

## Warning Motorists of Approaching Hazards



*You have that spot in the roadway, in your community, or along your highway that is a repeat offender. Maybe it ices up first, when nothing else does, or maybe it is prone to flooding during heavy rain. These spots can be a problem because they are somewhat unique, and motorists may not have seen this condition yet as they travel. Warning them locally can be the answer to this problem.*

### How Do We Warn Them?

Without too much thought you can probably name at least one location in your area that has a higher than normal crash occurrence when the weather turns bad. Maybe it is when it snows, or it frosts up, or is prone to fog and low visibility, or even flooding. The key is it happens quicker than the rest of your road network, or maybe when the rest of your network is fine. Then, as a motorist approaches the location, crashes occur more frequently because they were not anticipating the sudden change in weather conditions. The obvious solution is we need to warn the motorist locally before entering the location.

Possible warning criteria include:

- Ice
- Snow
- Low Visibility
- Flooding
- High Winds

### Limited Effectiveness

This concept may not be a new one to you. In some regions of the world using a Road Weather Information System (RWIS) to activate flashing beacons, turn on a sign, or display a message has been tried before. For low visibility and wet road notification the systems have worked quite well. That is partly because the sensors that detect those conditions are fairly straight forward. Detection of ice and snow has been more challenging because, up until recently, systems had to use embedded roadway sensors to do the monitoring.

### Summary

- Areas with higher than average crash rates for the region can be caused by local weather conditions.
- A thorough analysis of a location from a meteorological perspective will provide clues as to what local weather conditions are causing the problems.
- Using the correct sensors and RWIS ensures that an ITS warning solution is successful.
- Grip measurement is the key to sensing and activating an ITS solution requiring surface conditions.
- Local analysis and decision making means system does not rely on network communication and remote systems.

Embedded roadway sensors are a great tool for decision makers, because they work well when a human is viewing the data and making a decision. They do not work as well when the process is automated using a decision algorithm. This is partly because roadway sensors must infer the road condition from only what they can measure.

### Keys to Success

To successfully develop an Intelligent Transportation System (ITS) solution that can lower crash rates and improve highway maintenance of a trouble spot involves following some critical steps. First, it is important to identify which weather condition(s) are causing the localized change. Is it caused by an increase in localized atmospheric moisture? Does it appear the road surface temperature is colder than

surrounding areas? Or is there a body of water nearby? Performing a full meteorological assessment of the site, including a thermal map of the region to determine the temperature profile of the road, will help you understand exactly what is causing the problem. Next, you must select the correct RWIS sensors to measure the conditions most effectively. The Vaisala Road Weather Station RWS200 is a flexible RWIS platform that allows you to choose industry leading sensors, perfect for whatever your application requires. Make sure you have the correct atmospheric and/or surface sensors required at the proximity to ensure the correct conditions are measured. Finally, consider placement carefully, as locating them because of the proximity of utilities or for convenience is not an option - location is extremely important.



## The Right Solution

One of the biggest differences today is the advent of the grip/friction sensors, such as the Vaisala Road Surface Condition Sensor. This non-intrusive sensor uses laser technology to detect water, ice, and snow on the surface, so it can actually measure true road conditions. With this information, the surface condition sensor is then able to calculate the coefficient of friction of the road surface with the water, ice or snow on it.

This single value of grip, or slipperiness, provides a single decision point on road condition, which has many applications. The coefficient of friction is a value that ranges from 0 to 1.0. A typical dry road surface reported by the Condition Sensor reports the friction as 0.82. A wet road would be around 0.7, and a snowy or icy road could range from a 0.6 to a 0.4. The value is reported in real time and changes frequently, depending on what the sensor detects on the surface of the road. This value can greatly improve the algorithms needed to make decisions, and provide an easier decision process.

The key to this solution is when combining it with the Vaisala Road Weather Station RWS200 you now have a complete solution. The RWS200's Data Management Unit relay interface allows for the setting of complex algorithms. The RWS200 monitors conditions and activates the relay when custom conditions are met. Deploying a solution that uses the most advanced RWIS and the most advanced sensors, along with a thorough review of the site, ensures that your trouble spot sees a reduction of crashes and delays caused by weather.

### Example High Wind Area Message: CLOSED TO HIGH PROFILE VEHICLES

Sample Criteria	Wind 240° - 310°	above 50 mph	Grip .56 and above
Sample Criteria	Wind 240° - 310°	above 40 mph	Grip .55 or less

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