



Ontario

Ministry of Municipal Affairs & Housing



Association of Municipalities of Ontario

ONTARIO CENTRE FOR MUNICIPAL BEST PRACTICES

393 University Ave., Suite 1701, Toronto, Ontario M5G 1E6

BEST PRACTICE SUMMARY REPORT

January 2003

RO – WC – 03 - 08

Roads – Winter Control - Salt/Sand Mix

Practice identification: Roads - Winter Control – Salt/Sand Mix

Case study municipality: Town Of Caledon

Key Words: Technological innovation
Operating procedures

Benefits Which resulted from adoption of the Practice

- **Reduced overall chloride use**
- **Better control of salt and sand proportions, resulting in a homogeneous mixed material**
- **Reduced time to load material into Public Works vehicles, because of pre-mixing**
- **Ability to apply fast-acting pre-wetted deicing agents without the capital cost of retrofitting on-board liquid spray equipment on existing vehicles.**

Description of the Practice in the Case-study municipality

The Town of Caledon utilizes a mix containing 25% highway coarse salt and 75% sand (proportions mixed by weight). Further, they add 2 % liquid calcium chloride during stockpiling, which is mixed in with a mixer, called a pugmill. The material stretches the coverage of a single truck-load significantly, compared to other mix proportions, and usually avoids the need for trucks to return to the yard for a second salt/sand load in mid-route. The mix proportions are specifically designed for the timely creation of a centre-bare standard for hard-

surface roadways averaging 300-800 vehicles per day. In addition, the practice reduces the total application of chlorides to such roads, compared to previous practices.

The application of liquid calcium chloride is being undertaken during stockpiling of the salt and sand mix, because fewer than 20% of the Caledon equipment fleet is equipped with onboard material wetting units.

The practice was initiated in the Town of Caledon in the late 90's following observations of Innisfil Township's salt/sand storage replenishment in the mid 90's.

The Town of Caledon is a primarily rural lower-tier municipality in Peel Region that is within the GTA commutershed. It is rolling farm and forest land with a considerable number of estate lot developments as well as a number of historic villages and the Bolton settlement area. The bulk of its road system provides access from/to an extensive system of Peel Region and Provincial Arterial Roads.

Evaluation of Practice

Efficiency

The material is spread in variable application rates dependent on de-icing requirement of the specific Winter storm. Efficient rates of application vary within the range of a light application of highway coarse salt and an average application of sand.

At the typical application rate of 100 kg (0.1 tonnes) per kilometre, each combination unit can apply the mix to the vehicle's full assigned Winter plough-route without reloading.

In addition, the practice of pre-mixing the materials in the salt/sand facility both reduces truck loading time and avoids the expense of adding on-board spray devices to existing trucks.

The Town of Caledon had lower than average costs per lane-kilometre for municipalities of its population size.

Effectiveness

Liquid Calcium Chloride as an additive melts ice at somewhat lower temperatures than straight Sodium chloride. In addition, it starts to work immediately upon spreading, rather than having to create its own liquid through surface contact. Timely chemical reaction allows roads to dry out during the daytime and, where conditions allow, reduces the chance of refreezing that occurs with wet pavement and lower night time temperatures.

Statutory requirement

Salt has recently been designated a regulated product, requiring the monitoring of its disposition following purchase. By helping to reduce the total application of chlorides to its roads, Caledon's mix lessens environmental impacts.

Replication of the Practice

The practice best suits municipalities with road systems where a centre-bare pavement standard exists for much of their road systems and with more moderate winter temperatures, i.e. in southern Ontario.

The practice of prewetting mixed sand/salt or straight salt was also reported by other municipalities. However, the initial salt/sand mix ratio, the focus on a “design mix” for a specific end product (ie 3 metre-wide centre-bare local service road), and the pre-mixing of the wetted material in the dome were only mentioned by Caledon. The practice of liquid material wetting is becoming more widespread as a result of chloride reduction concerns.

The practice of a 25/75 salt/sand mix + 2% calcium chloride can be instituted at the start of a winter cycle or in mid-Winter if dome refill is required. The practice can be instituted during dome refill by calling an appropriate tender for the pugmill and stacking equipment. Initial dome refill costs are higher than a 5% salt/sand mix, for example, due to the increased salt content.

No specialized equipment is required as a result of the fact that the liquid brine is added in the dome. The practice appears to avoid the costs of an onboard application of brine as well as the depot machinery required to fill the onboard spray units, yet it still retains the increased adhesion and increased reaction time resulting from applying a moist mix rather than a dry mix. The need to retrofit onboard spray units in order to apply a brine would add several thousand dollars to the spreader costs and would require storage tanks and pumps at each Public Works yard in order to refill the onboard systems during sand/salt recharge. Caledon has on occasion noticed that the bottom of the sand pile is wetter than the top. Wetter bottom material can be mixed with top material during the truck loading operation with little waste time.

Contact: Mr Hans Muntz P Eng.
Director of Infrastructure
1-905-584-2272
hmuntz@town.caledon.on.ca