

# Winter Maintenance Practices



U.S. Department of Transportation  
**Federal Highway Administration**

Office of International Programs

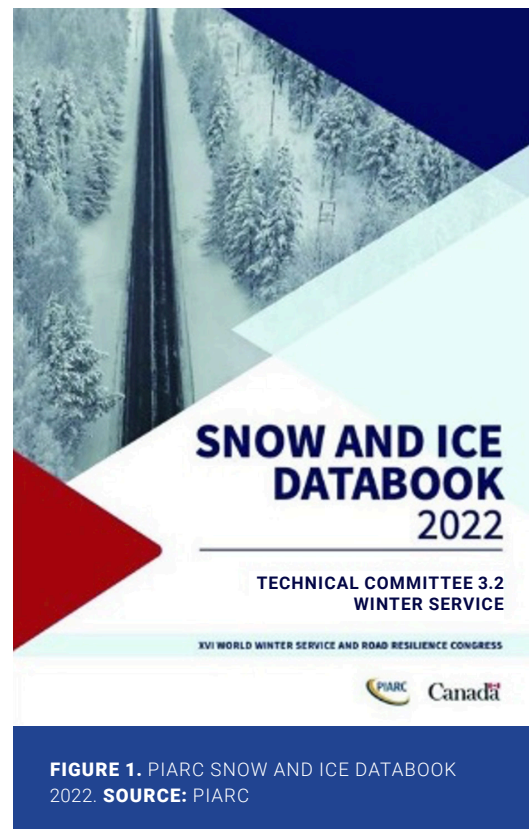
The Office of International Programs works to access, promote, and disseminate global best practices and technical innovations to ensure a safe and efficient United States highway transportation system.

## ORIGINS

The Federal Highway Administration (FHWA) Road Weather Management Program (RWMP) strives to sustainably strengthen the resiliency of the Nation's world-class highway system by mitigating the impacts weather can have on highways and the environment. The RWMP's vision, mission, and core values drive this pursuit through collaboration and leadership in the road weather community and by development and deployment of innovative technologies, solutions, and strategies. By using a combination of applied research, knowledge and technology transfer, solution deployment support, and stakeholder engagement, the RWMP works with the Office of International Programs (HPIP) to spread knowledge gained from international collaboration. Visit the website at <https://ops.fhwa.dot.gov/weather>.

## INTERNATIONAL COMMUNITY OF PRACTICE

The United States Department of Transportation participates in an international community of road weather practices by sharing solutions from the RWMP and by seeking opportunities to “scan” programs in other countries to identify best practices that can be implemented in the United States. Some examples of international collaboration include involvement with the Permanent International Association of Road Congresses (PIARC), Standing International Road Weather Commission, ITS World Congress, ITS Canada, Environment Canada, scan tours, and hosting delegations in the United States. As part of the PIARC collaboration, the RWMP prepares the United States chapter for the Snow and Ice Databook (published every four years), which shares experiences in winter maintenance practices across 20 countries with the latest version published in 2022. To obtain a free copy, go to <https://www.piarc.org/en/order-library/37033-en-Snow%20And%20Ice%20Databook%202022>.



**FIGURE 1.** PIARC SNOW AND ICE DATABOOK 2022. **SOURCE:** PIARC

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## INTEGRATED MODELING FOR ROAD CONDITION PREDICTION (IMRCP)

The IMRCP provides an integrated view of forecasted road weather and traffic conditions for a given road network. The IMRCP model draws input from hydrological and traffic data sources, as well as a diverse set of weather event sensors, to generate estimates of current conditions and forecasts of future conditions. Forecasted outputs are available in several places—web interfaces of maps, in reports, and subscriptions—while atmospheric and hydrological forecasts, work zones, and special events are taken from external sources. The IMRCP synthesizes road weather and traffic condition predictions with embedded, best-in-class forecast models. In the current IMRCP implementation, road weather conditions are estimated across the network using field measurements and also are predicted from atmospheric forecast conditions using the Environment and Climate Change Canada’s Model of the Environment and Temperature of Roads (METRo). Current traffic conditions are similarly estimated from detector stations and demand models, and are predicted from road weather, incident, and demand forecasts using machine-learning models.



**FIGURE 2.** RURAL HIGHWAY IN OREGON.  
**SOURCE:** OREGON DEPARTMENT OF TRANSPORTATION

## ROAD WEATHER INFORMATION SYSTEM (RWIS)

An RWIS comprises Environmental Sensor Stations (ESS) consisting of one or more sensors in the field, a communications system for data transfer, and central systems to collect and display field data from numerous ESS. An ESS can measure atmospheric, subsurface, pavement, and/or water-level conditions. The central RWIS processes observations from ESS that can be used to develop forecasts and other analytics related to atmospheric and surface conditions. The system can display or disseminate road weather information and forecast analytics in a format that can be easily interpreted by road weather maintenance professionals to support their decision making. The RWIS has been widely used in the United States since the late 1980s. Currently, there are nearly 3,000 ESS in the United States and more than 2,500 of the ESS are part of State-owned RWIS.



**FIGURE 3.** ENVIRONMENTAL SENSOR STATION.  
**SOURCE:** VAISALA