

Re-Establishing a Brand

A New Ontario Standard for Snow Removal Equipment Visibility

The Ontario Ministry of Transportation (MTO) is committed to continually ensuring that provincial highways are among the safest in North America. To achieve this goal, MTO developed a new lighting and visibility standard for snow removal vehicles and equipment. This standard was developed after in-house testing and industry consultation was conducted.

MTO's yellow and black snow removal equipment had its own "brand identity" before plowing was done by contractors. Since the mid-1980s, we have progressed to a point where 100 percent of winter maintenance in Ontario is done by contractors. As a result, snow plows have many differences in appearance and it can be difficult for motorists to identify and appropriately respond to snow removal equipment on the highways.

Winter can be a particularly challenging season across Ontario for both motorists and snow removal equipment operators. Seeing and recognizing snow removal equipment is made even more difficult because equipment operates under adverse weather conditions, when conspicuity is most important.

MTO's winter maintenance contractors raised concerns about visibility and requested the ability to use new and better lighting systems. The request was for updates to the winter equipment lighting standards allowing the use of LED lights. MTO's recognition that "brand identity" had been lost was also an impetus to investigate further. >



The new MTO standard for winter maintenance equipment lighting and visibility



Snow plows operating in Ontario today lack a consistent "brand identity".

A New Ontario Standard for Snow Removal Equipment Visibility, *continued*



Testing the new lighting and visibility standard in winter conditions and at night.



Air foils reduce snow, slush, and salt build-up on the rear lights and panel.

In July of 2013, MTO started a study to determine best practices for effective visibility and recognition of snow removal equipment and vehicles. The in-house research was multi-staged, beginning with a review of previous research and literature, particularly studies of the lights used by police and firefighter vehicles. Research determined that LED lights are most effective because they produce the greatest visibility, while strobe lights are least effective; while they can get a driver's attention quickly, they don't enable motorists to identify the source of the light effectively.

Following this literature review and workshop, an in-house study was conducted that focused on lighting and visibility. A major focus of the study was on the conspicuity panel, which is the large panel on the back of snow removal equipment that helps to identify it. The research determined that these conspicuity panels should be consistent in appearance for recognition purposes.

In November 2013, MTO conducted tests with nine different colour and sheeting combinations during daytime and nighttime winter conditions. The tests demonstrated that the best conspicuity panel is a checkerboard pattern in fluorescent yellow-green and black.

Tests were also conducted on lighting through the winter of 2013/2014. MTO's research determined that the conspicuity panel should be augmented with blue and amber LED lights in an "H" pattern to convey the height and width of the vehicle, with the upper arms including stop/turn lights, and culminating in blue and amber beacons. Research demonstrates that blue is the most conspicuous colour both day and night, and needs the least intensity, thereby reducing glare for motorists. Research also demonstrates that a combination of colours is more effective than a single colour warning light. >

A New Ontario Standard for Snow Removal Equipment Visibility, *continued*

The study recommended that the existing roof lighting on snow removal vehicles be replaced with an amber and blue LED light bar. Rear lighting effectiveness was determined to be best when the amber lights remain continuously illuminated, while the blue lights flash at a synchronized 1Hz rate (one flash per second). This slower rate of flashing subconsciously indicates to motorists that the vehicle is moving slowly and avoids any potential issues associated with higher flash rates or strobes.

Ambient sensors were also studied and they were ultimately recommended because they can tailor the intensity of lights for daytime and nighttime visibility. At night, the ambient sensor reduced the light output to approximately 65 per cent to reduce glare while still alerting motorists.

Finally, MTO's research included an analysis of air foils that had been developed and implemented in Alberta to prevent snow, slush, and salt from building up on the rear lights and conspicuity panel reducing their effectiveness. These air foils were effective in the tests and they are included as part of the proposed new standards.

MTO had many collaborators in this study. The ministry, assisted by HDR Corporation (value engineering specialists), engaged in a value analysis workshop with the Ontario Road Builders' Association (ORBA) and its Area Maintenance Contract (AMC) contractors. This workshop was the impetus for the in-house research that was conducted. Safety Warning Specialists (SWS) of Niagara Falls, Ontario, produced fully functional, half-size mock-ups of the proposed conspicuity panels, Star Signal Vehicle Products and SWS prepared lighting packages for the full-size conversions, Viking-Cives Group and Northern Power Equipment fabricated full-size units of the conspicuity panel and lights, and continue, to convert full-size vehicles to the new standard.

As winter maintenance vehicles are outfitted with the new lighting and conspicuity features, MTO will be monitoring their effectiveness.



Test panel trials during the conspicuity study.

The Transportation Association of Canada (TAC) has developed a new Canadian guideline for the visibility of snow-removal equipment, and the new standards developed by MTO form part of that new guideline. As a result, a new Ontario standard has been created and will eventually be implemented by all winter maintenance contractors working on provincial highways in Ontario. •

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"Double Duty" Snow Plows

The Ministry Is Raising Public Awareness about Tow Plows

Winter can be a particularly challenging season for drivers across Ontario and winter maintenance is certainly a challenge for contractors. Many of the Ministry of Transportation's (MTO) maintenance contractors are using "tow plows" to clear snow from Ontario's highways. Tow plows are trucks with a standard plow mounted on the front and an additional plow on a steerable trailer towed behind the truck that is extended out, to the right, when in operation.

When deployed, this configuration increases the effective clearing path to allow the tow plow to clear the adjacent driving lane.

This two-lane wide clearing path eliminates the need for a second piece of equipment on the highway, which means clearer roads in fewer passes with less equipment and reduced vehicle emissions.

The many benefits make tow plows an increasingly appealing choice for part of winter maintenance equipment fleets. Tow plows are in use across the province with a concentration of use on freeways in Southern Ontario. Through various means of communication, the ministry is raising public awareness about what they can expect to see when a tow plow is operating.

Tow plows have been used by contractors in a number of area maintenance contract areas since 2009. Tow plow use has increased significantly within North America, and Ontario's maintenance contractors are leading the way. There are now over 150 tow plows operating on Ontario's highway >



A tow plow, and regular snow plow, in "echelon" operation.



A tow plow in operation, with the plow extended out, to the right. The increased clearing path is evident.

The Ministry Is Raising Public Awareness about Tow Plows, *continued*

network. It is important for motorists to understand how to safely share the road with tow plows and to remember to never pass a plow.

The ministry has also developed standard messaging for signs on the back of tow plows to alert drivers that the plow can swing to the right, and then swing left, back in behind the truck.

This sign provides an additional warning to drivers to stay well back from winter maintenance equipment, and particularly out of the 'swing radius' of a tow plow.

The ministry is committed to keeping Ontario's highways among the safest in North America. Tow plows are proving to be another efficient and effective tool for winter maintenance that contributes to this goal.

The ministry, and our contractors, continue to evaluate the effectiveness of new innovative methods to clear highways efficiently and ensure that winter maintenance equipment and all other highway users can safely share the provincial highway network. ●



New sign on the back of a tow plow.

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