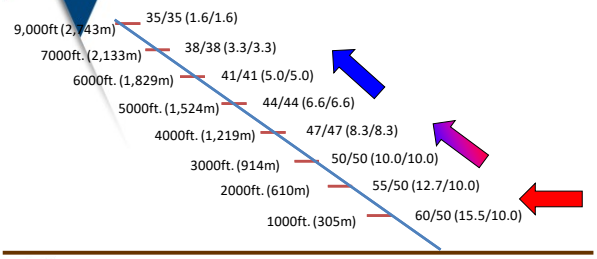
Fronts Produce The Lift Required



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Rate of Temperature Change

UNSATURATED (temp & dew not together)
= 5.5ºF (1°C) per 1000ft (100m)

SATURATED (temp/dew equal)
= 3.0ºF (.55°C) per 1000ft (100m)

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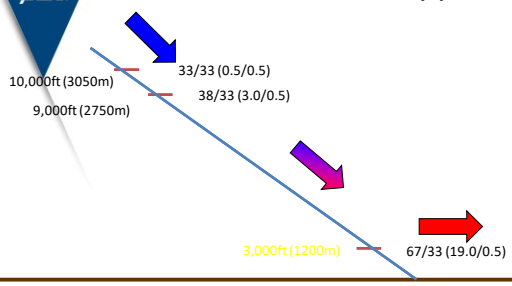
The Backside Produces The Exact Opposite



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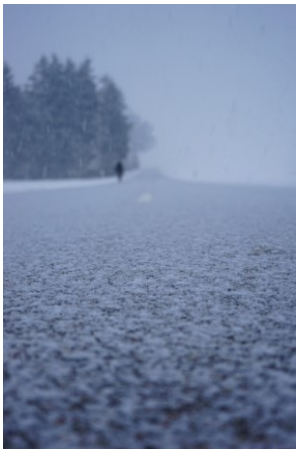
Road Conditions

- Pavement temperature
- Road condition



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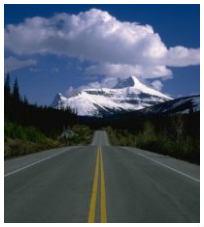
Thermodynamics (Heat Transfer, Roads & Bridges)

To Understand How The Air Impacts Our Pavement We Must Understand How Heat Transfers From Objects

- Every Object Is In A Constant State Of Change
- The Greater The Eq1xposed Surface Area, The Faster The Change



83

How Does Frost & Black Ice Form?

Frost

If The Air & Pavement Temperature Is Below Freezing…

Pavement Temperature Becomes Colder Than The Dew Point Temperature

…The Moisture In The Air Crystallizes Onto The Pavement BELOW FREEZING Surface, Forming Frost.

Black Ice

Liquid Moisture Appears On The Pavement

(Can Happen In A Variety Of Ways)

The Pavement Temperature Then Falls Below Freezing

Water Freezes Clear To The Pavement –

Because It Was A Liquid First!

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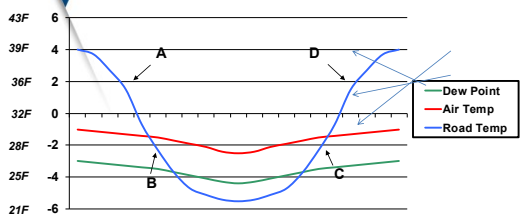
Frost Formation

Our Concern Is, What Will Happen At Each Of These Points: A, B, C And D?



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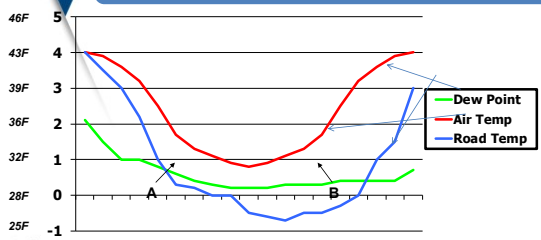
Black Ice Formation

Air Temp Above 32° F And Road Temp Falls Below Dew Point.



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Factors Affecting Precipitation Amounts and Type

- Lake (Water Body) Effects
- Topography
- Micro-Climates

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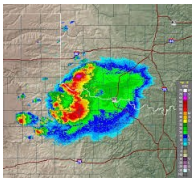
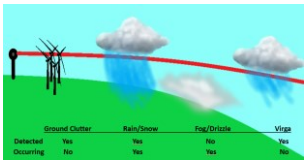
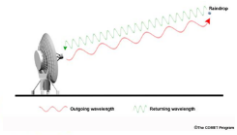
Radar

- Radar sends a beam of energy
- Return energy indicates relative size of the object
- Snow does NOT reflect energy well







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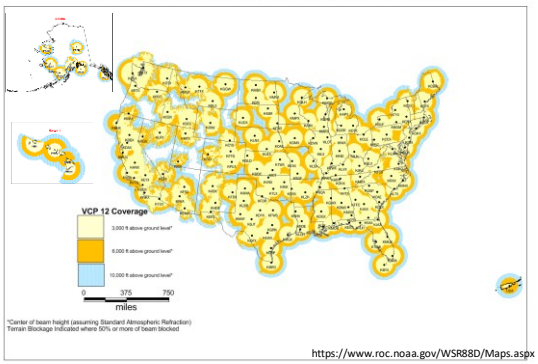
Radar Coverage

NEXRAD Coverage Below 10,000 Feet AGL



https://www.roc.noaa.gov/WSR88D/Maps.aspx

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Micro-Climate

Body of Water

Location that differs from the rest of your road network

Higher Elevation

Bridge

Shaded

100

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Weather Maintenance Tool Chest

Road Weather Measurements

Weather Forecasts

Decisions Support Tools

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Road Conditions

THINK PAVEMENT TEMPERATURE

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Handheld Infrared Gun

- Easy to use! Point and Shoot!
- Cheap!
- No training Required!
- Sensor must be acclimated to environmen
- Not originally designed for outdoor use
- Typical accuracy comments:
  - ± 4°F from 32°F to 55°F
  - Assumes ambient operations temperature of 73°F to 77°F
  - One model does not work below 32°F
  - It's best to allow some time (about 20 minutes is usually enough) for your IR thermometer to come to the temperature of its surroundings when bringing the thermometer into surroundings that are significantly warmer or colder than where it has been stored (errors of 5-6°F possible)

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Mobile: Why?

Real-time reaction to changing conditions

Provides much more accurate reading than handheld

Gives you conditions as you drive

Provides a broad view of road weather conditions

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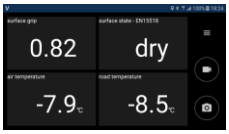
Mobile Weather Conditions

- **Standard Equipment**
  - Pavement Temperature
  - Air temperature
- **Advanced Equipment**
  - Water Film Height
  - Material Applied and Rate
  - Dew point / Relative humidity
  - Road Condition
  - Friction



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New Mobile Sensor

Multiparameter sensor for snow plow trucks and patrol cars

Measures all key parameters
- Surface temperature
- Surface grip
- Surface state
- Dew point
- Layer thicknesses of water / ice / snow
- Relative humidity
- Air temperature

Designed for snow plow trucks
- Special hood (patent pending) utilizes air flow to keep window clean
- Potted, robust design to withstand vibration and prevent water ingress

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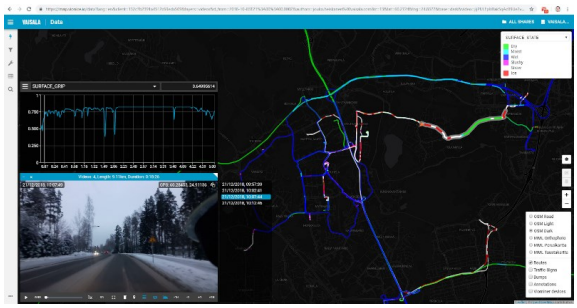
Mobile Sensor Data



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RWIS Hardware: Roadside Tower

Non-invasive sensors

Sensors Measure:
- Wind Speed, Gusts & Direction
- Precipitation
- Temperature & Humidity
- Pavement temperature
- Friction

Cabinet Contains:
- Processing Unit
- Telecommunications & Power Connections
- Digital Barometer – Pressure

Optional Equipment:
Visibility, Cameras, Traffic Counters, Precipitation Type and Amounts

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RWIS Installations & Weather Stations

Provides Weather Conditions along the Road 24/7

Useful for Assessing Success of New Road Maintenance Techniques

Salt Management Plan Performance

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Fixed RWIS: Why?

- Provide road conditions 24/7
- Most accurate way to obtain road conditions
- Improves a road weather forecast
- Provides key information on:
  - Timing of freezing/thawing
  - Aids in chemical decisions
  - Improves a weather forecast

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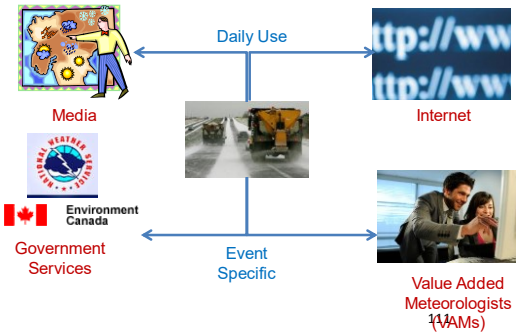
Weather Information Sources



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Is this really relevant to your job?

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False Sense of Security = Internet

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What kind of forecast is right for us?

- Provides specific timing
- Provides accurate and meaningful percentages
- Provides road temperatures
- Significant road weather event information
  - Frost
  - Black ice
  - Freezing Rain (freezing where?)
- Consultation
- Updates that are there when you make your decisions

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The Future - MDSS

Weather Forecast

Current Road Conditions

Operation Capabilities

Current Treatment

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Decision Support Information:
Road Weather Forecasting

- Tactical Forecasts, 48-72 Hr Windows
  - Frequent Updates
  - Multiple Weather Attributes
  - Point And Area Observations
- Pavement Predictions
  - Surface Temperatures
  - Moisture Phase
  - Snow Accumulation and Icing Potential
- Treatment Recommendations
  - Anti-ice
  - Application Time
  - Application Rate

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Consultation is the Secret to Success

Contacting (phone, web, text) a meteorologist is the key to a successful weather contract!

Ask good questions not just "what is the forecast?"

- How confident are you?
- How are the models doing?
- What else could happen?
- Will there be winds after the storm?
- Why don't you match the NWS or TV station?

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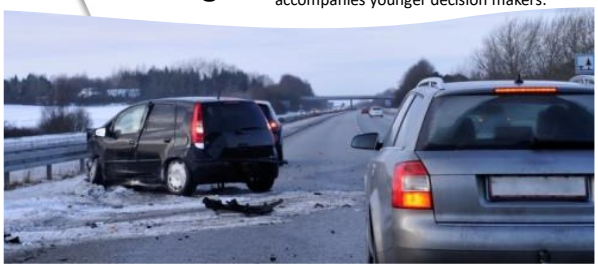
Times Have Changed!

As our world becomes more efficient the impacts of Weather, however minor, have an impact on our Community/Commerce.

We are on a "Crash Course" for information overload (if we are not already there)!

We can not afford the learning curve that accompanies younger decision makers.



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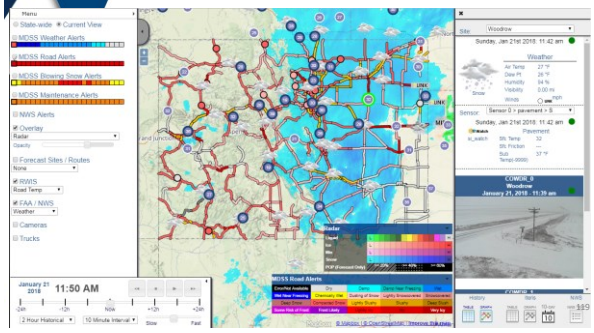
Weather Provider Examples



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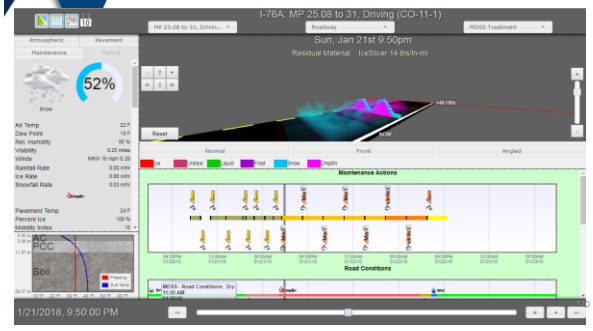
Weather Provider Examples



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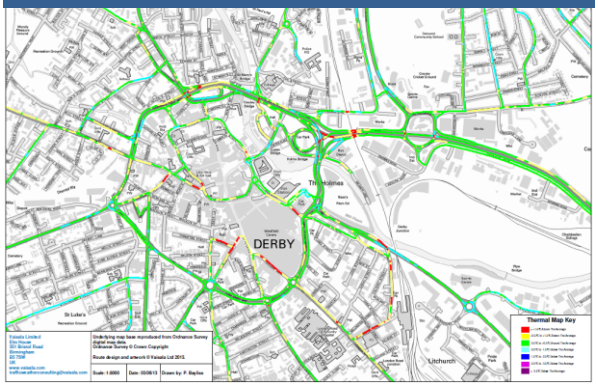
THERMAL MAPPING



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Weather vs. Climate

Climate Impacts

- Things you see change over your lifetime
- A particular plant no longer growing in an area
- Insects or animals changes, migration patterns

Weather Impacts

- Things you see now or over a season
- Cold Winter
- Heat Wave
- Record Temperatures
- Drought /Flood
- Severe Weather
- Lots or No Tornadoes
- Lots or No Hurricanes

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Unusual Weather is Normal!

- Most people got into weather because of the "unusual!"
- Can it snow that much here as it did in Boston in 2015? YES!
- We don't have tornadoes here? You can!
- It is too cold here for ice storms? No it is not!
- Do you have a plan if you saw Boston's snow in 2015?
- What about California flash flooding this year?
- Or a tornado through the center of your community?

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We are more Sensitive!

As societies become more developed and advanced, they remove wasted time from their process to improve efficiencies.

When we remove extra time in transportation, we leave no time for weather.

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So, What Now?

Evaluate Where **Your Agency** Was Yesterday, Are Today And **Want To Be** Tomorrow **In Managing Your Weather** Forecasting.

Determine how best to **Enhance** The **Accuracy** Of Your Weather Decisions?

Evaluate If There Is The "Will" To **Train** / Affiliate As Much **Staff** As Required ?

Investigate What **VAMS** (Value Added Meteorological Services) Are Available To Your Agency.

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Weather Quiz

Please find your test and complete Section 2: Weather.

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SNOW AND ICE CONTROL MATERIALS

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Materials Learning Objectives

- Why Chemicals Are Used
- Factors to Be Considered In Selecting Materials
- Environmental Impacts of the Use & Non-use
- Appropriate Storage & Handling Methods

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Ice Control Chemical Terms

Concentration	The **Percent** (by weight) **of** the Ice Control **Chemical** In the Liquid or Solid Product
Dilution	**Reducing** Solution **Concentration By Adding Water**
Form	The **Physical State of the Chemical** – Solid or Liquid
Gradation	A Characterization of the Distribution of **Particle Sizes** for Solid Chemicals & Abrasives
Hygroscopic	Having the **Ability to Draw Water Vapor from the Air**
Solution	A **Liquid Containing Chemicals & Water**

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Ice Control Chemical Terms

Endothermic	Becomes **Colder** When **Going Into Solution**
Exothermic	Becomes **Warmer** When **Going Into Solution**.
Eutectic Temperature	the **Lowest Temperature** a Concentrated **Solution Begins to Freeze** or the **Lowest Temperature It Will Melt Ice.**
Eutectic Concentration	The Solution **Concentration That Produces the Eutectic Temperature.**

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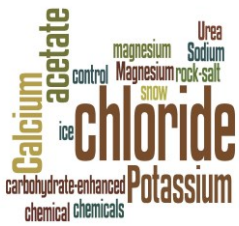
Material Options

ABRASIVES

CHEMICALS



or

NOTHING AT ALL

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Remembering Why We Need Materials

- We have to provide a level of service
- We have to balance societal, economic, and environmental concerns (i.e. Safe and Sustainable Snowfighting)

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Why, Again?

- Two primary reasons, both well established by research
- Safety – Marquette University study showed proper use of road salt resulted in:
  - Crashes reduced by 88%
  - Injuries reduced by 85%
  - Accident costs reduced by 85%
- University of Waterloo Study showed proper use of road salt resulted in a 95% reduction of crashes on four-lane highways
- Related University of Waterloo study showed that chloride levels were reduced by 50% when best practices were used

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Not Just Safety - Mobility

- Study by Global Insights looked at the impact of a one day shutdown for a State due to a winter storm. They found:
  - A one-day major snowstorm can cause a state $300-$700 million in direct and indirect costs
  - The economic impact of snow-related closures far exceeds the cost of timely snow removal
  - Snow related shutdowns harm hourly workers the worst
- Other studies have shown that safe and sustainable snowfighting when applied to a winter storm pays for itself in the first 25 minutes of operations
- Plus, a high level of service is what we expect…

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Chemicals

Chemicals are Applied to
Prevent or Break the Bond
Between Ice & Snow to the Road Surface

We Do NOT Use Chemicals to "Burn Off" the Snow	We Remove Snow & Ice with the Plow	We Make It Easier to Remove with the Chemicals

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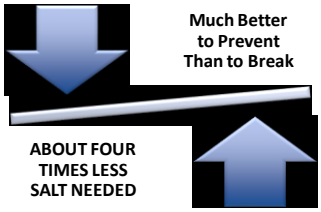
DEALING WITH THE BOND

Preventing the Bond = Pro-active = Anti-icing

Breaking the Bond = Re-active = Deicing



Much Better to Prevent Than to Break

ABOUT FOUR TIMES LESS SALT NEEDED

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What Happens When Materials Hit the Road?

First, the Material must go into Solution → Once In Solution (i.e. Mixed with Water), it lowers the Freezing Point

As soon as it goes into Solution, it starts to Dilute out → How Long? Depends On:

- Pavement Temperature
- Cycle Time
- Storm Type & Amount of Precipitation
- Amount of Material Used

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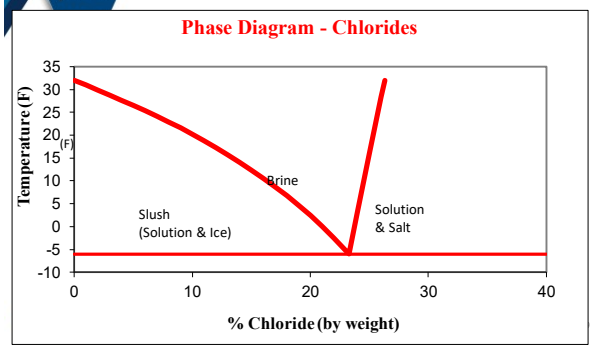
How Ice Control Chemicals Work



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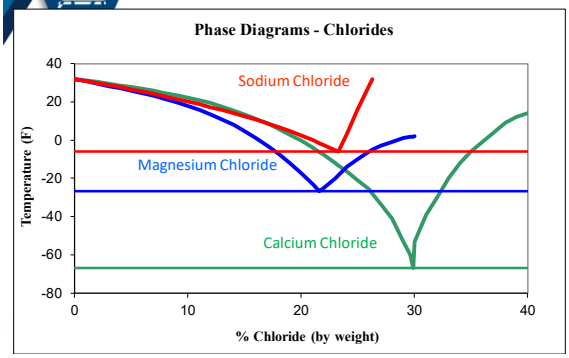
Ice Control Chemicals



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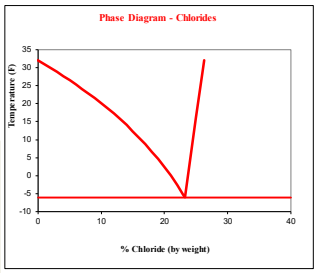
Thoughts On Temperature

When We Are Using Chemicals,

We Are Only Concerned with the Pavement Temperature!

The **Eutectic Temperature**

(the Low Point of the V)
Is **Not** the Lowest Effective Working Temperature of the Chemical



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Example On Quantity of Melting

- 300 lbs. Per Lane Mile (85 Kg/Lane Km)
- 23 ° F (-5° C)
- How Much Ice Can We Melt?
  - Express as Inches of Moisture
- First Determine the Percentage of Salt…

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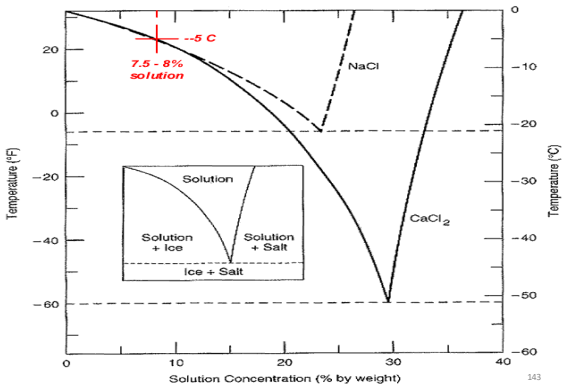
Solution Concentration



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Percentage of Salt

All Salt In Solution at About 7.5% → Water Amount? → Water Depth?

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How Much Water?

$$W = \frac{92.5}{7.5}(300) = 3700 \text{ lbs of water}$$

$$1680 Kgs$$

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How Deep Is the Water?

Diddeley Squat

$$\text{Depth of water} = \frac{mass}{density \times area}$$

$$Depth = \frac{3700 lbs / mile}{62.4 lbs / ft^3 \times (5280\, ft / mile) \times 12\, ft}$$

$$Depth = 9.358 \times 10^{-4}\, feet = 0.011 \text{ inches water}$$

2.3 mm of water – The thickness of two dimes

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Why So Little?

- ***Not Melting the Snow, But Breaking the Bond***
- We Can **Use** Even **Less Chemical** & **Still Be Effective** at This Pavement Temperature

If You Wanted to Melt 1" (2.5 cms) of Snow
at 23° F (-5.0°C),
You Would Need 3,000 Lbs.(850 Kg/Km) Per Lane Mile
Not a Good Idea - **DO NOT DO THAT!**

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Solids or Liquids?

It Is All Liquid
- **When It Is Working!**

Each Have Benefits & Drawbacks,
- **Ideally - Have Both**

Having Both Is Not a Luxury –
- **It is Getting the Right Tools in Your Tool Box**

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Solid Thoughts

- Best Practice , Most of the Time (More Than 90%)
- **Rock Salt Should Be Applied Pre-wet or Treated.**
- Almost All Solids Are Sodium Chloride
- Snow Pack & Freezing Rain really need Solids
- Solids will take longer to Dilute than Liquids, so are good if you have long Route Times.

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Liquid Thoughts

- Act Fast, Dilute Fast
- Excellent for Pre-treatments, especially for Frost Management
- Very little value if dealing with Freezing Rain
- Be very careful using on Snow Pack or Ice
- Appropriate equipment selection (Trailers) allows for Easy Liquid Pre-treatment & Solid In-storm Application
- Blending can allow enormous versatility

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Choosing Your Chemicals

Which Chemical/ Material should you use?

The Major Difference is in Operating Temperature	Salt is Good to 15° F/ -9.44° C	Calcium Chloride & Magnesium Chloride Will work at Lower Temperatures	How often do you have storms with Pavement Temperatures Below 15° F/ -9.44° C?

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Other Factors to Consider

Speed of Melting
- Calcium works really fast (Hot) but Dilutes out more quickly too

Corrosion
- A very difficult issue – Lab Tests cannot duplicate Field Conditions

Environmental Factors
- Are Chlorides a Major Problem?
- If so, use Acetates but Beware BOD Levels – or use the right amount of Chlorides!

Cost
- Salt is Cheaper

Efficiency
- Liquids allow you to stretch out your Salt

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New to Chemicals?

start here

The Pacific Northwest Snowfighters

http://pnsassociation.org/

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Selection Process-Choosing What's Right for You!

- State Contract
- Agency Bid
- Multi-Agency Contract
- No Formal Contract

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Considerations-State Bid

- Easy to "tag on"
- Review document carefully
- DOT may take priority
- May save or increase cost
- Decide if this is "right for you"

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Considerations-Agency Bid

- Drafting Specifications
- Sufficient quantities/Bidder Attractiveness
- Look at other contracts
- Can be time consuming

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Considerations-Multi-Agency Bid

- Drafting Specifications-Identify who will handle
- Determine "when" to bid
- Increased tonnage can lead to better pricing
- Gives agencies more control
- Politically popular- "Partnering"

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Drafting Specifications/Purchasing

- Determine what is important for your agency
- Inhibitors, environmental aspects, cost, etc.
- Know what you are buying: Be Careful of "Secret" Additives
- Be able to justify your decisions
- Base choices off of "facts" not sales pitches or relationships
- Include Quality Control (take samples and test materials to ensure specification conformance)

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Drafting Specifications/Purchasing Cont'd

- Look at other resources (PNS, DOT/Agency Contracts)
- Lab tests-independent vs. company based
- Product Availability
- Pilot Project vs. Full Scale Implementation
- Verify Product "Literature" is Accurate

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PNS Qualified Product List

Pacific Northwest Snow Fighters (PNS) Qualified Product List - PRODUCTS
Date of Listing: November 24, 2014

Category 1 - Corrosion Inhibited Liquid Magnesium Chloride

Product Name	Manufacturer	Corrosion Rate % Effectiveness	% Concentration	Date Approved
Iceban 200	Earth Friendly Chem.	9.4	26%	8/15/2002
Caliber M1000 AP	Envirotech Services Inc.	20.8	28%	8/2/2004
Meltdown with Shield AP	Envirotech Services Inc.	25.9	30%	8/2/2004
Hydro-Melt Green	Cargill	24.3	28.5%	8/1/2005
Meltdown APEX with Shield AP	Envirotech Services Inc.	25.1	30%	8/28/2006
SeezGard CI Plus	North American Salt	12.2	30%	8/28/2006
[illegible]	Sears Ecological Appl.	28.6	25%	8/9/2007
[illegible]	North American Salt	12.3	27%	6/13/2011
[illegible]	Cargill	28	28.5%	8/15/2011
[illegible] Zero	North American Salt	14.1	27.5%	10/11/2011
[illegible]	GMCO Corporation	25.1	26.6%	1/10/2013
[illegible]	GMCO Corporation	[illegible]	30.0%	1/10/2013
[illegible]	Envirotech Services Inc.	[illegible]	30.0%	4/16/2014
[illegible]	Envirotech Services Inc.	[illegible]	30.0%	4/29/2014

[illegible] was formerly Iceban Performance Plus M
[illegible] marked with an asterisk (*) indicates that the stratification can be seen and agitation is required.

SAMPLE

Category 2 - Corrosion Inhibited Liquid Calcium Chloride

Product Name	Manufacturer	Corrosion Rate % Effectiveness	% Concentration	Date Approved
Liquid Dow Armor	Dow Chemical	26	30%	6/25/1999
Winter Thaw DI	Tetra Technologies	16.5	32%	9/13/1999
Corguard TG	Tiger Calcium Services	27.7	29%	1/9/2001
Road Guard Plus	Tiger Calcium Services	16	25%	6/5/2006
Calcium Chloride with Boost (CCB)	America West	18.4	32%	4/10/2014

Category 3 - Non Corrosion Inhibited Liquid Calcium Magnesium Acetate

Product Name	Manufacturer	Corrosion Rate % Effectiveness	% Concentration	Date Approved
Liquid CMA 25%	Cryotech	-11	25%	6/19/1998
SC CMA 25%	Sure Crop Farm Services	-2.8	25%	9/13/1999

THERE ARE PAGES OF INFORMATION ON QUALIFIED PRODUCTS AND THEIR PROPERTIES

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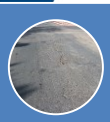
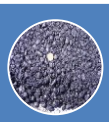
Pavement Considerations for Deicers



Surface Defects



Surface Texture

Mix Design

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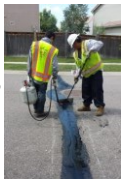
Surface Defects

- Cracks, etc.
- Potholes
- Rutting, heaving
- Good maintenance = Better snow response



162

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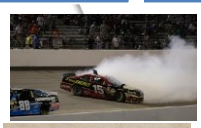
Surface Texture

- Concrete "tining"
- HMA aggregate size
- Dry material
- Initial slipperiness



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Pavements do act differently.
164

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Mix Designs
Chlorides can adversely affect 'new' concrete
Open Graded Friction Course (OGFC)
Pervious pavement
Deicer impregnated surface treatment
165

165

Using Abrasives
Why isn't it Melting?

166

Abrasives (Sand)

SOURCES

- Natural Sands
- Crushed Rock
- Process By-Products

QUALITY CONSIDERATIONS

- Grain Size Distribution or Gradation
- Particle Shape
- Hardness

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Sand: Advantages

Image - Courtesy Mark DeVries

- Relatively Inexpensive (Initial Material Cost)
- Easy to Apply
- Some Skid Resistance
- Visible Sign of your Presence
- Instant Effectiveness
- Suitable for Unpaved Roads

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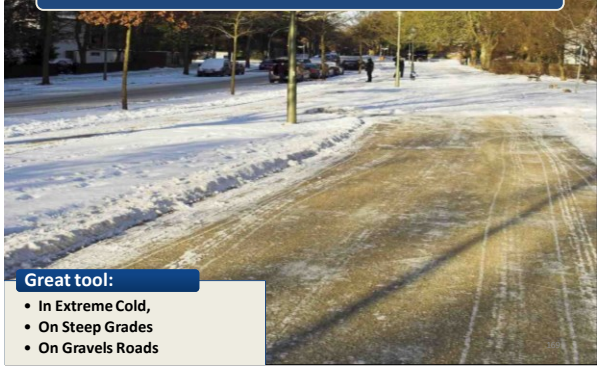
Benefit = Traction

Must Be Spread **ON TOP** of Residual Snow/Ice



Great tool:

- In Extreme Cold,
- On Steep Grades
- On Gravels Roads

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Stopping Distance

ROAD SURFACE CONDITION	STOPPING DISTANCE RATIOS
DRY	1.0
WET	1.7
SLUSH	2.0
FRESH SAND ON PACK	**2.0**
SOFT LOOSE SNOW	3.0
SAND AFTER LIGHT TRAFFIC	**3.5-4.0**
SNOW PACK	6.0
ICE	7.0+

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Temporary Friction Improvement (SAND)

Abrasive Application

+

18 Cars

→ The Effectiveness of Abrasives is Gone!

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But Isn't Sand Cheaper ?

To Buy:
- Yes

To Put In Place:
- Typically it is more costly – We apply at a higher rate & need to refill more often.

Clean Up:
- A Significant Cost that most do not consider, but you should!

Environmental Costs:
- Are different from Salt, but are still very real.

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What About Sand-Salt Mixes?

The material used should be geared to your level of service goals. A 50/50 salt/sand mix is confused on its goals. Why?

Suppose you are using a 50/50 salt sand mix → You want to apply 200 lb per lane mile of salt so you need to apply 400 lb per lane mile of sand-salt mix → If you have a five ton capacity (10,000 lb) you can cover 50 lane miles with straight salt, but only 25 lane miles with a mix

Conclusion: The mix means more refilling, more time in the shop, less time on the road – and there are minimal benefits to the added sand…That's why!

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Environmental Issues Associated with Most Ice Control Chemicals

Corrosion
- Vehicles
- Highway Infrastructure
- Underground
- Parking Garages

Roadside Vegetation

Soil

Drinking Water
- Surface
- Sub Surface

Aquatic Life*-First Signs are seen at this level!

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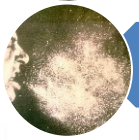
Environmental Issues with Abrasives (Sand)

Siltation & Build-up
- Lakes, Rivers & Streams
- Drainage Watercourses (Ditches)
- Shoulders
- Drainage Structures
- Vegetation



Air Quality
- Fine Dust
- Adverse Human Impacts
- Contributes to Air Pollution

175

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Environmental Responsibility

PLEASE USE BEST PRACTICES TO CONTROL POTENTIALLY HARMFUL MATERIALS FROM ENTERING THE ENVIRONMENT!

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Material Storage

Salt

Liquid Deicer

177

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Handling Materials

Safe Handling Means:

Read the Labels	Review MSDS (Material Safety Data Sheet)	Wear Proper Personal Protective Equipment	Follow Manufacturer's Directions

Use Common Sense!

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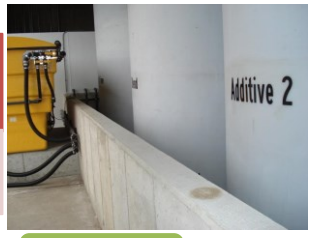
Liquid Storage: Secondary Containment EPA Tank Systems

The EPA Specifies Under 40 CFR Part 264.193(b)That

SECONDARY CONTAINMENT SYSTEMS ARE REQUIRED

TO PREVENT ANY MIGRATION of WASTES to

- **Soil**
- **Ground Water**
- **Surface Water**
  - **During the Use of the Tank System.**



EPA Regional Offices can Refer you to State Agencies that can explain State Codes.

Another Source for Secondary Containment Requirements is your **Local Fire Marshal.**

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Why Store Salt Properly?

1. **Prevent** Formation of **Lumpy Salt t**hat is Difficult to Handle with Loaders & to move through Spreaders
2. **Eliminate** the Possibility of **Contaminating Streams** & Wells with Salt Runoff
3. **Eliminate Salt Loss** Through Dissolving & Runoff.

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Good Salt Storage

- Inside Storage
- Sufficient Capacity
- Outside Piles Covered
- Impermeable Pads
- Good Housekeeping

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Site Selection: S-A-L-T-E-D

- **S** SAFETY: Good visibility for operators
- **A** ACCESSIBILITY: Easy access for Equipment & Trucks
- **L** LEGALITY: Zoning & Discharge Permits
- **T** TIDINESS: Good Housekeeping
- **E** ECONOMY: Avoid Long Hauls (location, location, location)
- **D** DRAINAGE: Away from the Pile

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Storm Water Pollution Prevention Plan

Identify & Evaluate Sources Of Pollutants
associated with salt storage that may effect the quality of storm water discharges

Identify & Implement Site Specific BMPs
to reduce or prevent pollutants associated with salt storage

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OUTSIDE SALT STORAGE

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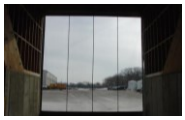
Inside Storage



Covered, Impermeable Surface, so Water Drains Away

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Conveyors

Pit Style: Above or Below Ground

Both Fluff Salt and Fill Salt Dome Evenly

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Conveyers

Avoid Uneven &
Inefficient Filling Practices

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Unsafe Filling Operations

191

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Loading the Spreader

- Know the Amount of Material for the Defined Route
- Identify Volume Capacity of Spreader/ Loader Bucket
- Determine Weight of Vehicle & Load Capacity Based On Material Being Used
- **DO NOT OVERFILL**

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Loading the Spreader

- ✓ Load Indoors, if Possible
- ✓ Watch Waste or Spillage of Material during Loading
- ✓ Be Careful! Do Not Overload the Truck
- ✓ Clean Up any Spilt Material; Return to Storage Facility
- ✓ Remove any Clumps off the Screen
- ✓ Do Not Leave the Yard with an Unsecured Load!

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Good Housekeeping

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A New Sustainable Storage Facility in Indiana

195

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Storage Summary

- Good Storage of Salt is Extremely Important!
- Salt should be Stored Under Roof or, if in the Open, Properly Covered
- All Salt, Inside or Outside, should be Stored on an Impermeable Pad
- Good Planning is Essential to Good Storage

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Resources

Professional Snowfighters Association

- Salt Storage Handbook
  - www.professionalsnowfightersassociation.org

Environment Canada

- Salt Management Plans
  - http://www.ec.gc.ca/nopp/roadsalt/cop/guide/en/p2.cfm

TAC (Transportation Association of Canada)

- Salt Management Plans
  - http://www.tac-atc.ca/products/briefing/saltmgmtplan.pdf
  - http://www.tac-atc.ca/english/pdf/saltprimer.pdf

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Review: Recommended Best Practices

- Use Only Enough Chemicals & Abrasives to Do the Job!
- Design Treatments for Weather & Road Conditions
- **Calibrate Equipment**
- Control Ground Speed Spreading
- **Utilize Weather & Road Technology**
- **Pre-Wet as Necessary**

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Review: Recommended Best Practices (Cont.)

- **Storage Practices**
- **Loading Practices**
- **Equipment Washing**
- **Safe Fluid Disposal**
- **Good Housekeeping**
- **Management/Accountability**
- **Training**
- **Continuous Improvement Philosophy (Applies to All Aspects of Operations)**

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So, Now What?

Are You **Pre-wetting** or Using a **Treated Solid Salt?**
You Should Be!

Re-examine Your Sand Usage – Is It Consistent with Your Goals? Would a Chemical Approach Be Better?

What About Using Liquids on Their Own for Pre-treatment – Could You Make That Work?

Do You Have the **Right Chemical** for Your Location?

Are Your **Chemicals Stored Properly?**

What Could You Do to Start Moving Toward Proper Storage?

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Materials Quiz

Please find your test and complete Section 3: Materials.

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Equipment Operations

How to chose and utilize the equipment available to meet the goals of your organization

APWA/Visalia Workshop

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Equipment Operations Learning Objectives

- **Determine needs** and stakeholders when purchasing equipment
- **Review equipment options** and technology to fit your needs
- Provide overview of **new technologies** and standards as they apply to equipment.
- Explain the **importance of proper maintenance** and **inspection of equipment.**
- Define **how fleet and operations can work together** to achieve success.
- Examine the requirements to obtain a CDL and other licensing options.

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Equipment for Mechanical Control of Snow & Ice

- Snow Plows
- Trucks
- Light Trucks
- Graders
- Loaders
- Snow Blowers
- Packers

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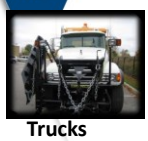
Equipment for Mechanical Control of Snow & Ice


Trucks

Light Trucks

Graders

Loaders

Snow Blowers

Packers

205

205

Purchasing Equipment

Question the Need

- Do We Need This?
  - Is it a Replacement or an Addition?
- If a Replacement:
  - Did it Serve its Purpose?
  - Was it Reliable?
- What Options Would Have Made it More Effective?

This is a long term decision. Make it a Good One!

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Purchasing Equipment

Gaining Buy-In

- Include All the Stakeholders
- Be Open to Ideas and Needs
  - Often the Best Ideas come from those that use the Equipment.
- Versatility is a Key to Gaining Buy-in
- Stay within Budget
- Prioritize your Options

Can You Defend Your Choices?

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Purchasing Equipment

Doing your Homework

- Develop Specifications or look for Alternatives like State Bids
- Buying from Purchasing Programs or other Agency Bids
- Find other agencies that have similar units and ask opinions
- Work with vendors and demo equipment when possible

Consider Sustainable Solutions but look at ROI as well.

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Purchasing Equipment

Doing your Homework

- Do you want a complete unit or will different portions be to different vendors
- Will additional equipment be added by the vendor or done internally?
- Is the new unit compatible with current agency equipment?
- How much local support is there for repairs and parts

If possible, let your staff be involved during the manufacturing process.

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Purchasing Equipment

Equipping your Equipment

- Choosing A Plow
- Different Types Of Blades
- Computerized Controllers
- Spreaders
- Adding Liquid To Your Equipment

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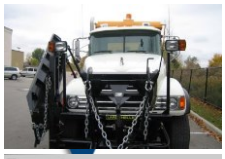

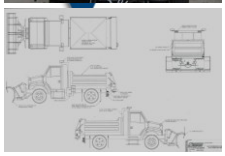

Trucks

- Various Types/Sizes
- Can Serve Multiple Roles
- Can Be Equipped with a Variety of Plows
- Continuous Technology Improvements

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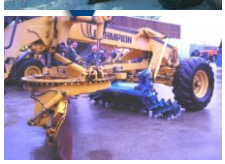

Graders

- Can Be Fitted with Wings/Plows
- Useful In Urban Areas: (Articulating)
- Also Useful In Rural Areas
- Excellent for Snow Removal
- Ice Cutting
- Good Operator Visibility

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Loaders

Loading	Hauling
Deicer Loading	Hauling Excess Snow/Ice

213

Snow Blower

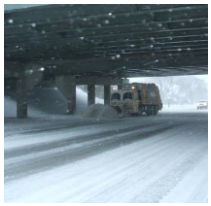
Used to Load Trucks for Snow Removal:

- **In Urban Areas**
- **Roads with Limited Snow Storage Area**

Can Also Be Used to Relocate the Snow & Widen the Snow Bank Area

214

Packers



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Snow Plows

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Plow Type & Blade

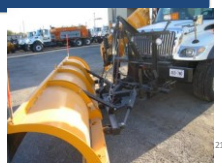
How Do We Decide Which Plow Type To Use?

Selected for:

- Different Applications/Conditions
- To Meet Level of Service (LOS)

Determine What Is Best Suited to:

- Operate In the Required Area
- Achieve the Desired Performance



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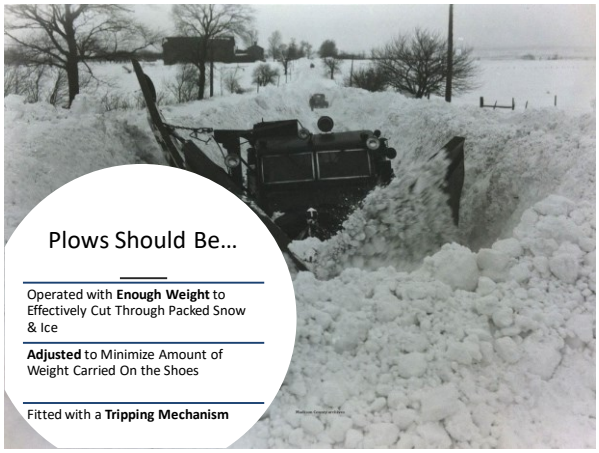

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One Way Plow

- Efficient Removal On:
  - Rural/ Urban/ Highway
  - Different Surfaces
- Fitted On Various Equipment
- Variety of:
  - Moldboard Materials
  - Clearing Path
  - Intake/Discharge Height
- Full or Trip Edge Models

219

Two-Way or Reversible Plows

220

V-plows

- Clear Deep Snow
- Clear Blocked Roads & Walk/Bike ways
- Attached to Variety of Equipment

221

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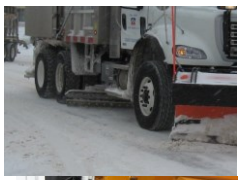
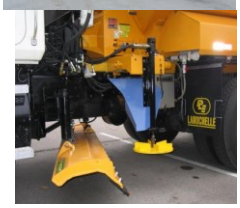
Underbody Plow

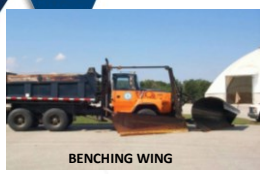
- Urban Streets/ Laneways/ Alleys
- Advantages In Slushing
  - Reduce Windrows
  - Assists in Getting to Bare Pavement
- Light Snow Conditions
- Suitable In Some Rural Settings
- Pressure Adjustable
- One Way/Reversible Models





222

Wing Plow



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Plow Blades

Steel Blades	Steel Blades with Tungsten Carbide or Ceramic Inserts	Rubber & Polymer Blades	"Shaped"
• Wear Quickly	• Wear Much Slower • May Have to Be Changed Only Once Per Season	• Used to "Squeegee" the Road & Provide a "Cushion" for Frequent Obstructions • Do Not Cut & Scrape Compacted Snow & Ice Very Well • Well Suited to Support a Routine Anti–icing Strategy	• Facilitate Ice Cutting, Texturing Ice Surface or Wear Into a New "Shape • Most Often Used On Plows That Have Down–pressure Capability

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Plow Blades

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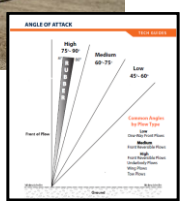
Plow Blade (Attack) Angle



ADJUST ANGLE FOR

- Type of Road Surface
- Blade Type
- Snow/Ice Conditions
- Plow Type (1 or 2 Way)
- Desired Cutting Edge

226

Ice Blade

Used to Cut Hard Packed Snow & Ice that can't be Removed with Conventional Blades

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Plow Shoes, Caster Wheels

Used to Minimize the Blade from dropping into Surface Depressions.

- Unless these Depressions are a real issue, there is little Benefit to Casters & Shoes.

228

Computerized Controllers

Other Technologies

- Ground Speed Control Spreaders
- Pre-wetting with Brines or Chemicals
- Chemical Blends for Both Anti & Deicing
- AVL/ GPS

229

In-Cab Plow Controls

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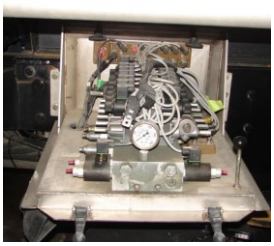
Plow Hydraulic Systems



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Spreaders

Operators have a responsibility to *not only* ensure that it's calibrated correctly, but to know how it works.

Maintenance Considerations:

- Where are the Wear Points
- Where do they need to be Greased
- Are they Calibrated correctly
- Is the right amount of Material Coming Out - In the Right Quantities - at the Appropriate Time

Cleaning Is Critical

- Materials Highly Corrosive

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Anti-icing Unit

233

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Direct Liquid Application

Nozzle/Spinner Types

Basic Equipment

- **Liquid Storage Tank/Pump**
- **Distributor Bar with Nozzle/Check Valves**
- **Controller for Application Rate**

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Direct Liquid Application (DLA)

- Variable Orifice Nozzles
- Pencil Sized Streams: 2-300 Mm Spacing
- Better Friction: Improved Public Perception

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Combination Units: 3 in 1 Units

236

Equipment Replacement Plan

Is it an Option? → What is your Timeline? → 10 Years? 15? 20?

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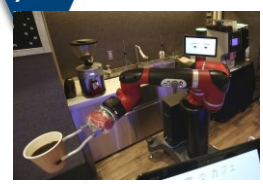
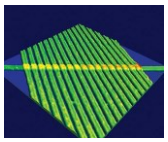
New Technology





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New Types of Equipment

Dual Blade

- Get Training from Your Equipment Supplier
- Equipped with Squeegee blade
- Good for areas with standing water
- Airport Applications

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20% More Snow Removed

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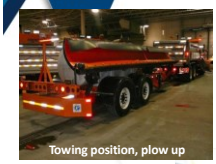
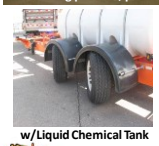
Tow Plows


Towing position, plow up

Plowing position, plow down

Easy to cover shoulder


w/Liquid Chemical Tank

Rear Camera Display in Cab to see Tow Plow

Rear-facing Camera

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Expandable Plows

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Ice Breakers:

Ice Breakers used in Alaska

Purchased

Built by DOT Staff

243

Ice Breakers

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ASSIST PROGRAM:

Pilot project in Sweden and Norway

A new satellite assisted GPS controller that controls, material dispensing, liquids, the front plow and the wing plow.

No more wires, the spinner is operated by Bluetooth!
All the Operator needs to do is DRIVE!!

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Alternative Fuel Fleets

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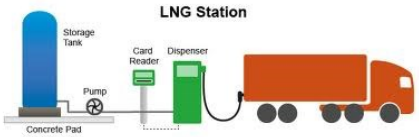
Alternative Fuel Fleets



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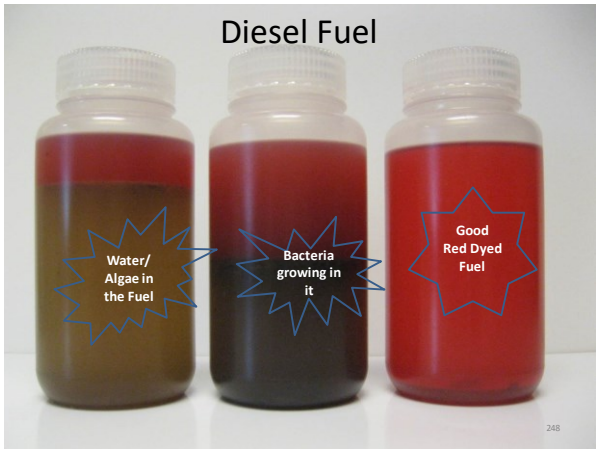

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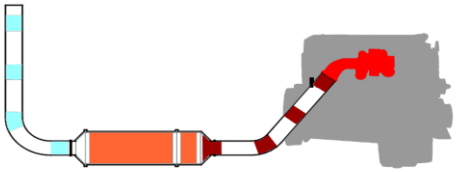
Aftertreatment Regeneration



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Carbon/Particulates

250

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Building Successful Relationships

How do Fleet and Operations get along in you agency?

Oil and water

or

Best Friends

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Commonly Heard Complaints…

I fixed it and they broke it again

It never got written down

I was never showed how, Its not my job

Do your job and I will do mine

The stuff inside the gun is called grease, learn to use it

The truck isn't a garbage can, can't you throw out your coffee cup

Someone needs to learn where we keep the hose and clean their truck

If I tell them, I will be forced to use the spare

We need to hire drivers, not cowboys

A walk around needs to be more than cleaning windows

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How can we communication better?

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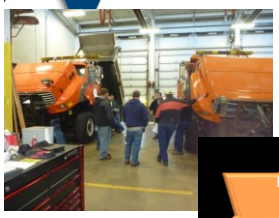
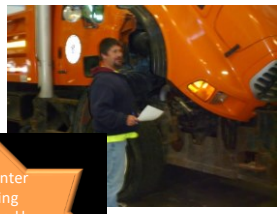
Let the Technicians Be Involved





Pre-winter training conducted by technicians not supervisors

255

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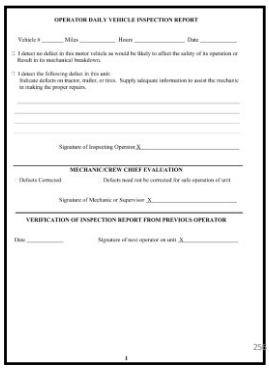
Vehicle Inspection/Cleaning

- Inspection at Start & Finish of Every Shift
- All Deicers Are Corrosive
- Clean After Every Event!



OPERATOR DAILY VEHICLE INSPECTION REPORT

Vehicle # _____ Miles _____ Hours _____ Date _____

☐ I detect no defect in this motor vehicle as would be likely to affect the safety of its operation or threaten to its mechanical breakdown.

☐ I detect the following defect in this unit:
Indicate defects on tractor, trailer, or tires. Supply adequate information to assist the mechanic in making the proper repairs.

Signature of Inspecting Operator X_____

MECHANIC/CREW CHIEF EVALUATION

Defects Corrected Defects need not be corrected for safe operation of unit

Signature of Mechanic or Supervisor X_____

VERIFICATION OF INSPECTION REPORT FROM PREVIOUS OPERATOR

Date _____ Signature of next operator on unit X_____

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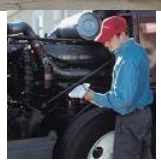
Inspection/Preventive Maintenance: Truck

- Grease Fittings
- Fluids Levels
- Battery
- Brakes
- Clutch
- Tires & Rims
- Required by CDL



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PERFORM POST WINTER EQUIPMENT MAINTENANCE AND REPAIRS

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New CLP Licensing Regulations

Commercial Learner's Permit (CLP)

- Valid for 180 days or more than one year, depending on your state.
- May renew for an additional 180 days or up to one year period without retaking the knowledge test.

- Need to Test for and obtain a CLP
- Must hold your CLP for a minimum of 14 days before taking the road skills test.
- Must be accompanied at all times by the holder of a valid CDL who has the proper CDL group and endorsement necessary to operate.
- Need to take the road skills test for your Commercial Drivers License (CDL)

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New CDL Regulations

If testing in an automatic transmission truck, restricted to automatic transmission trucks only.

Manual transmission tests are valid for both manual and automatic transmissions

Drivers must test in a representative vehicle

If testing in a non combination vehicle, restricted to No Tractor-trailer Commercial Motor Vehicles (CMV).

If testing in a non air brake vehicle, restricted to no full air brake equipped CMV.

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New CDL Regulations For Renewals

U.S. citizens are only required to show proof of lawful presence one time.

When renewing CDL's drivers will need to bring one of the following documents:

- Certified copy of US Birth Certificate
- Valid US Passport
- Consular Report of Birth Abroad (CRBA)
- Certificate of Naturalization
- Certificate of Citizenship
- Permanent resident card
- Employment authorization document (EAD) or I-94 document

FMCSA Medical Certificates that states could receive

- One form: MCSA-5876

REAL ID

- Not part of the CDL requirement, does supply proof of citizenship.
- Requires Document of date of birth, Social Security Number, your residency and residential address.

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Entry-Level Driver Training (ELDT) Rule

Effective on March 21, 2017

- Compliance date: February 7, 2020
- Three years necessary to modify system to begin recording training provider's certification information into Commercial Driver's Licensing Information System (CDLIS)

Mandatory theory (knowledge) training

Mandatory behind-the-wheel (BTW) training

- For all entry level operators of CMV in interstate and intrastate commerce.
- For all current CDL holders upgrading their CDL.
  - Class B holder seeking a Class A
  - Hazardous materials for first time
  - Passenger endorsement for the first time
  - School bus endorsement for the first time

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So, Now What?

Establish Your Equipment Needs Based On

- Desired Level of Service
- Available Resources
- Budget

Choose the Equipment that Best Fits your Needs

- KISS (Keep It Simple, Silly)
- Standardize
- Be Smart!

Develop a Plan

- Overall Snow Response
- Equipment Utilization/Replacement
- Training

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Equipment Operations Quiz

Complete Section 4: Equipment Operations of the Test.

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Equipment Operations Quiz

Please find your test and complete Section 4: Equipment Operations.

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Snow Control Learning Objectives

- Review Basic **Snowfighting Standards & Procedures**
- **Determine Levels of Service (LOS)**
- **Encourage Modern Snowfighting Technologies** (Pre-treatment, Pre-wetting, Smart Spreading)
- Illustrate **Importance of Calibrating** Equipment

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Ice Control Learning Objectives

- Explain **Pro-active Measures** Used In Ice Control Operations
- Encourage **Modern Ice Control Methods** Such as Deicing, Using Chemical Blends , Anti-icing
- Discuss the **Benefits of Proper Procedures** & Applications In Ice Control
- Define the **Appropriate Technique** Needed Prior, During & Following an Event

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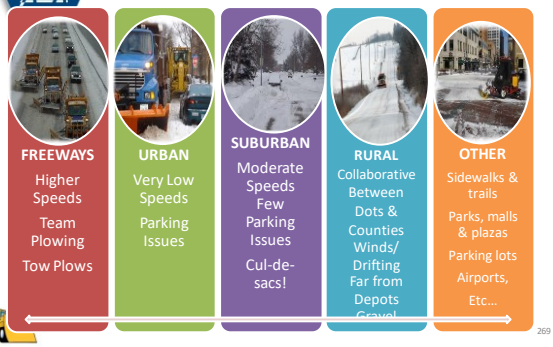
Snow & Ice Control Environments



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Different Environments Means Different Conditions

Different Agencies have Different Levels of Service for Snow & Ice Control

- Bare Pavement?
  - Freeway & Highway Lanes
  - Arterial or Primary Routes
- Plowed to Snow-pack & Treated?
  - Residential, Hills, Curves & Intersections
  - Alleys
- Not Plowed Until "X" Accumulation?

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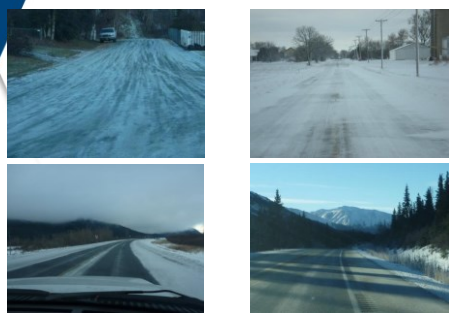
What Level of Service do you Provide and When?



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Key Pre-Season Activities

- Employee Training
- Get Equipment Ready Early
- Repair Potential Street Problems
- "Dry-runs" of Routes
- Notify Residents of Mailbox Problems
- Press Releases/Mailings
- Snow Fence/ Passive Techniques

These Should Be Complete Prior To The First Snowfall

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Snow Plowing Best Practices

- **Avoid Creating Windrows if possible**
- Be Aware of Your Snow Cast & Area of Impact - **Do not cast snow into traffic.**
- If Plowing a Grid System, **Utilize Right Turns to the Extent Possible**
- **Plow** Snow **In the Direction of Traffic**
- **Use Extra Caution In Low Visibility Situations**

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Snow Plowing Best Practices

- Do not plow Ice Control Chemicals off the road.
- Do not plow off Bridges and Overpasses
- Use Close Echelon Plowing on one-way highways
- Minimize Backing Maneuvers
- Plow snow well beyond the high point on banked curves
- Try to plow before peak traffic

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Operational Speed for Plowing

Type of Equipment

Weather Conditions
- Character of Snow
- Wind Conditions

Type of Road
- Right of Way Features
- Roadside Conditions
- Pavement Conditions
- Highway Geometry & Pavement Obstructions

Traffic Conditions

REFER TO YOUR OWN AGENCY'S STANDARDS

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Special Snow Operations

LET'S LOOK AT EACH

- Cul-de-sacs & Roundabouts
- Bridges
- Benching and Shoulders
- Railroad Crossings
- Tandem Plowing
- Hauling and Melting snow

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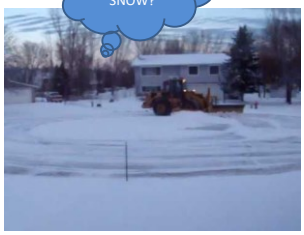
Cul-De-Sac/Roundabouts

WHERE DO YOU PUSH THE SNOW?



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Bridge Plowing, Special Operations

- May Have to Carry Snow Over Bridges
- Snow Could Hit Motorists Below
- Keep Plowed Snow Out of Waterways
- May Need to Share Windrow Storage with Sidewalk Snow
- May Require Follow-up Removal Operations

278

Operations: Benching/Shelving

When streets narrow "Benching" or "Shelving" can add storage capacity

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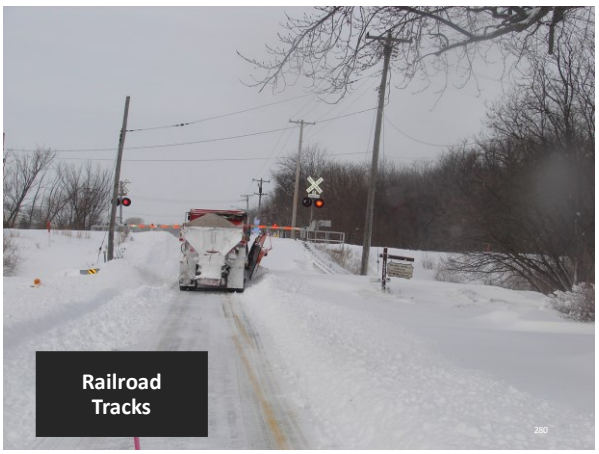

280

Tandem Plowing

Provides **Enhanced Efficiency** On Arterial System

Allows You to **Plow Centerline to Curb In One Pass**

Can Also **Clean Turn Lanes**

Key to Overall Program **Success**

Prevents Traffic from **Running Over Unplowed Snow**

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Operations: Hauling, Melting Snow

Hauling Snow

- Often Complete or Partial Removal Is Needed
- Restore Access for Emergency Vehicles
- Resolve Traffic Conflicts
- Reclaim Driving & Parking Lanes

Snow Melting

- VERY Slow
- Expensive
- Stormwater Considerations

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Multi-modal Operations:

Bike Lanes: Sidewalks, Trails, Train Stations, Etc.

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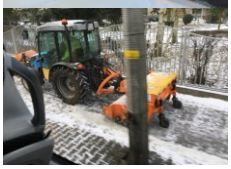
Multi-Modal Operations

Snow Storage, Special Equipment, Access Rules, Priorities & Level Of Service All Make Multi-modal Snow Removal Challenging

284

Sidewalk & Bike Trail Snow Removal Equipment



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Gravel Roads: Plowing

As weather conditions permit, the newly formed layer of snow or ice should freeze and provide a hard surface to plow, as well as provide a surface to hold any abrasives and increase time before reapplication.

286

Gravel Roads: Materials

Avoid excessive sanding on Gravel Surfaces

1. Too many fine soil materials will create a "greasy" condition
2. Too many coarse materials won't provide enough traction

Both will increase:
potholes,
wash boarding,
soil erosion,
shoulder berming,
ditch/culvert clogging,
and outfall sedimentation.

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Gravel Roads: Remember…

- Use the right sand mix… straight salt is not recommended
- Listen to your blades
- Know your surroundings and your equipment's abilities
- Communicate to all staff about on-going challenges & road surface conditions…

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Safety Restoration & Cleanup Operations

- **Shoulders**
- Commuter Lots & Sidewalks
- **Railroad Grade Crossings**
- **Removing & Hauling Snow**
- Procedures for Hauling Snow
- Maintaining Satisfactory Pavement Conditions
- Crash Attenuators & Bridge Parapets
- Sight Distance Problems
- **Pushing Back**
- **Maintaining "Problem" Areas**
- Drainage Restoration In Critical Areas
- **Drifts & Blowing Snow**
- **Sidewalks, Crosswalks & Hydrants**
- **Signs & Signals**

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Optimizing Your Routes

What Does It Mean?

Efficiency In Time, Coverage And Equipment

- Materials – Type, Amounts, Refill Sites
- Priorities – Where and why
- Utilizing technology – Thermal mapping and AVL
- Polices, LOS and Contract Considerations
- Agreements with other agencies

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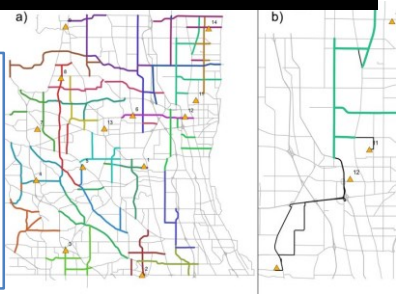
Optimizing Your Routes

[redacted]

- Software
- Consultants
- AVL and turn by turn directions



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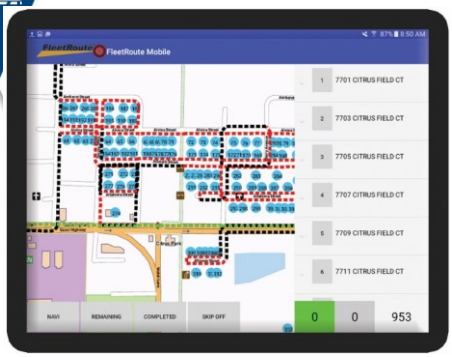
Route Guidance



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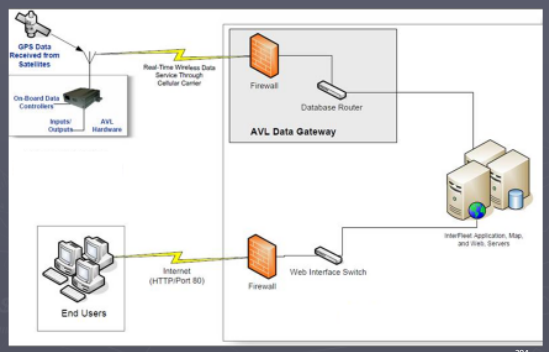
How does AVL Work



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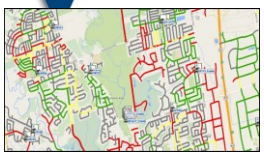
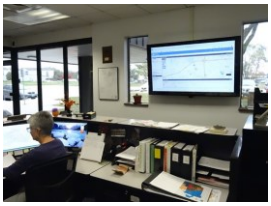
Live Information





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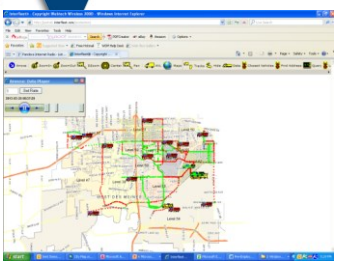
Implementation



- Determine the practical uses
  - Accident Management
  - Inventory Control
  - Complaint Resolution
  - Route Monitoring

- Reports
  - Material usage
  - Stops Report
  - Vehicle Status
  - Customer Service
  - Winter Operations
  - GIS Data Points

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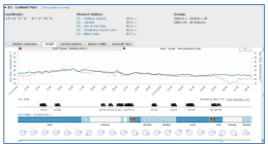
Combining AVL with Weather Data to Measure Performance

Plow goes by an RWIS



Data from the truck and the RWIS are gathered

Road condition and performance are indicated

297

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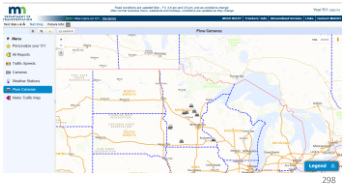
Share your Data?

Iowa Track a Plow

Minnesota 511 sites



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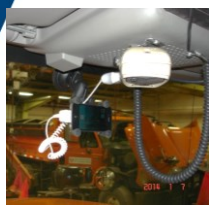

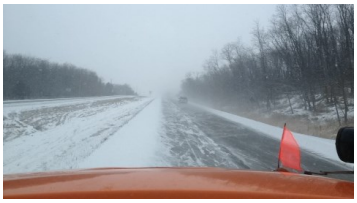

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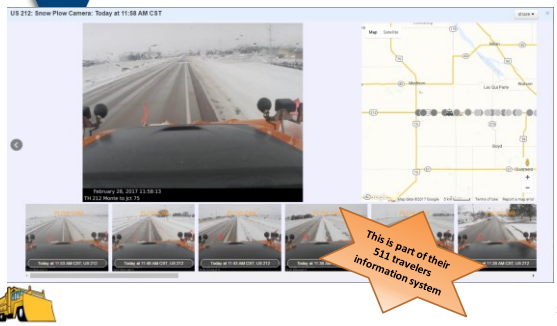
Minnesota Displays the Latest Image along with Several Previous Images



300

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Michigan DOT

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

301

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Operational Procedure Terms

Pre-treating
- Chemicals **applied** before the event **to a stockpile**

Pre-wetting
- The process of **applying** salt brine or a **liquid** chemical **to dry solid materials**

Anti-icing
- The practice of **preventing the formation of bonded snow & ice** by timely applications of a chemical freezing-point depressant

Discharge rate
- The **rate of material** actually being **applied** to the road

Application rate (liquid & solid)
- The **amount** of an ice control chemical or abrasive **spread** over a road area,

302

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Want Your Material to Work?

Get It Wet!

303

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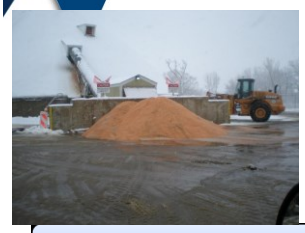
Pre-treating Salt



Treated Salt

304

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Liquid Pre-Treating

Is Done Prior to Stockpiling

- Salt:
  - 6-10 Gallon / Ton or
  - 25 Litres /Tonne
- Sand:
  - 4-6 Gallon/Ton or
  - 16 Litres/Tonne

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You Are Already Using Liquids

Salt Doesn't Melt Anything

Until It's In Solution

306

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Why Pre-wet?

- Minimizes Scatter During Application
- **Keeps 20% - 30% More Material on Road**
- Jumpstarts Brine Process
- Sticks Sand to Snow Surface
- **Reduces Working Temperature of Salt**
- Reduces Environmental Impacts
- **$$ Saves Money $$**

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PRE-WETTING

Is Done as Material is Applied to the Roadway

Liquid application rates vary and are often dependent on the equipment installed on the vehicle.

Many agencies have experienced good results with higher volume rates

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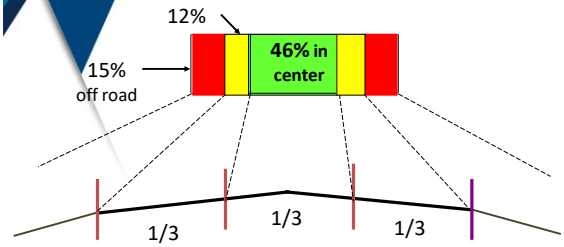
Typical Scatter Pattern of Road Salt



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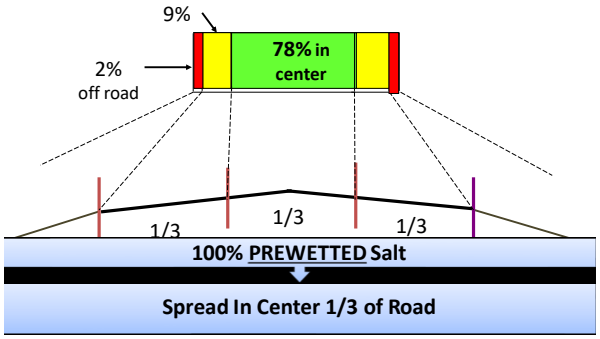
Typical Scatter of Pre-wet Road Salt



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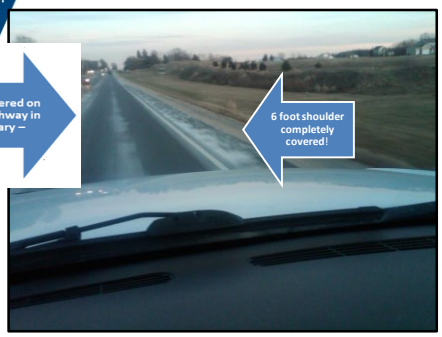
Do We Really Need Tests?



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Slurry Generator

Crushes Salt & Can Pre-wet

Up to Rates of 90 Gallons/Ton (375 litres/tonne)

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The "Control" In Snow & Ice Control

Anti-icing | Deicing

What's the Difference?

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Anti-Icing

Anti-icing **Prevents** Snow from Freezing & Bonding to a Surface

315

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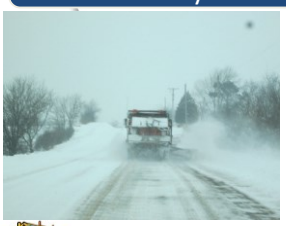
De-Icing

Deicing of **Breaks the Bond** Snow That Has Already Frozen to the Surface



316

316

Anti-icing = Preventing the Bond

317

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When to Anti-ice

- **Scheduled**
  - Bridge Decks
- **Frost Is Predicted**
  - Bridge Decks,
  - Hills,
  - Curves,
  - Shaded Areas
- **Snow Forecasted**
  - as Much as Possible
- **Weather Service Treatment Recommendation**

318

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This Flow Chart Is for Salt Brine or Enhanced Salt Brine Only!!

A copy of this chart is in your handout materials

319

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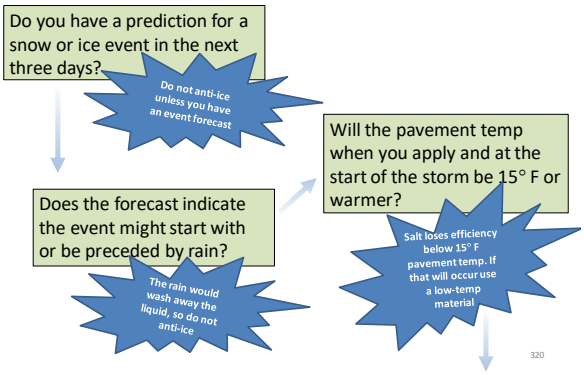
New Revised Chart with Explanation



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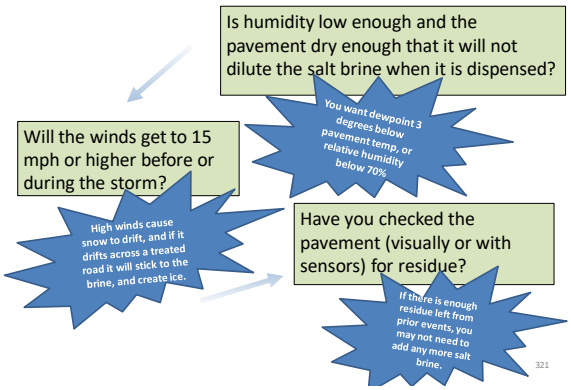
New Revised Chart with Explanation



321

New Revised Chart with Explanation

If you have worked your way through the considerations on this chart, then you most likely have the right conditions for anti-icing with salt brine at 30-50 gallons per lane mile (according to your agency's policy). However, you should always be guided by your experience too.

322

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Anti-Icing:
When You might NOT want to Anti-Ice

323

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Can You Tell Which Side Was Anti-iced?

325

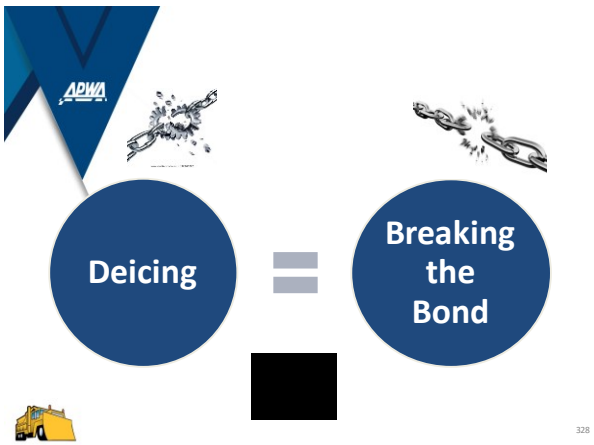
325

Know your expectations -
It is not meant to melt everything!
Treated
Untreated
326

326

It Doesn't Always Work
A Cold Storm, Dry Snow & the Anti-icing Caused the Snow to Stick.
327

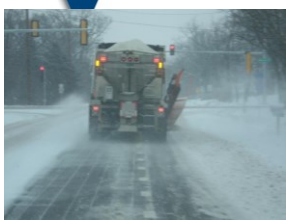
327


Deicing
=
Breaking the Bond
328

328

Plow First!!!

Plowing Is Still the Best Method of Removing Snow



Do Not Try to Burn Off Snow with Chemicals!

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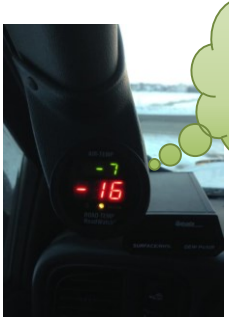
Temperature



THINK PAVEMENT TEMPERATURE!

330

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It Is Not Cost-efficient to Apply Salt (Sodium Chloride) at Pavement Temperatures Less Than 15° F or -9.4° C

Pounds of Ice Melted Per Pound of Salt

Pavement Temp. °F	One Pound of Salt (NaCl) melts	Melt Times
30	46.3 lbs of ice	5 min.
25	14.4 lbs of ice	10 min.
20	8.6 lbs of ice	20 min.
15	6.3 lbs of ice	1 hour
10	4.9 lbs of ice	Dry salt is ineffective and will blow away before it melts anything.
5	4.1 lbs of ice	
0	3.7 lbs of ice	
-6	3.2 lbs of ice	

It is not cost-efficient to apply salt (sodium chloride) at pavement temperatures less than 15° F.

Application Rate Guidelines

Kilograms of Ice Melted Per Kilogram of Salt

Pavement in Temp. °C	1 Kg of Salt Melts	Melt Times
-1.0	46.3 kgs of ice	**5 min**
-4.0	14.4 kgs of ice	10 min
-6.7	8.6 kgs of ice	20 min
-9.4	6.3 kgs of ice	1 hour
-12.0	4.9 kg of ice	Dry salt is ineffective and will blow away before it melts.
-15.0	4.1 kgs of ice	
-18.0	3.7 kgs of ice	
-21.0	3.2 kgs of ice	

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Temperature

The Lower the PAVEMENT Temperature, the Longer it takes to make Brine.

MORE SALT WILL NOT SPEED UP THE PROCESS!

Below 15 Degree Pavement Temperature Salt really starts to lose its Effectiveness

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Salt Application Rate Guidelines - Empirical

Salt Application Rate Guidelines							
Prewetted salt @ 12' side lane (assume 2-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	50	75	95	120	140	170
	Drizzle, Medium Snow ½" per hour	75	100	120	145	165	200
	Light Rain, Heavy Snow 1" per hour	100	140	182	250	300	350
Prewetted salt @ 12' wide lane (assume 3-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	75	115	145	180	210	255
	Drizzle, Medium Snow ½" per hour	115	150	180	220	250	300
	Light Rain, Heavy Snow 1" per hour	150	210	275	375	450	525

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Salt Application Rate Guidelines - Metric

Salt Application Rate Guidelines

		Prewetted salt @ 3.7m wide lane (assume 2-hr route)					
Surface Temperature (° Celcius)		0 - -1.0	-1.6 - -2.7	-3.3 - -4.4	-5.0 - -6.1	-6.6 - -7.7	-8.3 - -9.4
Kgs of salt to be applied per lane Kilometre	Heavy Frost, Mist, Light Snow	14.0	21.0	26.6	33.6	39.2	47.6
	Drizzle, Medium Snow 12.5mm per hour	21.0	28.0	33.6	40.6	46.2	56.0
	Light Rain, Heavy Snow 25mm per hour	28.0	39.2	51.0	70.0	84.0	98.0

		Prewetted salt @ 3.7m wide lane (assume 3-hr route)					
Surface Temperature (° Celcius)		0 - -1.0	-1.6 - -2.7	-3.3 - -4.4	-5.0 - -6.1	-6.6 - -7.7	-8.3 - -9.4
Kgs of salt to be applied per lane Kilometre	Heavy Frost, Mist, Light Snow	21.0	32.2	40.6	50.4	58.8	63.0
	Drizzle, Medium Snow 12.5mm per hour	32.2	42.0	50.4	61.6	70.0	84.0
	Light Rain, Heavy Snow 25mm per hour	42.0	58.8	77.0	105.0	126.0	147.0

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In Most Cases **300 Lbs. or Less Per Lane Mile or 85 kgs. or Less** Per Lane Kilometre of Granular Salt - Is All That Is Needed

Turn Spinner Speed to Lowest Setting

Except for Intersections

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Liquid Deicers

Can we use Direct Application of Liquids for Deicing?

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Direct Application of Liquid Deicers

Can Be the Best Method In the Right Situation: **Parking Lots**

- Puts Materials Right Where We Need Them
- Instant Results

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Direct Application of Liquid Deicers

Great for treating Frost

- Instant Results with Minimal Material

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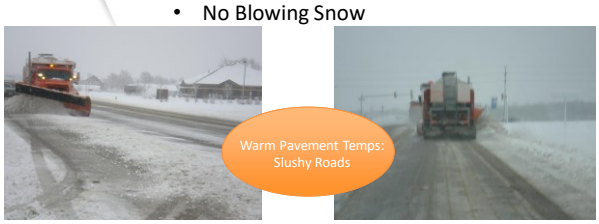
Direct Application of Liquid Deicers

Conditions must be Correct for Using Liquids in Deicing

- Warm Pavement Temperatures
- Low or No Additional Snowfall Rates
- Short Route Cycle Times
- No Blowing Snow



339

Direct Application of Liquid Deicers

May NOT be a Good Idea in a Situation Like This:

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The Magic Number in the Brine World is…

23.3%

Image - Courtesy Mark DeVries

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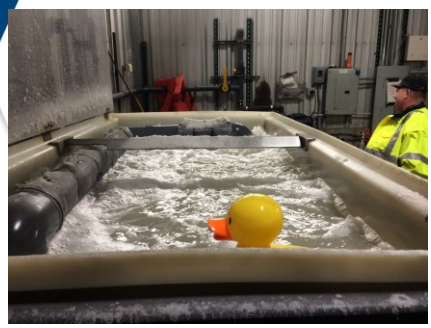
Brine Making is Easy & Cost Effective



Images - Courtesy Mark DeVries

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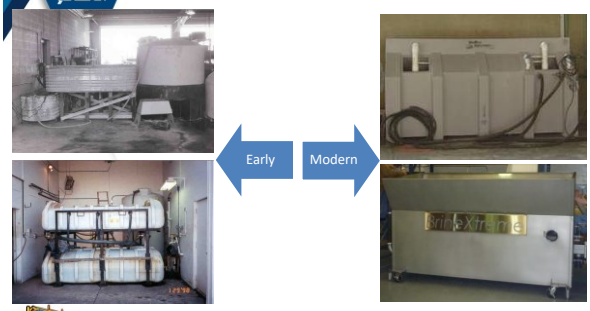
Brine Makers



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BLENDING CHEMICALS

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Mixtures Can Be Purchased

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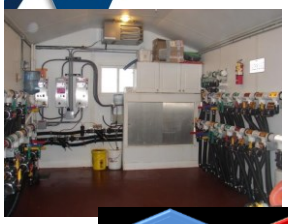
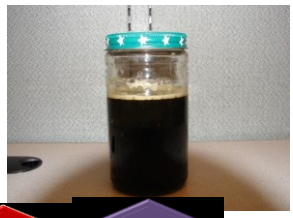
Blending/Combining Chemicals In-house





Salt Brine 85%

Organic 10%

Calcium Chloride 5%

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Automated Blending System

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THE OPERATOR CONNECTS THE HOSE,

ENTERS HIS TRUCK NUMBER,

ENTERS AN AMOUNT

AND IT FILLS IT PRECISELY ACCORDING TO THE PREDETERMINED FORMULA

Image - Courtesy Mark DeVries

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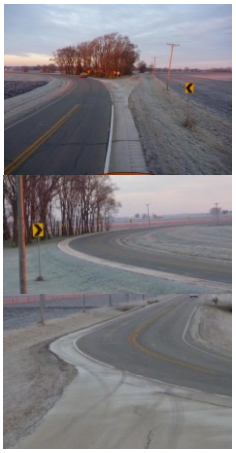
Frost Event: January 9

- Roads Were Anti-iced
- On Thursday January 5 - Before the Weekend



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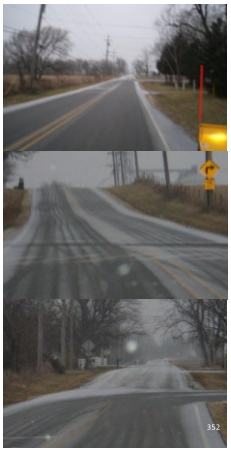
Material Still Worked After 7 Days On These Low Volume Roads



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Yearly Calibration:

Is the Backbone of your Snow & Ice Program!

We must know how much we are applying in order to improve our performance!

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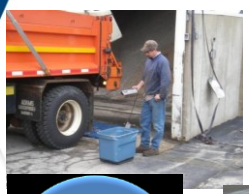
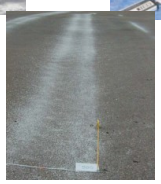
Calibration



Know What You Are Applying !



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Spreader Calibration

Correct Spread Rates Important for:

- Optimal Application
- Minimize Waste
- Cost Effectiveness & Cost Control
- Environmental Considerations

Need to Understand:

- Amount of Material for the Defined Route
- Identify Volume Capacity of Spreader/Loader Bucket

Understand Material Effectiveness

- Temperature Range

THINK PAVEMENT TEMPERATURES!

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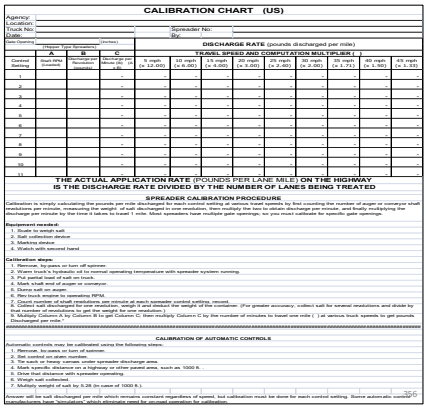
A copy of this chart is in your handout materials



CALIBRATION CHART (US)

Agency:
Location:
Truck No: Spreader No:
Date: By:
Gate Opening (Hopper Type Spreaders) (Inches)

	A	B	C	DISCHARGE RATE (pounds discharged per mile)							
				TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )							
Control Setting	Shaft RPM (rotation)	Discharge per rotation (pounds)	Discharge per minute (lb.)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2			-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute for each control setting, then multiplying the number of revolutions per minute times the weight of salt per revolution to get the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings, so you must calibrate for specific gate openings.

Equipment needed:
1. Scale to weigh salt
2. Salt collection device
3. Marking device
4. Watch with second hand

Calibration steps:
1. Turn off spreaders or turn off spinner.
2. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
3. Put partial load of salt on truck.
4. Mark shaft end of auger or conveyor.
5. Dump salt on auger.
6. Rev truck engine to operating RPM.
7. Count number of shaft revolutions per minute at each spreader control setting, record.
8. Collect salt from spreader in a container and weigh it to determine the weight of the container. (For greater accuracy, collect salt for several revolutions and divide by that number of revolutions to get the weight for one revolution.)
9. Multiply Column A by Column B to get Column C, then multiply Column C by the number of minutes to travel one mile ( ) at various truck speeds to get pounds discharged per mile.

CALIBRATION OF AUTOMATIC CONTROLS

Automatic controls may be calibrated using the following steps:
1. Turn off spreaders or turn off spinner.
2. Put partial load of salt on truck.
3. Tie sack or finely screen under spreader discharge area.
4. Mark specific distance on a highway or other paved area, such as 1000 ft.
5. Drive that distance with spreader operating.
6. Weigh salt collected.
7. Multiply weight of salt by 5.28 (in case of 1000 ft.).

Answer will be salt discharged per mile which remains constant regardless of speed, but calibration must be done for each control setting. Some automatic controls manufacturers have "simulators" which eliminate need for on-road correction for calibration.

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What Happens When…..

How to put your knowledge to work…

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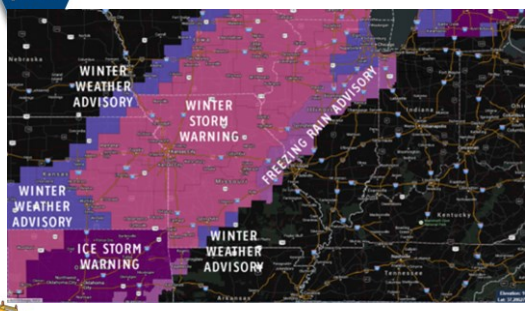
Specific Challenges



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Specific Challenges

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Implications

Policy & Procedures?

- What is policy according to your winter maintenance plan for this situation?
- Staffing: Is staff fully trained?
- Emergency Management: What to do about downed power lines on the roads?
- Public Communications
- Networking: Who do you know that can help you figure this out?

Weather

- How long & when will temperatures reach the low of -20° F/ -29°C?
- Do you have LED traffic lights – are weather conditions cold enough to burn off accumulated snow?

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Implications

Materials

- What materials will work in -20° F/ -29° C ?
- What materials do you have?
- What to do if no additional chemicals are available?

Equipment & Fleet

- Can existing equipment deal with increased volumes?
- What affect does the temperature have on the equipment?

Snow & Ice Control

- How do processes and procedures change?

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Now What?

1. Define/describe the **levels of service (LOS)** your agency delivers
2. Review your **training** programs
3. Ensure that you are promoting **appropriate standards & procedures** for your particular operating environment
4. **Utilize modern snowfighting technologies** such as anti-icing or use of chemical blends?
5. **Calibrate equipment** for optimal performance
6. Make sure your agency is fully up to date & **compliant with all federal regulations**

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Now What?

7. **Focus on adding liquids** to your winter maintenance program (if you're not there yet)
8. Make sure you **learn how to & how not to use** liquids before you start a program
9. Determine when your agency should utilize a**nti-icing** & **de-icing**
10. **Look at the environmental** & **cost benefits** of using liquids in your agency
11. **Examine if sand** is really **necessary** as your primary winter product.

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Snow and Ice Control Quiz

Please find your test and complete Section 5: Snow and Ice Control.

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THE BIG "Now What"?

ONE THING…..

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Wrap Up & Questions

Thank you for participating in the Winter Maintenance Supervisor Certificate Workshop!

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Final Instructions: Evaluation

Your Opinion is important to us, please complete the Program Evaluation.

Note: You must complete the Test AND Program Evaluation in order to receive a Completion Certificate. Your certificate will be emailed to you following your completion of these two requirements.

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Additional References

AASHTO:
- Snow & Ice Pooled Fund Cooperative Program (SICOP): http://www.transportation.org/Default.aspx?SiteID=88
- "Guide for Snow & Ice Control"

Clear Roads:
- http://www.clearroads.org

Environment Canada:
- http://www.ec.gc.ca/nopp/roadsalt/cop/guide/en/p2.cfm
- Road Salt Management Plans

Federal Highway Administration: (FHWA)
- the Local Technical Assistance Program (LTAP) http://ltap.org/
- Road Weather Information System
  - http://ops.fhwa.dot.gov/weather/weather_events/snow_ice.htm
- Clarus Initiative: http://clarusinitiative.org/
- Manual of Practice for an Effective Anti-Icing Program"

Ontario Good Roads Association:
- http://www.ogra.org/MemberServices/RoadSalt.asp

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Additional Resources

Pacific Northwest Snowfighters:
- http://www.wsdot.wa.gov/partners/pns/default.htm
- Pacific Northwest Snow Fighters (PNS) Qualified Product List

Professional Snowfighters Association:
- www.professionalsnowfightersassociation.org

Snow & Ice Management Association:
- http://sima.org/

Transportation Research Board (TRB)
- http://www.trb.org/NCHRP/NCHRP.aspx
- "Winter Highway Operations", NCHRP Synthesis 344

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Available in APWA's Store

DVD/ CD

- Crafting a Written Snow & Ice Plan
- Developing an Effective Snow & Ice Program
- Lessons Learned from Extreme Winter Events
- Liquid Use in Winter Maintenance
- Performance Measures for Winter Maintenance
- Ready, Set, Plow
- Salt Brine: Breaking Snow & Ice Bonds on Your Pavement
- Selecting Snow & Ice Control Materials to
- Training First-Rate Snowfighters
- Winter Roads: Effective Use of Chemicals

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Available in APWA's Store

WEB BASED TRAINING

- Anti-icing / RWIS Training
- Clear Roads CBT Program

VIDEO

- Snow Removal Techniques - Plowing Tips from the Pros
- Snow Removal, in Safety!

PUBLICATIONS

- Snow & Ice Control: Field Handbook for Snowplow Operators
- Guide for Snow & Ice Control
- Urban Snow & Ice Control

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WINTER MAINTENANCE SUPERVISOR CERTIFICATE

Thank you!

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With Special Thanks To the APWA Winter Maintenance Committee and More Specifically the Winter Maintenance Supervisor Task Force, For Their Contributions, Hard Work and Support in Compiling This Presentation. Contributors To This Presentation Are:

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Anti-Icing Application Decision Flowchart

ANTI-ICING DECISION CHART (for salt brine only)

[in this case, anti-icing is taken to mean an application of liquid salt brine]

Do you have a prediction for a snow or ice event in the next three days?

Do not anti-ice unless you have an event forecast

Does the forecast indicate the event might start with or be preceded by rain?

The rain would wash away the liquid, so do not anti-ice

Will the pavement temperature when you apply and at the start of the storm be 15° F or warmer?

Salt loses efficiency below 15° F pavement temp. If that will occur use a low-temp material

Is humidity low enough and the pavement dry enough that it will not dilute the salt brine when it is dispensed?

You want dewpoint 3 degrees below pavement temp, or relative humidity below 70%

High winds cause snow to drift, and if it drifts across a treated road it will stick to the brine, and create ice.

Will the winds get to 15 mph or higher before or during the storm?

If there is enough residue left from prior events, you may not need to add any more salt brine.

Have you checked the pavement (visually or with sensors) for residue?

If you have worked your way through the considerations on this chart, then you most likely have the right conditions for anti-icing with salt brine at 30-50 gallons per lane mile (according to your agency's policy). However, you should always be guided by your experience too.

DAILY WORK RECORD
Public Works Operations

Print Name:_____**Date:**_____

Act. Code	Description & Log (Anything coded for Miscellaneous must be explained)	Veh#	Mileage Reading or Time (Calculate the Total. Use **miles** unless there is no odometer)	Equip #	Hrs Used	# Loads	Hrs Worked
	_____ _____ _____ _____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____ _____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____ _____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____ _____ _____ _____		_____ Ending (less) _____ Beginning = Total				
						Total Hours Worked	
Explain Away from Work: (e.g., Sick Leave, Worker's Comp, C-time, Vacation, Casual Day, etc.)						Total Hours Not Worked	
Employee Signature _X_____						Total Paid Hours	

CITY & COUNTY OF DENVER
PUBLIC WORKS DEPARTMENT
VEHICLE INSPECTION REPORT

Date: _____ Equip. #: _____ Mileage:

INSIDE THE CAB
- ❑ Clutch / Gearshift
- ❑ Amp / Voltmeter
- ❑ Air Brake Check (G.B.V.)
- ❑ Steering Wheel Play
- ❑ Oil Pressure Builds
- ❑ Parking Brake
- ❑ Accelerator / Brake Pedals
- ❑ Mirrors / Windshield
- ❑ Heater / Wipers / Horn
- ❑ Lighting Indicators
- ❑ Vehicle Insp. Sticker

UNDER THE HOOD
- ❑ Fluid Levels
- ❑ Waterpump
- ❑ Air Compressor
- ❑ Alternator / Generator
- ❑ Battery
- ❑ Belts
- ❑ Radiator

HAZARDOUS MATERIALS
- ❑ Placarding
- ❑ Manifest Document

SUSPENSION
- ❑ Springs
- ❑ Shackles
- ❑ Shocks

WHEELS
- ❑ Rims
- ❑ Hubs
- ❑ Tires

BRAKES/FRAME
- ❑ Slack Adjuster
- ❑ Hoses / Leaks
- ❑ Drums / Covers

MISC.
- ❑ Other _____
- ❑ Other _____
- ❑ Other _____

LIGHTS / REFLECTORS
- ❑ Headlights
- ❑ Tail Lights
- ❑ Turn Signals
- ❑ Reflectors

SAFETY EQUIPMENT
- ❑ Emergency Exit
- ❑ Seat Belts
- ❑ Triangles
- ❑ Fire Extinguisher

FUEL AREA / OTHER
- ❑ Exhaust Leaks
- ❑ Fuel Tank / Leaks
- ❑ Coupling Devices
- ❑ Hydraulic Fluids

❑ CONDITION OF THE ABOVE VEHICLE IS SATISFACTORY

POST-OPERATOR: (Signature / Print) _____

Remarks: _____

_____

_____

❑ ABOVE DEFECTS CORRECTED

❑ ABOVE DEFECTS NEED NOT BE CORRECTED FOR SAFE OPERATION OF VEHICLE

MECHANIC: (Signature / Print) _____

PRE-OPERATOR: (Signature / Print) _____

PW 323 (5/09)

DISTRIBUTION: WHITE - Supervisor
CANARY - Mechanic
PINK - Pre-Operator
GOLDENROD - Post-Operator

№ 28502

CALIBRATION CHART (US)

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

Agency:													
Location:													
Truck No:					Spreader No:								
Date:					By:								
Gate Opening			(inches)	**DISCHARGE RATE** (pounds discharged per mile)									
(Hopper Type Spreaders)													
	A	**B**	**C**	**TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )**									
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)	
1			-	-	-	-	-	-	-	-	-	-	
2			-	-	-	-	-	-	-	-	-	-	
3			-	-	-	-	-	-	-	-	-	-	
4			-	-	-	-	-	-	-	-	-	-	
5			-	-	-	-	-	-	-	-	-	-	
6			-	-	-	-	-	-	-	-	-	-	
7			-	-	-	-	-	-	-	-	-	-	
8			-	-	-	-	-	-	-	-	-	-	
9			-	-	-	-	-	-	-	-	-	-	
10			-	-	-	-	-	-	-	-	-	-	
11			-	-	-	-	-	-	-	-	-	-	

NOTE: This e-form will do the calculations for you; you need enter data only into Column A and Column B.

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the weight of salt discharged in one revolution, then multiply the two to obtain discharge per minute, and finally multiplying the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings; so you must calibrate for specific gate openings.

EQUIPMENT NEEDED

1. Scale to weigh salt
2. Salt collection device (5 gallon bucket works well)
3. Marking device
4. Watch with second hand

CALIBRATION OF MANUAL CONTROLS

Calibration steps:

1. Remove, by-pass or turn off spinner.
2. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
3. Put partial load of salt on truck.
4. Mark shaft end of auger or conveyor.
5. Dump salt on auger.
6. Rev truck engine to operating RPM.
7. Count number of shaft revolutions per minute at each spreader control setting, record.
8. Collect salt discharged for one revolution, weigh it and deduct the weight of the container.
9. Multiply Column A by Column B to get Column C; then multiply Column C by the number of minutes to travel one mile ( ) at various truck speeds

***example : at Control Setting 2, w/ a shaft RPM of 3, a discharge of 18 lbs. per revolution and a speed of 20 mi/hr, the computation is: 3 x 18 x 3.00 = 162 lb/mi.**

NOTE: This e-form will do the calculations for you; you need enter data only into Column A and Column B.

CALIBRATION OF AUTOMATIC CONTROLS

Automatic controls may be calibrated using the following steps:

1. Remove, by-pass or turn of spinner.
2. Set control on given number.
3. Tie sack or heavy canvas under spreader discharge area.
4. Mark specific distance on a highway or other paved area, such as 1000 ft. .
5. Drive that distance with spreader operating.
6. Weigh salt collected.
7. Multiply weight of salt by 5.28 (in case of 1000 ft.).

Answer will be salt discharged per mile which remains constant regardless of speed, but calibration must be done for each control setting.
Some automatic control manufacturers have "simulators" which eliminate need for on-road operation for calibration.

WINTER WEATHER OPERATIONS PLAN AND MANUAL TEMPLATE

For APWA Snow Supervisor Course

Monte Vista Associates, LLC

1. The Planning Process
   1.1. Identify core work group and larger stakeholder participants
   1.2. schedule meetings and initial agenda
      1.2.1. Review of prior season(s)
      1.2.2. Evaluation of current policies, procedures, practices; note changes needed
      1.2.3. Develop action plan and assign tasks
      1.2.4. Set deadlines, due dates
      1.2.5. Regular meetings and communication by e-mail, conference calls
      1.2.6. Review draft of new or revised plan by legal advisers
      1.2.7. Submit final plan for approval by higher officials
      1.2.8. Implement plan

2. Cover
   2.1. Title
   2.2. Agency
   2.3. Date of issue

3. Introduction
   3.1. Brief statement of purpose or reason for the document
   3.2. Letter of approval; and distribution
   3.3. Note any major changes or circumstances that differ from prior plans

4. Legal
   4.1. Statute, ordinance or regulations establishing responsibility and authority
   4.2. official policy/ resolution enacting the plan
   4.3. Exceptions
   4.4. Disclaimers
   4.5. Prohibitions
   4.6. Emergency Powers
   4.7. Mutual Aid

5. Description of Jurisdiction (area size, winter climate, topography, population, etc.)

6. Description of Jurisdiction's Road System Classifications and Priorities

MVA, LLC

7. Levels of Service
   7.1. Define LOS
   7.2. Describe LOS for each priority/classification
   7.3. Photos or illustrations

8. General Strategies and Tactics
   8.1. Basis for the agency's plan (ex: APWA, AASHTO, TRB, Clear Roads, etc.)
   8.2. Describe general approach to snow and ice control based on ***typical*** conditions (Plan A)
   8.3. Describe other types of winter weather conditions and tactics (Plan B, C…)
   8.4. Explain special attention to bridges and overpasses; steep grades, sharp curves, etc.
   8.5. Explain anti-icing and de-icing and generally when implemented
   8.6. Commitment to Safety
   8.7. Commitment to Sustainability

9. Weather Information Sources and Decision Process

10. Resource Allocation; maximizing efficient and effective use of all available resources

11. Route Optimization: Existing routes may be outdated, inefficient; based on old data, priorities

12. Risk Management; reducing liability exposure

13. Media and Public Relations

14. Customer Service

15. Documentation and Reports

16. Financial

17. Performance Measurements

18. Organization
   18.1. list of all personnel by position, facility or district, and by shift (may be attachment)
   18.2. list by name and contact information (attachment for ease of updates and confidentiality)
   18.3. Shift hours/ schedule
   18.4. Brief *position* duties (may be attachment or appendix)
   18.5. O-chart (may be referenced as an attachment)
   18.6. Relationship –chart showing connection with other departments, agencies
   18.7. Indicate if NIMS-compliant

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19. Personnel
    19.1. Notification to Employees/ Contractors; Policy, Process and Procedures
    19.2. Required clothing, PPE and other necessary items
    19.3. Requirement to have valid, current CDL or driver license; DOT card (if required)
    19.4. Rest, relief and meal breaks (when and where taken)
    19.5. Time-keeping; computation of pay (reference applicable agency policies and rules)
    19.6. Use of personal cell-phones (ex: prohibited while operating equipment)
    19.7. Temporary/ emergency lodging in severe/ extreme conditions
    19.8. Transportation of employees between home and work in severe conditions
    19.9. Employee and contractor personal vehicle parking; use of agency equipment, facilities

20. Training and certification

21. Fleet: Vehicles, Equipment and Machinery

22. Facilities

23. Communications, Tracking and Data Systems

24. Materials

25. Pre-season activities

26. Mid-Season activities

27. Post-season activities

28. Operations
    28.1. Plowing procedures and techniques
    28.2. Spreading patterns and techniques
    28.3. Snow melting and/or hauling

29. Actions
    29.1. Pre-storm
    29.2. During Storm
    29.3. Post –storm

30. Contingencies
    30.1. Ice storm and debris clearance
    30.2. Blizzard
    30.3. Intense snow fall-rate
    30.4. Increased accumulations from successive storms
    30.5. Flooding caused by ice-jams
    30.6. Shortage of material

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30.7. Shortage of usable vehicles and equipment
30.8. Shortage of personnel
30.9. Communications systems failures
30.10. Loss of facilities

31. Attachments
    31.1. Copies of applicable authorizing statutes, ordinances, regulations, administrative policies
    31.2. Maps of routes
    31.3. O-chart
    31.4. List of key staff and contact information
    31.5. List of all personnel and contractors by shift/ location including contact information
    31.6. Shift check-in/ check-out report
    31.7. List of critical vendors/ suppliers and contact information
    31.8. List of jurisdiction's organization support (i.e., Facilities Maintenance, Finance, Law, Human Resources) and contact information
    31.9. List of key emergency contact information for police, fire, EMS, public transit, school district(s), utilities, adjacent jurisdictions, overlapping jurisdictions (i.e., state-county-municipal) toll-road, bridge and tunnel authorities; airports, marine terminal, railroads and major institutional, etc.
    31.10. Table of Vehicles, Equipment and Machinery
    31.11. Chart of Vehicle Assignments per location/ shift/ route
    31.12. Dispatcher's log
    31.13. Radio call numbers and channels
    31.14. Radio communication procedures
    31.15. Material Application Charts
    31.16. Spreader/ sprayer calibration chart
    31.17. Material handling precautions
    31.18. Material load –unload ticket
    31.19. Material specifications
    31.20. Vehicle/ equipment/machinery pre-check
    31.21. Vehicle/ equipment/machinery post-check
    31.22. Vehicle/ equipment/machinery trouble report
    31.23. Operator's "rules of the road"
    31.24. Accident report
    31.25. Injury report
    31.26. Damage to private property report
    31.27. Facility problem report
    31.28. List of required/ recommended clothing and PPE
    31.29. Cold-weather hazards and precautions
    31.30. Sample contract for plowing contractors
    31.31. Contractor performance evaluation report
    31.32. Training curriculum

MVA, LLC

City of West Des Moines

SNOW AND ICE CONTROL MANUAL

2017

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THE CITY OF
West Des Moines®

www.wdm.iowa.gov

Public Services

560 South 16th Street
P. O. Box 65320
West Des Moines, IA 50265-0320

PHONE:
515-222-3480

FAX:
515-222-3478

October, 2017

The City of West Des Moines is preparing to provide standard-setting snow removal services for our community this winter. We developed this Snow and Ice Control Manual to help us continually refine our snow and ice removal program.

The public depends upon the use of streets and highways during all types of weather related events. When the transportation system is shut down or the capacity is reduced, there are typically severe impacts. The public also utilizes public buildings, sidewalks and trails during and after storm events. Accidents due to snow and ice can result in property damage, personal injuries, and fatalities. Weather delays and inconveniences also play a role in driver attitudes and quality of life.

Included in the Manual are guidelines and instructions for carrying out the snow and ice control program for the City of West Des Moines. For more detailed information concerning our snow-fighting program, please do not hesitate to contact us.

Sincerely,

Bret Hodne
Director of Public Services

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SNOW AND ICE CONTROL PROCEDURES

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CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES
October, 2017

The purpose of this Snow and Ice Control Manual is to establish the City's policy and level of service in respect to the management of snow or ice and maintenance of its road system during the winter months. It will also serve as a practical guide for cost effective snow removal operations in the City of West Des Moines. This Manual supersedes all previously written policies of the City on snow and ice control operations.

1. IMPLEMENTATION

This Manual will be in effect during normal winter operations at times when weather conditions could cause accumulation of frost, sleet, ice, snow or other occurrences on the streets and public parking lots of the City of West Des Moines.

2. DEFINITION OF SUPERVISOR

When "Supervisor" is used in this Manual it is defined as the person who is on duty at that time directing the snow/ice removal operations for the City. These individuals include: Director of Public Services, Deputy Public Services Director, Public Services Superintendent, Public Services Managers, and/or any other individual who may be assigned the responsibility of Supervisor.

3. WEATHER FORECASTING

Weather information is essential for good planning of snow and ice control operations and other weather-related emergencies. An effective weather service must provide critical information about the storm sufficiently in advance so that plans and preparations can be made.

The City will utilize the services of a professional weather forecasting service during the snow and ice season. This service will provide information to the City to help determine what impact present and forthcoming weather will have on overall operations. They will also provide the City with on-screen tracking of weather systems and data from the Iowa Department of Transportation roadway weather information stations at various locations throughout the State.

4. MONITORING AND NOTIFICATION OF ICE AND SNOW ACTIVITY

City staff will monitor anticipated inclement weather. During significant storm events, departments will coordinate with each other regarding event intensity and winter maintenance procedures.

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During off-duty hours, weekends and holidays, the on-call Supervisor, Police Department, and our contract weather service provider will monitor weather and road conditions. In the event of inclement weather, the on-call Supervisor will initiate the appropriate response action.

5. COMMUNICATIONS

All operators of snow and ice control equipment will keep in communication with the applicable Supervisor or Dispatcher at all times.

The Supervisor or Dispatcher on duty will be the main line of communication between applicable City staff and the Police Department. The Police Department will assist in advising the Supervisor or Dispatcher with regards to current road conditions. It will be the sole responsibility of the applicable Supervisor to direct the winter maintenance operations for the City of West Des Moines.

Media notifications of emergency parking bans, snow emergency declarations, road closures, and other contact for inquiries regarding road conditions will be made by the Public Services Department.

6. CITIZEN INQUIRIES

All citizen issues concerning snow and ice control efforts will be routed to the Public Services Department. The Supervisor will determine appropriate follow-up responses to citizen inquiries.

7. INTERSECTION RIGHTS-OF-WAY

After periods of extraordinary snow events, the City may elect to haul snow from designated intersection rights-of-way to minimize sight obstructions. The decision to initiate this operation will be dependent upon the depth and accumulation of snow and analysis by the Public Services Department for any significant sight triangle issues. Operational priorities will be assigned to intersections based on street classification, traffic volumes and severity of sight restrictions. Snow will only be removed from intersections where a public street intersects with another public street. This operation will typically be conducted after other higher priority post storm activities have been completed. Under normal circumstances, hauling of the snow will be conducted during regular work hours. Snow removal from the rights-of-way into private property driveways will be the responsibility of the adjacent private property owner.

8. BOUNDARY STREET JURISDICTION AND RESPONSIBILITY

The following table outlines the responsible each agency has to roads bordering West Des Moines corporate limits. The agencies listed below have first response maintenance responsibility to these roads. If West Des Moines has its snow routes open and serious problems remain on the boundary streets, West Des Moines snow plows may assist based upon the judgment of the Supervisor on duty, with the exception of Interstate roadways.

SAMPLE

Street Segment	Responsibility	Telephone No.
S. 1st St. (63rd St.) (Hwy 28) - Walnut Creek to SW Connector	IDOT	265-0310
S. 1st St - cul-de-sac. to Army Post Rd.	West Des Moines	222-3480
University Ave. – 22nd St. to West Corporate Limits of Clive	Clive	223-6231
University Ave. – East Corporate Limits of Clive to 98th Street	Waukee	249-1212
Booneville Rd. – Grand Ave to West Corporate Limits of West Des Moines (South 115th)	West Des Moines	222-3480
98th St. – Ashworth Rd. to University Ave	Waukee	249-1212
105th – Wendover North to Ashworth	Waukee	249-1212
Mills Civic Pkwy – S. Jordan Creek Parkway to Wendover Road	West Des Moines	222-3480
County Line Rd. – S. 20th St. to S. 5th St.	West Des Moines	222-3480
S. 20th St. (Hwy R45) – S. County Line Rd. to Adams Street	West Des Moines	222-3480
Adams St. – S. 20th St. (Hwy R45) to S. 35th	West Des Moines	222-3480
S. 35th – Adams to Cumming City limits.	West Des Moines	222-3480
Ashworth Rd. – Jordan Creek Parkway to 98th St.	West Des Moines	222-3480
Pine Ave./SW 72nd Ave. – I-35 to West Corporate Limits of West Des Moines	West Des Moines	222-3480
Willow Creek - North and South of Pine.	West Des Moines	222-3480
S. 50th St. (Polk County SW 112th St.) - Pine Avenue to Warren County Line	West Des Moines	222-3480
SW Maffitt Lake Road. – North of SW 72nd Avenue	West Des Moines	222-3480
88th Street – Ashworth Rd. to Booneville Rd.	West Des Moines	222-3480
Windsor Court – Raccoon River Dr. North to end of Street	West Des Moines	222-3480
Xavier - Booneville to Raccoon River Dr.	West Des Moines	222-3480
Raccoon River Dr. – Grand Ave to R-22	West Des Moines	222-3480
Center Street from 8th St. to approx. 550' East of Hoak Drive	West Des Moines	222-3480

SAMPLE

9. PRIORITIES FOR SNOW AND ICE CONTROL OPERATIONS

In order to make the most efficient use of available resources, we have established priorities using the assumption that the severity of a storm is not beyond the normal capabilities of the City's snow removal resources. Depending on the nature of the snowstorm, deviations could occur. The established priorities are as follows:

Arterials Streets	1st Priority
All Improved Streets/ City Facility Parking Lots	2nd Priority
All Unimproved Roads/Alleys/Trails	3rd Priority

10. EMERGENCIES

Emergencies are defined as follows, but not necessarily limited to:

1. Immediate need for Police, Fire and/or Emergency Medical assistance. If City emergency personnel must leave the public right-of-way to respond to an emergency, snow removal crews may provide necessary assistance such as opening a driveway or parking area to give access to them.

2. Isolated problem areas where access is urgently needed before all other areas are handled.

3. Icy conditions due to a water main break or clearing of streets due to debris blocking streets or access.

11. ICE CONTROL PROCEDURES

The objective of ice control is to provide a safe pavement surface for vehicular traffic by attempting to prevent a build-up of snow and ice on the pavement. Ice control also includes attempting to remove any build-up that may occur. This is typically done with the utilization of mechanical snow removal equipment and deicer products.

The City may also apply liquid chemical deicers on designated streets prior to, and during storm conditions, to prevent the bonding of snow and ice to the pavement. This activity is known as anti-icing. The effectiveness of deicers used in this process is directly related to pavement temperatures. Based upon conditions, Supervisors will have discretion as to when to implement this activity and the deicer products which may be utilized.

The City will apply ice control materials in accordance with their recommended use. Application rates and locations may vary depending upon the type of storm. The Supervisor will have discretion as to what materials are used and when they are applied.

SAMPLE

12. USE OF SALT AND ABRASIVE MATERIALS

The City will typically use rock salt for deicing applications. However, under certain conditions it may be desirable to also utilize abrasives when pavement temperatures inhibit the melting action of rock salt. While abrasives do not have the ability to melt snow and ice, they may be utilized to provide traction in certain conditions. Due to the high overall cost of using abrasives and the associated environmental impacts, supervisory discretion will be used to determine if and when conditions are appropriate for applications.

Utilizing salt, pre-wetted with liquid deicer products offers several advantages over non-treated rock salt. Expediting the melting process; the ability to melt at lower pavement temperatures, reduction in overall application rates and less material waste are just a few of the attributes associated with pre-wetting rock salt. Based upon conditions, Supervisors will have discretion as to what deicer materials are used during a respective storm event.

13. SNOW CONTROL PROCEDURES

The depth and timing of snow accumulation, weather forecasts and traffic volumes, will normally dictate when snow plowing operations will begin. Plowing will take place during a storm as needed in an attempt to keep the accumulation on the pavement surface less than desired guidelines.

Snow plowing operations will be carried out in accordance with the guidelines established for the various street classifications as set forth in the Snow Manual. Such plowing operations may often times be done in conjunction with ice control activities.

Typically on major snow routes, plow trucks will operate in teams. Team plowing may consist of two or more plows operating together to provide for the removal of snow from the street between the centerline and the curb line in one pass. This eliminates the need to make repeated passes to plow the streets to the curb line. On local residential streets when only one snow plow unit is used, it may be necessary to make two or more passes in each direction to completely clear the street of accumulated snow.

If weather forecasts indicate a significant increase in pavement temperatures during or after a storm event, supervisors will have discretion regarding plowing and/or deicer applications. If forecasts indicate that the snow and/or ice will dissipate in a time period deemed reasonable by the Public Services Director or their designee, applicable procedures will be implemented. With the environmental and budgetary impacts of deicers, informed decisions and practices need to be utilized in the City of West Des Moines operational plan.

14. SNOW FENCE

The Department of Public Services may elect to place snow fence where it could potentially minimize blowing snow from accumulating on the road surface. Snow fence will be placed on private property only with mutual consent between the property owner and the City. The City will have sole discretion as to when and where to place snow fence.

15. EQUIPMENT AVAILABLE

The primary equipment available to remove snow and ice will be supplied by the City and/or its contractors.

SAMPLE

16. MANPOWER AVAILABLE

The primary staffing for snow removal and ice control will be supplied by Public Services. During major events, personnel from other City departments and contractors may be utilized to assist with snow and ice removal efforts.

17. TYPE OF EQUIPMENT

The City utilizes many different types of equipment during snow and ice control operations. The equipment utilized is chosen to fit the job that must be performed at that time.

For snow plowing activities the City typically utilizes reversible plows, "V" plows, "under body" plows, as well as plows mounted on front end loaders. In addition, the City utilizes wing plows for more efficient and effective plowing operations. For blowing or physical removal of snow, the City utilizes snow blowers mounted on end loaders and tractors which can load snow directly into dump trucks or place it on adjacent right-of-way or private property.

18. EQUIPMENT MAINTENANCE AND REPAIR

As in all maintenance operations, successful snow and ice control depends upon the skillful use of manpower, personnel, equipment, and material. The efficient and economical control of ice and snow depends on the availability and use of the proper equipment. This availability does not just happen. It involves a well-planned program that is in progress during each season of the year. It also includes a program of routine inspection, maintenance, and repair of equipment utilized in snow removal operations. As such, the City will typically schedule a mechanic to be on duty in its shop located at the Public Services Facility whenever the 12-hour shift assignments go into effect. In addition, it may be necessary to have mechanics on duty at other times. Such determination will be made by the Fleet Manager or Supervisor on duty at the time.

19. TOWING VEHICLES ILLEGALLY PARKED – DECLARATION EMERGENCY PARKING BAN

Cars parked on the streets during a snow removal effort may be ticketed and/or towed away in accordance with Section 6-6-7 Snow Removal and Section 6-2-3-6c Impounding Vehicles Snow Removal of the City Code dated 2004 as amended. A snow emergency parking ban may be declared by the Director of Public Services or the Director's designee. The Police Department and media will be notified when the parking ban is initiated.

20. SIDEWALK – PRIVATE RESPONSIBILITY

All sidewalks adjacent to private property are the responsibility of the property owner. The City's responsibility is to plow the streets and keep them open to traffic. Due to the location of some sidewalks and the volume of snow being moved off of the streets, there may be occurrences when plowing operations may deposit significant amounts of snow onto the sidewalks. When this occurs, it is the responsibility of the adjacent property owner to remove all snow from the sidewalk. All complaint calls about sidewalks not being cleared will be routed to the Police Department for complaint follow-up and code enforcement.

SAMPLE

21. DRIVEWAYS – PRIVATE

City snow plows will not clear private driveways except under emergency conditions and with the approval of the Supervisor on duty. The snow placed in driveways by City plows is the responsibility of the property owner to remove. Snow from a private driveway may not be placed on or pushed across a City Street in accordance with Section 7-1-4C "Dumping of Snow" of the City Code dated 1993 as amended.

22. PLOWING PRIVATE PROPERTY

The City will not plow or clear snow or ice from private property unless it must be done to allow emergency vehicles access to private property for Fire, Police, or EMS calls.

23 MAILBOXES

The City will typically plow snow within the confines of curb line to curb line of a street. During frequent periods of heavy snowfall accumulations when storage areas for snow on the right-of-way are limited, there may be times when City plows cannot physically place the snow from the curb line of the street up onto the adjacent City right-of-way. The adjacent resident will be responsible for cleaning snow around their mailbox to assure delivery of mail. The resident is also responsible for assuring that the mailbox is properly installed as required by the United States Postal Service Guidelines. This requires the face of the mailbox to be installed 6" behind the back of the curb and it should be constructed to be able to withstand snow cleaning efforts by the City. During preliminary routine inspections, City staff will typically notify citizens when potential problems are observed with the location or if improvements to the structural integrity of their mailboxes need to be made prior to winter plowing operations. It will be the responsibility of the residents to properly relocate or improve the structural integrity of the mailbox prior to winter plowing operations. The City will document the mailbox locations that have been tagged for improvements. The City will not be responsible for damage to mailboxes which have not been relocated or repaired after the notification has occurred.

24. REPORTS

A storm record will be completed by the Department of Public Services for each snow event. This record should contain operating times, weather conditions, and resources committed.

25. DISCLAIMER

This Manual may be affected by at least one or more of the following events which could delay or alter snow and ice control by the City:

1. Equipment breakdown
2. Vehicles disabled in deep snow.
3. Weather so severe as to cause work to be stopped for the safety of all personnel.
4. Unforeseen conditions and emergencies.
5. Significant medical related emergencies.

SAMPLE

26. DISTRIBUTION OF MANUAL

This Manual shall be distributed to the following:

1. Mayor and City Council
   - Mayor: Steven Gaer
   - Council: Kevin Trevillyan, Russ Trimble, Jim Sandager, John Mickelson, Rick Messerschmidt
2. City Manager
   - Tom Hadden
3. Public Services Director
   - Bret Hodne
4. City Attorney
   - Richard (Dick) Scieszinski
5. Assistant City Attorneys'
   - Jason Wittgraf
   - Greta Truman
6. Public Services Supervisors'
   - Mike Coughlon, Rick Knowles, Ron Wiese, Gary Rank, Kevin Hensley, Rian Rasmussen, Brian Fowler, John Olds
7. Interim Chief of Police
   - Jim Barrett
8. Director of Parks and Recreation
   - Sally Ortgies
9. Superintendent of Parks and Recreation
   - Dave Sadler
10. Fire Chief
    - Craig Leu
11. Community Compliance Division
    - Joe Cory
12. City Clerk
    - Ryan Jacobson
13. EMS/WestCom Chief
    - Jeff Dumermuth
14. Finance
    - Maureen Richmond
    - Katie Johnson
15. Communication Specialist
    - Lucinda Stephenson

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12-HOUR SHIFT SCHEDULE

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CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

12 HOUR SHIFT SCHEDULE

NOTE:

1. **SNOW SHIFTS WILL BE FROM 8:00 A.M. TO 8:00 P.M., AND 8:00 P.M. TO 8:00 A.M.**

2. **IN CASE OF AN EMERGENCY STORM DURING SHIFT CHANGE, THE EXISTING SHIFT ARRANGEMENT WILL HOLD UNTIL SNOW IS REMOVED.**

DATES	TIME	DAY SHIFT	NIGHT SHIFT	NIGHT MECHANIC
Monday, September 18 thru Sunday, October 8	3 weeks	2	1	Tommy
Monday, October 9 thru Sunday, October 29	3 weeks	1	2	Chris
Monday, October 30 thru Sunday, November 19	3 weeks	2	1	Ed
Monday, November 20 thru Sunday, December 10	3 weeks	1	2	Tommy
Monday, December 11 thru Sunday, December 31	3 weeks	2	1	Chris
Monday, January 1 thru Sunday, January 21	3 weeks	1	2	Ed
Monday, January 22 thru Sunday, February 11	3 weeks	2	1	Tommy
Monday, February 12 thru Sunday, March 4	3 weeks	1	2	Chris
Monday, March 5 thru Sunday, March 25	3 weeks	2	1	Ed
Monday, March 26 thru Sunday, April 15	3 weeks	1	2	Tommy
Monday, April 16 thru Sunday, May 7	3 weeks	2	1	Chris

If snow/ice conditions are developing at a time other than regular business hours, contact the on-call supervisor through the Operations emergency cell at 650-7555. If there is no response after 10 minutes, use the following numbers to contact a Shift Supervisor:

	Cell		**Cell**
Kevin Hensley	515-468-3094	Brian Fowler	515-202-5177
Ron Wiese	515-473-0674	John Olds	515-608-2213
Mike Coughlon	515-419-1544		
Rick Knowles	515-240-2359		

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USE OF ABRASIVES AND CHEMICALS

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CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

RECOMMENDED USE OF DEICERS

Pavement Temperature	Type of Precipitation	Road Surface Condition	Plow	Salt/Deicers
Near 30°	Sleet/Freezing Rain Snow	Wet Pavement/Icing Slush	No Yes	In most cases (Supervisor Discretion) In some cases (Supervisor Discretion)
20° - 30°	Sleet/Snow	Slush/ Snow	Yes	In most cases (Supervisor Discretion)
15° - 20°	Snow	Dry Pavement/Slick Areas	Yes Yes	In most cases (Supervisor Discretion)
Below 15°	Snow	Dry Pavement	Yes	Supervisor discretion. May cause additional accumulations on some pavement surfaces.

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GUIDELINES FOR STREETS AND HIGHWAYS

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CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

SNOW PLOWING GUIDELINES
FOR STREETS AND HIGHWAYS

Classification	**Snow Depth at Which Plowing Typically Will Begin**		**Full Pavement Width that Typically will be Cleared After Ending of Storm**
	Desirable	**Maximum**	
Major Snow Routes	*1”	*3”	*4 hours
<u>Collector Streets</u> Priority Routes	*1”	*4”	*8 hours
Improved Streets	*1”	*4”	*16 hours
Unimproved Streets/Alleys	*2”	*6”	*24 hours

***The snow depths for plowing listed above are guidelines and may not be adhered to for each storm event. The Public Services Director and/or Supervisor will have discretion based upon current and forecasted weather and pavement conditions.**

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CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

LEVEL OF SERVICE GOALS
FOR CITY STREETS

LEVELS OF SERVICE DETERMINATION

In an effort to promote operational awareness, levels of service goals have been established for the various street classifications within the City's jurisdiction. While these goals have been developed by the City based on various types of criteria, they are primarily defined for the benefit of the employees who have responsibility for performing the maintenance duties associated with snow and ice events throughout the winter.

Factors such as service level expectations, responsible use of deicer chemicals, road safety and budgetary considerations are just some of the criteria considered in the development of these goals. While the agency will strive to meet these goals, it is important to understand that the time it may take to achieve them will be dependent upon weather conditions and other factors that may be outside the control of the City.

SAMPLE

Major Arterial Street

(Significant Portion of Pavement is Bare)

Collector Street

(Some Bare Pavement – Focus on Wheel Paths)

Residential Street

(Streets will have residual snow – minimal bare pavement)
(Deicers will primarily be utilized on steep hills and intersections)

Unimproved Street

Plowed Only – Minimal Bare Pavement

ADMINISTRATION SUPPORT STAFF ASSIGNMENT

SAMPLE

SAMPLE

SUPERVISOR PAGER SCHEDULE
October 2017 – May 2018

October 2017							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Mike							1
Rick	2	3	4	5	6	7	8
John	9	10	11	12	13	14	15
Ron	16	17	18	19	20	21	22
Brian	23	24	25	26	27	28	29
Mike	30	31					

November 2017							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Mike			1	2	3	4	5
Rick	4	7	8	9	10	11	12
John	13	14	15	16	17	18	19
Ron	20	21	22	23	24	25	26
Brian	27	28	29	30			

December 2017							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Brian					1	2	3
Mike	4	5	6	7	8	9	10
Rick	11	12	13	14	15	16	17
John	18	19	20	21	22	23	24
Ron	25	26	27	28	29	30	31

January 2018							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Brian	1	2	3	4	5	6	7
Mike	8	9	10	11	12	13	14
Rick	15	16	17	18	19	20	21
John	22	23	24	25	26	27	28
Ron	29	30	31				

February 2018							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Ron				1	2	3	4
Brian	5	6	7	8	9	10	11
Mike	12	13	14	15	16	17	18
Rick	19	20	21	22	23	24	25
John	26	27	28				

March 2018							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
John				1	2	3	4
Ron	5	6	7	8	9	10	11
Brian	12	13	14	15	16	17	18
Mike	19	20	21	22	23	24	25
Rick	26	27	28	29	30	31	

April 2018							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Rick							1
John	2	3	4	5	6	7	8
Ron	9	10	11	12	13	14	15
Brian	16	17	18	19	20	21	22
Mike	23	24	25	26	27	28	29
Rick	30						

May 2018							
	M	**T**	**W**	**Th**	**F**	**Sat**	**Sun**
Rick		1	2	3	4	5	6
John	7	8	9	10	11	12	13
Ron	14	15	16	17	18	19	20
Brian	21	22	23	24	25	26	27
Mike	28	29	30	31			

SAMPLE

CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

ADMINISTRATIVE/SUPPORT STAFF

Mechanic	Per Schedule
Phone/Radio Dispatch (4:00am-4:00pm)	Alice Barrett
Phone/Radio Dispatch (7:30am-8:00pm)	Kim Pinegar
Phone/Radio Dispatch (Alternate)	Peggy Englehart

SAMPLE

ANTI-ICING ROUTES

SAMPLE

SAMPLE

CITY OF WEST DES MOINES

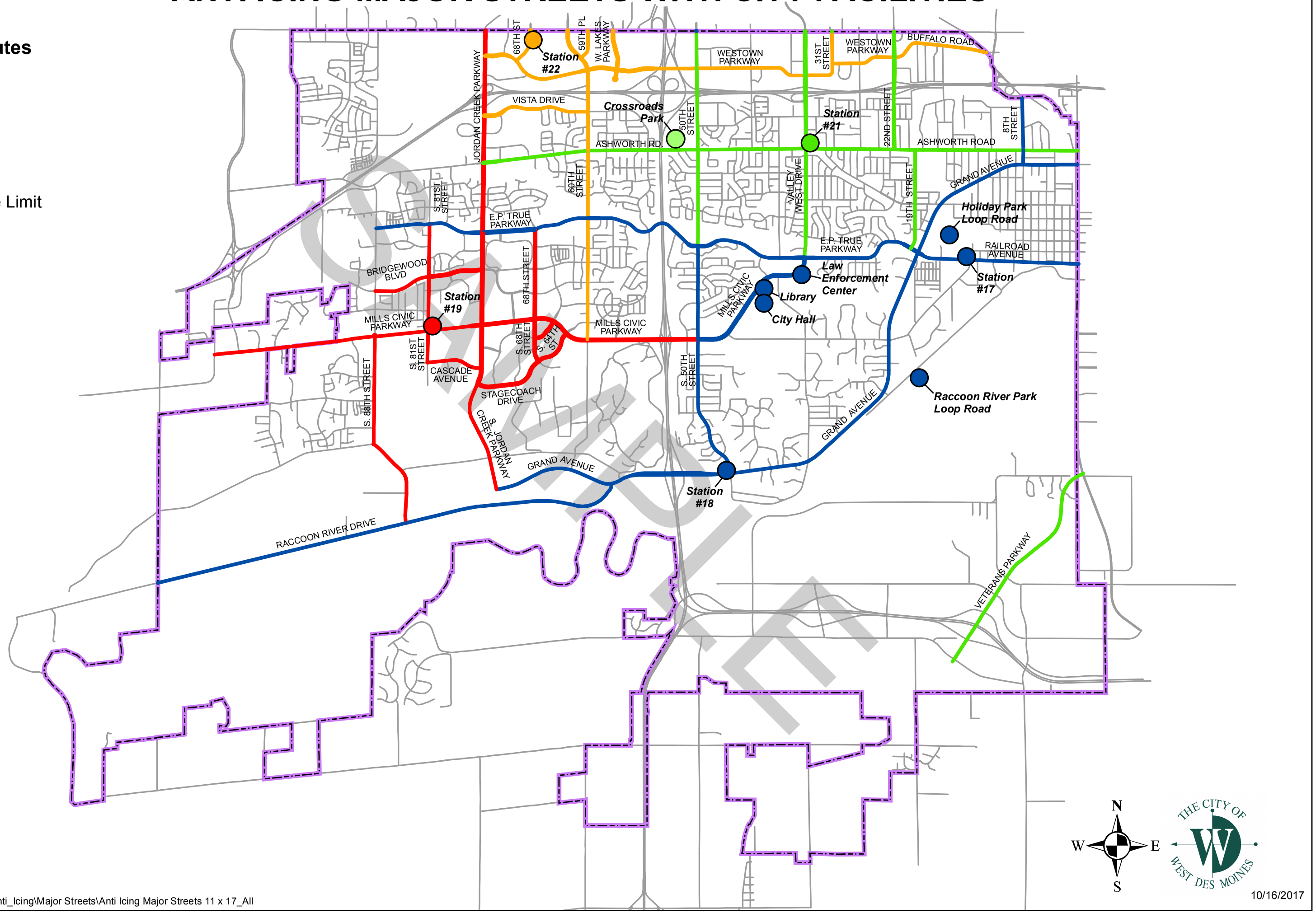
ANTI-ICING OPERATORS

DRIVER/License Class	
Larry Laughridge	A
Mark Adair	A
Brian Crnkovich	A
Wayne Barrett	A
Trevor Bindel	A
Nathan Headley	A
Mike Neuman	B
Kevin Hershberger	A
Matt Dolan	A
Brian Snyder	A
Beav McDaniel	A
Jeff Sherman	A
Robb McMahon	B
Mike Hiatt	A
Eric Goode	A

SAMPLE

SAMPLE

ANTI ICING MAJOR STREETS WITH CITY FACILITIES



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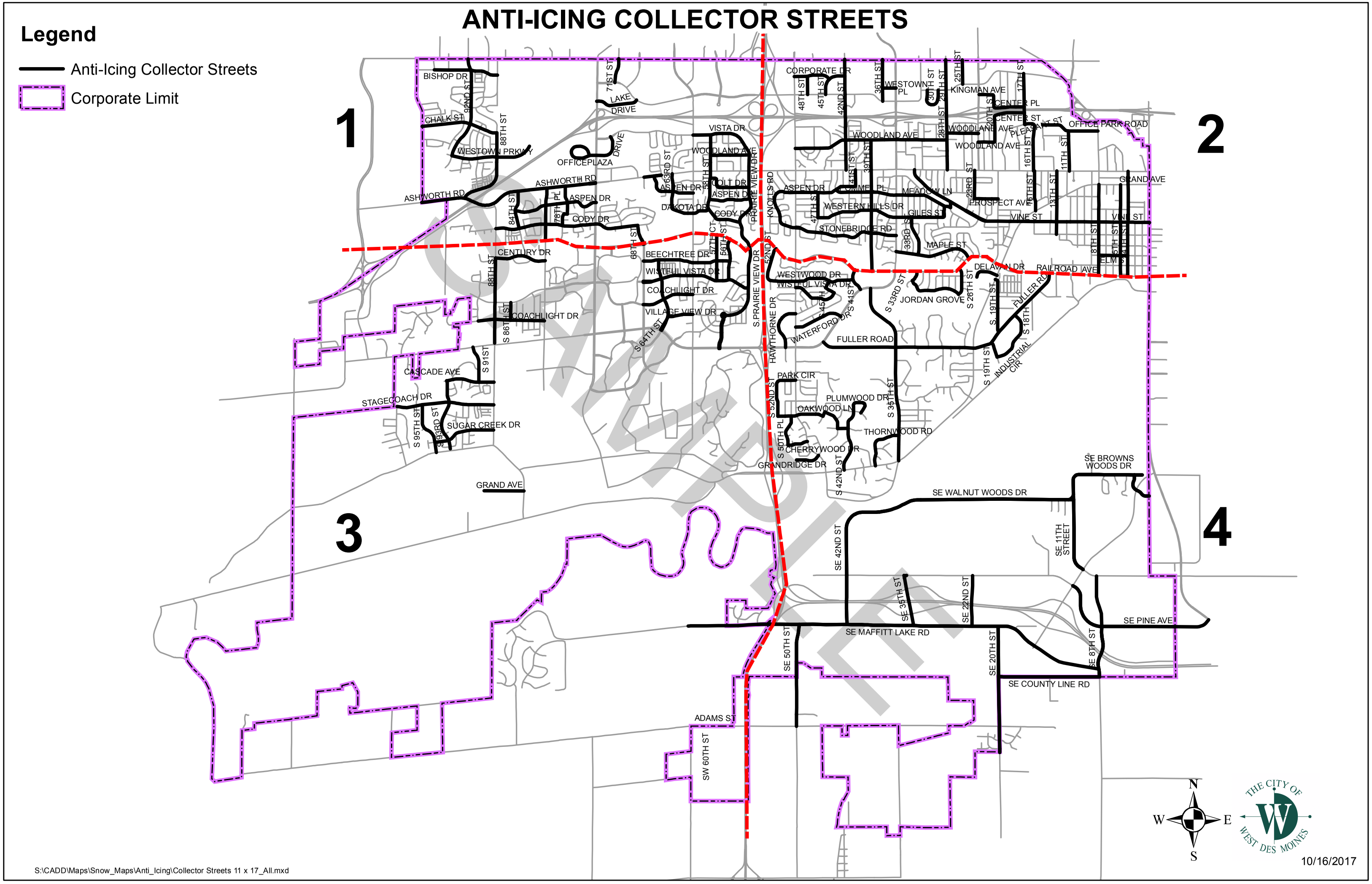
10/16/2017

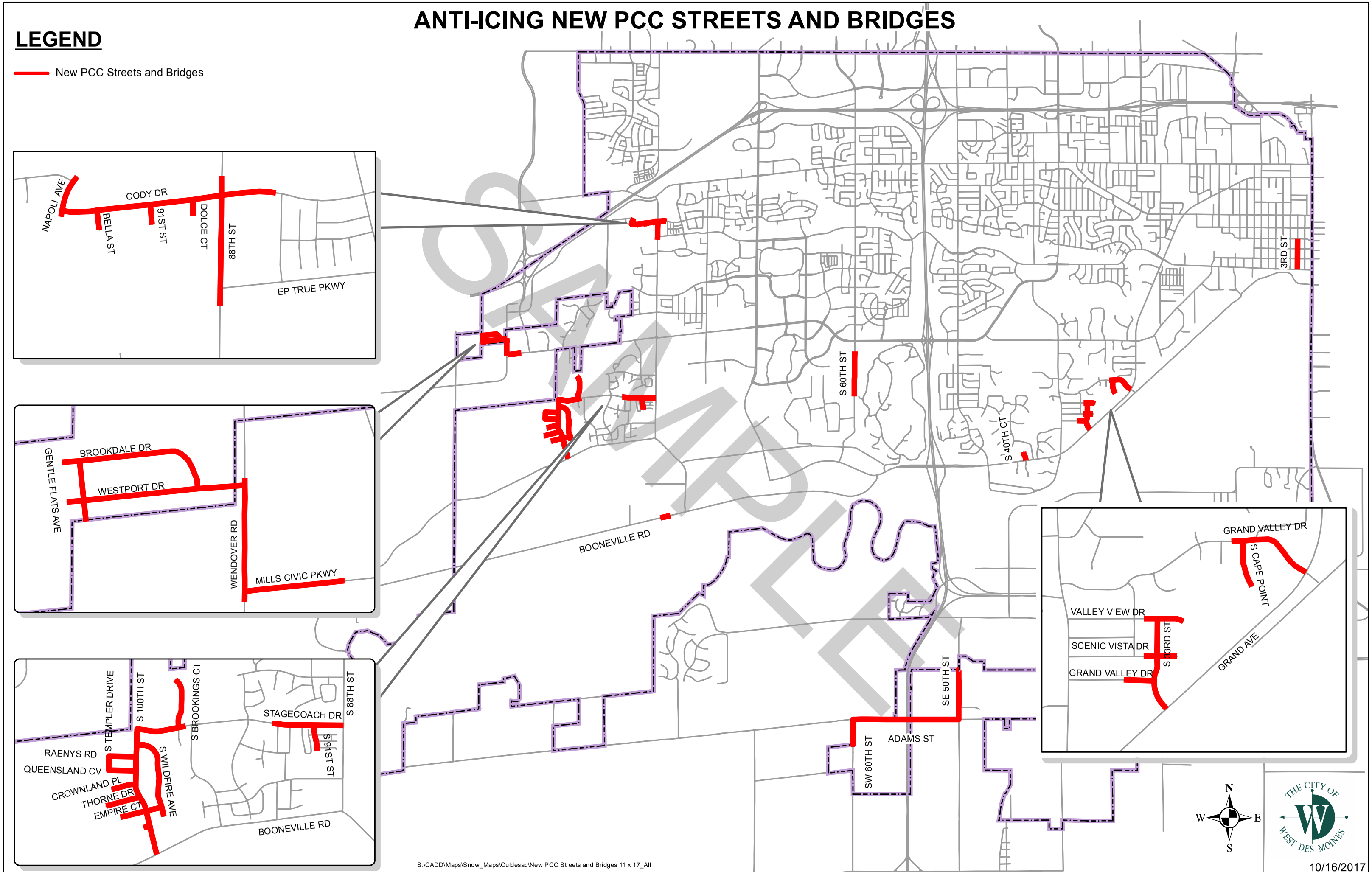
ANTI-ICING COLLECTOR STREETS



ANTI-ICING NEW PCC STREETS AND BRIDGES

LEGEND

New PCC Streets and Bridges



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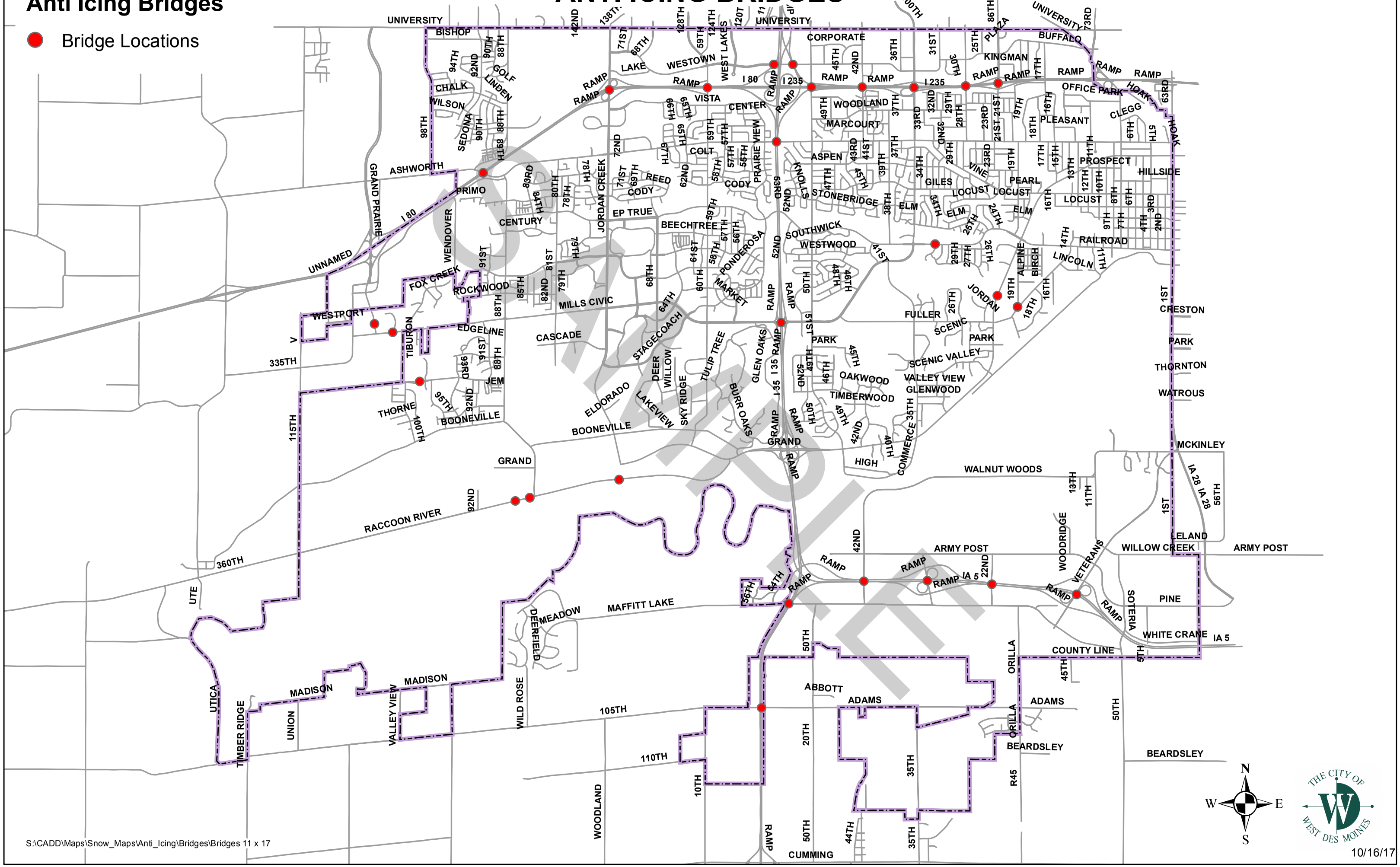
10/16/2017

ANTI ICING BRIDGES

Anti Icing Bridges

- Bridge Locations



MAJOR SNOW PLOWING ROUTES

SAMPLE

SAMPLE

MAJOR SNOW PLOWING ROUTES

SHIFT 1 ASSIGNMENTS

ROUTE	VEH #	DRIVER	VEHICLE TYPE
1-1	333	Trevor Bindel	Motor Grader w/ Wing
1-2	323	Chad Gillespie	Tandem Axle Sander w/ Plow & Wing
1-3A	324	Brian Crnkovich	Tandem Axle Sander w/ Plow & Wing
1-4	343	Derek Muche	Single Axle Sander w/ Plow & Wing
1-5	390/316	Larry Laughridge	Tandem Axle Sander w/ Plow & Wing
1-6A	339	Tim Schneider	Single Axle Sander w/ Plow & Wing
2-1	340	Wayne Barrett	Single Axle Sander w/ Plow & Wing
2-2	341	Jon Jorgensen	Single Axle Sander w/ Plow & Wing
2-3A	329	Chris Schinckel	Single Axle Sander w/ Plow & Wing
2-4A	319	Allen Brown	Single Axle Sander w/ Plow & Wing
2-5	320	Dan George	4 Wheel Drive 1 Ton w/ Plow
3-1	342	Brad Hughes	Single Axle Sander w/ Plow & Wing
3-2	315	Eric Goode	Tandem Axle Sander w/ Plow & Wing
3-3	354	Nathan Geil	Single Axle Sander w/ Plow & Wing
3-4	372	Fay Beals	Single Axle Sander w/ Plow & Wing
3-5	337	TBD	Single Axle Sander w/ Plow & Wing
4-1	318	Mike Neuman	Tandem Axle Sander w/ Plow & Wing
4-2	338	Mark Adair	Tandem Axle Sander w/ Plow & Wing
4-3	321	Mark Smith	Single Axle Sander w/ Plow & Wing
4-4	325	Jon Keimig	Single Axle Sander w/ Plow & Wing
4-5	485	Al Wise	4 Wheel Drive 3/4 Ton w/ Plow
Alternate Operators		Josh Reynolds Bob Crowdes Kelly Sand Scott Thomas Randy Cox	4 Wheel Drive 3/4 Ton w/ Plow 4 Wheel Drive 3/4 Ton w/ Plow 4 Wheel Drive ¾ Ton w/ Plow

SAMPLE

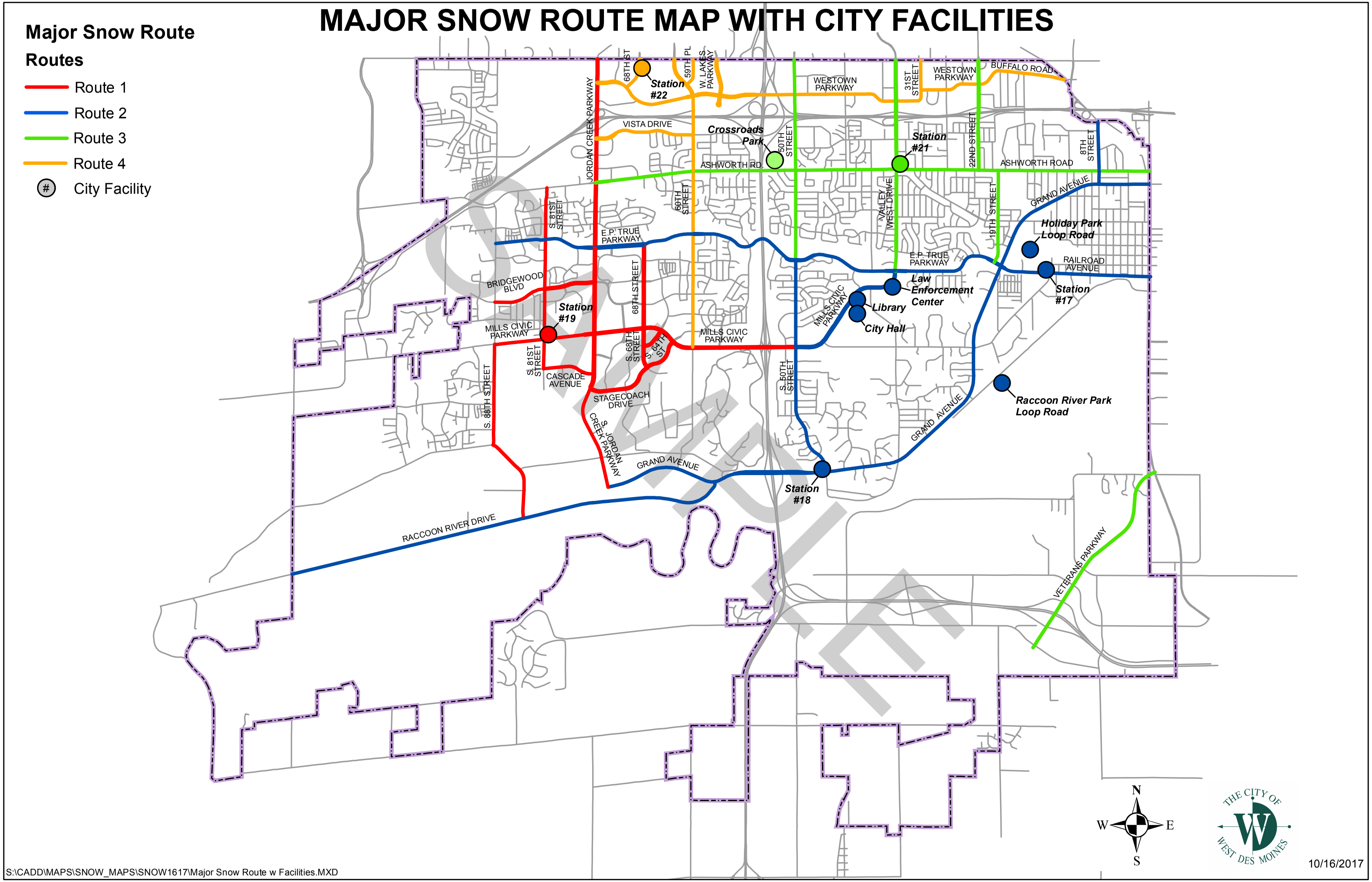
MAJOR SNOW PLOWING ROUTES

SHIFT 2 ASSIGNMENTS

ROUTE	VEH #	DRIVER	VEHICLE TYPE
1-1	333	Matt Dolan	Motor Grader w/ Wing
1-2	323	Brian Snyder	Tandem Axle Sander w/ Plow & Wing
1-3A	324	Kevin Hershberger	Tandem Axle Sander w/ Plow & Wing
1-4	343	Michael Hagen	Single Axle Sander w/ Plow & Wing
1-5	390/316	Beav McDaniel	Tandem Axle Sander w/ Plow & Wing
1-6A	339	Don Tuel	Single Axle Sander w/ Plow & Wing
2-1	340	Jon Thill	Single Axle Sander w/ Plow & Wing
2-2	341	Jeff Munsinger	Single Axle Sander w/ Plow & Wing
2-3A	325	Luke Quinn	Single Axle Sander w/ Plow & Wing
2-4A	319	Tony Hawbaker	Single Axle Sander w/ Plow & Wing
2-5	320	Sam Wyman	Single Axle Sander w/ Plow & Wing
3-1	342	Keith Licht	Tandem Axle Sander w/ Plow & Wing
3-2	315	Jeff Sherman	Tandem Axle Sander w/ Plow & Wing
3-3	354	Robb McMahon	Single Axle Sander w/ Plow & Wing
3-4	372	Mark Lampe	4 Wheel Drive 1 Ton w/Plow
3-5	337	TBD	Single Axle Sander w/ Plow & Wing
4-1	318	Nathan Headley	Tandem Axle Sander w/ Plow & Wing
4-2	338	Mike Hiatt	Tandem Axle Sander w/ Plow & Wing
4-3	321	Laramie Sandbulte	Tandem Axle Sander w/ Plow & Wing
4-4	329	Jeff Munsinger	Single Axle Sander w/ Plow & Wing
4-5	485	DeeAnn Fredericks	4 Wheel Drive ¾ Ton w/Plow
Alternate Operators		Josh Reynolds Bob Crowdes Kelly Sand Scott Thomas Randy Cox	 4 Wheel Drive ¾ Ton w/Plow 4 Wheel Drive ¾ Ton w/Plow 4 Wheel Drive 3/4 Ton w/ Plow

SAMPLE

MAJOR SNOW ROUTE MAP WITH CITY FACILITIES



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10/16/2017

SAMPLE

RESIDENTIAL PLOWING/ ICE CONTROL ZONES

SAMPLE

SAMPLE

RESIDENTIAL PLOWING/ICE CONTROL ZONES

SHIFT 1 ASSIGNMENTS

ZONE	TRUCK	DRIVER	TYPE
1	354	Nathan Geil	Single Axle Sander w/ Plow & Wing
2	342	Brad Hughes	Single Axle Sander w/ Plow & Wing
3	318	Mike Neuman	Tandem Axle Sander w/ Plow & Wing
4	341	Jon Jorgensen	Single Axle Sander w/ Plow & Wing
5	315	Eric Goode	Tandem Axle Sander w/ Plow & Wing
6	340	Wayne Barrett	Single Axle Sander w/ Plow & Wing
7	329	Chris Schinckel	Single Axle Sander w/ Plow & Wing
8	339	Tim Schneider	Single Axle Sander w/ Plow & Wing
9	343	Derek Muche	Single Axle Sander w/ Plow & Wing
10	324	Brian Crnkovich	Tandem Axle Sander w/ Plow & Wing
11	323	Chad Gillespie	Tandem Axle Sander w/ Plow & Wing
Unimproved	333	Trevor Bindel	Grader w/ Wing Plow
Rover	390/316	Larry Laughridge	Tandem Axle Sander w/ Plow & Wing
Rover	338	Mark Adair	Tandem Axle Sander w/ Plow & Wing
Alternate Operators		Dan George	Single Axle Sander w/ Plow & Wing (320)
		Fay Beals	4 Wheel Drive 1 Ton w/ Plow (372)
		Kelly Sand	4 Wheel Drive ¾ Ton w/Plow (349)
		Jon Keimig	Single Axle Sander w/ Plow & Wing (325)
		Bob Crowdes	4 Wheel Drive ¾ Ton w/ Plow (359)
		Al Wise	4 Wheel Drive ¾ Ton w/Plow (485)
		Mark Smith	Tandem Axle Sander w/ Plow and Wing (321)
		Allen Brown	Single Axle Sander w/ Plow & Wing (319)
		TBD	Single Axle Sander w/ Plow & Wing (337)

SAMPLE

RESIDENTIAL PLOWING/ICE CONTROL ZONE

SHIFT 2 ASSIGNMENTS

ZONE	TRUCK	DRIVER	TYPE
1	354	Robb McMahon	Single Axle Sander w/ Plow & Wing
2	342	Keith Licht	Single Axle Sander w/ Plow & Wing
3	318	Nathan Headley	Tandem Axle Sander w/ Plow & Wing
4	341	Jeff Munsinger	Single Axle Sander w/ Plow & Wing
5	315	Jeff Sherman	Tandem Axle Sander w/ Plow & Wing
6	340	Jon Thill	Single Axle Sander w/ Plow & Wing
7	329	Luke Quinn	Single Axle Sander w/ Plow & Wing
8	339	Don Tuel	Single Axle Sander w/ Plow & Wing
9	343	Michael Hagen	Single Axle Sander w/ Plow & Wing
10	324	Kevin Hershberger	Tandem Axle Sander w/ Plow & Wing
11	323	Brian Snyder	Tandem Axle Sander w/ Plow & Wing
Unimproved	333	Matt Dolan	Grader w/ Wing Plow
Rover	390/316	Beav McDaniel	Tandem Axle Sander w/ Plow & Wing
Rover	338	Mike Hiatt	Tandem Axle Sander w/ Plow & Wing
Alternate		Scott Thomas	
Operators		Sam Wyman	Single Axle Sander w/ Plow & Wing (320)
		Mark Lampe	4 Wheel Drive 1 Ton w/ Plow (372)
		Josh Reynolds	4 Wheel Drive ¾ Ton w/Plow (349)
		Laramie Sandbulte	Tandem Axle Sander w/ Plow & Wing (321)
		DeeAnn Fredericks	4 Wheel Drive ¾ Ton w/ Plow (485)
		Tony Hawbaker	Single Axle Sander w/ Plow & Wing (319)
		TBD	Single Axle Sander w/ Plow & Wing (337)
		TBD	Single Axle Sander w/ Plow & Wing (325)

SAMPLE

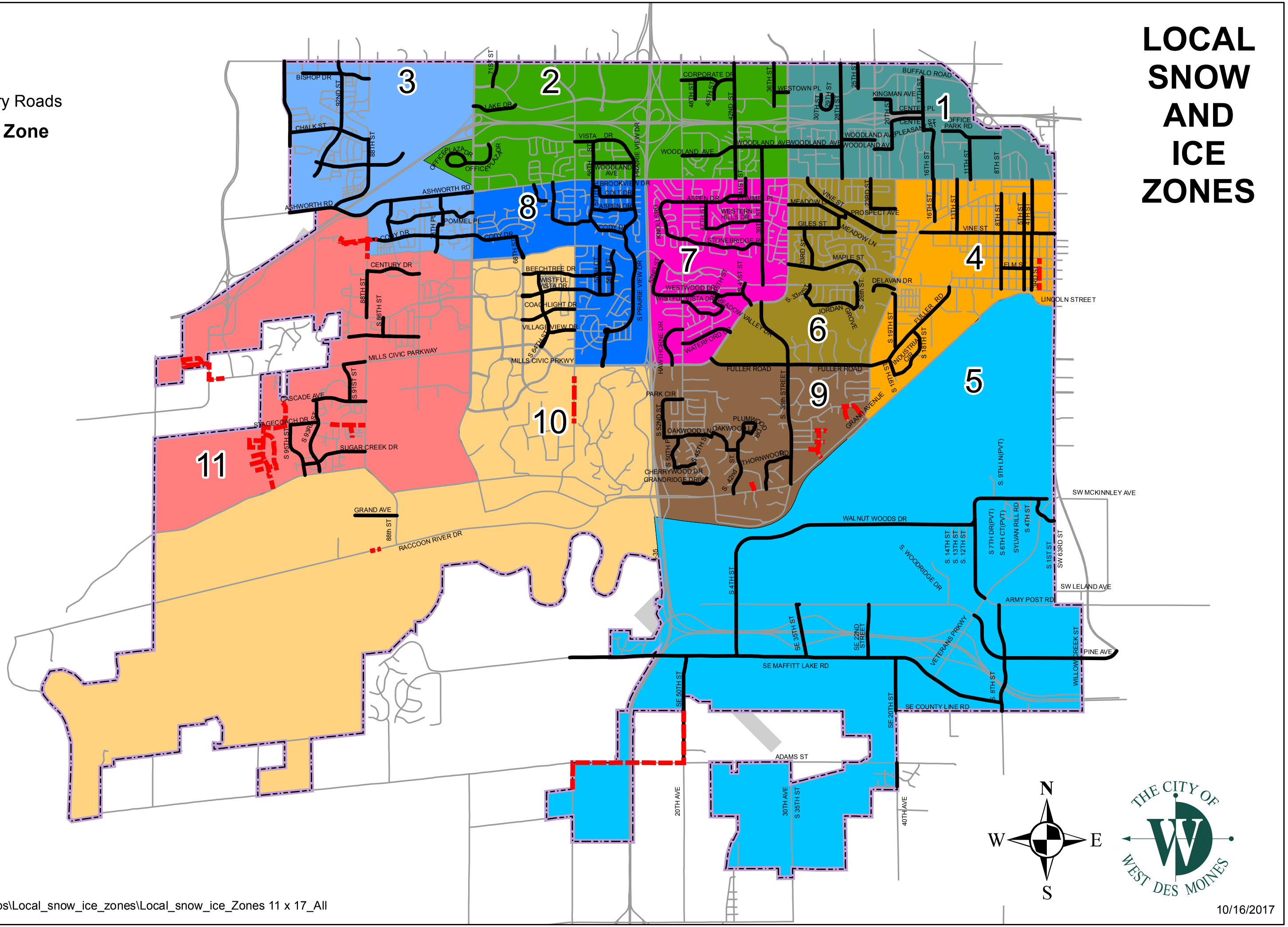
LOCAL SNOW AND ICE ZONES

Legend

- No Salt
- Secondary Roads

Snow and Ice Zone

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5
- Zone 6
- Zone 7
- Zone 8
- Zone 9
- Zone 10
- Zone 11



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10/16/2017

SAMPLE

UNIMPROVED STREETS PLOWING AREAS

SAMPLE

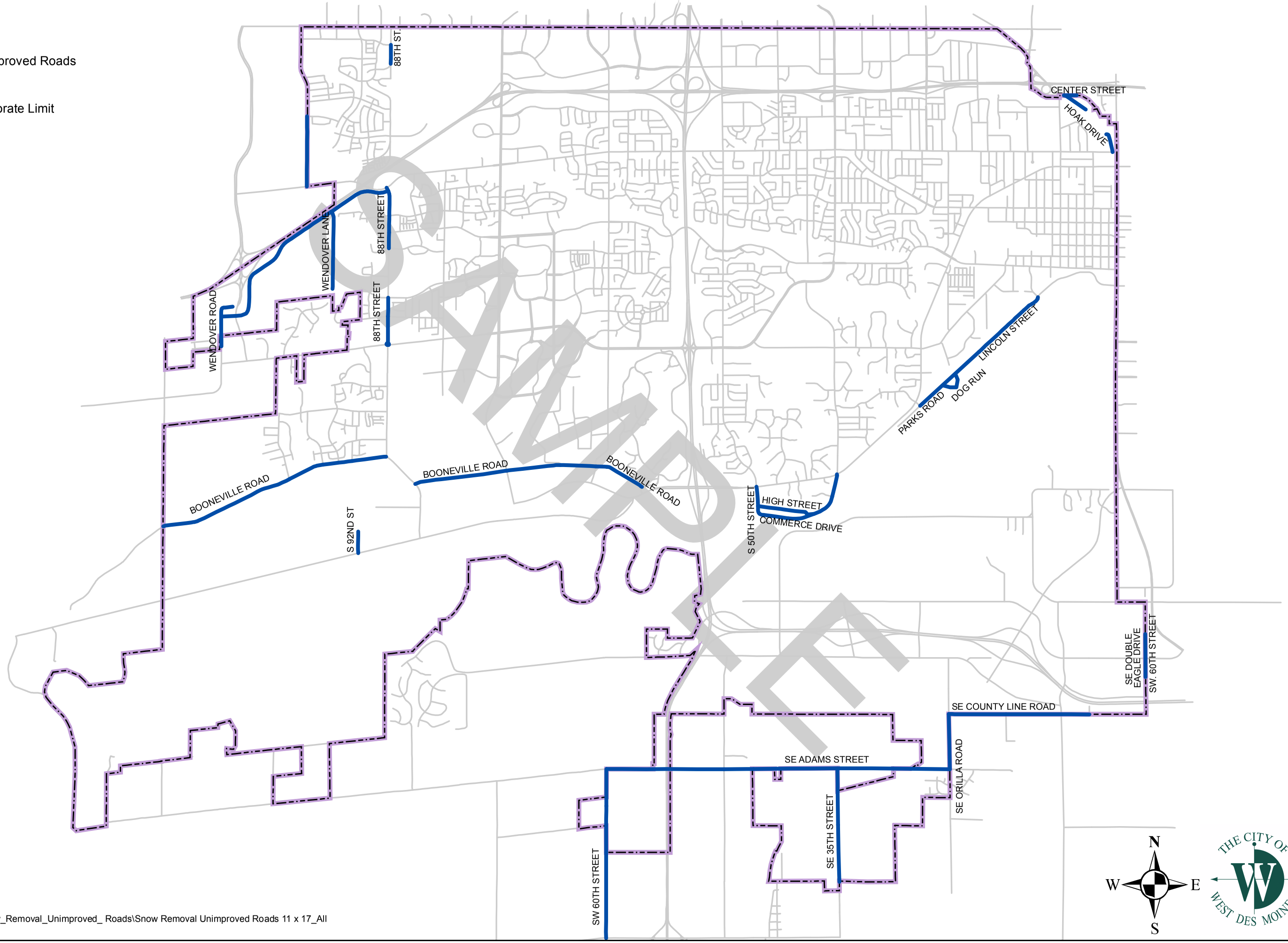
SAMPLE

SNOW REMOVAL UNIMPROVED ROADS

LEGEND

Unimproved Roads

Corporate Limit



S:\CADD\Maps\Snow_Maps\Snow_Removal_Unimproved_ Roads\Snow Removal Unimproved Roads 11 x 17_All

10/16/2017

SAMPLE

Trails, City Facility Parking Lots, City owned Sidewalks

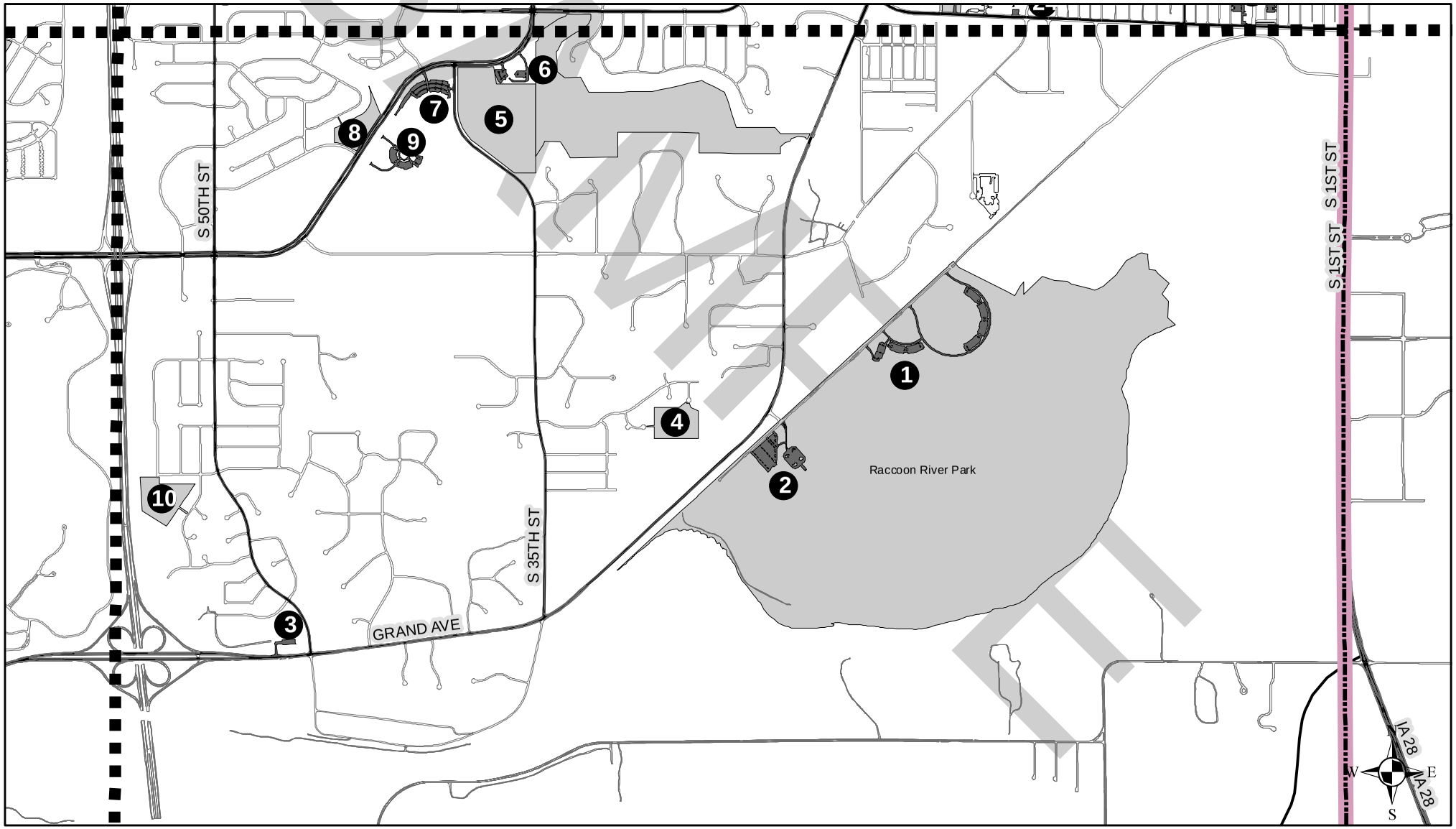
SAMPLE

SAMPLE

CITY PARKING LOTS (1 of 4)

City Parking Lots

1. Nature Lodge/Softball Complex
2. Boat Ramp/Soccer Complex
3. Fire Station #18
4. Scenic Valley Park
5. South Woods Park
6. Law Enforcement Center
7. Library
8. Ashawa Park
9. City Hall
10. Quail Cove Park
11. Fire Station #19
12. Valley View Park (aquatic)
12. Valley View Park (west lot)
13. Willow Springs Park
14. Wild Rose Park
15. Jaycee Park
16. Peony Park
17. Fire Station #22
18. CrossRoads Park
19. Jordan Creek Park
20. Fire Station #21
21. Pearson Park
22. Fairmeadows Park
23. Holiday Park
24. Fire Station #17
25. Wilson Park
26. Valley Junction
27. Legion Park
28. Maple Grove Park
29. 39th Street Parking Lot



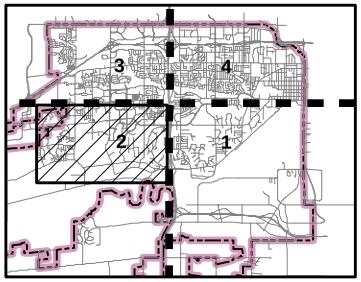
DRAFT

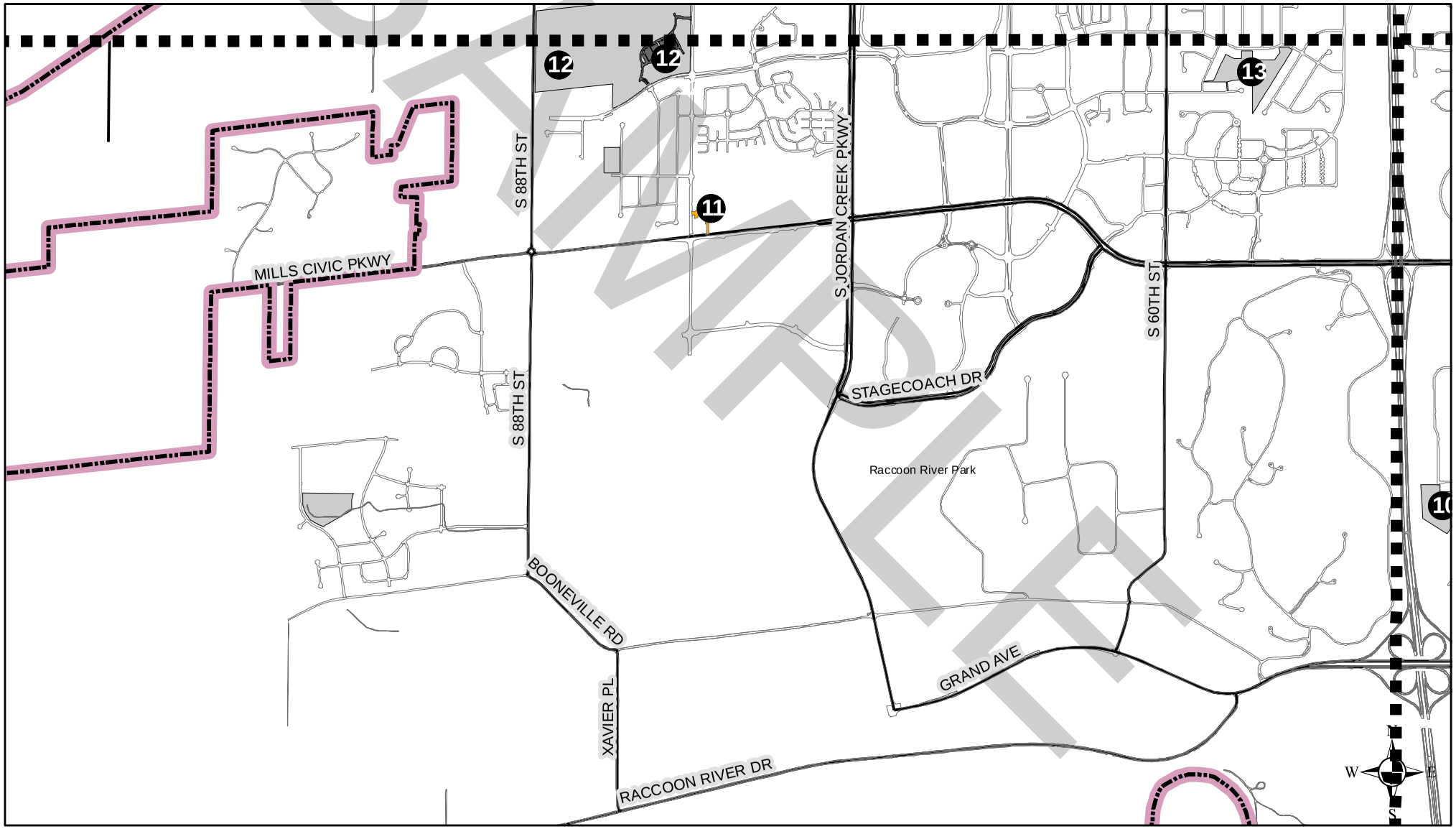
edited 10/20/17

CITY PARKING LOTS (2 of 4)

City Parking Lots

1. Nature Lodge/Softball Complex
2. Boat Ramp/Soccer Complex
3. Fire Station #18
4. Scenic Valley Park
5. South Woods Park
6. Law Enforcement Center
7. Library
8. Ashawa Park
9. City Hall
10. Quail Cove Park
11. Fire Station #19
12. Valley View Park (aquatic)
12. Valley View Park (west lot)
13. Willow Springs Park
14. Wild Rose Park
15. Jaycee Park
16. Peony Park
17. Fire Station #22
18. CrossRoads Park
19. Jordan Creek Park
20. Fire Station #21
21. Pearson Park
22. Fairmeadows Park
23. Holiday Park
24. Fire Station #17
25. Wilson Park
26. Valley Junction
27. Legion Park
28. Maple Grove Park
29. 39th Street Parking Lot





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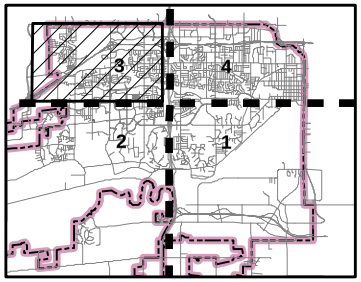
edited 10/20/17

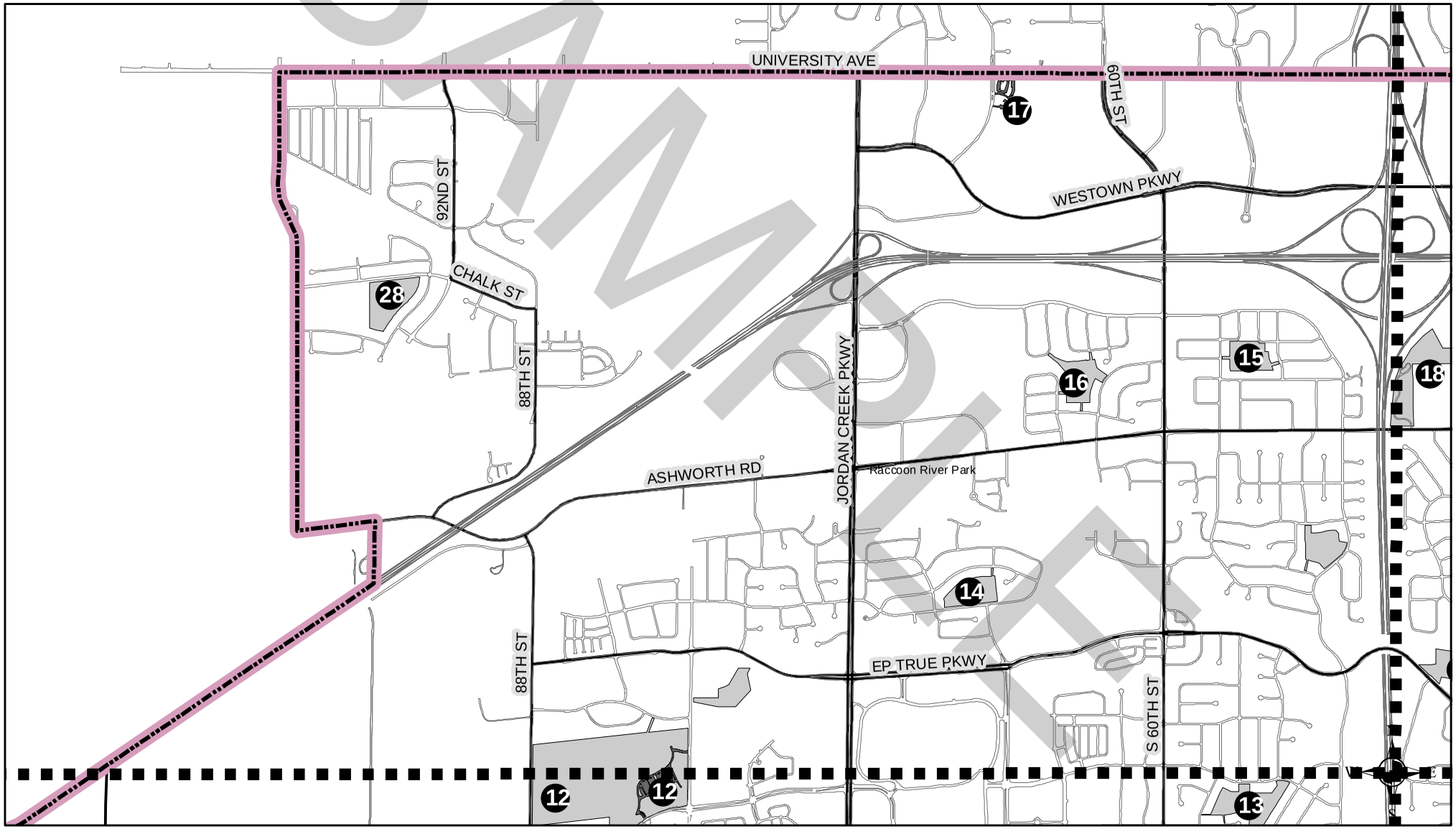
CITY PARKING LOTS (3 of 4)

THE CITY OF WEST DES MOINES

City Parking Lots

1. Nature Lodge/Softball Complex
2. Boat Ramp/Soccer Complex
3. Fire Station #18
4. Scenic Valley Park
5. South Woods Park
6. Law Enforcement Center
7. Library
8. Ashawa Park
9. City Hall
10. Quail Cove Park
11. Fire Station #19
12. Valley View Park (aquatic)
12. Valley View Park (west lot)
13. Willow Springs Park
14. Wild Rose Park
15. Jaycee Park
16. Peony Park
17. Fire Station #22
18. CrossRoads Park
19. Jordan Creek Park
20. Fire Station #21
21. Pearson Park
22. Fairmeadows Park
23. Holiday Park
24. Fire Station #17
25. Wilson Park
26. Valley Junction
27. Legion Park
28. Maple Grove Park
29. 39th Street Parking Lot





SAMPLE

edited 10/20/17

CITY PARKING LOTS (4 of 4)

THE CITY OF WEST DES MOINES

City Parking Lots

1. Nature Lodge/Softball Complex
2. Boat Ramp/Soccer Complex
3. Fire Station #18
4. Scenic Valley Park
5. South Woods Park
6. Law Enforcement Center
7. Library
8. Ashawa Park
9. City Hall
10. Quail Cove Park
11. Fire Station #19
12. Valley View Park (aquatic)
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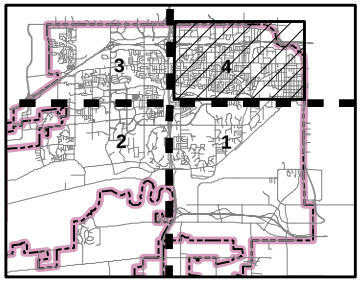
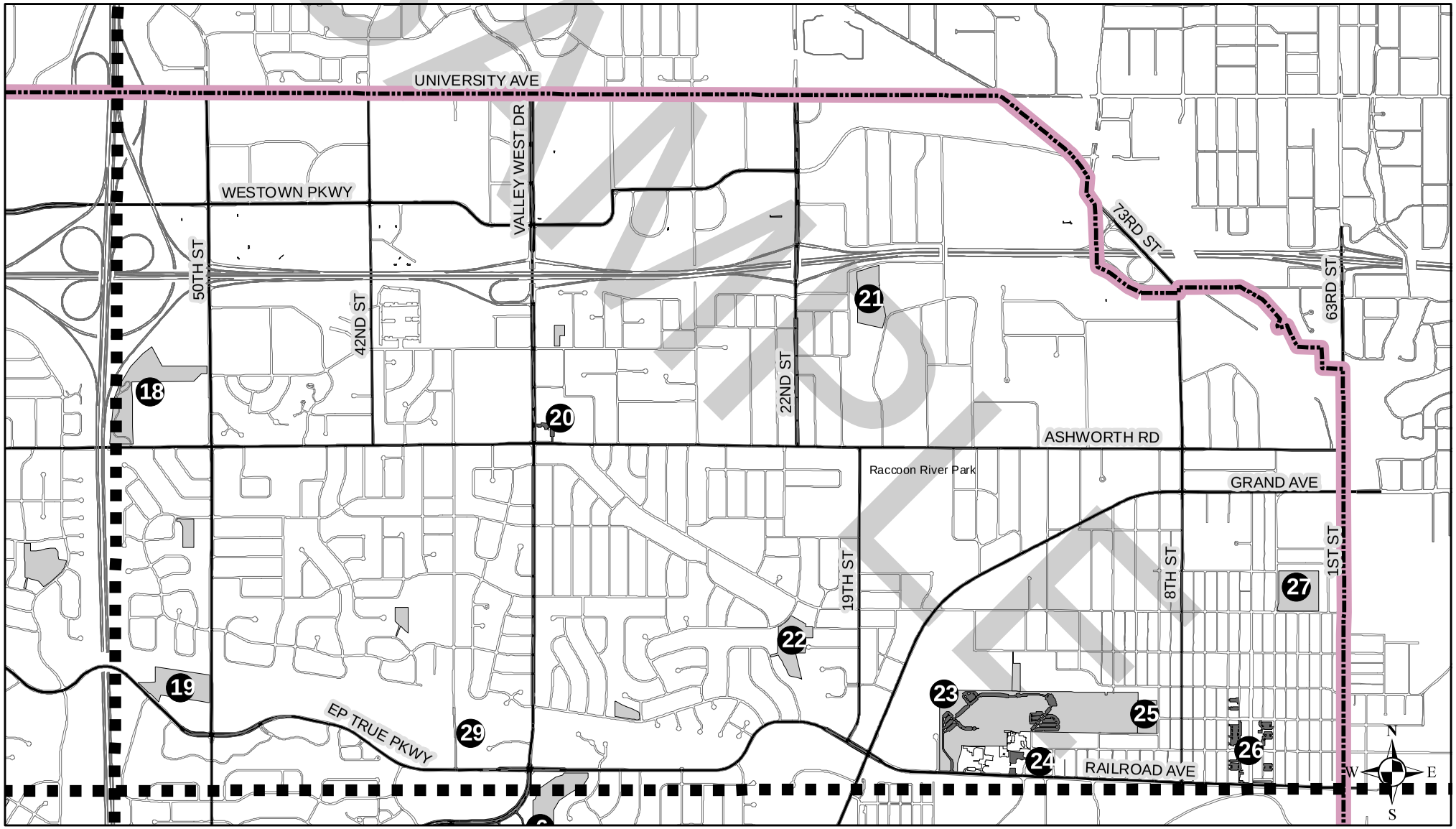
28. Maple Grove Park
29. 39th Street Parking Lot





SAMPLE

edited 10/20/17

City Hall
4200 Mills Civic Pkwy

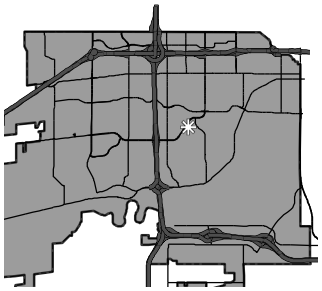
Building

No Parking Area

Plow Direction

Snow Dump Area

edited 10/29/15



Plow roadways to designated sides and/or plow lots to snow dump areas. Plow all entrances to the south and pile across the interior cross street in designated snow dumps.

HOT SPOT -> the west drive from the Valley Stadium entrance to the lot has a tendency to drift.

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MILLS CIVIC PKWY

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O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2010

Library
4000 Mills Civic Pkwy

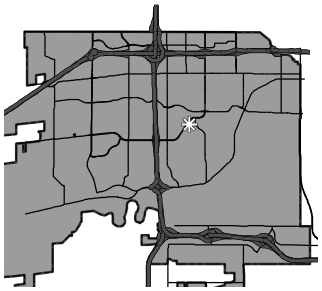
Building

No Parking Area

Plow Direction

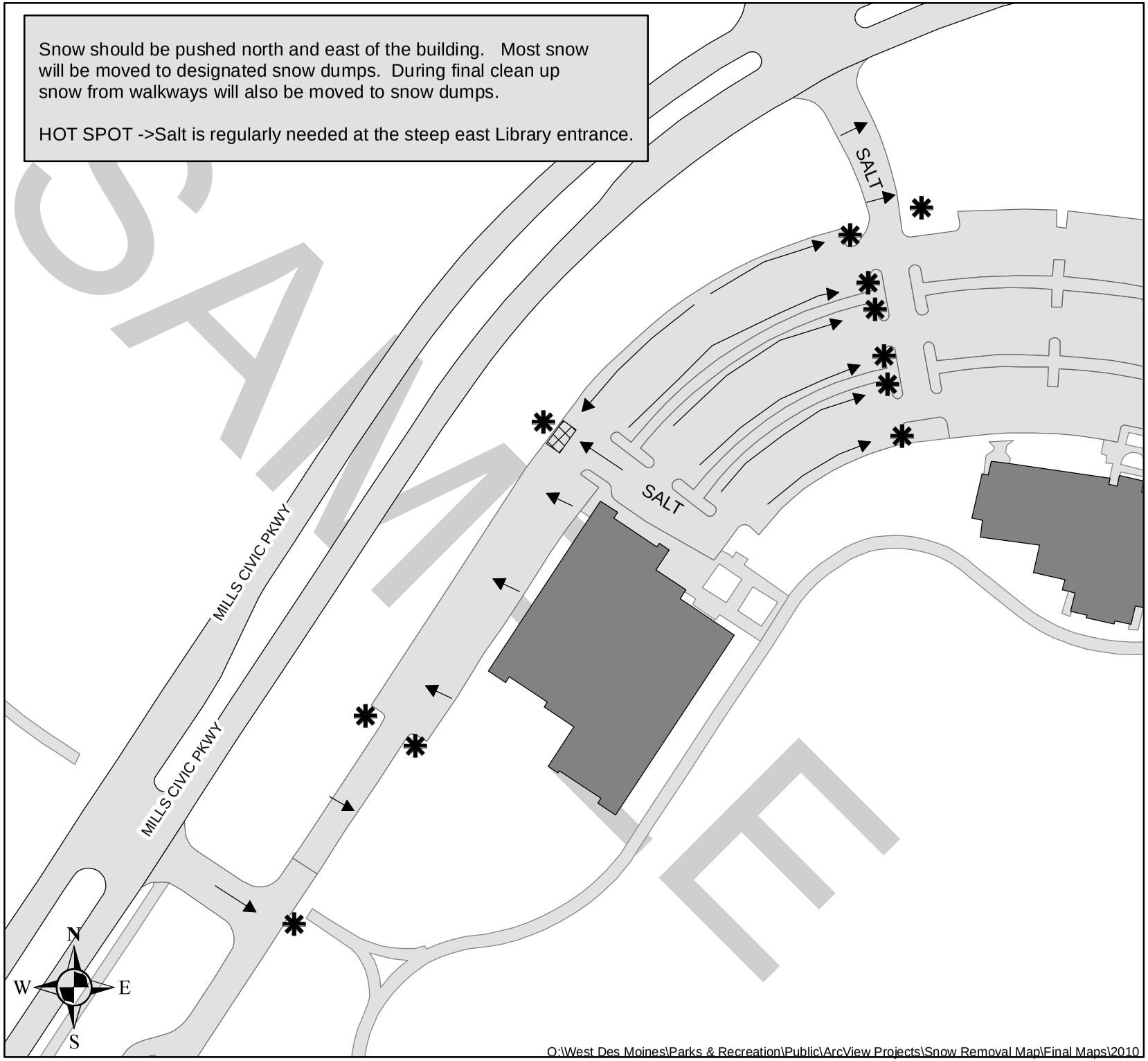
Snow Dump Area

edited 09/23/10



Snow should be pushed north and east of the building. Most snow will be moved to designated snow dumps. During final clean up snow from walkways will also be moved to snow dumps.

HOT SPOT ->Salt is regularly needed at the steep east Library entrance.



SAMPLE

Law Enforcement Center

250 Mills Civic Pkwy

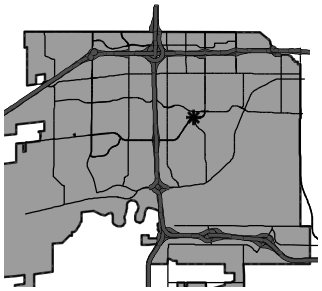
Building

No Parking Area

Plow Direction

Snow Dump Area

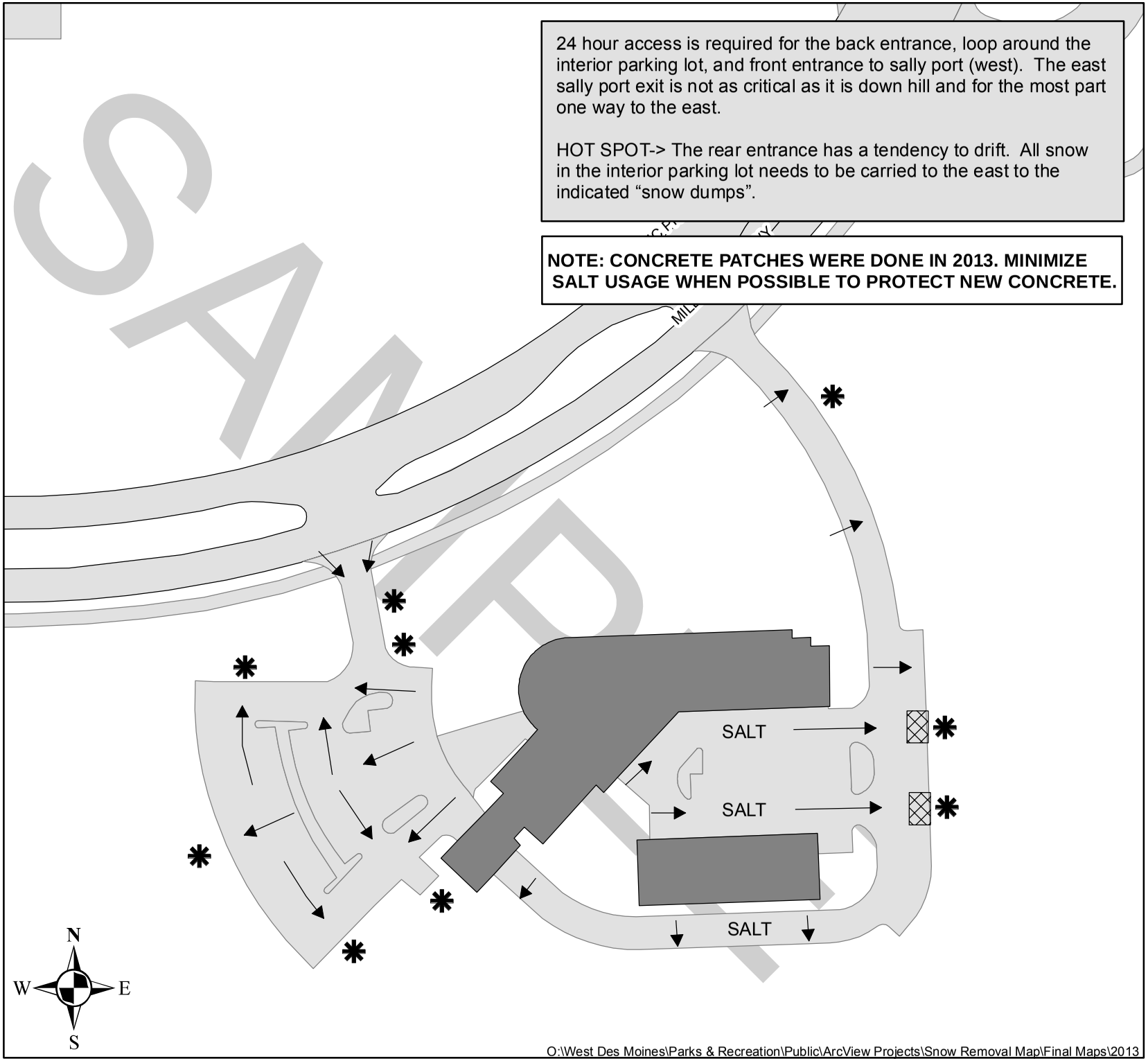
edited 09/26/13



24 hour access is required for the back entrance, loop around the interior parking lot, and front entrance to sally port (west). The east sally port exit is not as critical as it is down hill and for the most part one way to the east.

HOT SPOT-> The rear entrance has a tendency to drift. All snow in the interior parking lot needs to be carried to the east to the indicated “snow dumps”.

NOTE: CONCRETE PATCHES WERE DONE IN 2013. MINIMIZE SALT USAGE WHEN POSSIBLE TO PROTECT NEW CONCRETE.



SAMPLE

O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2013

Fire Station #17
1401 Railroad Ave.

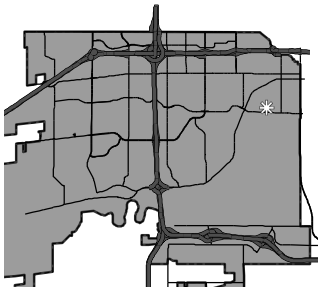
Building

No Parking Area

Plow Direction

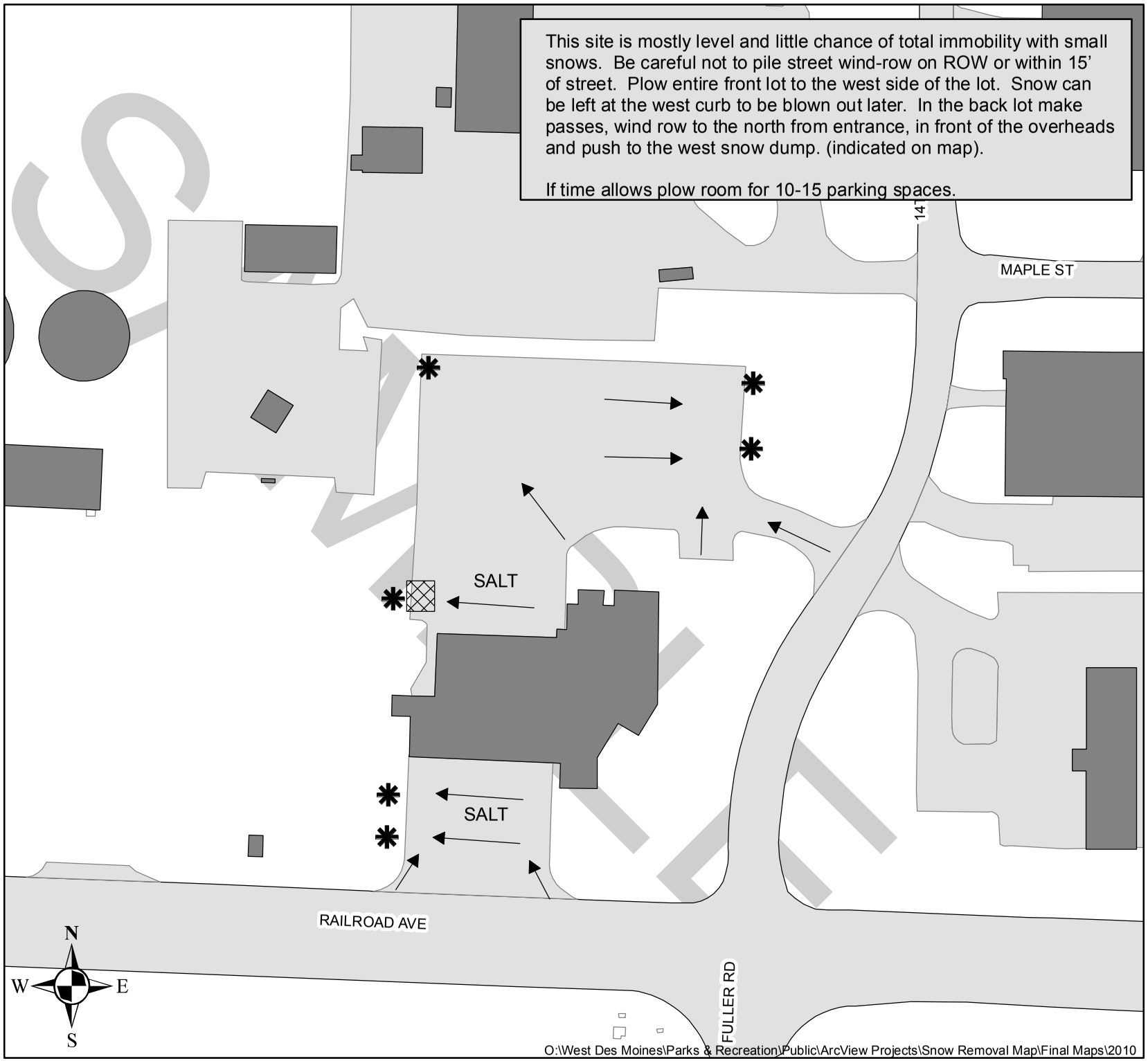
Snow Dump Area

edited 09/23/10



This site is mostly level and little chance of total immobility with small snows. Be careful not to pile street wind-row on ROW or within 15' of street. Plow entire front lot to the west side of the lot. Snow can be left at the west curb to be blown out later. In the back lot make passes, wind row to the north from entrance, in front of the overheads and push to the west snow dump. (indicated on map).

If time allows plow room for 10-15 parking spaces.



O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2010

Fire Station #18
5025 Grand Ave.

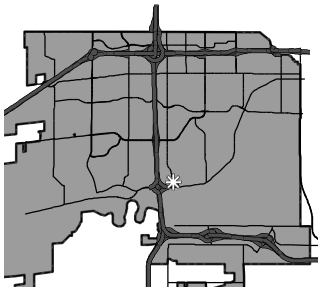
Building

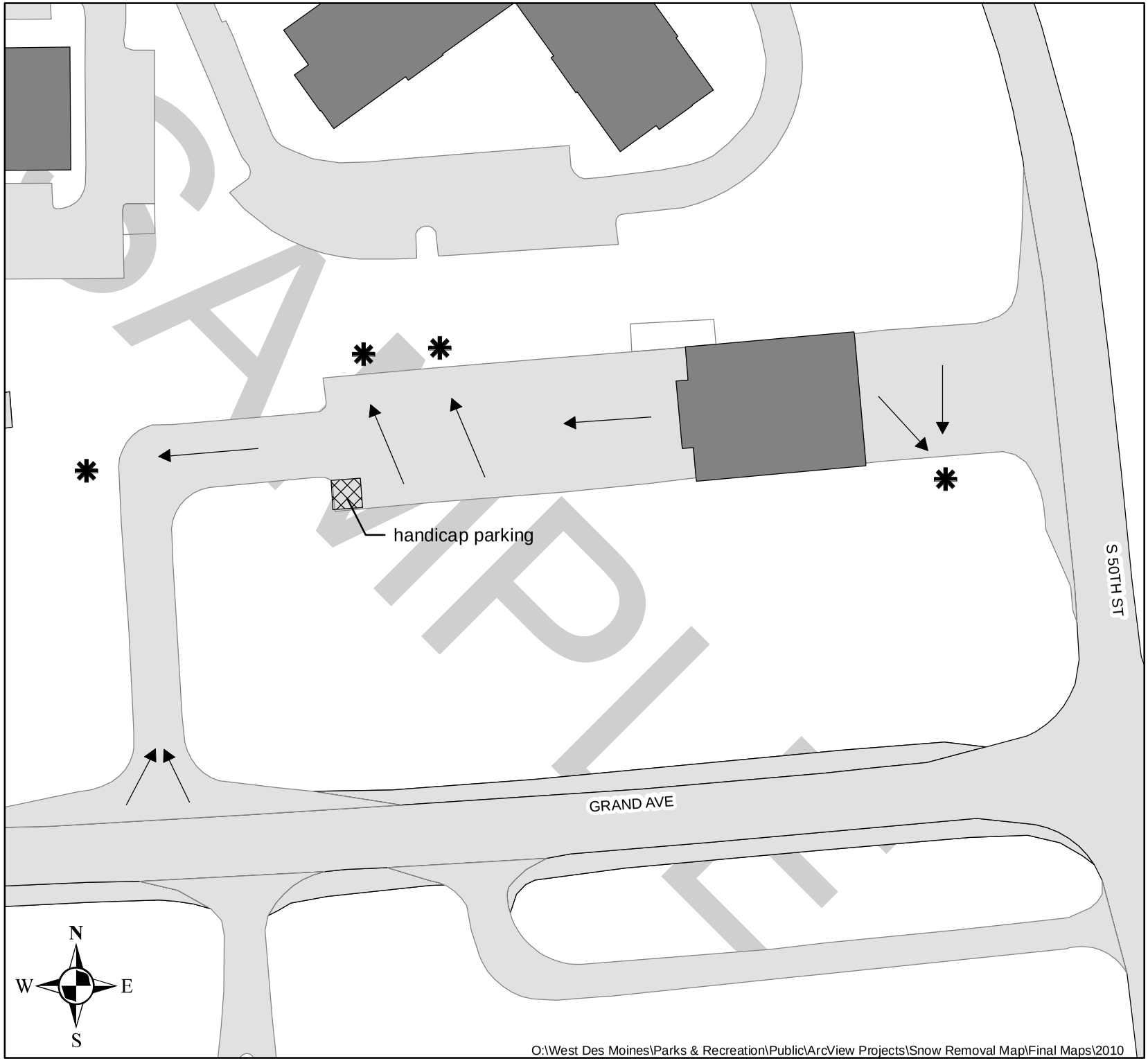
No Parking Area

Plow Direction

Snow Dump Area

edited 09/23/10





O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2010

Fire/EMS Station #19

8055 Mills Civic Pkwy

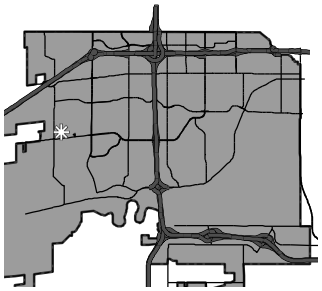
Building

No Parking Area

Plow Direction

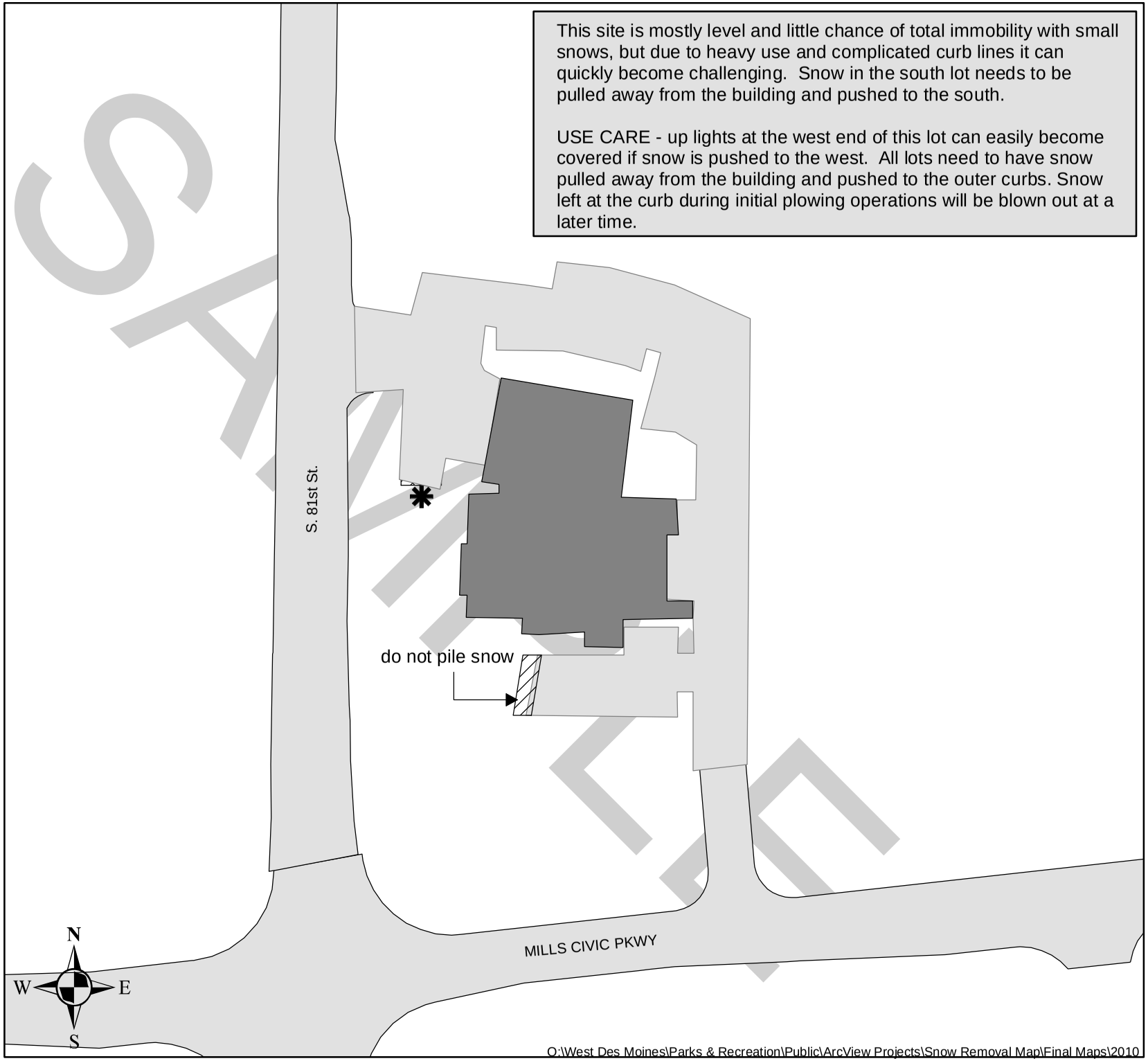
Snow Dump Area

edited 09/23/10



This site is mostly level and little chance of total immobility with small snows, but due to heavy use and complicated curb lines it can quickly become challenging. Snow in the south lot needs to be pulled away from the building and pushed to the south.

USE CARE - up lights at the west end of this lot can easily become covered if snow is pushed to the west. All lots need to have snow pulled away from the building and pushed to the outer curbs. Snow left at the curb during initial plowing operations will be blown out at a later time.



SAMPLE

O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2010

Fire Station #21
3421 Ashworth Rd.

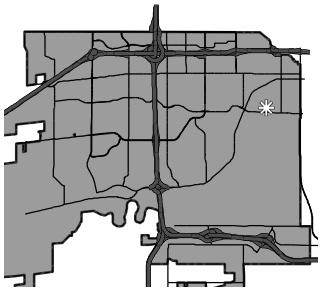
Building

No Parking Area

Plow Direction

Snow Dump Area

edited 09/26/14



The front lot is critical to plow and salt often. HOT SPOT -> Fire trucks need to be able to back up and into overhead doors when returning from a call. The steep angle of lot complicates ability to do so. Plow in from the street and pile to the west as much as possible. Fire staff will also have a supply of salt at the overheads for emergency use.

For the rest of the lot, try to maintain a drive through and pull snow away from north overheads, walks and east main door entrances. All snow in the north lot needs to be pushed to the north curb. Snow in the east lot can go to east and south as to the indicated snow dumps. Snow pile will be blown out at a later time. This facility is staffed 24/7 and has many overhead and pedestrian entrances. This combination can make finding a spot for the snow challenging. Piles that are not pushed to the curb during initial plowing operations can be moved during, or after, clean up.

NOTE: ENTIRE CONCRETE PARKING LOT WAS REPLACED IN 2014. WHEN POSSIBLE, MINIMIZE SALT USAGE TO PROTECT NEW CONCRETE.

VALLEY WEST DR

SALT

SALT

SALT

ASHWORTH RD

N

W

E

S

SAMPLE

O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2014

Fire Station #22
1801 68th St.

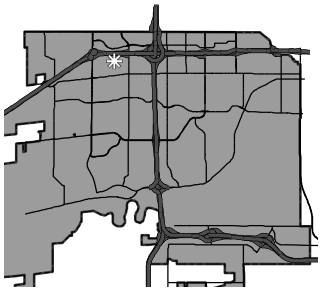
Building

No Parking Area

Plow Direction

Snow Dump Area

edited 09/23/10



Access to the east doors can become tricky. Snow needs to be pulled away from the east overheads and parking areas and then moved to the north or east side of the lot. This is an uphill procedure and can be challenging. This area also needs frequent salt applications.

Snow at the west overhead door should be pulled away from the door and piled to the south side of the drive. All of the snow in the south parking needs to be plowed to the south and/or north.

68TH ST

SALT

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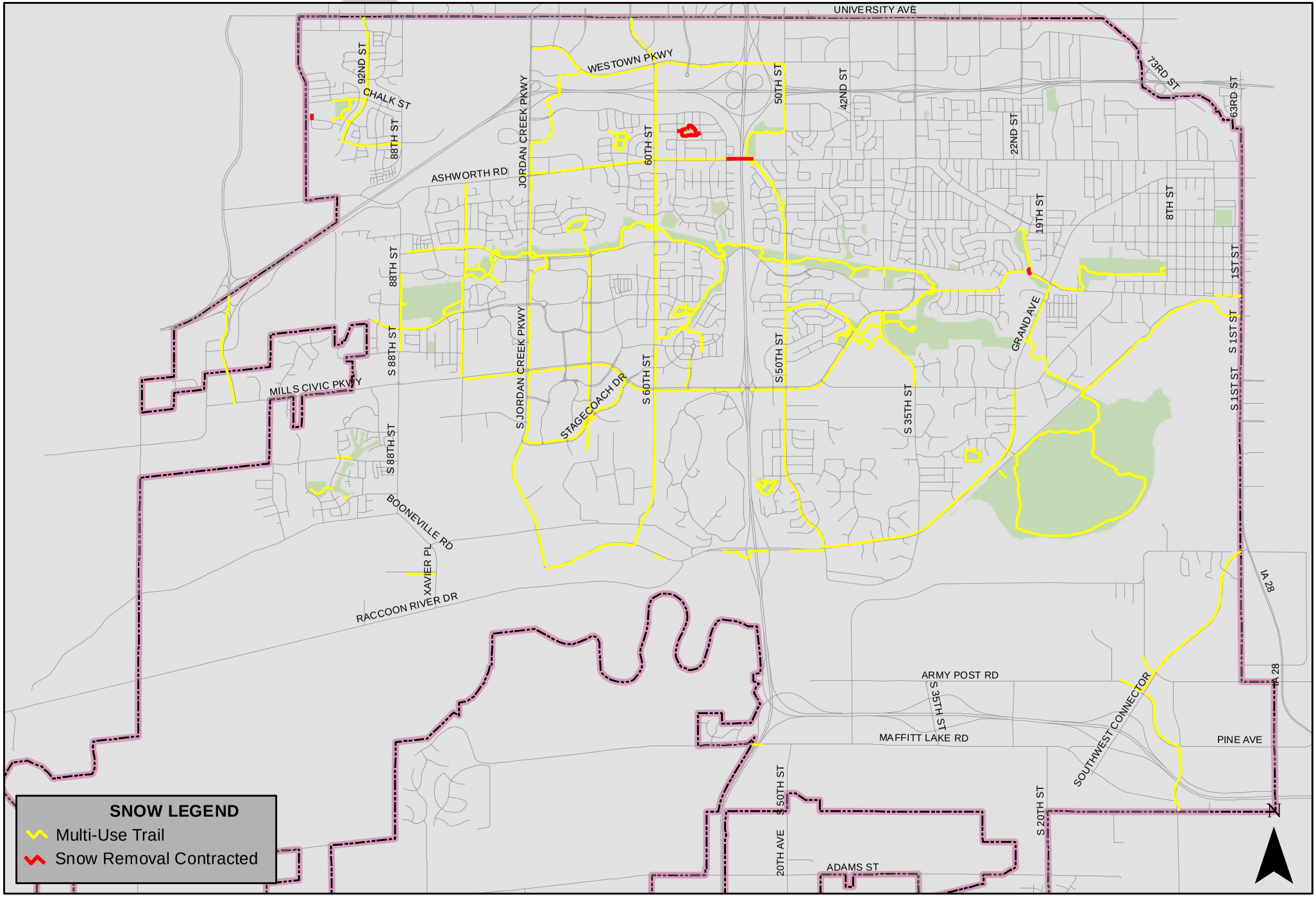
W
E
S

SAMPLE

O:\West Des Moines\Parks & Recreation\Public\ArcView Projects\Snow Removal Map\Final Maps\2010

2017
MULTI-USE TRAIL
SNOW REMOVAL MAP

0 0.25 0.5 1 Miles



SAMPLE

PARKING LOTS/ SIDEWALK CLEANING PRIORITIES

SAMPLE

SAMPLE

CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

PARKING LOTS

*Performed by snow contractor

Priority	**Description**	**Address**
1.	Fire Station #17	1401 Railroad
2.	Fire Station #18	S. 50th & Grand Avenue
3.	Public Safety #19	8055 Mills Civic Parkway
4.	Fire Station #21	3421 Ashworth Road
5.	Fire Station #22	1801 68th Street
6.	Law Enforcement Center	250 Mills Civic Parkway
7.	Library *(PW assist with outer area of lot)*	4000 Mills Civic Parkway
8.	City Hall *(PW assist with outer area of lot)*	4200 Mills Civic Parkway
9.	*Former* Human Services Building	318 5th Street
10.	Human Services Building	139 6th Street
11.	RRP Nature Lodge	2500 Grand Avenue
12.	Valley Junction Parking Lots	200 Block 4th Street 200 Block 6th Street 100 Block 6th Street 100 Block 4th Street 300 Block 6th Street
13.	*Former* Phenix School	415 7th Street
14.	Parks Maintenance Yard	1421 Maple
15.	City Parks *(PW will plow from the end of Lincoln to Grand, the loop around the softball complex and dog park at RRP)*	Legion, Fairmeadows, Pearson, Crossroads, Holiday, Jaycee, Southwoods, 50th Street, RRP, Boat Ramp, Willow Springs, Scenic Valley, Wild Rose, Ashawa, Valley View
16.	Jordan Cemetery	2600 Block Fuller Road

SAMPLE

SIDEWALK SNOW REMOVAL

*Performed by snow contractor

Priority	Description	Length (feet)
1	School Crossing Guard Locations: Clear guard parking areas and sidewalk access to street at all corners A. 8th Street & Ashworth Road B. 8th Street & Grand Avenue C. 8th Street and Vine Street D. 22nd Street and Ashworth Road E. 50th Street and Ashworth Road F. 50th Street and Woodland Avenue G. Valley West Drive and Giles/Western Hills H. 39th Street and Western Hills Drive I. 56th Street and Highland Court J. Grand Ave and Vine Street K. Prairie View Drive and Ashworth Rd	
2	A. City Parking Lot – 200 Block 4th Street 4th Street Elm Street Pedestrian Walkway B. City Parking Lot – 200 Block 6th Street 6th Street Maple Street C. City Parking Lot – 100 Block 6th Street 6th Street Maple Street Pedestrian Walkway to 5th Street D. City Parking Lot – 100 Block 4th Street 4th Street Pedestrian Walkway to 5th Street Railroad Place E. City Parking Lot – 300 Block 6th Street 6th Street Former Human Services Building	1080 509 837 486 521
3	Hillside Avenue Sidewalk (Between 9th St and 11th St)	600
4	Hillside Street Sidewalk (leading to Sacred Heart School)	125
5	*Former* Phenix School property (415 7th Street)	2,800
6	Woodland Hills Park (sidewalk along S. 95th & S. 93rd Street)	1,028
7	Woodland Hills Greenway (sidewalks along Stagecoach Dr, Harper Ln, & Sugar Creek Dr)	868
8	Southwoods Park (350 S. 35th Street)	1,720
9	Waterford Greenway sidewalks	476
10	Ashawa Greenway sidewalks	930

Priority	Description	Length (feet)
11	Ashawa Park (4431 Waterford Drive)	1,359
12	Fire Station #21 sidewalks	544
13	Fire Station #17 sidewalks	1084
14	Fire Station #22 sidewalks	214
15	Fire Station #18 sidewalks	784
16	Public Safety Station #19 sidewalks	552
17	Fairmeadows Park (543 22nd Street)	729
18	Fairmeadows North Greenway (Meadow lane & 27th Street)	355
19	50th Street near Lowes	65
20	42nd Street @ I-235	273
21	Valley West Drive @ I-235	355
22	28th Street @ I-235	468
23	22nd Street @ I-235	648
24	17th Street @ I-235	592
25	Pearson Park (1256 19th Street)	569
26	Fairmeadows Greenway sidewalks (EP True Pkwy)	169
27	Beh Glen Greenway sidewalk (Grand Ave)	442
28	Kiwanis Park (3101 Maple Street)	571
29	Jordan Creek Greenway – EP True Pkwy east of Valley West Dr	365
30	Jordan Creek Greenway – Valley West Dr	416
31	Jordan Creek Greenway - E.P. True & 39th Street	812
32	Jordan Creek Greenway - E.P. True west of rugby fields	1899
33	Jordan Creek Greenway – 50th Street	555
34	Jordan Creek Greenway – under I35 bridge	935
35	Jordan Creek Greenway - Prairie View Dr	775
36	Jordan Creek Greenway – 60th Street north of tracks	315
37	Jordan Creek Greenway – 60th Street	187
38	Jordan Creek Greenway – EP True Pkwy west of Polo Apts.	90
39	Jordan Creek Greenway – 68th Street	306
40	Jordan Creek Greenway – Jordan Creek Pkwy	888
41	Western Hills Park – 4100 Block of Walnut	30
42	Knolls Park sidewalks (5150 Aspen Dr)	201
43	Knolls Greenway South	974
44	Knolls Greenway North	475
45	Crossroads Park (5205 Ashworth Rd)	28
46	Meadowview Park sidewalks (638 Prairie View Dr)	720
47	Meadowview Greenway sidewalks	172
48	Jaycee Park sidewalks (5608 Center Street)	931
49	Legion Park sidewalks (301 Vine Street)	1351
50	1017 Maple Street (open lot)	48
51	100 11th Street (open lot)	159
52	100 13th Street (open lot)	188
53	Parks Maintenance Facility (1421 Maple Street)	253
54	Water Works Facility (Railroad Ave)	510

SAMPLE

Priority	**Description**	**Length (feet)**
55	Scenic Valley Park (1223 S. 24th Street)	64
56	Scenic Valley Greenway (S. 34th St and Scenic Valley Dr)	447
57	Peony Park (1100 63rd Street)	303
58	Willow Springs Park (5685 Wistful Vista Dr)	545
59	Wild Rose Park (6801 Cody Drive)	210
60	1st Street north of Vine Street (open lot)	1185
61	1st Street east of bowling alley (open lot)	526
62	221 8th Street (open lot)	100
63	Wilson Park (298 9th Street)	538
64	Florer Park (1410 Locust Street)	688
65	Jordan Cemetery (2950 Fuller Rd)	893
66	Mills Civic Pkwy @ I35 overpass	822
67	Huston Ridge Park (8455 Coachlight Dr)	1161
68	Valley View Park (255 81st Street)	100
69	1859 University Ave (Pump House)	102
70	Grand Ave, west of Fire Station #18 (open lot)	963

TRAIL SNOW REMOVAL

Priority	**Description**	**Length (miles)**
1	50th /S. 50th Street Trail	3.57
2	60th / S. 60th Street Trail	2.68
3	68th / S. 68th Street Trail	1.27
4	81st / S. 81st Street Trail	1.18
5	88th / S. 88th Street Trail	.44
6	92nd Street Trail	.81
7	Army Post Rd Trail	.19
8	Ashawa Greenway Trail	.75
9	Ashworth Rd Trail	1.24
10	Bridgewood Blvd Trail	.64
11	Chalk Street Trail	.26
12	Cody Drive Trail	.12
13	EP True Pkwy Trail	1.57
14	Grand Ave Trail	2.23
15	Jordan Creek Pkwy Trail	3.26
16	Lake Dr Trail	.17
17	Mills Civic Pkwy Trail	3.45
18	Office Plaza Dr Trail	.28

SAMPLE

Priority	Description	Length (miles)
19	Pine Avenue Trail	.02
20	Railroad Ave Trail	.43
21	S. 8th Street Trail	.05
22	S. 11th Street Trail	.16
23	S. 19th Street Trail	.48
24	S. 35th Street Trail	.66
25	S. Prairie View Dr Trail	.13
26	Stagecoach Dr Trail	.92
27	Sugar Street Trail	.04
28	Veterans Pkwy Trail	1.36
29	Vista Dr Trail (bridge over I-80)	.45
30	Westown Pkwy Trail	2.06
31	Maffitt Lake Rd trail bridge	.08
32	Ashawa Park Trail	.36
33	Brookview Park Trail	.18
34	City Campus Trail	.72
35	Crossroads Park	.47
36	Fairmeadows Greenway Trail	.32
37	Fairmeadows Park Trail	.18
38	Holiday Park Trail	.87
39	Jaycee Park Trail	.4
40	Jordan Creek Greenway Trail	6.07
41	Knolls Greenway Trail	.82
42	Levee Trail	1.56
43	Maple Grove Park Trail	.45
44	Peony Park Trail	.67
45	Quail Cove Park	.26
46	Raccoon River Park Trail	1.17
47	Scenic Valley Park Trail	.39
48	Southwoods Park Trail	.43
49	Valley View Park Trail	.25
50	Westridge Greenway Trail	.66
51	Wild Rose Park	.33
52	Willow Springs Park	.63
53	Wilson Park	.09
54	Woodland Hills Greenway Trail	.06

SAMPLE

Guidelines for Plowing Public Safety Locations and City Parking Lots

General plowing guidelines for all properties:
When plowing for access only, (during overnight storms and open business hours) push along main drives to designated areas. Detailed plowing will follow storm (generally 4 am to 10 am). Keep lot access open and/or work to reduce total snow accumulation by plowing to snow dumps. Key areas that may reduce ability for access are listed as "hot spots".

Push all public street entrances to an interior area of the parking lot. DO NOT pile snow at entrances or on ROW. (NO "Guard Dogs")

When possible, plow windrows to downwind locations to help avoid drifting. Arrows on maps show the direction to plow based on prevalent wind directions.

Move as much snow as feasible to snow dump locations listed on maps. If the piles become too large for the location City staff will work to distribute following initial plowing operations.

Plow snow away from entrances, overhead doors, walkways and handicap parking.

On occasion, the City will clear snow from areas that are normally the responsibility of the private property owner. This will only be in circumstances where the removal is incidental to snow removal being performed on sidewalks, trails, or parking lots that are the City's responsibility. This will be done primarily to maximize efficiency of City snow removal operations, and not for the benefit of the private property owner. Example: Two City properties may be separated by private property; rather than backing up and/or leaving the sidewalk by driving across the grass parking area out into the street, the City employee may continue to remove snow from the sidewalk across the private property in order to access the adjacent City property.

Public Safety

During snow events:
For storms that begin late in the day, continue overnight and are more than 4" in depth, or when drifting occurs, access for emergency vehicles need to be maintained. If a site has a specific need they will call dispatch with the request. Each site has different "hot spots" that should be addressed prior to the need if possible.

During ice events:
All public safety facilities need to have salt applied with careful attention to "hot spots".

Raccoon River Park

Plow main roadway from Grand to Lincoln and loop around softball complex. Use caution at center median islands located on the main park road, as the roadway may be too narrow to plow with all equipment.

All Other Parking Lots

During snow events:
Overnight access is not generally important. If time allows see description on map for instructions.

During ice events:
Salt as able

SAMPLE

TYPICAL WORK REPORTS

SAMPLE

SAMPLE

DAILY WORK RECORD

Date:_____ **Print**
Name:_____

Act. Code	Description & Log (Anything coded for Miscellaneous must be explained)	Veh#	Mileage Reading or Time (Calculate the Total. Use **miles** unless there is no odometer)	Equip #	Hrs Used	# Loads	Hrs Worked
	_____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____		_____ Ending (less) _____ Beginning = Total				
	_____ _____ _____		_____ Ending (less) _____ Beginning = Total				
						Total Hours Worked	
Explain Away from Work: (e.g., Sick Leave, Worker's Comp, C-time, Vacation, Casual Day, etc.)						Total Hours Not Worked	
Employee Signature _X_____			Total Paid Hours				

SAMPLE

OPERATOR DAILY VEHICLE INSPECTION REPORT

Vehicle # _____ Miles _____ Hours _____ Date _____

☐ I detect no defect in this motor vehicle as would be likely to affect the safety of its operation or Result in its mechanical breakdown.

☐ I detect the following defect in this unit:
Indicate defects on tractor, trailer, or tires. Supply adequate information to assist the mechanic in making the proper repairs.

_____

_____

_____

_____

Signature of Inspecting Operator X_____

MECHANIC/CREW CHIEF EVALUATION

☐ Defects Corrected ☐ Defects need not be corrected for safe operation of unit

Signature of Mechanic or Supervisor X_____

VERIFICATION OF INSPECTION REPORT FROM PREVIOUS OPERATOR

Date _____ Signature of next operator on unit X_____

SAMPLE

OPERATING INSTRUCTIONS AND SAFETY RULES

SAMPLE

SAMPLE

CITY OF WEST DES MOINES

SNOW AND ICE CONTROL PROCEDURES

OPERATING INSTRUCTIONS AND SAFETY RULES

1. WORK HOURS

For major storm events, two 12 hour shifts will be established at the discretion of the Director of Public Services and/or Deputy Director of Public Services.

2. SAFETY PROCEDURES

Safety is paramount during any snow storm. The following safety rules will be observed by all equipment operators.

A. Check your snow removal equipment prior to leaving the yard and also the following:

1) All work lights and emergency lights
2) Two-way radio
3) Snow plow and frame for damage
4) Sander
5) Rear view mirrors
6) Flags and reflectors
7) Windshield wipers
8) Heater and defroster
9) All necessary mapping for snow and ice removal
10) Vehicle Inspection Items
11) Liquid dispensing apparatus

B. Report any non-working equipment to a Supervisor immediately.

C. Use reasonable caution in operation of snow removal equipment.

D. Drive cautiously.

E. Utilize caution when operating in cramped quarters with parked cars on a street.

F. Know your route and any fixed objects covered by snow.

G. Obey all traffic laws.

H. Do not follow traffic too closely.

SAMPLE

I. Slow down prior to turning—your plow will tend to push you where it wants to go.

J. Equipment involved in snow and ice control operations is emergency equipment, but you as the operator, must obey all traffic laws and provide right-of-way to other vehicles.

K. Do not attempt to tow private automobiles—offer assistance by way of radio contact to Dispatch or Supervisor.

L. Utilize caution when operating deicing equipment. Watch for overhead obstructions. Lower box when necessary.

3. ACCIDENTS

Report all moving vehicle accidents immediately to your Supervisor. Depending on the severity of the accident and availability due to storm related issues, the Police Department will typically be called to evaluate the accident. Prior to leaving duty on the shift, a Motor Vehicle Accident Report & Review form and the internal Vehicle Damage Claim Report should be filled out. Your Supervisor will attempt to interview the driver at the end of the shift or within 24 hours after return to normal duties. Accident forms should be available from the on-duty Supervisor or dispatcher.

4. CARE AND USE OF EQUIPMENT

The snow plow operator is responsible for routine maintenance of the vehicle. Report any maintenance needed to the Supervisor or mechanic on duty. Check vehicle before and after use for any maintenance needed or damage to equipment. Fill out Operations Daily Inspection Check Sheet. The vehicle should be refueled at the end of each operator's shift.

5. RADIO COMMUNICATIONS

Operators are to take duty instructions from the Public Services Dispatcher or Supervisor on duty. The Police may report road conditions or other issues to the Public Work's Dispatcher or Supervisor. It will be the role of the Public Services Supervisor to direct all winter maintenance related operations.

6. DAILY REPORT

Upon completion of the shift, operators will be required to fill out a Daily Report sheet. This sheet will document location, date, mileage, and material usage.

SAMPLE

ORDINANCE REFERENCES

SAMPLE

SAMPLE

6-6-7: SNOW REMOVAL:

No person shall park, abandon, or leave unattended any vehicle on any public street, alley, or city owned off street parking area during any snow emergency proclaimed by the mayor, public works director, or their respective designees. A snow emergency parking ban shall continue from its proclamation through five o'clock (5:00) P.M. the following day. The mayor, public works director, or their respective designees may extend the duration of the parking ban if conditions require additional time to clear the snow and ice. Notice of an extension shall be posted in the same manner as a proclamation of snow emergency and shall contain the date and time the parking ban shall expire. Such a parking ban shall be of uniform application. The city shall publish information regarding the responsibilities of vehicle owners under this section in the fall and/or winter editions of the "WDM Magazine" distributed to city residents, as well as post such information on the city of West Des Moines website in the fall and/or winter of each year. When predictions or occurrences indicate the need, the mayor, public works director, or their respective designees, shall proclaim the snow emergency and direct the appropriate city employee to post said proclamation on the city of West Des Moines website and forward notice of the proclamation to at least two (2) radio and two (2) television stations that broadcast their signals into the city of West Des Moines. Such emergency may be extended or shortened as the emergency warrants or when conditions warrant. This section shall not be construed as suspending parking limitations or restrictions imposed by any other section of this title. In addition to enforcement of this section by police officers, code enforcement officials and public works employees have the authority to enforce the provisions of this section. The code enforcement officials and public works employees shall have the power to issue citation-complaints for violations of this section and impound vehicles found in violation of this section as provided in subsections 6-6-15A and G of this chapter. (Ord. 1844, 10-5-2009)

6-2-3-6: IMPOUNDING VEHICLES:

A police officer is hereby authorized to remove, or cause to be removed, a vehicle from a street, public alley, public or private parking lot, or highway to the nearest garage or other place of safety or to a garage designated or maintained by the city under the circumstances hereinafter enumerated:

C. Snow Removal: When any vehicle is left parked upon a street during a snowstorm or immediately following a snowstorm, when it is deemed advisable that snow removal apparatus must be used on said street.

SAMPLE

6-6-15: PARKING VIOLATIONS; FAILURE TO PAY:

A. Notice On Illegally Parked Vehicles: Whenever any motor vehicle without a driver is found parked or stopped in violation of any of the restrictions imposed by this chapter or any other city ordinance or by state law, police officers, code enforcement officers, and any other city employees designated by the police chief finding such vehicle shall take its registration number and may take any other information displayed on the vehicle which may identify its owner or user and shall conspicuously affix to such vehicle a citation-complaint, in writing, on a form as provided by this code for the owner to appear to the charge against him or her at the city's finance department. In addition to enforcement of this chapter by police officers, code enforcement officials, and designated city employees, fire department officials and any other city employees designated by the fire chief shall have the authority to enforce the provisions of this chapter for fire lane violations. Also, in addition to enforcement of this chapter by police officers, code enforcement officials, and designated city employees, public works employees shall have the authority to enforce the provisions of this chapter for snow ordinance violations.

G. Removal and Impoundment Of Illegally Parked Vehicles: The police department may remove and impound vehicles or cause vehicles to be removed and impounded, when the vehicles are stopped or parked in violation of this chapter or other city ordinances and, in so doing, may employ such means as are reasonably necessary. Impounded vehicles shall be stored in a location designated by the city.

7-1-4: ENCROACHMENTS:

C. Dumping Of Snow: It shall be unlawful for any person to throw, push or place or cause to be thrown, pushed or placed, any ice or snow from private property, sidewalks or driveways onto the traveled way of streets so as to obstruct gutters or impede the passage of vehicles upon the street or to create a hazardous condition therein; except where, in the cleaning of large commercial drives in the business district it is absolutely necessary to move the snow onto the streets temporarily, such accumulation shall be removed promptly by the property owner or his agent, and only after first making arrangements for such prompt removal at the owner's cost of the accumulation within a reasonably short time. (1985 Code §8-1.0110)

SAMPLE

IOWA DOT

SMARTER I SIMPLER I CUSTOMER DRIVEN

www.iowadot.gov

Office of Rail Transportation
800 Lincoln Way Ames, IA 50010
Phone: 515.239.1052

November 8, 2016

RE: Snow Removal near Railroad Crossings

TO ALL CITY, COUNTY, & IDOT SNOWPLOW DRIVERS:

The Iowa Department of Transportation, Office of Rail Transportation, conducts winter meetings with all the railroads annually. Safety related issues are part of our discussion during these annual meetings. Snow removal season has arrived, and we would like to remind snowplow drivers of some safety items related to winter operations at railroad crossings.

The railroads serving Iowa request you use special care when plowing and salting roads this winter season in the vicinity of highway-railroad crossings. Though specific railroads may differ slightly in their policies on snow and ice control at crossings, these general guidelines are good practices to keep in mind.

1. While it is essential that salt, brine, sand, and other snow and ice removal chemicals be used on roadway surfaces, these materials should be used judiciously at highway-railroad crossings.

2. Special attention should be paid to snow management at or <u>within 15 feet either side</u> of highway/railroad crossings. Enhancing the ability for vehicles to stop prior to the crossing is paramount. Snow and ice removal using salt/chemicals or sand on approaches to grade crossings assists the motorist in maintaining braking ability when approaching a grade crossing.

3. Where possible, avoid piling snow on or near railroad crossings, under gate arms or mechanisms and on access roads parallel and adjacent to tracks. Piles of snow may obstruct motorists' view as they approach a crossing, interfere with the proper operation of automatic gate arms or prevent railroad personnel from accessing infrastructure associated with the crossing safety devices.

4. In the unlikely event that snow removal equipment does or potentially has damaged a highway-railroad crossing in any way, *immediately* contact the railroad so that the situation can be evaluated. Raising the plow at the crossing may prevent any mishaps, but it is important to limit the amount the plow is lifted so that an accumulation of snow and ice on the crossing does not allow a vehicle to get stuck or "hung up" on the tracks.

To report emergencies or unsafe crossing conditions use the emergency telephone number posted on the ENS sign located on the crossbuck post or signal mast, providing the unique crossing identification number on the sign (See sign example below)

Figure 8B-5. Example of an Emergency Notification Sign

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If you are having a problem with snow or ice control at a crossing, please contact the railroad for additional assistance. If you need additional railroad contact information, please feel free to call the Office of Rail Transportation at 515-239-1108.

The Office of Rail Transportation is concerned about snowplow drivers' safety. In your focus to make the roadways safe for motorists, do not overlook the potential danger to you at rail crossings. See Tracks? THINK TRAIN. We also encourage all locations to schedule an Operation Lifesaver (OL) presentation on railroad safety. The presentations are provided by OL certified volunteers at no charge. To schedule a presentation at your location, please visit the following website www.iowaoperationlifesaver.org.

The Office of Rail Transportation and the railroads thank you for your extra care around highway/railroad crossings and for making our roads safe for all this winter driving season.

Sincerely,

Stu Anderson, Director
Planning, Programming & Modal Divisions
Iowa Department of Transportation

City crossing

County gravel road crossing

NOTE: Both of the above photos are an example where the snow plow was raised completely, which dumped snow on the railroad crossing. The vehicle traffic caused this snow to be hard packed with ice causing the train ditcher/snow plow to derail. Please only raise plow *slightly* when plowing snow through the railroad crossings.