



RWIS in Michigan's Upper Peninsula

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Michigan Department
of Transportation

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T3 Webinars are brought to you by the ITS Professional Capacity Building Program (ITS PCB) at the U.S. Department of Transportation's (USDOT) ITS Joint Program Office, Research and Innovative Technology Administration (RITA)

Superior Region Con-ops

- Project Vision – Objectives & Goals
- Stakeholder Involvement
- Environmental Sensor Station (ESS)
Location Siting
- ESS Sensor and Devices
- Communications & Power
- System Architecture and Standards
- Anticipated Impacts and Benefits
- Performance Measures
- Outcomes and Next Steps

RWIS Project Vision

- Objectives
 - Provide safer highways
 - Improve road maintenance decision making
 - Improve traveler information
 - Provide data for review of historical weather events to enhance transportation planning

RWIS Project Vision

- Goals
 - Reduce the duration of hazardous road conditions
 - Improve maintenance efficiency of all resources
 - Improve traveler information

Stakeholder Involvement

- State Agencies
- National Weather Service
- Airports
- Transit
- Planning Organizations
- Emergency Response
- Schools
- Businesses
- Local Agencies
- Casinos
- And More!

ESS Location Siting

- FHWA Siting Guidelines
- Co-Location
- Prioritization
 - Regional/corridor importance
 - Higher than average crash rate per mile in adverse weather conditions
 - Frequent road closure areas
 - Maintenance benefit
 - Unique weather information needs
 - Filling in gaps in existing weather data

Existing Weather Data Sites

Potential Co-Location Sites

- Airports
- Cities/Counties
- Adjoining States and Countries (Clarus)
- National Weather Service
- National Forests
- State Agencies
 - Transportation
 - offices, PTR/WIM, DMS, Bridge treatment systems,
 - State Police, Natural Resources, Agriculture
- National Weather Service

Reduced Cost for Shared Resources Due to Co-locating

- Reoccurring Fees
 - Power
 - Communication
 - Administration Overhead (billings)
 - Maintenance (routine and unplanned)
- One-Time Fees
 - Installation costs
 - Road side structure

Co-Location Efforts



- Early involvement during the Con-op phase and throughout construction

ESS Sensors and Devices

- ESS Applications
 - Roadway Surface Monitoring
 - Bridge Condition Monitoring
 - Roadway Maintenance
 - Traveler Information & Safety
 - Incident Management
- ESS Options
 - Basic
 - Optional Sensors
 - Reduced Power
 - Portable
- Draft Special Provision

Communication & Power

- Requirements of sensors and devices
- Capacity of different methods
- Recommended methods for basic, optional, solar, etc. ESS

System Architecture and Standards

- Collection, Transfer, Storage and Distribution of ESS Data
- Data Users and their Needs
- Draft Special Provision

Anticipated Impacts

- Technology
- Road Maintenance
- Inter-Agency Data Coordination
- Region ITS Architecture Coordination
- ESS Maintenance
- Staffing
- Training

Anticipated Benefits

- Roadway Maintenance
- Traveler Information
- Incident Management
- Resource Allocation
- Density of Weather Data
- Historical Weather Information

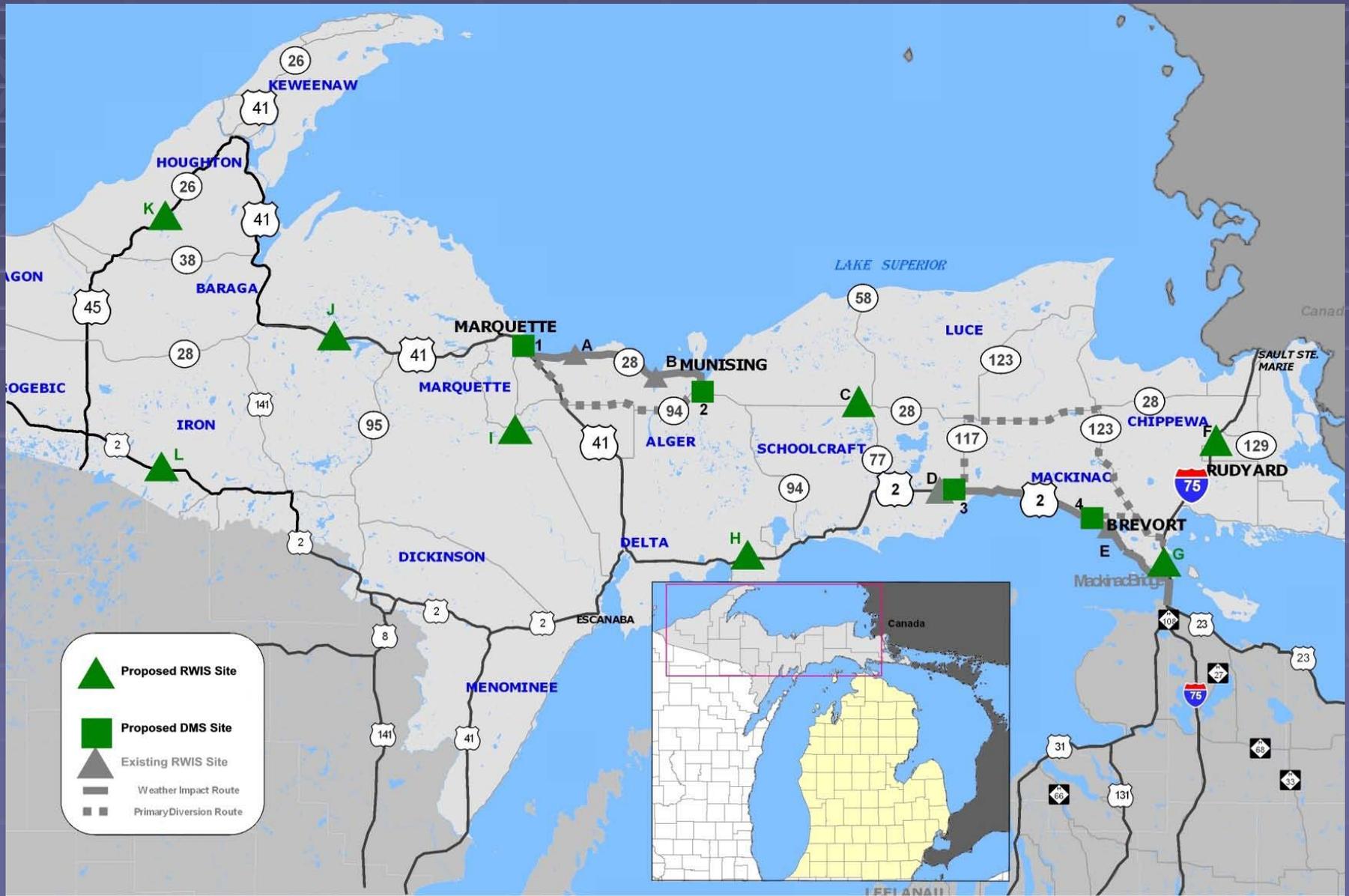
Performance Measures

- Time required to clear roadway
- Crash rates
- Maintenance response times
- Maintenance vehicle miles traveled
- Emergency response times
- Road treatment material used
- Traffic volumes and speeds during weather events
- RWIS website usage
- Percentage of 'up-time' on system components

Superior Region RWIS

- 12 Basic ESS Sites with Traffic Data added
- 2 Specialized ESS Sites
- 4 Non-Freeway DMS
- Adding in 2010
 - DMS along the I-75 Corridor

ESS and DMS Sites



In Pavement Sensors



- Pavement temperature
- Frost depth
- Chemical concentration
- Traffic information

Atmospheric Sensors



- Wind speed and direction
- Precipitation
- Barometric pressure

RWIS on Line

Upper Pen.
Au Train⁽⁷⁰⁵⁰⁰¹⁾
Site Status

Current Time: 02/10/2009 13:50 CST

Data Time: 02/10/2009 13:38 CST

Air Data						Wind Data				Visibility	
Temp	RH	Dew	WBIB	Min	Max	BaroPs	SpdAvg	SpdGst	DirAvg	DirGst	Distance
45F	78%	39F	42F	34F	45F	28.7 in	6 mph	17 mph	S	S	10.0 mi

Precipitation			Last Precipitation Period		Accumulation					
Type	Intensity	Rate	Start Time	End Time	10 min.	1 hr.	3 hr.	6 hr.	12 hr.	24 hr.
None	None	0.0 iph	02/10/2009 03:28	02/10/2009 03:29	0.00 in	0.00 in	0.00 in	0.00 in	0.00 in	0.11 in

Snow Depth
10.2 in History

Surface Data											
Sensor	Status	Sfc	Sub	Frz	CF	Chem	Dpth	Ice	Cond	Salin	
M-28 W/B (0)	Wet	45.9F	26F	-	25	-	-	-	-	-	History
M-28 E/B (1)	Wet	45.9F	-	-	5	-	-	-	-	-	History

Subsurface Data		
Sensor	Temp	
PvmtBtm (0)	40F	History
SubBtm - 3in (1)	32F	History
SubBtm - 6in (2)	29F	History
SubBtm - 9in (3)	29F	History
SubBtm - 12in (4)	28F	History
SubBtm - 15in (5)	28F	History
SubBtm - 21in (6)	25F	History
SubBtm - 28in (7)	25F	History
SubBtm - 34in (8)	25F	History
SubBtm - 40in (9)	26F	History
SubBtm - 46in (10)	27F	History
SubBtm - 52in (11)	28F	History
SubBtm - 58in (12)	29F	History
SubBtm - 62in (13)	30F	History
SubBtm - 68in (14)	31F	History

Cam Pos 1
02/10/2009 12:58



Site Information

- Currently 5 locations

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45F	78%	39F	42F	34F	45F	28.7 in	6 mph	17 mph	S	S	10.0 mi

Precipitation			Last Precipitation Period		Accumulation					
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Snow Depth
10.2 in History

Surface Data											
Sensor	Status	Sfc	Sub	Frz	CF	Chem	Dpth	Ice	Cond	Salin	
M-28 W/B (0)	Wet	45.9F	26F	-	25	-	-	-	-	-	History
M-28 E/B (1)	Wet	45.9F	-	-	5	-	-	-	-	-	History

Surface Conditions

RWIS on Line

Upper Pen.
Engadine - US-2 E/B (705002.0)
Surface/Precipitation History

01/01/2009 12:00 to 1/2/2009 12:00

[▶ Surface/Atmos. History](#)
[▶ Surface History Graph](#)
[▶ Atmospheric History](#)
[▶ Precip. History](#)
[▶ Export](#)

Change End Date:

Date/Time (CST)	Sf Stat	Temp			Chem		Water Layer		Surface		Precipitation			
		Sf	Sub	Frz	Factor	Pct	Depth	IcePct	Cond	Salin	Type	Intens	Accum	Rate
01/02/2009 11:52	Ice Watch	30.6F	26F	-	15	-	-	-	-	-	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:51	Chemically Wet	30.4F	26F	29F	15	9%	0.00 in	0%	20 mhos	2239	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:42	Ice Watch	29.1F	26F	-	15	-	-	-	-	-	None	None	0.55 in	0.0 iph
01/02/2009 11:41	Ice Watch	28.9F	26F	-	15	-	-	-	-	-	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:32	Chemically Wet	29.1F	26F	30F	15	8%	-	27%	18 mhos	2134	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:31	Chemically Wet	29.1F	26F	30F	15	8%	-	20%	19 mhos	2206	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:22	Chemically Wet	28.6F	26F	30F	10	8%	-	41%	17 mhos	2004	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:21	Chemically Wet	28.6F	26F	30F	15	8%	-	37%	19 mhos	2155	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:13	Ice Watch	27.9F	26F	-	15	-	-	-	-	-	None	None	0.55 in	0.0 iph
01/02/2009 11:11	Chemically Wet	27.9F	26F	30F	10	7%	-	54%	16 mhos	1926	None	None	0.55 in	0.0 iph
01/02/2009 11:02	Ice Watch	27.0F	26F	-	15	-	-	-	-	-	Snow	Slight	0.55 in	0.0 iph
01/02/2009 11:01	Chemically Wet	27.0F	26F	30F	5	6%	-	71%	13 mhos	1491	None	None	0.55 in	0.0 iph
01/02/2009 10:53	Ice Warning	26.1F	26F	31F	5	5%	-	79%	11 mhos	1263	Snow	Slight	0.55 in	0.0 iph
01/02/2009 10:51	Ice Warning	25.9F	26F	31F	5	5%	-	80%	10 mhos	1239	Snow	Slight	0.55 in	0.0 iph
01/02/2009 10:42	Ice Warning	25.3F	26F	31F	10	5%	-	82%	10 mhos	1206	Snow	Slight	0.55 in	0.0 iph

Harvey



AuTrain



Engadine



Engadine



Brevort



Brevort



Outcomes and Next Steps

- Proximity to maintenance transfers
- Snow depth measurements
- ITS Construction is NOT Road Construction
- Cameras
- Cell Service
- Mini-RWIS
- Maintenance
- Evaluation

Take Away

Keep your Con-ops handy!!

It is a very useful document that will provide assistance through your RWIS development.

Thanks and Good Luck!

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