

Design Considerations for Road Weather Information Systems to Detect, Measure, and Support Forecasts for Lake Effect/Enhanced Snows

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Snowfall patterns in areas adjoining the Great Lakes are highly influenced by lake effect and lake enhanced snows. This creates significant variations in annual snowfall accumulations as well as huge spatial and temporal variations in snowfall patterns during individual events. This variability impacts department of transportation (DOT) maintenance responses and negatively impacts driving conditions. Drivers are often faced with unexpected changes in the weather, road conditions, and visibility in short distances.

The states and provinces bordering the Great Lakes have installed road weather information systems (RWIS) primarily to aid maintenance operations, but also to provide weather and road condition information as part of their traveler information services. The meteorological community has found the road weather information from these sites useful as a supplement to the primary observation network. Since the main objective of RWIS has been the support of transportation services, the sites for the environmental sensor stations (ESS) in DOT RWIS networks have been typically selected to provide either uniformly distributed representative road weather information or site-specific information in accident-prone locations. However, snowfall patterns associated with lake effect snows create unique maintenance and traveler information requirements that essentially create a third RWIS selection process.

This modified RWIS network selection process became apparent in the expansion of the RWIS program in Michigan over the last eight years. The Michigan DOT Region offices implemented the deployment of the new RWIS networks in Michigan and each Regional program was carried out as a multi-phased installation program. Initially, the first phase established a relatively equally spaced distribution of ESS sites, partially to establish a representative network of information and partially to assure that a reasonably close ESS site was available for field maintenance personnel in all portions of the Region. Once field personnel started using the RWIS data, they started requesting modification of future phase site options to address operational issues they deemed more critical than at the locations selected in the Concept of Operations document that had defined the phased deployment and most probable ESS site locations. This report will review the special operational needs that affected the site selection process within the MDOT program due to the lake effect snow impact and the specific instrumentation requirements that are needed in the ESS configuration to more effectively support the use of RWIS as a lake effect monitoring tool.