



# Surface Transportation

**Road Weather Solutions**

Flexible | Reliable | Open Architecture



# IN 2018

WINTER WEATHER EVENTS

IN THE UNITED STATES

COST AN ESTIMATED

# \$3 BILLION

IN INSURED LOSSES

## Great Networks Save Time and Money

A properly functioning surface transportation network is vital to a nation's economic growth. In the UK, the direct economic impact of disruption caused by snow and ice is estimated to be around £130m per day<sup>1</sup>. In 2018, winter weather events in the US cost an estimated \$3 billion<sup>2</sup> in insured losses. In the same period, Canada's extreme weather events cost an estimated CA\$1.9 billion<sup>3</sup>.

Delivering an efficient and effective winter maintenance service is a fine balance between minimizing costs and environmental impacts while maintaining optimum levels of service. Campbell Scientific provides a range of road weather solutions to help network managers make informed, data-driven decisions to keep their transportation networks moving during adverse weather conditions.

### References

- 1 Winter Resilience in Transport: An assessment of the case for additional investment. A report by DfT, DECC and Defra December 2011
- 2 <http://www.ihc.ca/on/resources/media-centre/media-releases/severe-weather-causes-190-million-in-insured-damage-in-2018>
- 3 <https://www.iii.org/fact-statistic/facts-statistics-winter-storms>



[www.campbellsci.com/rwis](http://www.campbellsci.com/rwis)



# Challenges



## Limited Budgets

With maintenance budgets continually under pressure, legacy road weather stations reaching the end of their useful life, and emerging technologies changing the landscape of road weather monitoring, road authorities face the challenge of where to invest their resources for optimum return on investment.



## Network Densification

By developing solutions that are flexible, highly capable, and cost effective, we have made Road Weather Information System (RWIS) technology accessible for maintenance programs of every operation maturity level.



## Optimization

Optimizing the balance between safety and efficiency is an increasingly difficult challenge for transport authorities aiming to maintain safe road conditions while minimizing the financial and environmental costs of winter road treatments. Existing road weather networks lack the granularity of spatial and temporal data needed to validate and, ultimately, optimize maintenance decisions.



## Full-RWIS

**Feature-rich, high-quality, reliable, open-platform systems for years of dependable service**

Campbell Scientific's forecast-grade RWIS offers a complete range of environmental measurements, ideal for primary forecast sites requiring a full-feature RWIS station.

Providing a sensor-agnostic, future-proof, open-platform solution, Campbell Scientific is the ideal choice for upgrading legacy RWIS networks.

Supporting industry-standard communications protocols, clients have multiple options to access their data, including CampbellCloud data services.

### Key benefits:

- Long-term solution for providing accurate data for input into forecast models and Maintenance Decision Support Systems (MDSS)
- Maximizing roadway safety, mobility, and efficiency while minimizing maintenance-related costs and reducing environmental impacts
- Greater situational awareness for the motoring public by providing the correct messaging for the impacts of current weather events

# Solutions



# Solutions

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## Mini-RWIS

**Off-grid, forecast-grade systems in a cost-effective package**

Mini-RWIS solutions are the ideal choice for densifying existing road weather networks and creating new networks in locations without AC power. These solar-powered systems feature a range of standard, non-invasive road and meteorological measurements optimized for off-grid use.

Mini-RWIS delivers true off-grid RWIS stations deployable anywhere with cellular communications coverage. Data can be managed and visualized using CampbellCloud data services or exported to third-party software systems using industry-standard communications protocols.

### Key benefits:

- Accessibility to road weather data for organizations that have not had systems in the past due to various constraints
- Cost-effective solutions with a small footprint. No utilities and/or major infrastructure are required. This allows sites to be placed in remote or non-traditional locations.
- Supplementation to current RWIS networks to provide complete data where important forecast information is needed



## IoT-RWIS

**Versatile data collection for tomorrow's needs**

With the advent of the Internet of Things (IoT), RWIS technology has become increasingly available for organizations looking to gather weather data in a non-traditional manner. Generally consisting of a compact environmental sensor station (ESS) with integrated power and communications, an IoT-RWIS is efficient in its deployment, operation, and maintenance. Organizations can deploy a dense network of IoT sensors without the constraints of cumbersome capital projects and policy (IT, engineering, etc.), which can be challenging with large-scale projects. These networks are scalable from a few sensors to thousands of sensor locations, with data sent directly and securely to CampbellCloud. The Aspen™10 IoT Edge Device, coupled with the Wintersense, enhances and complements new and existing road weather programs to help manage maintenance resources for preventing traffic accidents and potential life-threatening situations.

### Key benefits:

- Easy to install. Just strap it to existing street furniture or a simple road-side pole.
- Integrated power. Everything is in one box; no separate power or communications are needed.
- Automatic data transmission. Data are automatically transmitted to a secure cloud platform where clients can visualize, export, and manage their data.
- Semi-mobile sensor. It's easy to re-deploy around your network—for example, in troublesome hotspots or thermal profiling over all weather conditions.



# Solutions

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# Solutions



## Mobile-RWIS

Road and runway measurements when and where you need them

Mobile road weather solutions fill in the gaps between existing weather networks to provide a complete picture of what is happening on your road or runway. The SurfaceVue™20 mounts to a vehicle and provides details about the weather affecting the pavement—as it happens—to the vehicle operator and management software. Information is used to improve decision-making and reduce costs associated with managing resources and material usage.

The SurfaceVue 20 provides accurate and reliable measurements for surface condition (dry, damp, wet, slush, snow, and ice), surface friction coefficient or grip, water and ice thickness, surface temperature, air temperature, relative humidity, and dew point.

### Key benefits:

- Get a better picture of your network by filling in gaps between weather stations.
- The simple installation gets you up and running quickly and is rugged enough for plow vehicles.
- Accurate and reliable data ensure confidence in your decision-making.



## Sensor Solutions

Forecast-grade instrumentation for harsh environments

Campbell Scientific is a world leader in environmental monitoring. We care about measurements, so we only manufacture products that give you accurate data. We care about reliability, so we design and test for use in the harshest environments. We care about your success, so we offer continuous support to back you up. Rely on Campbell Scientific when your measurements matter.

### Road Surface Condition and Temperature Solutions

- SurfaceVue™10 Fixed-Location, Non-Invasive Road Surface Condition and Temperature Sensor
- Wintersense SDI-12 Non-Invasive Surface Temperature Sensor
- In-pavement road sensor
- Subsurface temperature probe

### Atmospheric Weather Solutions

- HygroVue™10 Air Digital Temperature and Relative Humidity Sensor with M12 Connector
- CS125 Present Weather and Visibility Sensor
- BaroVue™10 Digital Barometer
- Mechanical and ultrasonic anemometers
- Cameras can also be used for verification.

# Solutions





# Solutions



## Professional Services

End-to-end project management, service life cycles, and support

For any RWIS project, professional services can be just as important as choosing the correct data loggers and sensors. Campbell Scientific offers an extensive menu of end-to-end professional services to ensure our clients' success. Our attention to detail ensures successful deployments for our customers, and we stand behind our work as an ISO-certified organization.

Additionally, we offer maintenance services for our customers' sensor networks to ensure their systems work reliably to the manufacturer's specifications.

Key benefits:

- Project services delivered by industry experts
- Global project team able to support across time zones
- High degree of technical and field experience
- Maintenance and calibration services to ensure accurate and reliable system performance in the toughest of environments

PROFESSIONAL SERVICES			
Site assessment and surveys	System design and build	Maintenance services	Calibration and repair services
Application consultation and programming	Installation and commissioning services	Configuration, integration, and testing	Obsolescence and spare-parts management
TECHNICAL SUPPORT AND TECHNICAL RESOURCES			
TRAINING			

C A S E S T U D Y

### Southwest Calgary Ring Road RWIS Stations | Alberta Transportation

Overview

The Southwest Calgary project is a subset of a five-year, multi-million-dollar operation and maintenance contract Campbell Scientific began with Alberta Transportation in 2017. Under the contract, Campbell Scientific provides turn-key, year-round maintenance and operation of 112 RWIS stations with CCTV cameras, as well as a further 11 CCTV-only stations located across the province of Alberta, Canada.

As part of the network upgrades, Campbell Scientific is upgrading existing legacy RWIS stations by third-party vendors whose components have reached their end of life. Upgrades to the network continue on an on-going basis.

Solution

The Southwest Calgary Ring Road Project consisted of approximately 31 km of a new 6- and 8-lane divided freeway, 14 interchanges, 1 road flyover, 46 bridges, and 1 tunnel. Campbell Scientific was selected to design, supply, install, commission, and incorporate multiple RWIS with integrated CCTV IP cameras along this high-speed by-pass route around Calgary.

Benefits

Campbell Scientific's multi-year operations and maintenance contract for Alberta Transportation has facilitated the updating of a legacy RWIS network to a modern, open-platform solution built around Campbell Scientific's core data-acquisition technology.

### Alaska DOT Mini-RWIS Pilot Project | Alaska Department of Transportation

Overview

In 2019, Campbell Scientific entered a public/private partnership project with the Alaska Department of Transportation and Public Facilities (ADOT&PF) to demonstrate the Mini-RWIS concept. The partnership included research personnel from the University of Alaska Fairbanks (UAF) to assess the performance of these stations and the feasibility of adding the Mini-RWIS station concept as a cost-effective, robust option to fill in critical gaps in the Alaskan RWIS network where harsh weather conditions and lack of power infrastructure are serious challenges.

the roadway. Cameras are also used to verify weather conditions. The stations were designed to operate in the harsh Alaska environment and with the winter's limited sun exposure. Advanced power management is used along with power-conscious Campbell Scientific instrumentation and cellular communications to operate through the year without interruption.

Benefits

Throughout the duration of the project, it was determined that the Mini-RWIS concept has tremendous applicability in the state of Alaska. Traditional RWIS here can leave large gaps of critically needed information and imagery for ADOT&PF decision-making as well as public use. Atmospheric data and imagery collected from the Campbell Scientific Mini-RWIS stations were found to be accurate, reliable, and useful for maintenance personnel and stakeholder needs.

Solution

Campbell Scientific and its partners installed seven Mini-RWIS along the roadway between the northern and central regions in Alaska. One station was installed at Atigun Pass and has additional sensing technology for research purposes. These stations are equipped with atmospheric and road weather sensors for collecting critical measurements to help ADOT maintain



campbellsci.com/rwis



# Campbell

S C I E N T I F I C ®



As a trusted provider of measurement solutions since 1974, Campbell Scientific has delivered the information that helps mitigate severe weather casualties; aids scientists in gathering data to assist in the understanding of climate change and other human-made environmental impacts; and supports countless organizations, institutions, and national agencies in providing more efficient services to their people. Our instrumentation hardware is known to be the best in the business. Our software services provide an unrivaled level of insight. Our project delivery expertise combines both to deliver a unique end-to-end solution capable of changing the world.



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