District 3A ITS Scoping Study

MEMORANDUM
Executive Summary

March 2004

Prepared by
INTRODUCTION

The Minnesota Department of Transportation (Mn/DOT) District 3A transportation system serves a large community of users, including traffic management agencies, travelers, transit operators, and private partners. The Regional Intelligent Transportation System (ITS) Architecture and Implementation Plan for Mn/DOT District 3A will provide the overall framework for the operation of an integrated ITS for this transportation system that supports different transportation modes and these multiple users. The Mn/DOT District 3A Scoping Study identifies and studies local transportation needs for the District 3A region for use in defining a long term vision for transportation technology applications. This Executive Summary gives a broad overview of the process undertaken for the development of the District 3A ITS Architecture and Implementation Plan.

PROJECT OUTREACH

In addition to the essential state, city and county transportation agencies, the range of organizations with a potential stake in ITS within the greater Brainerd Lakes area includes incident and emergency services, tourism, public transit, major commercial sources, and planning organizations, as well as local civic groups. Each of these organizations participated in the ITS Scoping Study by attending interactive workshops, providing survey information, and participating in telephone interviews. Certain key stakeholders were also selected to form a Steering Committee, which met monthly during the course of the Scoping Study to guide the development team.

INVENTORY

An extensive inventory was undertaken to identify existing and planned characteristics of the District 3A transportation system. This inventory included traffic volumes, transit ridership volumes, crash totals, highway-rail intersection locations, and utility locations. The inventory also identified existing and planned ITS deployments, including communications infrastructure deployments, as well as ongoing ITS related projects affecting the District.

PROBLEM AND NEEDS IDENTIFICATION

One of the results of the project outreach efforts described above is the identification and prioritization of transportation problems and needs within the District from the standpoint of both partner agencies and the overall traveling public. As part of the surveys, stakeholders were asked to prioritize their top transportation network issues and their top implementation issues. Shown in Figures 1 and 2, these issues capture the stakeholder concerns at the onset of the Scoping Study.

At the conclusion of the outreach campaign, four general goals came to light that benefit the broad range of organizations involved in the scoping effort. The goals are:

- Improving Emergency Response Times
- Increasing Availability of Traveler Information
- Integrating Inter-Agency Communications
- Improving Highway Safety
Figure 1

Question #1 - Top Local Transportation Network Issues

![Bar chart showing importance of various issues]

- Unfamiliar Users
- Road Construction
- Emergency Coordination
- Transit Facilities
- Weather Info
- Special Events
- Emergency Response
- Traveler Info
- Signal Operations
Figure 2

Question #2 - Top Implementation Services

![Bar chart showing the importance of various services]

- Incident Response
- Emergency Vehicle Mgmt
- Highway-Rail Traffic Control
- Incident Management
- Pre-Trip Trav Info
- Commercial Vehicle Ops
- En-Route Driver Info
- Public Transp Ops

Services
REGIONAL ITS ARCHITECTURE

The process for developing the District 3A Regional ITS Architecture began by collecting stakeholder input and gathering a comprehensive inventory of existing and planned ITS initiatives within the District. When combined, this data provided a list of requirements that could be applied to the National ITS Architecture, the national model for developing regional ITS architectures. This step was further refined by applying terms and techniques from the Polaris Statewide ITS Architecture to ensure that the District 3A ITS Regional Architecture would be consistent with other efforts within the state. The resulting Regional ITS Architecture, shown in graphical format in Figure 3, provides a framework for organizing and planning ITS initiatives within District 3A by highlighting the links between the various stakeholders and presenting the operational concept of the District. The architecture also identifies potential integration opportunities, applicable ITS standards, and leads into the identification of technologies that should be considered for implementation in the District 3A region.

TECHNOLOGY ASSESSMENT

In order to identify the most applicable candidate ITS technologies for District 3A, the development team utilized the Rural ITS Toolbox, a document prepared by the Federal Highway Administration. This “toolbox” of ITS applications gathers together examples of successful rural ITS deployments throughout the country, including several projects in Minnesota. After identifying the candidate technologies, they were assessed using rational planning techniques to identify the best technologies that should be considered for implementation. Technologies were identified on a basis of cost and performance. Cost factors included implementation cost, recurring cost, and integration/customization cost. Performance parameters were functionality, technology maturity, support of local operations, and public acceptance. Upon completion of the assessment, the following technologies were recommended for consideration in District 3A, broken down by Rural ITS Toolbox development tracks:

1. Emergency Services
   - Emergency Vehicle Preemption (EVP)
   - Mayday Systems
   - Computer Aided Dispatch (CAD)
   - Closed Circuit Television (CCTV) Surveillance
   - Automatic Vehicle Location (AVL)
   - Integrated Land/Mobile Radio
   - Dedicated Telephone Number

2. Tourism and Travel Information
   - 511/Traffic Information Telephone Number
   - Information on the Internet
   - Dynamic Message Signs (DMS)
   - Television/Radio
Figure 3
District 3A Regional ITS Architecture “Sausage” Diagram

Travelers
- Remote Traveler Support
- Personal Information Access

Centers
- Traffic Management
- Emergency Management
- Toll Administration
- Commercial Vehicle Administration
- Maintenance and Construction Management

Wide Area Wireless Communications

Vehicles
- Traffic Management
- Emergency Management
- Toll Administration
- Commercial Vehicle Administration
- Maintenance and Construction Management

Roadside
- Toll Collection
- Parking Management
- Commercial Vehicle Check

Wireline Communications

Dedicated Short Range Communications

Figure 3
district 3A regional ITS architecture “Sausage” Diagram
3. **Traffic Management**
   - Control Center
   - Closed Circuit Television (CCTV) Surveillance
   - Geographic Information Systems (GIS)
   - Closed Loop Signal Control
   - Interagency Signal System Coordination
   - Pager Activation of Warning Systems
   - Route Diversion Systems
   - Inductive Loop Detection
   - Non-Invasive Loop Detection
   - Service Patrols

4. **Rural Transit and Mobility**
   - Coordination of Rural Transit Services
   - Automatic Vehicle Location (AVL)
   - Paratransit Operations Software

5. **Crash Prevention and Safety**
   - Automated Visibility Warning Systems
   - Highway-Rail Alert/Crossing Systems

6. **Operations and Maintenance**
   - Integrated Communications Systems
   - Public Vehicle Fleet Management Systems
   - Smart Plows/Agency Vehicle Monitoring
   - Automatic Anti-Icing System
   - Public Agency Outreach for Transportation Management

7. **Surface Transportation and Weather**
   - Road Weather Information Systems (RWIS)
   - Weather Information Dissemination Systems
   - Integrated Weather Monitoring/Prediction Systems

Many of the technologies listed above are already in place in the District, which further solidifies the practicality of using these technologies.

**IMPLEMENTATION PLAN**

The implementation plan provides an implementation strategy and sequence of deployments at a conceptual level to implement the ITS elements of the District. The implementation plan identifies a program of coordinated activities by defining what, where, and when these activities will happen. In addition, the plan considers existing programs that may effect the deployment of ITS in the District 3A
region including statewide efforts such as the Transportation Operations Communications Center (TOCC) Plan, intelligent vehicle initiative, and several other related efforts.

Table 1 provides a summary cost table that defines the planning level funding requirements for the short, intermediate, and long term costs, as well as ongoing outreach, operations, and maintenance costs.

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Deployment Cost</th>
<th>Operations and Maintenance Cost</th>
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</thead>
<tbody>
<tr>
<td>Short Term (0 – 2 Years)</td>
<td>$1,360,000</td>
<td>$67,700</td>
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<tr>
<td>Intermediate Term (3 – 5 Years)</td>
<td>$1,520,000</td>
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<tr>
<td>Long Term (6 – 10 Years)</td>
<td>$790,000</td>
<td>$28,500</td>
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<tr>
<td>Ongoing Programs</td>
<td>$120,000</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Contingency (20%)</td>
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<td>$284,000</td>
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<tr>
<td>Totals</td>
<td>$4,550,000</td>
<td>$1,700,000</td>
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<tr>
<td><strong>Overall Program Cost</strong></td>
<td></td>
<td>$6,250,000</td>
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</table>

It should be noted that funding is not currently available for all of the projects contained in this planning study. However, as additional funds become available, the District will be in a position to mobilize and implement these projects on an accelerated basis because of the efforts involved in creating an Implementation Plan for District 3A.

**CONCLUSION**

By implementing a wide range of transportation technology solutions, the District 3A region will effectively achieve the goals laid out by the stakeholders. To reiterate, these goals include:

- Improving Emergency Response Times
- Increasing Availability of Traveler Information
- Integrating Inter-Agency Communications
- Improving Highway Safety

The completion of the District 3A ITS Scoping Study and Architecture concludes another piece of the puzzle for the overall state of Minnesota ITS Integration efforts and will provide additional benefits for both the motoring public and the agencies involved. The study lays the groundwork for future advanced transportation technology initiatives in the District 3A region.