



Sustainable Procurement of Snow and Ice Management Services

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Toronto and Region Conservation Authority

June 17, 2021

The water component of STEP is a collaborative of:

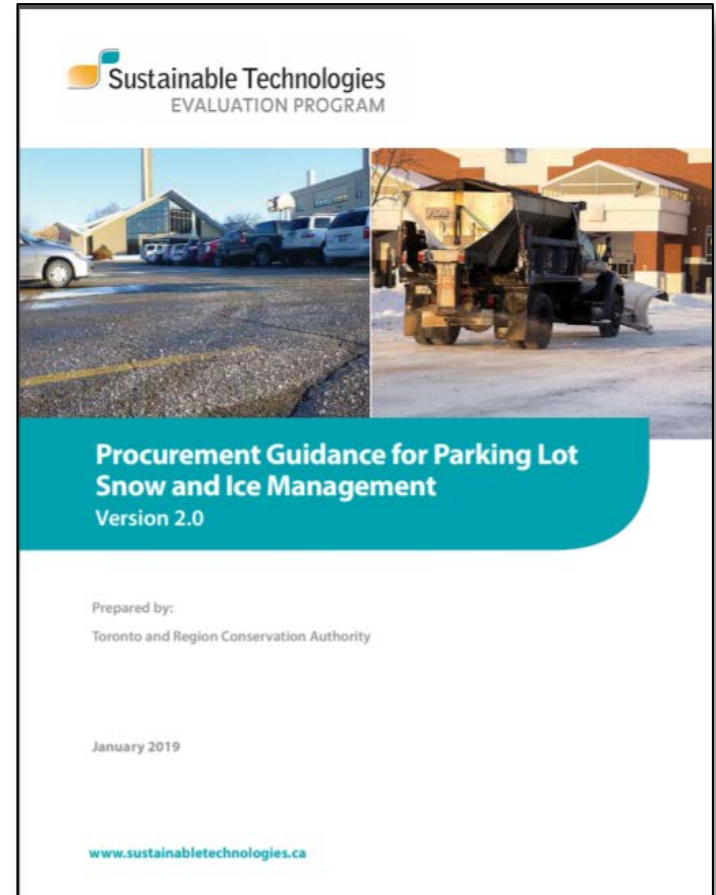


Why focus on procurement?

- Ensures alignment between services provided and services desired
- Snow and ice management industry is largely unregulated
- Onus is on businesses to ensure best practices are employed
- Specifying practices helps encourage contractor investments in their business

Procurement Guidance

- Focus on **parking lot** snow and ice management
- Emphasis on practices that **optimize salt use**
- Describes key practices and potential to reduce salt
- Expected impact of practice specification on contract price
- Sample contract wording



Procurement Guidance v2.0
www.sustainabletechnologies.ca

Preventable scenarios



Slip and fall lawsuits



Scoop and shoot



Improper salt storage



Salt dumping (80x average amount)



Uneven spreading



Unwanted impacts



Developing Contracts that Encourage Effective Salt Management

- Effective pricing of services
- Accurate salt delivery
- Efficient application
- Low chloride alternatives
- Reduced application rates
- Reduced liability risk
- Well informed decision making
- Professional Training and Certification



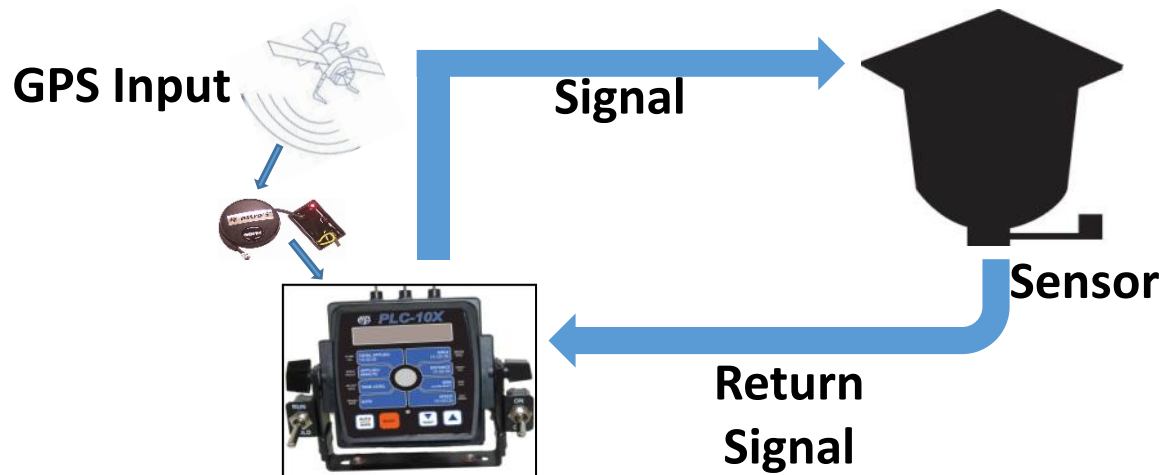
Effective Pricing of Services

- Salt extra vs salt inclusive – don't incentive higher salt use!
- Set payment per event or by season, not by application
- Combination: Stand-by fee + extra set payment per event



Accurate salt delivery

- Equipment specification
 - Ground speed controller → up to 47% less salt
 - Documentation of equipment calibration



Records and regulates application rates



VERIFICATION PROTOCOL FOR PARKING LOT SALT SPREADERS

SALT APPLICATION VERIFIED
EQUIPMENT (SAVE) PROGRAM

Robert Roszell / Program Director

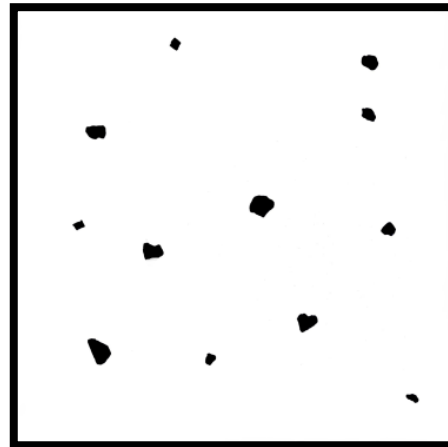


3/8/2016

Calibration protocol
and video

Accurate Delivery: Walkway and Stairways

- Shakers
- Manual spreaders
- Brine Sprayers
- Driver operated spreaders

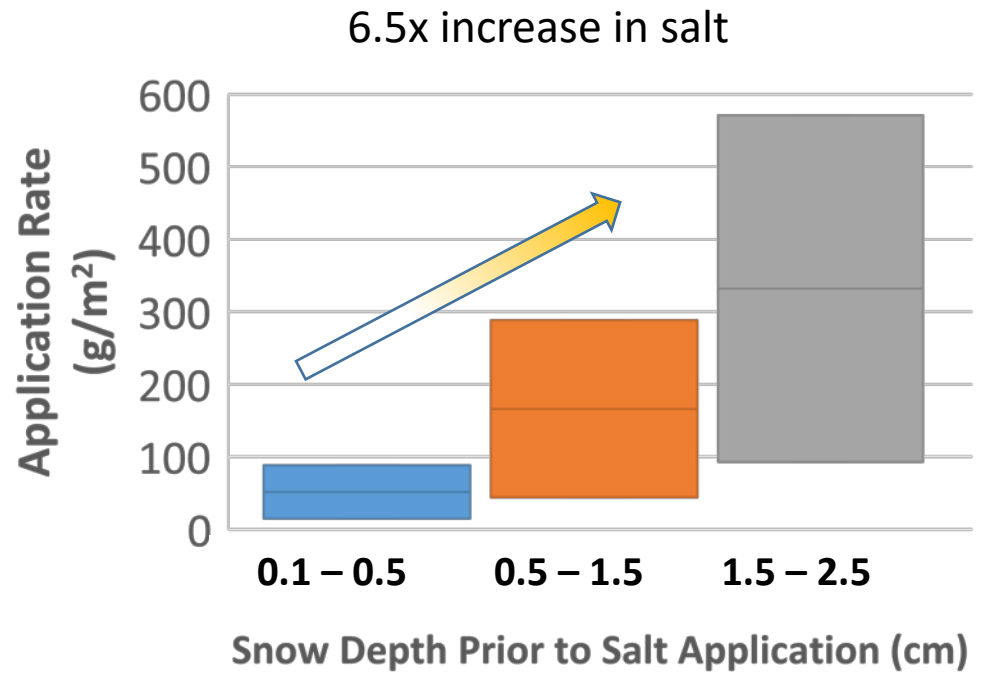


What 'enough'
looks like
(approx: 50 g/m²)



Efficient Plowing

- Less snow = less dilution = less salt
- Specify snow plowing trigger depth (e.g > 1.25 cm snow accumulation)
- Segmented blades better conform to pavement surface



Based on Hossain and Fu, 2015



Efficient Application and Material Specifications

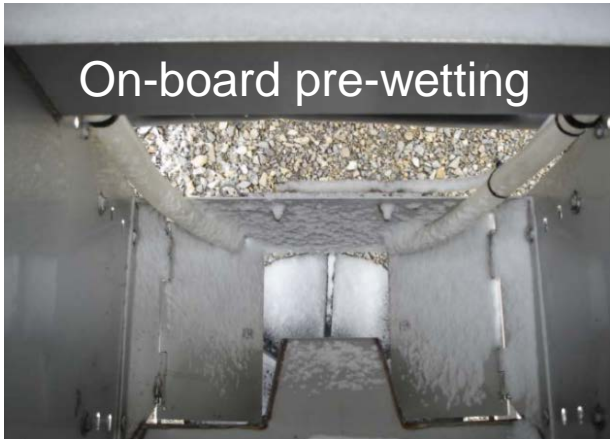
Application method

- **Anti-icing**, pre-wetting
- 18 to 40% salt reduction

Pre-planning – snow storage, trouble spots

Material specification

- Salt meets OPSD standards?
- Low chloride alternatives (up to 30% reduction)
- **Treated salt** (approx. 15% salt reduction)



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In Toronto's deep freeze, beet juice beats salt for melting ice

By LIAM CASEY GTA
Mon., Jan. 6, 2014

f t e ...

Nothing beats a beet in bad weather.

On Tuesday, Toronto's salt trucks will be rolling out across the city spraying salt covered with beet juice to help roads melt in the frigid temperatures.

City crews fill tanks on salt trucks with Fusion Liquid De-icer, an organic solution containing beet juice. The beet juice coats the road salt and improves its effectiveness in temperatures as low as -30 C. (RANDY RISLING / TORONTO STAR)

Evaluation of Organic Anti-icing Materials for Winter Maintenance

TECHNICAL BRIEF

ANTI ICE
STAY BACK
30m

Approximately five million tonnes of road salts are applied in Canada every year. Road salts have been shown over years of use to reduce accidents, injury and mortality associated with icy and snowy conditions. However, the salts also pollute groundwater, damage roadside vegetation, alter the hydrologic properties of soils, and drain into streams and lakes where they pose a threat to aquatic ecosystems. Salt is also a significant factor contributing to the corrosion of bridges, buildings and vehicles, resulting in substantially higher maintenance costs.

The practice of anti-icing, in which liquid brine solutions are applied to paved surfaces before or at the onset of winter storms to help prevent ice and snow from bonding to the surface, has been shown to significantly reduce the quantity of salt needed to remove compacted snow and ice after storms. New liquid organic and semi-organic alternatives with low chloride content have become available but lack independent data on performance at different application rates. This study compares the performance of liquid road salt (brine) to three types of organic/semi-organic alternatives applied on a university parking lot in Waterloo, Ontario. Products are evaluated as anti-icers (applied pre-snowfall) based on the coefficient of friction (CoF). The results indicate that in general, anti-icing treatments improved friction levels by 18-40% relative to a control without any application of anti-icers. Despite containing less chloride, the organic and semi-organic products performed as well as traditional sodium chloride brine at similar application rates. It was also found that an application rate as low as 3L/1000 ft² was sufficient for parking lot snow and ice management, which is 25% less than the current practice of applying 4L/1000 ft². Although organic anti-icers contributed less chloride into receiving streams, they contain higher concentrations of nutrients and organic content, which may limit their applicability in some contexts.

In 2001, following a comprehensive review of scientific literature on the effects of road salts on the environment, Environment Canada and Health Canada recommended that road salts be considered "toxic" under section 64 of the Canadian Environmental Protection Act (EC and HC, 2001).

Sustainable Technologies Evaluation Program
www.sustainabletechnologies.ca

An Initiative of
Conservation
At The Long City

Salt Management

Application rates

- Specify **level of service** (time to meet desired pavement conditions)
- Specify **return period** during and after an event
- Application rates
 - Wide variation based on temperature, type of precipitation, etc.



Application Rates: Encourage rather than Command

- Signal to contractor that over-application is a concern without being prescriptive

“The contractor will provide the contract administrator with the salt application rates for the premises...The contractor agrees to work in good faith with the administrator to reduce rates to only that which is needed to maintain safety and meet the LOS stipulated in this contract....”

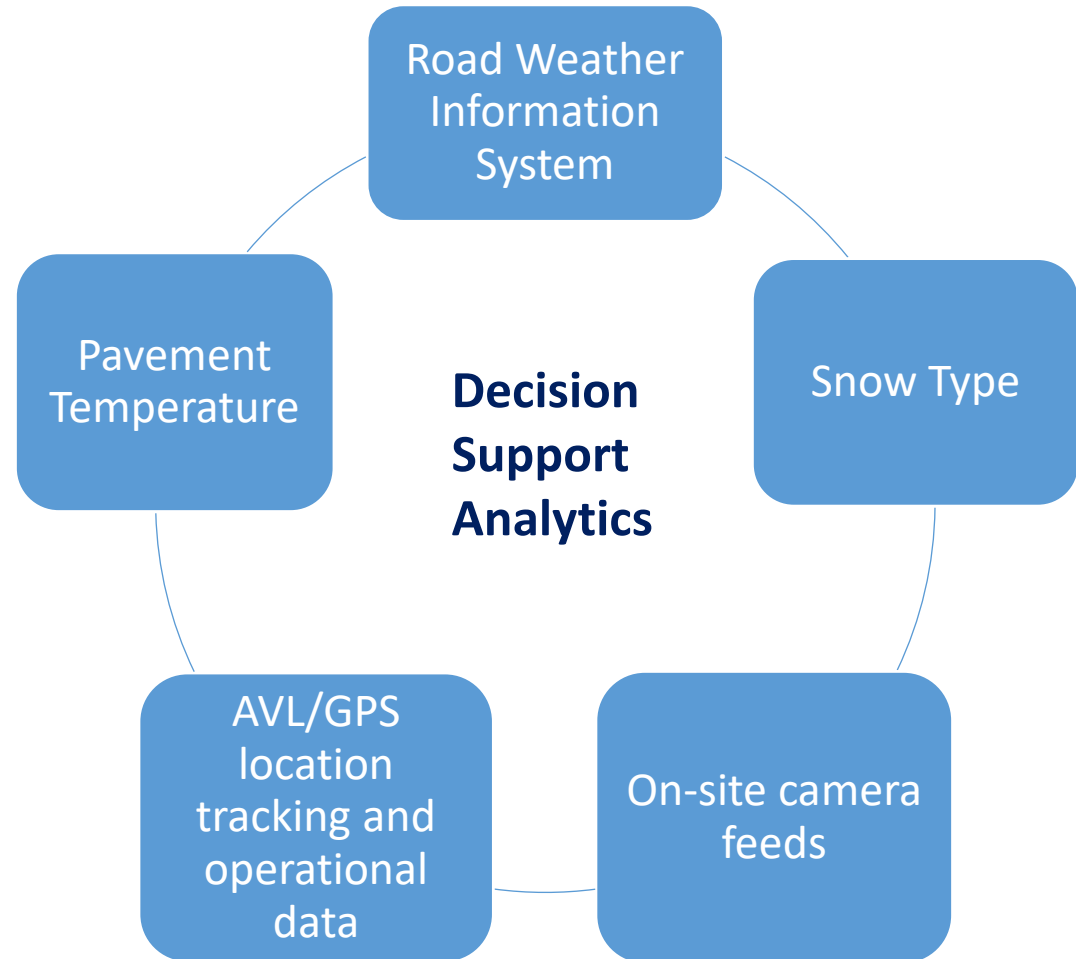
Reducing Liability Risk

- Excess salt is often applied to reduce legal liability risk
- Documentation reduces risk by providing due diligence defense
 - Specify that salt application rates, time and location be recorded
 - Automated controls make tracking salt use easier
 - Calibrated equipment certificates help bolster your case



Well informed decision making

- Good decisions are based on good information
- Request use of decision support tools:
 - Road Weather Information Systems
 - Pavement temperature
 - Snow type
 - etc



Training and Certification

- Experience counts!
- Specify training and certification requirements
- Ask for references



- Future improvements in certification programs will help simplify procurement process

Does sustainable procurement cost more?

- Depends on requested requirements and pool of contractors that bid
- Costs will decrease as industry builds capacity

Lower Impact on Costs	Higher impact on costs
Training and Certification	Anti-icing
Temperature sensors, RWIS	On-board pre-wetting
Application rate scrutiny	Low chloride alternatives
Treated salt	High levels of automation
Effective pricing	Closed loop ground speed controllers
Snow depth trigger for plowing	Segmented plow blades
Equipment calibration reports	

Managing Costs and Expectations

- Determine which practices may increase price
- Structure RFQ to include different options for cost estimation
- Offer on-site pre-bid question and answer meeting
- Provide lots of time to attract more bidders

Company	Site	Option 1 Include lower cost options	Option 2 Include low and medium cost options	Option 3 Include low to high cost options
Company A				
Company B...				

Questions?

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