PROJECT SUMMARY

Real-Time Integration of Arrow Board Messages into Traveler Information Systems

Project Location:
Twin Cities, MN

Start – Finish Date:
September 2017 – March 2019

Project Status:
Complete

Project Partners:
Athey Creek Consultants
Castle Rock Associates
Street Smart Rental

MnDOT Project Cost:
$300,000

Projects with Similar Characteristics:
511 WZDx
Centralized SPaT and MAP Data Sharing
Enterprise Pooled Fund Study - Arrow Board Projects (Phase 1-3)

Project Description:
Many DOTs struggle with real-time information being relayed to their users in situations that involve lane closures. Due to the variability in location and duration, real-time integration of arrow board messages into traveler information systems became an item of interest for MnDOT to provide up-to-date data to travelers. This project involved:

- Deployment of an integrated ITS solution to report on the location and operational status of arrow boards in real time to MnDOT's Regional Transportation Management Center (RTMC) systems.
- Integration of the arrow board status information with the MnDOT Intelligent Roadway Information System (IRIS) to alert RTMC operators of lane closures who could then add messaging to nearby dynamic message signs.
- Integration of the arrow board status information with the MnDOT Condition Acquisition and Reporting System (CARS) which provided real-time updates to the traveler information system.

The pilot project involved 20 arrow boards equipped with the status monitoring unit to test displaying real-time information to travelers related to stationary and mobile lane closures.

Project Objective:
The objective of the project was to provide real-time, accurate information to travelers related to lane closures by following a modified systems engineering process to guide deployment of the ITS solution.

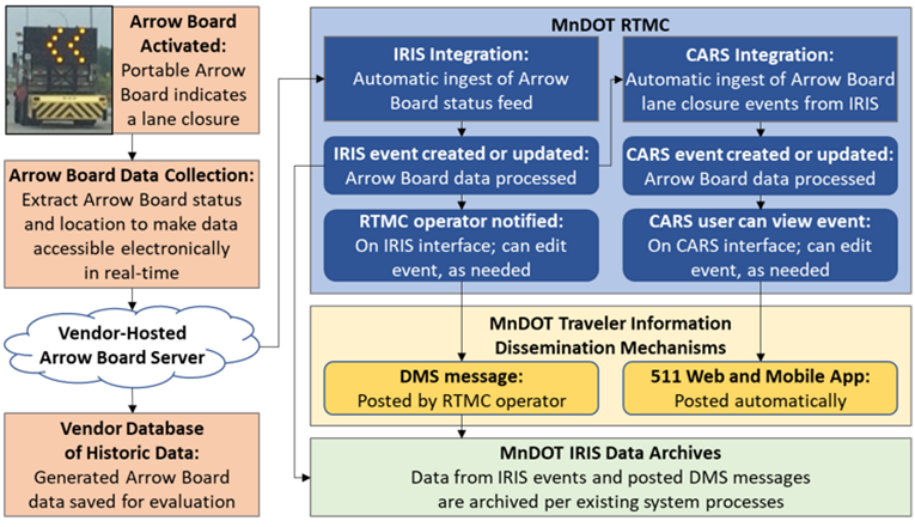

Figure 1: Project Systems Layout

Project Accomplishments:
The project accomplishments included the successful deployment of technology and system integrations to support real-time integration of arrow board messages into traveler information systems. The delay between being turned on in the field to being displayed on 511 was only between 2 to 3 minutes.

Date Updated: 2024-11-21

Key Findings:

Equipment Installation

Installation of the equipment was not one-size-fits-all since each MnDOT maintenance truck was wired differently.

Integration

Many parties had to communicate effectively to ensure integration across all platforms was achieved.

Testing Requirements

Not all testing requirements were met, but documentation was provided on why they were not met, and they did not alter the overall goal of the project.

Other Related Arrow Board Projects

The Enterprise Pooled Fund Study completed three phases of a similar project which supported transportation agencies with integration of arrow board status information from the roadside to the traveler information systems. Phases 1-3 documentation can be viewed at through this link.

Lessons Learned:

- System requirements documents required modifications to fit the project more accurately.
- Continuous stakeholder involvement with the consultant project team led to a cohesive plan for requirements and testing.
- The CARS importer had to be modified to match route names from the IRIS feed for integration.
- The system proved to be a feasible solution with a comprehensive process for bringing back all arrow board messages.
- There was a need to identify both construction and maintenance lane closures, which led to a spec change in the project to include maintenance lane closures.

Potential Next Steps for MnDOT:

Should MnDOT choose to deploy additional devices on arrow boards for real-time information, they can consider the following:

- Adding delay monitoring to arrow board events and creating a historical archive of delays resulting from lane closures to assess traffic impacts.
- Attaching lane closure plans to IRIS or CARS events.
- Creating shoulder closure events in IRIS and CARS.
- Modifying CARS to update after two cycles to one cycle to reduce the delay time that the event shows in CARS for mobile lane closures.
- Developing a concept to integrate all MNDOT maintenance vehicles and arrow boards with this ability to receive and display messages.
- Integrating maintenance arrow boards into the traveler information system.
- Initiating a pilot or demonstration of a Reduced Width / Lane Closure V2X application.

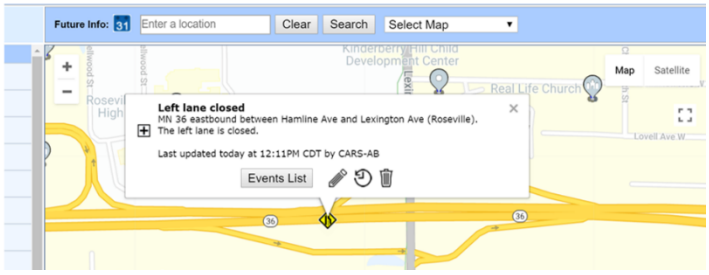

Figure 2: CARS Screenshot Displaying Lane Closure