

SALT &**Highway Deicing™**

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HOW DO WE KNOW IF WE ARE DOING A GOOD JOB OF SNOW AND ICE CONTROL?

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The “quality in government services” movement started in earnest about fifteen years ago. Today, it is central to the business plan of most governmental agencies and the private sector. The core concepts of the quality movement include:

- Efficiency
- Effectiveness
- Performance standards
- Performance measures
- Customer satisfaction
- Customer communication
- Continuous improvement

In recent years, there has been increasing emphasis on the customer component (operating government to satisfying customer expectations). Recently issued NCHRP Report 487 “Using Customer Needs to Drive Transportation Decisions” (download available at: http://gulliver.trb.org/publications/nchrp/nchrp_rpt_487.pdf) provides general guidance and numerous case studies illustrating how to implement outcomes-based performance evaluations of public service.

LEVEL OF SERVICE GOALS

The first step in performance evaluation is establishing level of service (LOS) goals. Developing LOS goals using a broadly-participative process not only produces more relevant and responsive program direction, but is a vital public education tool as well. Led by the highway agency, the participants might include:

- Road users (several categories)
- Police
- Fire
- Medical
- Business
- Elected officials
- Emergency management
- Media
- Roadside property owners and residents
- Transit
- School district
- Automobile clubs
- Agency legal

Creating such an all-inclusive working committee is unrealistic in many communities, but these stakeholders should be asked for written comments on draft versions of the product as it is being

developed. **There has to be a clear understanding that LOS capability is resource driven.** Level of Service outcomes are related to program **outputs** which, in turn, are supported by available resource **inputs** like budgets for equipment, personnel and materials.

- **The goals that are finally developed should be meaningful, measurable and achievable.**

Snowfighting LOS goals might be framed in different ways including:

- Timing and frequency of treatments (output)
- Types and location of treatments (output)
- Road conditions during an event (outcome)
- Road conditions after an event (outcome)
- Traffic movement descriptors (outcome)

Outcome measures are most helpful, but they depend on collecting data and measuring service performance. This usually involves expending agency resources.

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PERFORMANCE MEASURES

Output performance measures include considerations of efficiency and cost effectiveness. Efficiency is typically measured in cost per unit of work. Examples include: cost per lane mile for various snow and ice tasks (plowing, spreading chemicals, spreading abrasives, pack removal, benching, patrolling, etc.) by storm, storm hour, inch of snow, day, week, season, etc. Cost effectiveness is achieving high levels of efficiency (lower unit costs) while achieving the desired LOS.

Output performance measures also relate to conditions encountered and maintenance actions performed during snow or ice events. These may include:

- Inches of snow and ice accumulation on road prior to plowing
- "X" hours plowing or spreading cycle
- Minimum coefficient of friction of "X"
- Plow or treat within "X" hours after event begins or ends

The preferred set of performance measures is based on how well the agency preserves or restores a safe LOS on the roadway. It is time and outcomes based. Often, new data collection systems are required to implement outcomes-based performance assessment. These might include achieving the following considerations at various points in time relative to event progress:

- "Bare/wet" lane
- Minimum coefficient of friction of "X"
- "Bare/wet" wheel paths or center line
- Absence of ice/pavement bond
- Passable (reasonably safe)
- Traffic flowing at "X" % of speed limit

MEASURING PERFORMANCE

Snow and ice control performance is measured internally, externally or a combination of the two. Outputs (data on efficiency and cost effectiveness) can be compared internally among work groups within the organization, between similar work groups in other organizations and with the private sector. Outcomes may be measured by in-house personnel who are patrolling and measuring road and traffic conditions, by volunteer observers from the customer base, or by use of electronic sensors or cameras that indicate road surface conditions and traffic flow characteristics. Customer satisfaction assessments of agency performance and fine-tuning of service delivery can involve various types of customer surveys and forums. Individual agency managers may have output and/or outcomes performance as a part of their personal performance evaluation.

We will look at how some highway agencies judge how well they are doing.

Chautauqua County, NY, Department of Public Facilities

Chautauqua County uses a performance driven approach to all county functions. In the area of snow and ice control they survey people who live on county maintained roads. Residents provide input on level of service issues and their satisfaction with the various aspects of the snow and ice control provided in their area by county crews during the past season. Customers are asked questions relative to their service expectations in terms of road conditions, agency responsiveness and staff courtesy. Customer satisfaction is elicited through questions relating to snow removal, ice control, problem resolution and damage claims. The

data are used for continuous improvement efforts, performance evaluation and to address site-specific problems. Ken Smith manages the Public Facilities Program and Kate Hill supervises the survey program.

City of Yellowknife, NWT, Department of Public Works and Engineering

Yellowknife uses a biannual customer survey to judge how well it is providing a wide variety of services. The objectives of the snow and ice control program are clearly identified and people are asked to rate performance on that basis. Objectives include: ice control at intersections, snow removal in residential areas and snow removal on major streets. The performance measure is the % of respondents that are "satisfied" with the agency performance in those three areas. The results of the survey are used to judge department performance and identify local and general areas that need improvement. The data also provides a basis for seeking budget authorization. Mike Elgie is the Public Works Superintendent. He finds this data useful in improving operations.

Province of Nova Scotia, Department of Transportation and Public Works

Nova Scotia has been surveying a sampling of provincial residents over 16 years of age for their input on a variety of transportation related issues on an annual basis for several years. The survey elicits information on the perceived importance of the services they provide (level of service) and the quality of services actually performed. The rated snow and ice services are: snow/ice removal during a storm and the completeness of after-storm clean up. Respondents are asked to rate actual performance on a four level satisfaction scale. The data are used

in the performance evaluation of programs and managers. Kathleen Rogers manages the survey program for the Department.

State of Ohio, Department of Transportation, District 12

Ohio Department of Transportation District 12 uses a system of volunteer “spotters” from their customer base to evaluate the performance of its snow and ice control operations. The “spotters” are a mix of “professional” and other drivers that are likely to be driving the roads. They are asked to rate the performance on a scale of 1 to 10 for each snow and ice event during the season. Data are tabulated weekly, monthly and seasonally. These data are incorporated into an internal organizational performance system. Examples of findings? DOT managers use this data to adjust operations where necessary to bring performance to an acceptable level. This information comes from the ODOT District 12 website (http://www.dot.state.oh.us/dist12/About%20D-12/snow_and_ice.htm)

State of Minnesota, Department of Transportation

Minnesota Department of Transportation uses the time (hours) to achieve a bare lane condition after the end of a snow/ice event as a measure of performance. Different volume classes of highway have different goals. Super commuter roads have a 1 – 3 hour target while low volume secondary roads have a 9 – 36 hour target. Patrolling supervisors record the time to achieve bare lane at various points on the system that represent the spectrum of volume classes. These data are summarized by various time intervals throughout a season and used to identify and correct problem situations.

In addition to the internal performance system, Minnesota DOT uses market research

techniques to track customer satisfaction. Ken Nelson of MNDOT indicates that MNDOT has a strong focus on customer satisfaction and is continually trying to improve performance.

SUMMARY

The advent of new “intelligent” highway technologies offers the promise of expanded outcomes data and expanded customer-driven performance measures. Road Weather Information Systems (RWIS) can tell managers when a re-application of ice control chemicals may be needed. RWIS data can also tell both managers and the general public that the roadway is serviceable. Traffic cams are becoming common and data is increasingly accessible. Many larger metro areas have Web-posted real-time maps and video data that show traffic flow on their major arterials.

Evaluating our snow and ice control programs is a continuous effort that begins with setting level of service goals. These goals should be created through a participatory process and be meaningful, measurable and achievable. Next, data collection systems must be created consistent with the level of service goals and field tested for reality. After performance measures are established, measurement and



analysis can begin and continue. As the process continues, changes in the measurement system and the snow and ice control operations themselves are likely to evolve. Performance measurement will probably move from measuring service outputs toward measuring service outcomes. This is consistent with the concept of continuous improvement. ■

You just enjoyed another electronic **Salt and Highway Deicing** Newsletter! It helps you make better decisions in your winter maintenance responsibilities and gives even more information by active links to www.saltinstitute.org <<http://www.saltinstitute.org>> specific pages to further snowfighter information. Please feel free to forward this newsletter to other interested persons so that they can also enjoy this informative free quarterly. Please sign up at: <http://www.saltinstitute.org/subscribe/index.html>

Q I've read that the U.S. Department of the Interior is giving away free highway salt. Sounds good to me. Where can I order it?

A We've seen the same reports. Waste salt being removed from the salt mine to be used to store low-level radioactive waste at the Department's Waste Isolation Pilot Plant (WIPP) in Carlsbad, NM, is a management challenge for the agency. Unfortunately, the salt does not meet ASTM specification D-632-01 and public works directors who have tried to get a sample to be tested are still waiting for a response. Also, "free" does not include transportation costs and the salt pile is not located on a rail line. Sometimes if something sounds too good to be true....

Q What do managers do about runoff from well covered salt stockpiles and from vehicle washing facilities?

A There are a number of ideas. Ask others in your area what's worked best for them. In relatively arid Calgary, AB, collected runoff is sprayed on the stockpile where it dries and helps control dust. That solution wouldn't work in some areas. Some agencies have used runoff in their brine-making operations, adding salt to bring the brine to the proper, 23rd concentration. Milford Township, PA has installed two 3,000-gallon underground containment tanks. The system captures wash water that is used to pre-wet their salt.

Q I understand the Federal Highway Administration is developing a "Maintenance Decision Support System." How could that help me with my local operations?

A The FHWA Road Weather Management Program (contact: Paul Pisano paul.pisano@fhwa.dot.gov) has been working for several years to develop a prototype tool to help local snowfighters capture and utilize road weather in their winter maintenance tactics. The primary audience is state/provincial DOTs, but, once tested, there is no reason why the system should not be adapted for municipal use. Basically, the MDSS is software that combines road and weather data (precipitation, chemical concentration, snow drifts, pavement temperatures, air temperatures, weather predictions), analyzes those data and produces a map of the current situation, identifies options and offers recommended tactical snowfighting responses. The prototype will be tested this summer.



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