APPLYING ENVIRONMENTAL SENSOR STATION (ESS) STANDARDS

The U.S. DOT is working with standards development organizations (SDOs) to accelerate the deployment of Intelligent Transportation Systems (ITS) standards. ITS standards are industry-consensus standards that define how system components operate within a consistent framework known as the National ITS Architecture. By specifying how systems and components interconnect, the standards promote interoperability and facilitate the deployment of ITS projects.

Environmental Sensor Stations (ESS) are sensing devices that collect environmental and pavement condition data from the roadside, roadway, or vehicle. These data are then transmitted to a center, which can be a traffic management or roadway maintenance center or a meteorological data warehouse. ESS devices provide decision-makers with information about current roadway conditions, and also feed into a variety of forecasts. These road weather information products enable road operators to conduct their work more efficiently, safely, and with greater flexibility. For example, winter road maintenance managers are able to dispatch maintenance personnel, deploy anti-icing equipment, and use supplies in a manner that costs less than traditional methods, and is more effective at maintaining a safe and efficient roadway. In addition, road users are able to make more informed decisions about when and where to travel. ESS standards enhance the interoperability of ESS components and devices by making system upgrades and expansions easier to implement and more cost-efficient. They also promote data sharing across the transportation and meteorological communities.

In order to help transportation professionals evaluate and deploy ESS standards, the U.S. DOT has assembled this package of informational materials. The package consists of the Application Area Matrix, the ESS Roadmap, Standards Fact Sheets, Early Deployers Profiles, ESS Lessons Learned, and a reference sheet on RWIS and meteorological standards.

The **Application Area Matrix** lists all ITS standards applicable to ESS deployments, as well as the other ITS services where these same standards can be used. The chart can be used to determine which ESS standards apply to a specific type of ITS project. (Note: The matrix does not list projects.)

The **ESS Roadmap** illustrates the activities surrounding the

The ESS-RWIS Connection

Environmental Sensor Station (ESS) is the term assigned to an assortment of intelligent devices that collect and transmit environmental and pavement condition data from the roadway to a host of end-users involved in road weather information.

To date, most ESS devices have been installed along the roadside, or with pavement sensors embedded in the roadway itself. Now, vehicle-mounted ESS devices are beginning to be deployed, increasing the flexibility of ESS deployments and expanding the range of weather and roadway information that can be collected.

A deployment of multiple ESS devices within a region is referred to as an **Environmental Sensing System,** and this system is generally part of a larger **Road Weather Information System (RWIS)**. The primary purpose of RWIS is to collect, process and make available information pertaining to road weather conditions to aid roadway-related decision making. An RWIS relies on many technologies to collect, process, and transmit weather and road condition information. As well, there are many institutional arrangements to effectively use and disseminate that data. **A graphical depiction of ESS data uses is on the back of this page (Fig. 1).**

Many ESS standards highlighted in this package fall under a broader collection of ITS communications standards known as NTCIP (National Transportation Communications for ITS Protocol) standards. For more information about NTCIP standards, including ESS standards, visit the U.S. DOT's ITS Standards Web site at www.its-standards.net or the NTCIP Web site at www.ntcip.org.

development and deployment of standards that relate to the ESS application area, including a timeline for when all the standards that pertain to ESS are likely to be approved and evaluated; where, and when, ESS projects may be deployed; and the time frame for when outreach and technical assistance materials will be available.

The **Standards Fact Sheets** describe ITS standards that apply to ESS devices, along with related standards that may be necessary to deploy an ESS project. Standards Fact Sheets are available on the ITS Standards Web Site and provide concise, "plain English" descriptions of the standards and how they can be used in transportation projects. Standards Fact Sheets are produced for standards that have reached a high level of stability in content and that are not expected to change substantially. Fact sheets for both approved standards and draft standards (standards soon to be formally approved by the SDO) are included.

The **Early Deployer Profiles** highlight the accomplishments of several transportation professionals who have deployed ESS standards in their ITS projects. Read their stories, and learn from them firsthand about the benefits, as well as some of the challenges, of using ESS standards.

The **ESS Lessons Leaned** describes the issues and challenges faced by the state transportation agencies that were among the first to use ESS standards.

Finally, the **Meteorological Standards Reference Sheet** contains information on existing standards and guidelines for deploying Environmental Sensor Stations (ESS). These guidelines were not specifically developed to serve the surface transportation community, but there are areas of applicability to road weather information systems. These references can give general guidance to agencies wanting to deploy ESS.

Figure 1. Environmental Sensor Station (ESS) Operational Applications