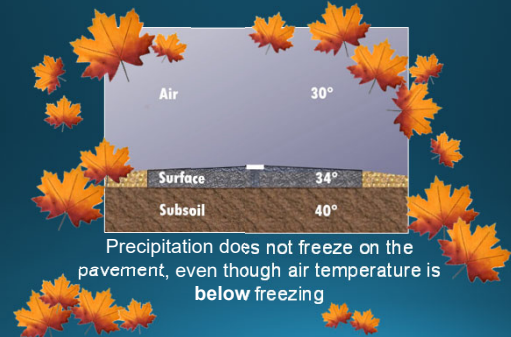


Understanding & Fighting the Storm



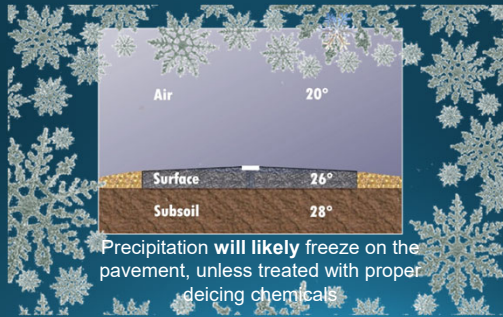
1

Subsurface: Fall scenario



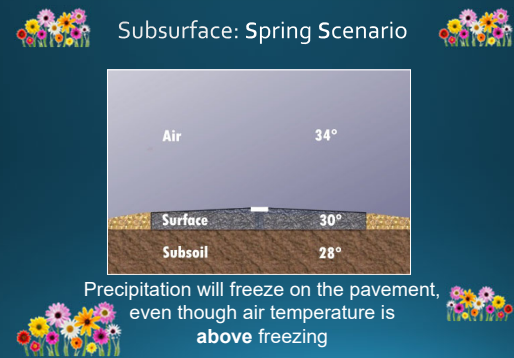
2

Subsurface: Winter Scenario



3

Subsurface: Spring Scenario



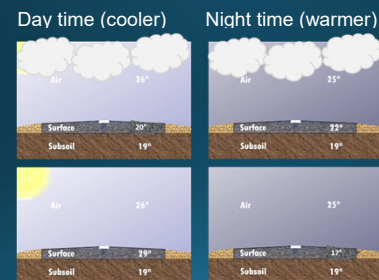
4

Influence of the sun



5

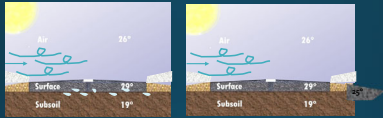
Influence of cloud cover



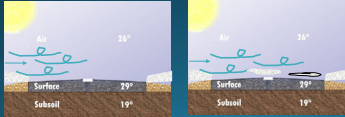
6

Influence of wind

Winds and wet pavement (dries and cools)



Blowing winds: do not anti-ice



7

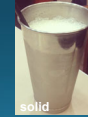
Dew point

The dew point is the temperature at which the air will be fully saturated with moisture:



Can temperature: 35°F

When the air temperature is cooled to the dew point, water vapor will condense into:



Cup temperature: 30°F

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More than One Kind of Ice



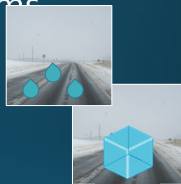
9



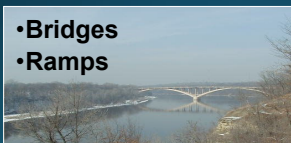
10

How black ice forms

1. Pavement temp near dew point.
2. Condensation
3. Pavement temp drops



- Bridges
- Ramps



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Preventing black ice

Anti-icing will help stop the formation of black ice. It helps prevent the ice forming or bonding to the road.



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If black ice has already formed

- Direct Liquid Application (D.L.A.)
- Pre-wet salt at a very low application rate.
- Sand at very low temperatures



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Glaze Ice
Deceptively Slick

14

How glaze ice forms

- Very cold air and pavement temperatures.
- Moisture freezes to the road.

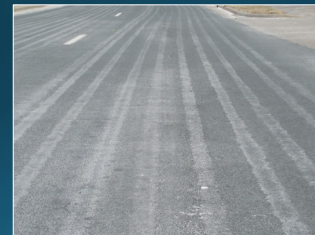


One example is when vehicle exhaust melts existing moisture on the road and it refreezes on the road surface.

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Preventing glaze ice

Anti-icing can help to stop the formation of glaze ice. It prevents the ice forming or bonding to the road.



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If glaze ice has already formed

- DLA with a cold pavement temperature product.
- Pre-wet salt with a cold pavement temperature product
- If too cold for chemicals, sand may be used to give traction.



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Freezing rain



Rain that falls when surface temperatures are slightly above or below freezing.

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Mitigating freezing rain



- If ice is formed, try pre-wet salt.
- If slushy, try dry salt.
- Pre-wet abrasives can be used to get a sandpaper effect.

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- Snow accumulates.
- Bottom layer bonds to the road.
- Temperature drops freezing bottom layer in place.

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Preventing traffic compaction



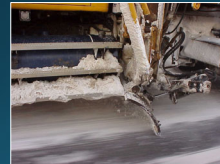
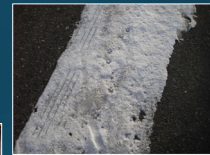
- Anti-icing
- Early plowing
- Frequent plowing



21

Mitigating traffic compaction

- Pre-wet deicers appropriate for pavement conditions



- Plowing with underbodies with good down pressure or other specialized equipment

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When melted snow or ice on the road freezes

Refreeze

23

Preventing Refreeze

- If slush is on the road plow before it freezes.
- If moisture is still on the road and temperatures are dropping reapplication of deicer.



24

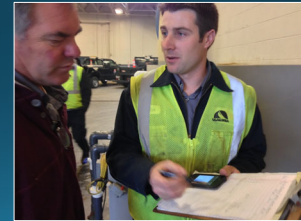
Mitigating refreeze



- Pre-wet deicers
- Sand at cold temperatures

25

What Would You Do?



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Storm 1: January 10

Current Conditions

- Time: 11:00 AM
- Temperature: 30° F
- Pavement Temperature: 32° F
- Precipitation: None
- Wind: NE 5-10 mph



Forecast

- Temperature: Rising into the low 30's throughout the day. Temperatures will fall sharply after midnight and continue falling to near 0° F by tomorrow
- Pavement Temperature: 28-30° F until 4 AM, falling to 10° F at 7 AM
- Precipitation: Snow, heavy at times, beginning by 1 PM, ending by 11 PM. Total accumulation 6-10 inches
- Wind: NW increasing 20-30 mph after midnight and gusty all day tomorrow

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Storm 1 (Jan. 10th) Discussion

- Continuous plowing through storm is necessary
- Advance crew scheduling (continuous operations past midnight)
- Deicing early on will help
- Medium salt application
- Tomorrow's low temp and winds will make pavement conditions worse...stay ahead of conditions!
- Due to high winds the following day, plan on plowing drift prone areas
- Final clean-up may continue for several days, urban roads may need snow to be loaded and hauled away

Enhancing Transportation in Your Community

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Storm 2: November 20

Current Conditions

- Time: 6:00 AM
- Temperature: 35° F
- Pavement Temperature: 33° F
- Dew Point: 32° F
- Precipitation: None
- Wind: SE 10-15 mph



Forecast

- Today: Mostly cloudy with rain developing by midday...changing to light snow this afternoon. Air temp nearly steady in the mid 30's. Pavement temp dropping slowly to 31° by 5pm. Winds 10-20mph. Precipitation chance 80%
- Tonight: Cloudy with light snow ending late. Total accumulation of 1-3 in. Air temps in the upper 20's. Pavement temps of 23° at midnight. Winds becoming north at 10-20mph. Snow chance 60%.

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Storm 1 (Jan. 10th) Discussion

- Icing may occur after sunset, creating widespread slippery pavements
- Anti-icing probably not effective, rain would wash it away before snow started
- Pay close attention to air and pavement temperatures
- Chemicals would be most effective when applied just before the rain/snow change-over
- This type of storm makes crew scheduling much more difficult

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