

VAISALA

Solutions for
Intelligent Year-Round
Road Maintenance



[#plowsmart](#)

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From critical sensors to complete road weather systems — tools to support weather decisions throughout the year

Increased road usage. More severe weather. Limited budgets. Ever-increasing public expectations. Road maintenance professionals are facing more year-round challenges than ever before.

Yet you still need to keep your road network safe and continuously available, even with these increased demands. No matter what the weather, you can count on Vaisala's exclusive combination of hardware, software and services to provide you with the critical information required to make data-driven, real-time decisions. And that's what you need to get you through the storm.

Vaisala solutions arm you with the most accurate data and analysis available so you can:

Keep roads clear of ice and snow: Plan, mobilize, treat and monitor the effectiveness of winter maintenance actions with confidence. With RoadDSS, today's most accurate end-to-end decision support solution, you can:

- Ensure safe transport by analyzing past, present and future road weather data.
- Monitor road usage and condition to prioritize maintenance for maximum efficiency.
- Limit road treatment to areas only when and where it is needed.

Prioritize your budget: Perform timely and well-targeted road repairs by automatically identifying and assessing issues and assets on your road network. Vaisala's AI-powered collection and analysis of road data enables you to act up to four times faster — and at lower costs — than traditional methods. Extend the life span of your assets while improving both efficiency and safety.

Maximize road capacity and journey planning: Control traffic flow and speed to minimize rapid acceleration/deceleration in areas with heavy traffic. Complement your decision-making with Vaisala's expert application know-how and accurate, reliable weather and air quality data.

Quality-assured, timely and reliable road weather data also extends to the Connected Autonomous Vehicle (CAV) industry as well as automobile industry infotainment suppliers, fleet operators and other mobile app providers.



Vaisala Sensors

Reliable observation is at the heart of what we do

Proven accuracy in the most demanding environments

Every monitoring network begins with reliable sensors. Vaisala sensors are used by thousands of customers around the world in a variety of applications, both on their own and paired with Vaisala weather stations. They are designed to perform in the most austere environments, from extreme cold to sweltering, high-humidity conditions. Vaisala's sensors are so reliable, in fact, the company has twice been selected by NASA to place sensors on Mars Rover projects. They're fully weatherproof, and their comprehensive self-diagnostics minimize downtime and maintenance visits.

One of the most convenient ways to measure the road surface is through non-invasive sensing. Vaisala's DSC211 and DST111 sensors enable accurate measurement of two key parameters – grip and surface temperature – without the need to stop traffic or cut into the road.

Certain measurements, such as road salinity and ground temperature, can only be measured through physical contact with the road. Vaisala's embedded sensors (DRS511 and DTS12G) enable those measurements and complement the information provided by the non-invasive sensors.

Atmospheric sensors, built specifically for road applications (HMP155), measure relative humidity, air temperature and dew point. Other sensors measure precipitation type, intensity as well as visibility (PWD22), and wind speed with ultrasonic technology (WMT700). With this wide range of proven technologies, your stations can be tailored to meet your climate and terrain.

Finally, mobile sensors, like the Vaisala MD30, are used to capture real-time data from moving vehicles.





Vaisala Mobile Detector MD30 Sensor

Tracking for real-time road data

The MD30 mobile sensor tracks road conditions and transmits road weather data – including road surface state, grip, relative humidity, dew point and road and air temperature – from snow plows or other vehicles. The sensor distributes precise data to supervisors and other decision-makers at the city, county and state levels – without disruption – to help ensure the best possible decisions. The MD30 works well as a stand-alone sensor or to help fill in the data gaps between stationary weather stations.



Robust durability

The compact MD30 was purpose-built to transmit data from snow plows operating in the most demanding winter conditions. Molded to withstand continuous vibration (from rugged roads to running engines and scraping plows) while preventing water ingress, the sensor's robust design ensures the collection of reliable road weather data in any weather conditions. Because it was built with the harshest environments in mind, it is suitable for any vehicle type, including patrol cars.

Patented outer hood

Designed for the difficult conditions on a snow plow, the MD30 has a patent-pending hood that protects the sensor and device from the elements – so you get an accurate analysis of road conditions. The hood of the sensor utilizes a special holed double structure that directs air flow to protect the sensor lens and keep it clean. Additionally, the double-hood can be removed by hand for easy cleaning.

Cost-effective

A fraction of the cost of a road weather information station, the MD30 provides valuable measurements in a small but robust mobile package. The compact all-in-one design is cost-effective to equip large fleets with the sensor, thus utilizing the full potential of their vehicles as data collection platforms.

Complementary data for better decisions

Supervisors are concerned about their entire road network, not just the limited area surrounding a single station, but without mobile sensors, it's difficult to know how road weather is impacted between road weather information stations. The MD30's quick response time and high sensitivity allow for reliable mobile road condition measurement that ultimately fills in the gaps.





Vaisala DSP100 Surface Patrol Pavement Mobile Temperature Sensor

Detect freezing risk with temperature data

While roadside weather stations provide accurate and continuous observations from fixed locations, they can't provide information on road conditions between stations. Mobile sensors feeding the Vaisala RoadDSS system provide an easy way to collect road weather data on those in-between locations, providing a more holistic view of weather conditions across the entire network.

Live data for winter maintenance operators

The DSP100 allows you to accurately detect the risk of freezing based on road and air temperatures coupled with weather data. Road crews can accurately optimize their chemical spread rates for different conditions, reducing unnecessary chemical spreading as well as the environmental impact and costs associated with inefficient chemical usage.

“While roadside weather stations provide accurate and continuous observations from fixed locations, they can’t provide information on road conditions between stations.”





Vaisala Monitoring Systems

RWS200 road weather station: reliable multisensor roadside data collection

With advanced algorithms and smart power management, the RWS200 is intelligently designed to keep all paired sensors running reliably. It provides the flexibility to deploy a variety of sensors to ensure you have the accurate road state information you need to make the right road maintenance decisions.

The RWS200 runs advanced, proprietary Vaisala algorithms to combine information from multiple sensors and validates the data to provide the most accurate picture of current road states possible. Battery backup allows the RWS200 to keep working — even in the event of network disconnections.

Flexibility to work today — and tomorrow

The RWS200 automatically provides information on the status and maintenance requirements of the unit itself and the sensors deployed with it, ensuring timely, cost-effective servicing. The station can be remotely debugged and reset either as a whole or sensor by sensor, boosting overall system uptime. It is fully weatherproof and features integrated lightning protection, ensuring reliable operation for years after installation.

Additionally, the RWS200 is built to last up to 20 years, and Vaisala recognizes that over its lifetime, your data needs may evolve. That's why we built the RWS200 with flexibility in mind, enabling you to upgrade and expand the sensors you deploy as your needs change.

Easy installation and worry-free performance

Many of the problems with roadside weather stations stem from installation issues. By contrast, the RWS200 features a fast, easy installation procedure and factory-tested system components mean less hassle with the system overall and fewer worries about uptime when the weather becomes inclement.





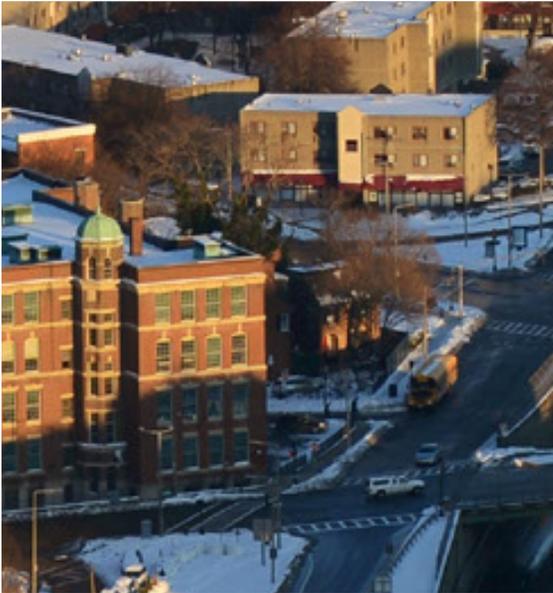
Vaisala NM10 Observation Network Manager

Optimize your road weather station investment

Identify problems and minimize site visits

Monitor, manage and control your road weather observation networks remotely on one central, secure, automated platform. The NM10 provides easy access to all essential information, including alerts, observations, metadata, device status and maintenance requirements — enabling your observation network to operate more reliably while reducing the lifetime cost of management and maintenance.





Real-time problem-solving

Thanks to its alert and notification services, the NM10 can inform you about issues with your road weather station network in real time, 24/7. Access to all relevant information (site, device status, maintenance tasks, etc.) is available through a secure browser-based application, enabling real-time diagnosis should issues arise. The ability to integrate with third-party management systems eliminates the need for full-time operators and maintenance engineers to monitor the system. Instead, the right people can be easily notified in real time, only when necessary.

Reduce operational costs

The NM10 enables remote updating of firmware and system configurations, minimizing the number of site visits required to manage your network. It also enables detailed diagnosis of system issues to be performed remotely and reduces costs by ensuring the right parts, tools and personnel are deployed for repairs.

Constant monitoring of data availability and validity

The NM10 automatically provides continuous information about data availability and validity. Continuous flow of high-quality observation data from all stations and sensors across your network is always ensured. The result is a real-time view of the entire network's status, more reliable network performance and less manual work spent on maintenance and report generation.





Thermal Mapping

Observation-based temperature profiles of your entire road network

Thermal Mapping helps road authorities ensure that they treat when and where it is needed on their network with an observation-based solution to create thermal road profiles. It provides you with the full picture when making treatment decisions and locating weather stations.

Intelligence-based road weather station positioning

You need to locate your weather station in the most effective location to get a full picture across your network so you can make decisions based on the best information possible. However you do not have a full understanding of the temperature profile of your network so weather stations may not be located correctly and therefore you won't get the best value from your investment and potentially make decisions based on unrepresentative information.

Thermal Mapping gives you a full picture of how your network behaves using actual temperature measurements, meaning you can locate stations in the most appropriate locations. Using the thermal temperature profiles we will make recommendations on where weather stations should be located.

Forecast network wide based information

When making a treatment decision you need to understand how your entire network is currently behaving and will behave in the future, so you can make the best call and your network is treated when and where needed. You may have forecast information at fixed locations across your network or a forecast of the minimum temperature across your whole network, but not a full picture of the network wide temperature variations. This leads to parts of your network being over treated and others not being treated when needed, increasing the potential for increased number of accidents.

Using the measured thermal road profile, Vaisala Thermal Mapping extends forecast temperatures from individual locations across the whole network to provide a dynamic network wide map. This displays the minimum road temperatures and also a time-step view, showing how the network temperatures vary at different times across the night.

Thermally based route design

When designing your treatment routes, it is often best practice to ensure that they take into account the temperature profile of your network so that when any routes are treated, you are focusing on the parts of your network that need treating. Often routes have not been designed taking into account the temperature variations, and it is a challenging task to acquire the required information and design the routes, leading to inefficient route design and wasting of resources each time actions are taken.

The network temperature profile gained through Thermal Mapping can be fed into the route design process. When combined with Vaisala Route Manager, the optimized routes created will be designed so that the colder parts of your network will be prioritized and roads with the same thermal profiles can be grouped together in individual routes.





Turn Data Into Decisions
The Vaisala RoadDSS[®] software suite

Access your road weather data anytime, anywhere

Vaisala's RoadDSS software suite is designed to provide you with an effective solution for the storage and display of both historic and current road weather data, ensuring you have access to your information anytime and anywhere, from any device.

With RoadDSS you:

- Don't need to maintain a local IT infrastructure for road weather data
- Have access to road weather data – no VPN connection required
- Can store, maintain and retrieve weather data, treatment plans and other crucial data – all from one centralized place
- Get relevant information about treatment decisions quickly to counter traffic accident claims
- Can set tiered user levels to meet the needs of any organization

Know the road conditions *before* the weather hits

Being able to predict and potentially prevent the impact of weather hazards before they occur is crucial. RoadDSS offers pavement temperature and road weather forecasts so you can view predicted and historical information in a single view. You can better plan for approaching weather events and freezing temperatures while monitoring and targeting historic trouble areas to minimize risks. RoadDSS also suggests treatment and maintenance strategies, giving you virtual expertise during critical moments.

Optimize road crew performance

Just as RoadDSS offers the ability to track the performance of road treatments by using a performance index, it can also track crew performance relative to conditions by comparing crews to a storm severity index and using grip and friction readings from Vaisala sensors.

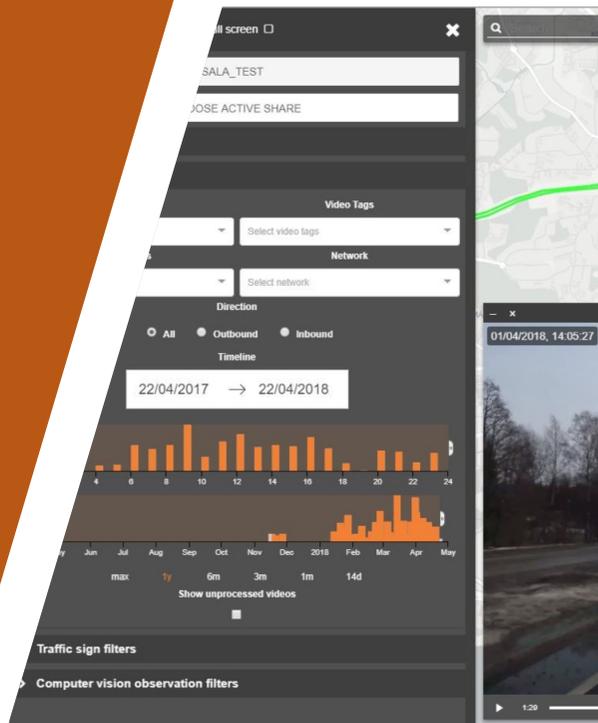




Vaisala RoadAI System

Dynamic road management through real-time videos and AI-powered mobile data

Vaisala's computer vision-powered data collection platform, RoadAI, leverages wireless connectivity and cloud technology to make safe, continuous data generation possible for entire road teams or fleets of vehicles through real-time visual information.



Changing information, such as blowing snow or fleet vehicle location, can easily be captured using onboard cameras and mobile sensors. Data is automatically geo-referenced and mapped into the system, empowering everyone from highway engineers to policy-makers to make better, more informed decisions.

Fix the roads — before the complaints

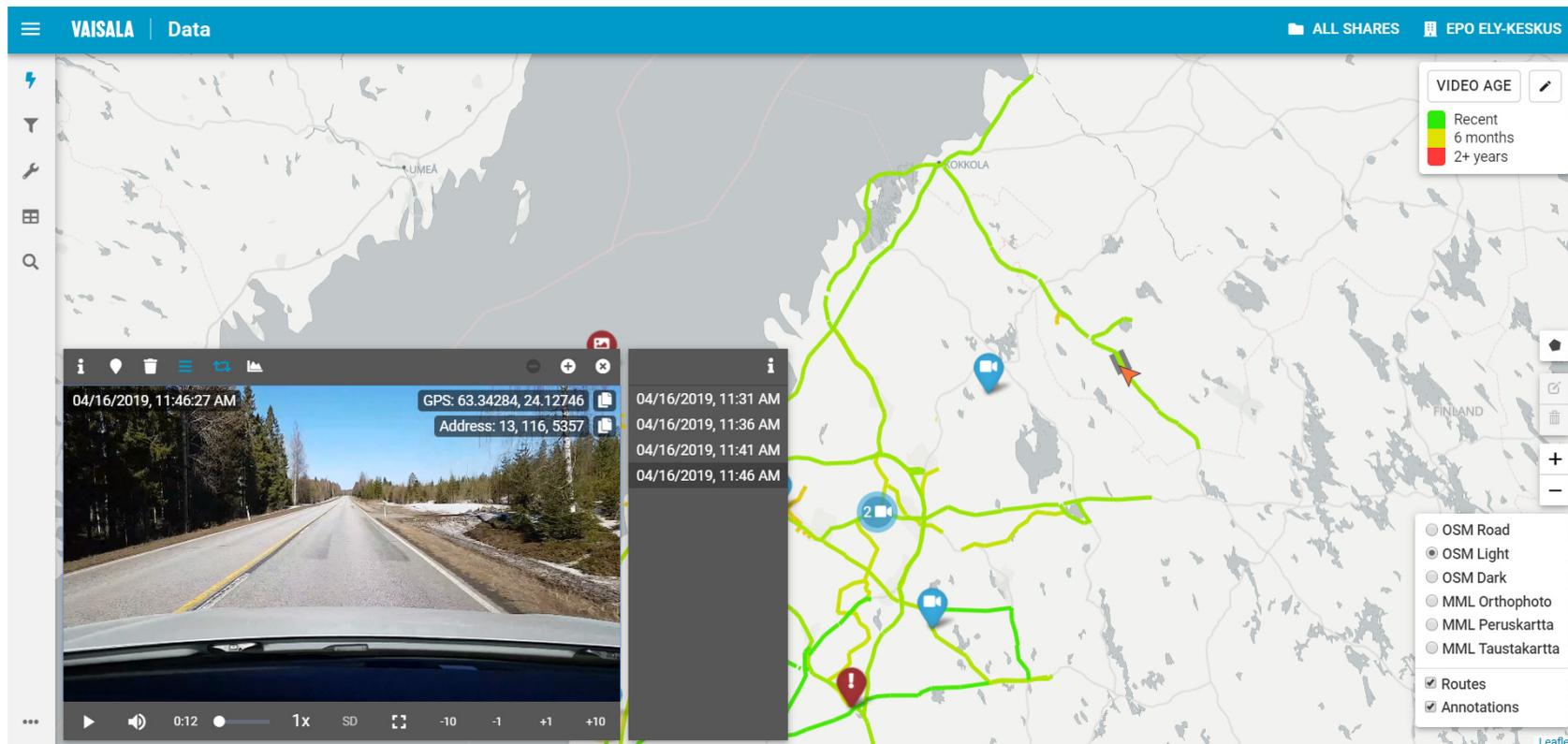
Don't wait for citizen complaints or claims for auto damage before taking action. With RoadAI's computer vision technology, you're able to perform timely and well-targeted road repairs by automatically identifying and assessing issues and assets on your road network. The system's AI-powered collection and analysis of road conditions lets you act based on real-time pavement condition data — and at lower costs — than traditional methods. RoadAI classifies road defects into different categories according to type and severity. Extend the life span of your assets, improve both efficiency and safety and reduce driver claims and complaints.

Simplify sign management

RoadAI simplifies the laborious task of sign management. The system detects, maps and classifies each road sign and provides tools to mark sign condition and use data in a simple format (e.g., night visibility analysis). Sign data can be used also for situational awareness (e.g., road work signs are individually detected).

Connected vehicles can “talk” to RoadAI

Whether a member of your fleet with a Vaisala sensor or an independent connected vehicle, RoadAI captures visual data from vehicles, so drivers can manually flag issues and share and receive notifications about network-related events or changes along their routes. This information helps speed up response times and improves maintenance procedure efficiency throughout your network.





Vaisala Route Manager

Ensure the road network is treated in the most efficient way possible

Route Manager helps road authorities ensure their network is treated in the most efficient way possible with a web-based route optimization service that significantly reduces the time and effort involved to create treatment routes based on network priorities and available resources.

Route efficiency

When you need to take action, you want to be sure you are plowing or treating as efficiently as possible to keep your roads free of ice and snow so that you meet public expectations within your budget. The time and effort needed to ensure this is happening can be significant. Vaisala Route Manager allows you to import details of your network together with available resources – such as depot locations and vehicle capacity – to produce fully optimized routes with turn-by-turn instructions.

Treating in different weather scenarios

You may want a different set of routes for different weather situations to treat your network no matter what the weather is so that you can keep your roads clear all the time. However, your routes are only designed for one or two weather situations, so your treatments may not be effective in some winter weather events. Route Manager allows you to create sets of routes that are each based on different amounts of treatment material being used and different treatment actions.

Network prioritization

There will be times when you need to redesign your route network while ensuring that certain parts of your network are always prioritized to ensure that roads that are, for example, more prone to snow or ice or are more heavily used are targeted first. This will allow you to focus your treatments on the highest priority areas. But often routes are not designed upon this criteria, so strategically important parts of your network may not be treated in time. Route Manager lets you assign ranking/priority values to all parts of your network, which the software takes into account when creating new routes, for example, designing “cold routes”.

Scenario planning

Road authorities are often under constant pressure to ensure they are always delivering the best service with the resources available. So you may be required to run a few scenarios on your existing treated network to ensure you can still efficiently treat your network under changed circumstances such as fewer depots or trucks. Any changes made will need to be based on the best options available, but it's often a long and complicated process to run several different scenarios, meaning you may end up making critical decisions without all the necessary information. Route Manager allows you to easily change the resources available to you in terms of fleets and depots and then quickly run different scenarios from the web user interface.

Changes in network

You've optimized treatment to your network but now need to add to or remove some roads so you meet any new policy or public expectations to ensure your new network is treated as efficiently as possible. Again, there is often not a simple way to update your treatment routes, so the process to do this can be long and costly. With Route Manager, you can feed in new route networks so you can quickly undertake optimization through the web user interface.



Your Trusted Partner

With Vaisala, you're supported by 80+ years of science-based experience. We are experts in observation and data collection, offering the highest quality sensors, systems and services available. We then layer on algorithm support to analyze and prioritize that data to help you determine fleet routing, chemical use and more.

Don't go it alone

Augment your decision-making with expert application know-how and accurate, reliable weather and air quality data. This not only makes commuting safer and more enjoyable, it gets automobiles off the roads more quickly, helping to reduce carbon emissions.

Contact Vaisala at www.vaisala.com to learn more about how our suite of options can best support your community.

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