SURFACE TRANSPORTATION

Network densification and full road weather information system measurement solutions

CAMPBELL SCIENTIFIC®

Environmental Solutions

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[1]. In 2018, winter weather events in the US cost an estimated $3 billion[2] in insured losses. In the same period, Canada's extreme weather events cost an estimated CA$1.9 billion[3].

Delivering an efficient and effective winter maintenance service is a fine balance between minimizing costs and environmental impacts while ensuring optimum levels of service are maintained. 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.ibc.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

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

Route-based decision-making is creating an increasing need for more measurement data at lower cost. However, increasing the number of measurements made across a route is not always easy or within budget. Network densification requires smarter, low-power alternatives to full road weather stations.

Optimization

Maintaining the optimum 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 treatment decisions.

Solutions

Full RWIS Systems

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

Campbell Scientific's forecast-grade road weather information systems (RWIS) offer a complete range of RWIS 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 communication protocols, clients have multiple options to access their data, including Campbell Cloud data services.

Key features:

- Open-platform hardware – sensor-agnostic, future-proof systems ideal for upgrading legacy networks to an open-platform RWIS network
- Robust and reliable – Campbell Scientific's core data-acquisition technology represents excellent value and low cost of ownership over a network lifespan.
- Flexible design – adaptable, client-centric systems

Mini RWIS Systems

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 usage.

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

Key features:

- Multiple sensor options – feature-rich, flexible, compact RWIS system
- Lower installation costs – no AC power or additional roadside cabinets required
- Solar powered – no longer restricted to locations with AC power
- Robust and reliable – uses Campbell Scientific's core data-acquisition technology

Smart Infill Sensors

Wintersense™ is a fully integrated, non-invasive smart sensor that is an order of magnitude more cost effective to install and maintain than other measurement solutions. With integrated power and communications, installation is as simple as strapping it to existing street furniture or a road-side pole; no complex installation or road construction is required.

Data is collected and transmitted 24/7 directly to our secure cloud platform (or your own existing data system), which can be used by forecast providers for real-time data processing and operations.

Key Features

- Non-invasive sensor – delivers road temperature, air temperature, relative humidity, and dew point measurements.
- 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 needed.
- Automatic data transmission – data is 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.

PRE-PURCHASE		POST-PURCHASE	
PROJECT MANAGEMENT & PROJECT SERVICES			
Site assessment and site surveys	System design and system build	Maintenance services	Calibration and repair services
Application consultation and programming	Installation and commissioning services	Configuration, integration, and testing	Obsolescence and spare-part management
TECHNICAL SUPPORT & TECHNICAL RESOURCES			
TRAINING			

Project Services

End-to-end project management, life cycle services, and support

Campbell Scientific can offer a complete end-to-end project management service, including training, technical support, and technical resources throughout. We have a dedicated global project team able to provide a project management service capable of flexing to accommodate the largest of projects.

Services can be provided in whole as a complete project or in part as discrete services.

Key features:

- Project services delivered by measurement experts
- Global project team able to support across time zones
- High degree of technical and field experience



Case Studies

Utah Road Weather Management | Utah Department of Transportation

Challenge

The state of Utah has some unique geography that makes it impossible to employ a one-size-fits-all solution to road weather management. A wide variety of climatic conditions cause Utah to experience floods, snow drifts, landslides, high winds, and fires.

Solution

To deal with the wide variety of weather conditions, Utah Department of Transportation (UDOT) has developed one of the most extensive RWIS networks in the US. Teaming up with Campbell Scientific, they have deployed 152 RWIS stations to capture real-time data across the state.

Each RWIS station measures several meteorological and road parameters including wind, air temperature, relative humidity, road temperature, road condition, visibility, and snowfall. Additionally, half of these stations have cameras for visual confirmation.

At the forefront of road weather management, UDOT needs the ability to develop custom stations and measurement techniques. Campbell Scientific's remote processor units (RPU) at the heart of their systems allow UDOT to prepare for and manage even the worst storms, keeping the roads clear and the traveling public safe.

Benefits

"The Campbell Scientific systems we use are necessary to UDOT and are incredibly useful. They allow us the flexibility to use a wide variety of sensors from various providers, can be used for a variety of applications, and allow us to run sensors and organize the output data to our specific needs that a closed turnkey system may not allow."

–Cody Opperman, UDOT Weather Operations Program Specialist



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 turnkey, 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.

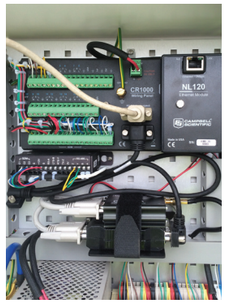
As part of the network upgrades, Campbell Scientific is upgrading existing legacy RWIS stations by third-party vendors whose components have reached their end of life. Upgrades to the network continue on an on-going basis.

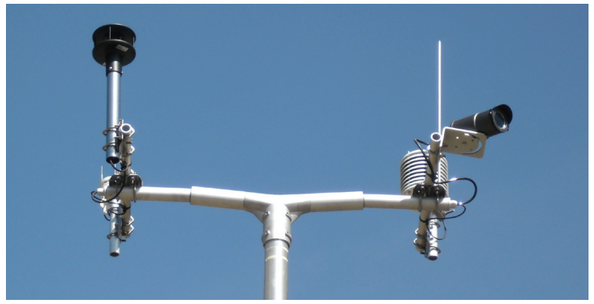
Solution

The Southwest Calgary Ring Road Project consisted of approximately 31 km of a new six- and eight-lane divided freeway, 14 interchanges, 1 road flyover, 46 bridges, and 1 tunnel. Campbell Scientific was selected to design, supply, install, commission, and incoporate multiple RWIS systems 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.



Welsh Government RWIS Network | South Wales Trunk Road Agent

Overview

The South Wales Trunk Road Agent (SWTRA) is responsible for managing, maintaining, and improving the strategic road network in South Wales on behalf of the Welsh Government.

In 2014, Campbell Scientific won a tender to upgrade and expand SWTRA's road weather station network, and we continue to provide road weather systems and services for this network.

Solution

To date, the Welsh Government network consists of 51 Campbell Scientific road weather systems, 34 of which are located within the South Wales region and managed by SWTRA.

Campbell Scientific works closely with SWTRA's network contractors who operate and maintain the road weather station network for SWTRA. Campbell Scientific provides data management services for this network via our cloud data services. For this project, Campbell Scientific developed an on-premise software management tool that manages data collection from field stations into a cloud-hosted software application where data flow to the client's forecast provider is managed.

Benefits

"Campbell Scientific systems have enabled SWTRA to upgrade the South Wales road weather monitoring network to a modern, open-platform system. As a network contractor to the South Wales Trunk Road Agent, we want systems that are reliable, robust, and easy to maintain, and Campbell Scientific systems deliver on all these fronts."

–Rhys Jolly, Senior Engineer, ERH Communications, SWTRA Network Contractor

www.campbellsci.com/rwis

Project Planning Notes

www.campbellsci.com/rwis

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