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

Bob Hart
Road Weather Information System (RWIS)

- Network of Environmental Sensor Stations (ESS)
- Purpose is to record and report:
  - Pavement temperature
  - Pavement condition
  - Weather conditions
  - Camera imagery of pavement & roadway environment
  - Traffic speeds & volume (optional)
Road Weather Information System (RWIS)

• Supports
  • DOT maintenance
  • Travelers
  • Weather service providers
    ▪ To aid forecast products
    ▪ To supplement analysis fields
  • Traffic management
  • Research organizations
RWIS Infrastructure

- Owner – typically state DOT
- ESS Network Implementation – typically done by DOT district or region
- Data Acquisition and Delivery
  - Managed by owner agency
  - Data collected from ESS remote processing unit using cellular or radio communications
  - Data transported to central processing center
  - Users typically access RWIS & weather data via web sites
    - Maintenance personnel & travelers
RWIS Network Design

- RWIS has been a transportation support system
- Design considerations for ESS sites
  - Evenly distributed network
    - To fairly support maintenance facilities
    - To provide representative data
  - Site selection to serve major traffic corridors
  - Critical local maintenance issues
    - Accident prone zones
    - Monitor remote areas away from maintenance facilities
    - Areas affected by local weather conditions
  - Fill gaps in existing weather networks
METAR and RAWS Reporting Sites
MDOT Phase 1 Reporting Sites
North Region

MDOT Phase 2 Reporting Sites
Innovation for better mobility

Source: John Kowaleski and Evan Webb, Grand Rapids NWS
MDOT Phase 3 Reporting Sites

WHY SELECT THESE ESS SITES?
Innovation for better mobility

MDOT Phase 3 Reporting Sites

LEGEND
ESS CAMERA

REPRESENTATIVE TO FILL VOIDS
Innovation for better mobility

MDOT Phase 3 Reporting Sites

TROUBLE SPOTS
MDOT Phase 3 Reporting Sites

LES MAINTENANCE REQUEST
LAKE EFFECT SNOW SITES

- **ESS06 – I-75 & Levering Road**
  - Break point in rise from Lake Michigan (577’) to 800’ plateau extending south for 40 miles

- **ESS07 – US-131 8 miles south of Petoskey**
  - 1 mile long hill climbing from 780’ to 915’

- **ESS08 – M-72 10 east if Kalkaska**
  - West edge of N/S moraine 170 feet above the Boardman River drainage plain

- **ESS11 – US-131 @ Wexford SCL**
  - On upslope from 1200’ to 1400’ into Cadillac highlands
  - Westerly flow funneled up the Pine River basin
LAKE EFFECT SNOW SITES

- ESS03 – M-33 @ Loon Lake
  - Morainal dome that is 200+ feet higher than surrounding plateau
  - Affected by northwest LES flow
LAKE EFFECT SNOW SITES

- Key Criteria for Determining LES Sites
  - Experience of MDOT winter maintenance personnel
  - Routine travelers
  - Highway patrol
PRIMARY LES MONITORING TOOLS

- **Cameras**
  - Multiple views
    - Road surface
    - Views along highway
  - This is MDOT preferred resource

- **Present weather sensor**
  - Precipitation type
  - Precipitation rate
  - Visibility
  - Most effective sensor is the WIVIS sensor (equivalent to the LEDWI)

- **Other support**
  - Temp/RH and winds
QUESTIONS?

Thank you,
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