Anti-icing Operations

Anti-icing is a proactive snow and ice control strategy that aims at preventing the formation or development of bonded snow and ice by applying chemical freezing-point depressant before or at th onset of a snow storm event. Effective anti-icing operations must take into account the following factors:

- Type of the snow storm (precipitation type, rate and duration)
- Pavement temperature and trend
- Pavement conditions at the time of application (dry, wet, slush, ice, snow)
- Dilution potential (traffic, slope)

Recommended solid salt application rates (to be developed)
Recommended liquid application rates (to be developed)

Deicing Operations

Deicing operations involve application of chemical freezing-point depressant such as salts to break the bond of already-bonded snow and ice. Different from anti-icing, deicing is a reactive process intended to melt the snow and ice that hav accumulated and bonded to the pavement. Deicing is the most widely used strategy in the current practice for snow ar ice control at parking lots and sidewalks.

The general guidelines for deicing operations as applied to snow and ice control of parking lots and sidewalks are summarized as follows:

- Plow first before applying salt. Where ever possible, avoid using salt to melt off snow;
- Follow the application rate recommended for the particular weather and local conditions (Optimum salt application rates will be developed as part of this research; the ***minimum salt application rates*** used in highwa snow and ice control are provided in the following link);
- Don't apply a deicing chemical when the pavement temperature is below its ***practical lowest effective temperature (PLET)***;
- Avoid using salt and sand mix;
- At low temperature, consider using salt prewetted with calcium or magnesium chloride which have lower working temperature;
- For extreme cold weather, avoid using chemicals and consider using abrasives only;
- Consider ant-icing strategy to prevent bonding of snow and ice to pavement for easy subsequent plowing operations.

Practical lowest effective temperatures of various deicing chemicals

Recommended salt application rates (to be developed)

Minimum salt application rates used in highway snow and ice control (from literature)

Use of Abrasives

Sand and other abrasives are used to provide temporary traction improvement at slippery spots when pavement temperatures drop below the effective range of regular deicing chemicals (e.g. <-7C). Abrasives do not melt snow and ice and are only effective when they stay on top of ice or packed snow. The following is a list of some general findings from literature on the effect and limitations of abrasives such as sands for winter *road maintenance*:

- Sand has exhibited limited effectiveness at higher vehicle speeds, especially when it is not been prewetted. Mixing sand with salt to keep it from freezing also limits sand's effectiveness.
- Studies suggest that at highway speeds sand is swept off the road after relatively few vehicle passes (eight to 12) and that friction gains from sanding (when the sand remains on the road) are minimal.
- Friction improvement with sands for snow- and ice-covered roadways is quite small.
- During storm periods when anti-icing operations are successful, abrasive applications provide no consistent or apparent benefit in hard-braking friction, traction or pavement condition.
- A mix of abrasives and chemical will usually be no more effective as an anti-icing treatment during snowstorms than the same amount of chemical placed alone.
- Some study has also indicated that the melting of snow and ice will be delayed by using a mixture of salt and sand. That is, in a blend, sand and salt may work against each other. The salt in the mix may blow away as vehicles travel the roadway. If the sand remains on snow, tires can push the sand down into the slush, making it ineffective for improving traction.
- Use of salt/abrasives mixes at moderately or much higher application rates than straight chemical does not lead to corresponding improvements in hard-braking friction or pavement conditions.

Because both traffic and speed at parking lots and sidewalks are usually quite low, it is expected that abrasives *could* be effective in providing temporary friction enhancement, especially when the temperature is below the effective range of rock salts.