



Road Talk

Ontario's Transportation
Technology Transfer
Digest

Ministry of Transportation

Spring 2024

Ontario uses pavement data to create new reduced load period (RLP) model

New model offers better flexibility for First Nations and municipalities

Secondary and tertiary roads in Ontario are usually built to carry less weight than provincial highways or municipal roads, which means they can be more easily damaged by heavy loads and seasonal moisture. It is important that their pavement structures are protected by Reduced Load Periods (RLPs) during wetter seasons.

RLPs are needed for a specific time each spring when frost heaves from the ground and moisture seeps from the roadbed. Certain vehicles may not use the roads during these periods. Road authorities are often asked to provide exceptions, allow alternative vehicle configurations, or shorten the RLP timing.

Vehicle load restrictions and exemptions

Load restrictions limit maximum vehicle axle weights, except for certain truck types and vehicles carrying certain materials such as:

- highway maintenance vehicles
- public utility emergency vehicles
- waste disposal vehicles
- milk transport vehicles
- two axle trucks carrying heating fuel and livestock feed
- vehicles transporting live poultry

Review of load restriction timing

Load restrictions for secondary and tertiary roads are typically implemented from March 1 to May 31, but those dates have always been based on historical weather patterns, rather than the actual weather each year. That means load restrictions may sometimes be in place even when they are not actually needed.

The Ministry of Transportation has reviewed the timing of RLPs based on feedback from trucking and agriculture stakeholders. In 2021 municipalities and



An example of road surface pavement damage.

36 First Nation communities were surveyed to get a better understanding of how RLPs are implemented in different parts of the province:

- 90 per cent apply RLPs in some form, using fixed dates.
- Most do not support increases to the current weight limit outlined in the *Highway Traffic Act*.
- RLPs are not applied the same way across municipalities and set dates do not always align with the actual weather each year.
- RLPs are an effective means to protect infrastructure, but can create challenges for the trucking industry, agri-businesses, and other industries.

As a result of this review, the ministry partnered with Good Roads (formerly the Ontario [Good Roads Association](#) or OGRA) to develop a tool for Ontario road authorities to optimize RLP timing so that secondary roads stay protected while the impact on industries and communities is reduced.

The tool's model provides seven-day advanced notice of recommended RLP timings based on real-time

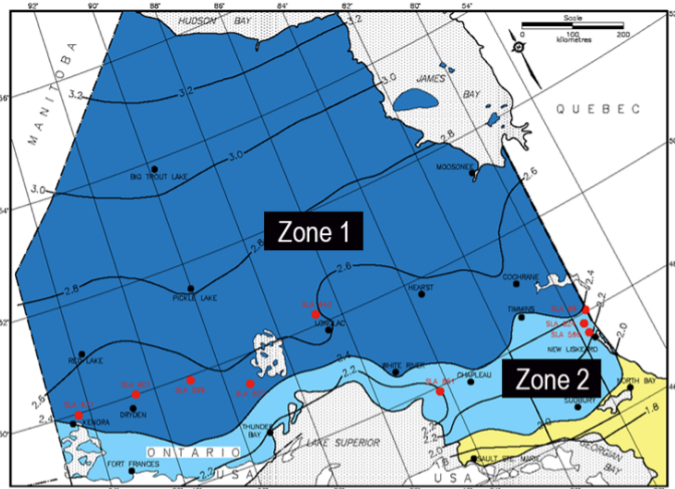
and forecasted weather conditions for four different geographical zones. Ministry of Transportation data helps other jurisdictions shorten the duration of load restrictions where possible, which makes it easier for businesses to plan their routes and improve their delivery times.



Rutting and surface damage shown on an unpaved road.

New Model Data

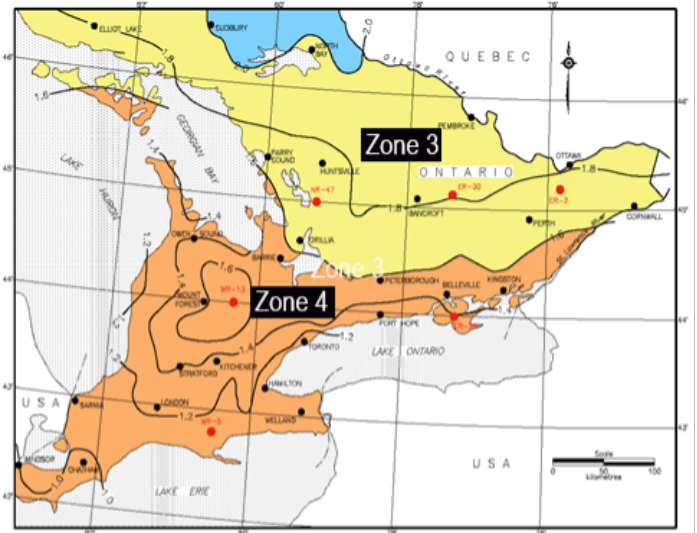
There are twenty Road Weather Information System (RWIS) sites throughout the four zones. Highways within these sites have sensors and probes in the pavement that gather information about frost and moisture conditions.



Zones 1 and 2.

These tools, along with temperature variation data, play a crucial role in establishing the frost front and assessing pavement strength. The predictive approach involves analyzing a three-day consecutive thaw trend (CTI) to counteract the impact of one to two days of re-freezing temperatures.

The Ministry of Transportation collects data on the strength of highway pavement using falling weight



Zones 3 and 4. Above: RLP Onset and Removal Model uses data from MTO's RWIS, including 20 sites with frost depth/moisture sensors (red dots) across the province (four geographic zones).

deflectometer (FWD) sensors at sixteen of the twenty RLP stations. This data, combined with frost and moisture data, contributes to the load restriction calculation.

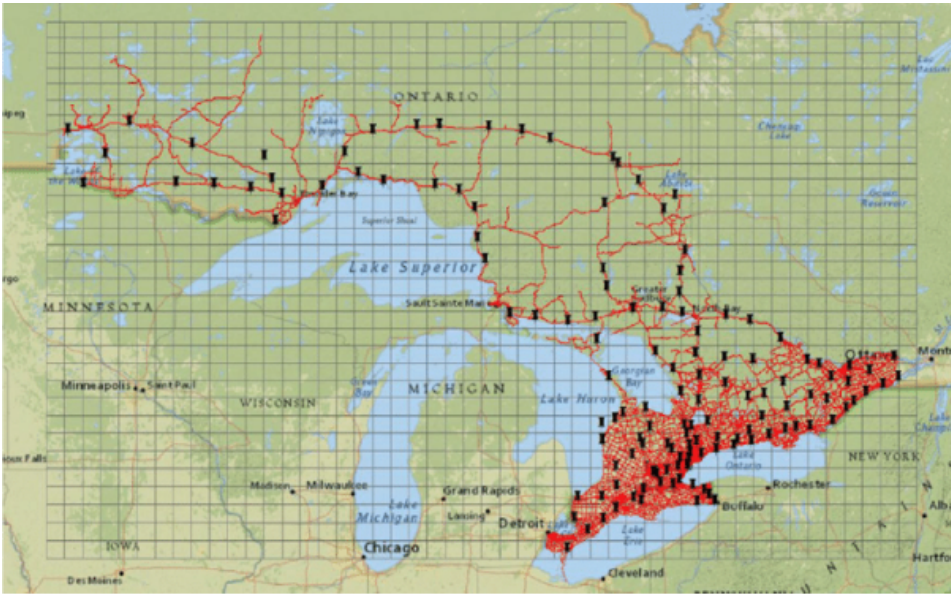
Using these data sets, the new RLP model allows for flexibility in setting and removing load restrictions. The model is meant to be used with local sensor input so that RLP implementations can be zone-specific. The ministry's provincial data is meant to provide provincial zone decisions.

The ministry shares this relevant weather and pavement model data with municipal road supervisors, who have authority over most roads that require RLPs, to assist them with understanding real-time factors when implementing RLPs.

Sharing the Model

In November 2022, Ministry of Transportation staff presented the model at the [Municipal Engineers Association \(MEA\) Conference](#). Another presentation was delivered at the Good Roads Conference in April 2023.

Good Roads is offering free training and technical knowledge transfer to municipalities and First Nation communities via eLearning modules. Ministry staff are conducting more research and providing ongoing yearly data updates to refine the RLP algorithms and threshold values as required.



A Road Weather Information System tower (RWIS). MTO makes effective real-time Spring Load Restrictions (SLR) and Winter Weight Premiums (WWP) decisions using Road Weather Information Systems (RWIS) real-time data and forecasts.

Above: Map showing the location of MTO's Road Weather Information System (RWIS) towers.

Using the Model

To simplify the use of the model, the Ministry of Transportation has developed the [MTO Reduced Load Period Calculator](#). Users enter the daily air temperatures and future forecast temperatures in their area to get predictions for the best RLP onset and removal dates. These predictions will allow municipal officials to make timing decisions and work with stakeholders to mitigate any impacts.

Municipal and First Nation road authorities are encouraged to adopt this model and take advantage of its benefits.

Model Continued Development

Last year, the web-based prediction model was posted on the [goodroads.ca](#). On February 1, 2024, the MTO Pavement Section began delivering weekly data updates for Good Roads.

In the future, the Ministry of Transportation plans to improve the RLP calculator by adding interactive mapping and an automated data upload that provides approval on proposed RLP periods to municipal agencies working with Good Roads.

For more information on the ministry's work on the Reduced Load Period Model, please contact:

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