



Weather Intelligence for Transportation Decision Support Systems

2016 ITS Canada

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Weather Affects Transportation in Canada

SAFETY

- 20% of vehicle crashes are due to adverse weather and slick roads¹
 - Approximately 500 fatalities per year
 - Approximately 38,000 injuries per year

MOBILITY

- ~25% of non-recurrent delay on highways is weather related
 - Commercial delays cost money
 - Vehicle emissions are increased
 - Productivity decreases



¹Transport Canada Statistics
National Collision Database Online, 1999-2013

<http://wwwapps2.tc.gc.ca/Saf-Sec-Sur/7/NCDB-BNDC/p.aspx?!=en>

Road Weather Intelligence Integration Process for Decision Support Systems



RWIS Obs



Mobile Obs



Crowd-Sourced Obs



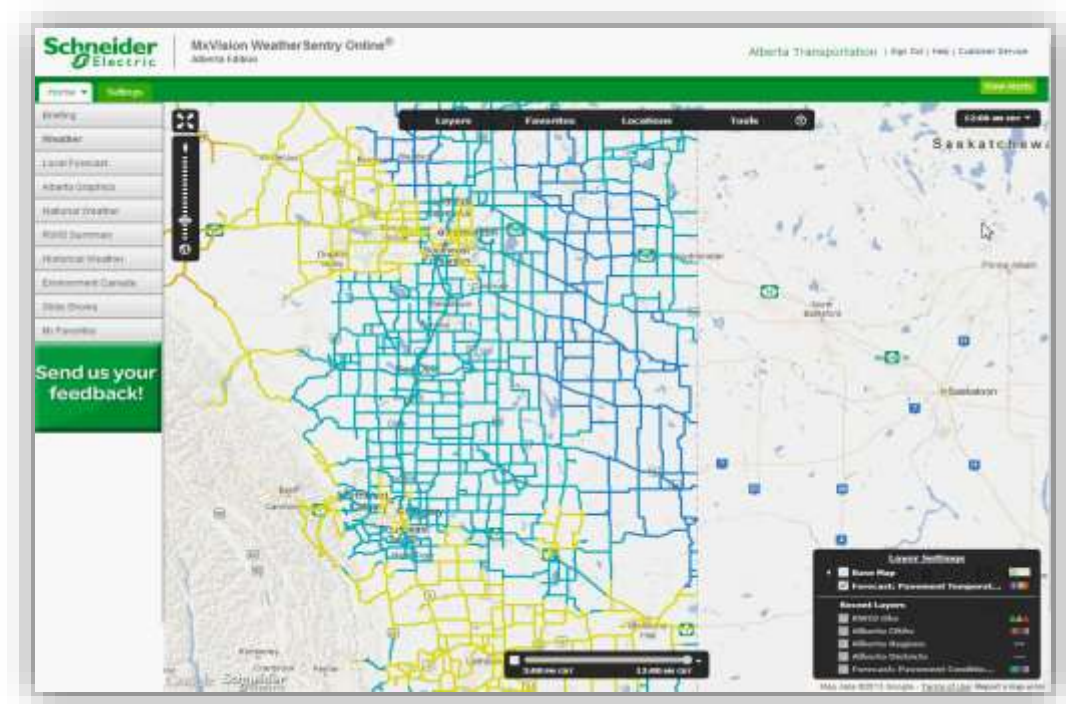
Geospatial Integration with Road Segments

Meteorological Assimilation Data Ingest System (MADIS)
<https://madis-data.ncep.noaa.gov/MadisSurface/>

Traffic Management Decision Support/Integrated Corridor Management

WHEN and WHERE will roads and traffic be affected? WHAT should be done to mitigate accidents and delays?

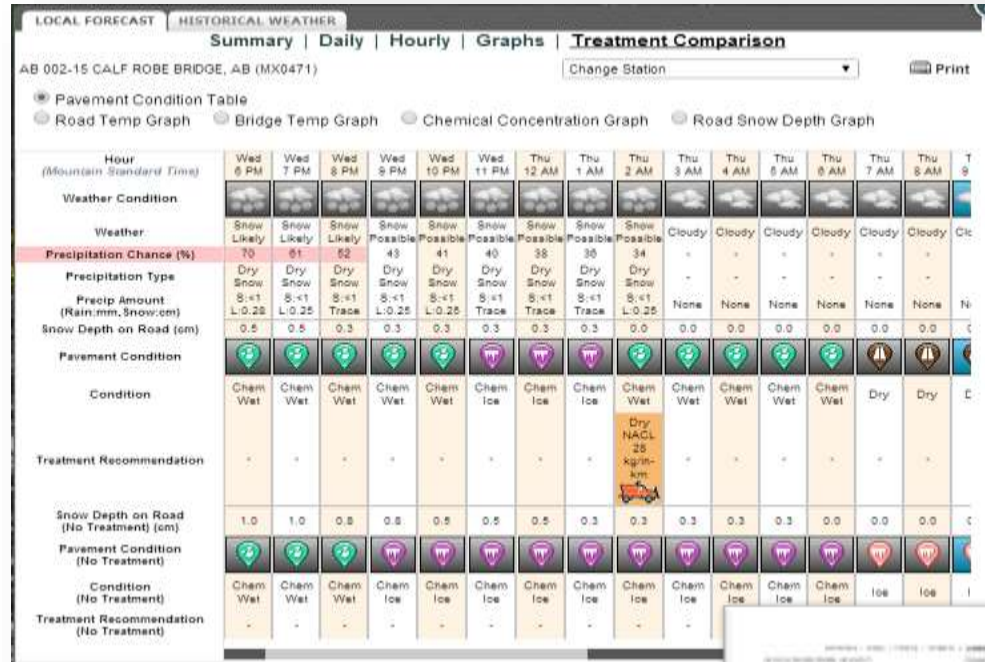
- Weather conditions affect both **PAVEMENT CONDITIONS** and **DRIVER BEHAVIOR**
- Pavement conditions can be predicted to understand locations and timeframes of concern.
- When integrated within a traffic management system, both current and forecasted weather and pavement conditions can be used to initiate actions:
 - Dynamic Message Sign (DMS) Warnings
 - Variable Speed Limit (VSL) Controls
 - Increased patrols/assistance for specific locations
 - Traffic rerouting in severe situations (e.g., floods)



Road Maintenance Decision Support Systems (MDSS)

WHEN and WHERE will the weather cause issues on the roadways? What should be done to maintain safety at an effective cost?

- Proper treatment of the roadways is critical to maintaining driver safety, especially in the winter.
- All of the following factors must be considered:
 - Timing of hazards (current and future)
 - Specific location of hazards
 - Available equipment and chemicals
 - Available labor resources
 - Budget
 - Environmental effects
- Location specific weather and pavement forecasts are fed into an MDSS.
- Straightforward instructions are provided to maintenance operators.
- MDSS can also offer “What If” scenario planning or “No Treatment” analysis.



Public Facing Decision Support

What hazards may be present on my route? Is it safe to travel? How can I modify my driving behavior to stay safe?

Alberta Transportation RWIS Obs/Cameras
511.alberta.ca

511 Alberta's Official Road Reports

Rather Phone?
In Alberta 5-1-1
Out of Alberta 1-805-381-0143
Contact Us

511 Alberta
Road Conditions Help
Help
FAQ
Text Report
Wx Load Report
Road Restrictions/Road Bans
Weather
Definitions
Other Locations

Click on highway segment of choice for additional information

Legend
■ Bare (Dry/Wet)
■ Partly Covered (Snow/Ice)
■ Covered (Snow/Ice)
■ Closed
■ No Reports Available
— Paved Road
--- Gravel Road
--- Paved and Gravel Road
● Closed
● Construction
● Incident
● Multiple Items

Map Details
Stoney Trail South & Highway 2 (Westbound)

Weather
Air Temperature: -3.90 °C
Pavement Temperature: -3.70 °C
Wind Speed: 2.10 km/h
Wind Direction: W
Relative Humidity: 49.00%
Weather Updated: Tue Dec 22 2015 at 2:25 PM MST

511 Alberta - Helping You Arrive Safely

Public Facing Decision Support

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Dallas/Ft. Worth, Texas 511 Road Weather Alerts
511dfw.org

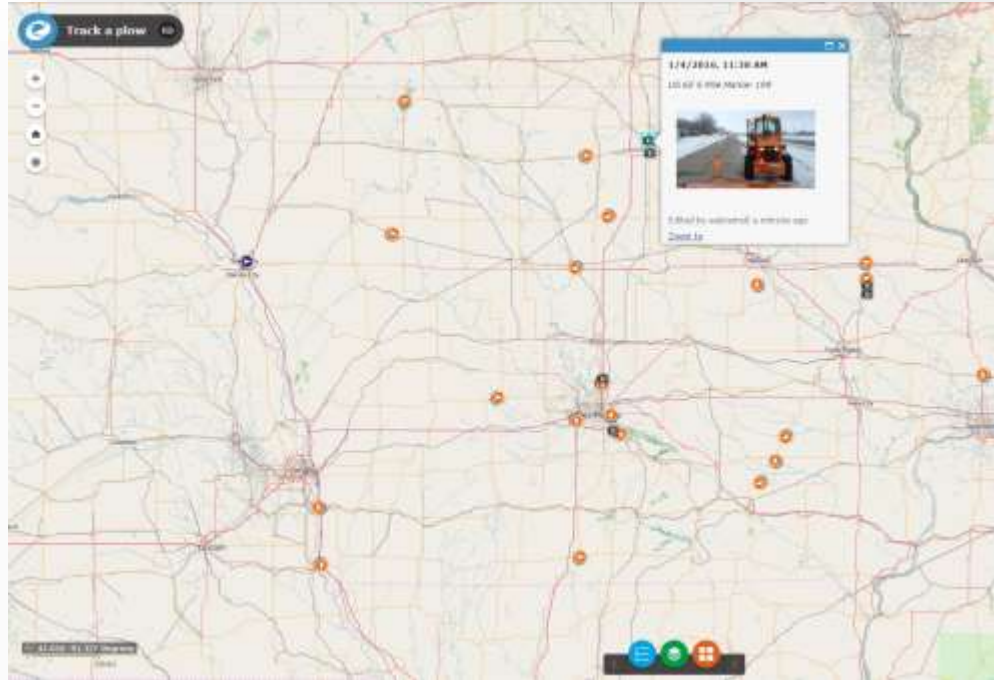


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Iowa DOT Plow Tracking Application
lowadot.maps.arcgis.com



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Alberta Transportation RWIS Automated Advisory System

Weather DSS Lessons Learned

- Upfront **PLANNING** and **DESIGN** involving all stakeholders is essential to success:
 - What road weather information needs to be communicated, to whom, when, how?
 - How is the system going to work technically and fit within the current processes and infrastructure?
 - Design should include flexibility for future expansion, technologies.
 - Consider how performance will be measured.
 - Plan for adjustments as additional lessons are learned and technology advances.
- Road weather information must be **CURRENT** and **ACCURATE** to be useful and trusted in transportation decision support.
 - “Ground truth” should be incorporated whenever possible.
 - Cameras are invaluable.
- Communication of desired **ACTIONS** must be **SIMPLE** and **CLEAR**.
 - Traffic Management – When and where is a problem anticipated or actually happening, suggested messaging, traffic control options.
 - Maintenance Operations – When, where and how to treat specific road segments to most effectively mitigate hazardous conditions.
 - Public Communication – Simple, clear wording of where and when hazards will exist, with suggested driving behavior adjustments.
 - FHWA Pathfinder Project – Guidance document in progress.

Questions for Implementation Planning

- Is your organization proactively planning for potential road weather events or reacting to them as they happen?
- Where does your organization obtain weather information and is this source effective in providing the intelligence required for your decision support?
- How are road weather hazards communicated to your constituents?
- Could location-specific road weather condition and forecast information be used to improve your traffic management, winter road maintenance, and driver decision support systems?
- Who are the potential stakeholders in your organization who would benefit from weather intelligence integration?
- What current DSS within your organization would benefit from weather intelligence integration?

Life Is On

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