MDOT North Region
Road Weather Information System
Concept of Operations

Presented by:
Kimley-Horn of Michigan, Inc.

In association with:
CAMBRIDGE SYSTEMATICS
Transportation leadership you can trust.

HNTB
Richard A. Foltman Consulting
Overall Project Description

- **Six Concept of Operations**
  - 4 TMC ConOps (3 Regional, 1 Statewide)
  - 2 Regional RWIS ConOps

- **Focus of RWIS Projects**
  - Identification of System Requirements
  - Roles and Responsibilities of Agencies Involved
  - Prioritized Phases for RWIS Regional Deployment
  - Fiscal Assessment Assuming a 10 Year Deployment
Concurrent Projects

- Additional RWIS Projects
  - Superior, Grand, Metro Regions

- TMC
  - Existing MITS Center in Detroit and West Michigan
  - TMC in Grand Rapids
  - Planned TMCs for North Region, Grand Traverse Joint
    TMC, Superior Region, and Statewide

- Statewide ATMS Deployment
Project Background

- What is the catalyst
  - Project was identified during the Regional ITS Architecture and Deployment Plan
  - High priority for Maintenance and Construction

- How will it be used
  - Winter Weather Maintenance
  - Environmental Conditions (i.e. visibility)
  - Coordination with TMCs
North Region Project Team

- Michigan Department of Transportation
  - Matt Radulski, Project Manager
- Consultant Team
  - Kimley-Horn of Michigan (Lead Consultant)
  - Cambridge Systematics (ConOps, SE)
  - HNTB (Data Collection, Field Investigations)
  - Rick Foltman (Meteorologist)
Stakeholders – Participating Agencies

- MDOT North Region TMC (Planned)
- MDOT North Regional Office and TSC Offices
- County Road Commission (CRC)
  - Maintenance Garages
- Michigan State Patrol (MSP) and Local Law Enforcement
- NWS
- County Emergency Operation Centers
ConOps Development Process

- **Project Kick-off Meeting**
  - Meteorologist Identified Locations
    - Concept of Operations submittal
  - Workshop
    - Draft list of locations
    - Use case scenarios
  - Phase distribution & confirmation
- **Preliminary Research**
  - Workshop
    - Confirm information from the survey
  - Field Study
    - Geographic
    - Communications
    - Power supply
- **Stakeholder Survey**
  - Deployment of Phase 1
- **Meeting**
  - Deliverable
Preliminary Research

- Operational Issues
  - Safety, Mobility, and Productivity
- Institutional Issues
  - Coordination for Maintenance Activities
  - Access toExisting Data Sources (ASOS, AWOS, etc.)
- Technical Issues
  - Integration with ATMS and TMC
  - Information to Field Forces
Stakeholder Survey

*Identification of “Hot Spots”*

- Stakeholder input
  - Stakeholder Identification of Experienced Issues

- Data Collection Guide / Survey
  - 3 Impact Areas (Mobility, Safety, Productivity)
  - Guiding Questions / Descriptors
    - Areas that experience a reduction in speed
    - High crash locations
    - Areas that require additional treatment
  - Location, Rank, Existing Resources
Preliminary Siting

- Mapping of Existing Data Sources (AWOS, ASOS...)
- Mapping of Identified “Hot Spots”
- Reference the FHWA Siting Guidelines
- MDOT North Region Workshop – Input from all Stakeholders
- Major Thoroughfares (ADT)
- Michigan Meteorological Factors

MDOT
Site Refinement & Confirmation

- Use Case Scenarios Presented
- Sites Confirmed and Refined
- Ranked
  - Traffic Rank
  - Weather Rank
  - MDOT/Workshop Factor
  - Local/Other factors
- Workshop
Functional Requirements

**System Needs**

- Enhance NWS Ability to Monitor Large Storms
- Integrate with the Statewide ATMS software
- Provide Specific Data to Field Personnel
- Supplement Existing Atmospheric Data Points with Road Surface Condition Data Points
## Functional Requirements

### User Needs

<table>
<thead>
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<th>Data Collected</th>
<th>MDOT</th>
<th>MSP</th>
<th>CRC</th>
<th>NWS</th>
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<td>Wind Speed</td>
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<td>CCTV Camera Images</td>
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</table>
# Functional Requirements

## Data Needs

### Types of Sensor Available

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<th>Data Collected</th>
<th>Sensor Station</th>
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<td><strong>Basic</strong></td>
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<tr>
<td>Precipitation (Type, Intensity)</td>
<td>Rain Gauge, Optical Present Weather Detector</td>
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<td>Atmospheric Temperature (Air)</td>
<td>Thermometer</td>
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<td>Pavement Temperature</td>
<td>Pavement Sensor</td>
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<tr>
<td>Wind Speed</td>
<td>Anemometer and Wind Vane or Aerovane (combination of the two)</td>
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<tr>
<td><strong>Enhanced</strong></td>
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<tr>
<td>Visibility</td>
<td>Visibility Sensor</td>
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<td>Water Vapor (Humidity)</td>
<td>Hygrometer</td>
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<td>Snow Depth</td>
<td>Snow Depth Sensor</td>
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<td>Flooding/Water Level</td>
<td>Float Gauge, Conductance Sensor</td>
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<td>CCTV Images</td>
<td>CCTV Camera</td>
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Functional Requirements

Site Needs

- Location for Most Relevant Data
- Accessible Power Supply and Communication
- Not Allow Data to be Influenced by Immediate Surroundings (such as large buildings, dense tree growth, etc.)
Field Study

General Observations

- Wide Open Area? Any Obstructions?
- Available Right of Way
- Terrain Around the Site
- GPS Coordinates of the Devices if Needed (including elevation)
- Photographs at Each Site
- Small Diagram Depicting the Site Location with Respect to Roadway
Field Study

Power and Communications

- Existing Cell Towers in the Vicinity
- Tree Heights Near the Site Location (Line of Sight and Unobstructed Measurement of Wind)
- Existing ITS Cabinets, Power Poles or Underground Utilities
- Which Company is Responsible for Providing Power Connection to the Site Area
Phase Distribution

- Requirements and Related Rank
- Estimated Costs
- Projects – *(Phase 1-5)*
10-Year Budget Overview

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Concept of Operations

- Submittal to Stakeholders for Comments
- Includes Stand Alone Appendices for Each Phase
  - Summary of proposed locations
  - Proposed costs
  - Field study information
  - Map
North Region – RWIS Phase 1

- Site Selection
  - Funding
  - Con-ops
  - Ease of installation
  - Environmental clearance

- Project – Design/Build

- Consultant Services
  - Field review

- Develop contract
Design/Build Hurdles

- Complexity
- Contract Documents
- Utilities
- Project Management
- Project Let
Michigan DOT Future RWIS

Superior Region

- Original 5 sites (1 test)
- 8 sites in 2009
- 20 sites in 2012
Michigan DOT Future RWIS

North Region

- Phase 1
  - 12 sites in 2010
- Phase 2
  - 8 sites in 2011
Successes

- Invested Stakeholders
- Experienced Team Members
  - ATMS Knowledge
  - Design Experience
  - Knowledge of concurrent projects (TMC)
- Meteorologists
- Extensive Field Investigations
- Comprehensive Data Document
MDOT North Region
Road Weather Information System
Concept of Operations

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