Using ITS to Improve Safety on Rural Highways

Transportation Research Conference
May 24, 2011

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Wright County Engineer
Wright County
WRIGHT COUNTY AT A GLANCE

- 538 Miles of County Highways
- County Population 115,000
- 6 Cities Over 5,000 Population
  - Albertville
  - Buffalo
  - Delano
  - Monticello
  - Otsego
  - St. Michael
Wright County Highway System

• Mileage Breakdown (All Miles are Paved)
  – County State Aid Highways 415 miles
  – County Roads 123 miles

• TOTAL MILEAGE = 538 MILES
SAFETY is our No. 1 Priority

In the City...

In the Country...
MINNESOTA
Strategic Highway Safety Plan
June 2007

TOWARD ZERODEATHS

Traffic Safety Fundamentals Handbook
STRATEGIC HIGHWAY SAFETY PLAN (SHSP)

• Identifies Statewide Safety Goal
• Safety Emphasis Areas
• High Priority Strategies
• New Approach to Distributing Funds
  (driven by distribution of crashes across state)
• More Involvement with Local Governments
TRAFFIC SAFETY HANDBOOK

• Updated Since 2001 Original Version

• New Safety Practices, Policies, and Research

• Traffic Safety Tool Box

• Lessons Learned
TRAFFIC SAFETY TOOL BOX

- Pavement Markings
- Lighting
- Signing
  - Sight Line Improvements
  - Rumble
  - Strips/StripEs
- Safety Edge

- Clear Zone Management
- General Maintenance
- ITS Applications
  - Shoulder Paving/Widening
- Turn-Lane Treatments
What is ITS?

ITS Components

Sensors

Communication

Processor

Displays
Minnesota Crash Mapping Analysis Tool (MnCMAT)

- Easily maps and analyzes crashes
Minnesota Crash Mapping Analysis Tool (MnCMAT)

- Ten years of data available statewide
Minnesota Crash Mapping Analysis Tool (MnCMAT)

- Data can be filtered for specific results
Minnesota Crash Mapping Analysis Tool (MnCMAT)

- Output in form of charts, maps, reports and data files
Rural Stop Controlled Intersection Crashes

- Right Angle: 50%
- Other/Unknown: 15%
- Rear End: 11%
- Sideswipe: 5%
- Left Turn: 5%
- Road Departure: 10%
- Head On: 3%
- Right Turn: 1%
FATAL CRASHES

- Right angle crashes overrepresented at rural STOP controlled intersections.
- Most of the fatal crashes are stop and proceed.
- Strategies to address include use of new technologies.
Typical Intersection Strategies

Included Strategies:

- Change Intersection Type
- Street Lighting
- Dynamic Warning Signs
- Enhanced Signing and Delineation

8/12/2010
Wright County Safety Solutions

INTERSECTIONS

• Rural Intersection Street Lighting

• ITS - Intersection Warning System

• Improved Signing
## SUMMARY OF WRIGHT COUNTY RURAL INTERSECTIONS WITH LIGHTING

<table>
<thead>
<tr>
<th>TYPE</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Street Light Installed on Existing Power Poles</td>
<td>17</td>
</tr>
<tr>
<td>Breakaway Light Poles (Two Lights/Intersection)</td>
<td>56</td>
</tr>
<tr>
<td>Traffic Signals w/Street Lights</td>
<td>17</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>90</strong></td>
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</tbody>
</table>
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Intelligent Transportation Systems

Intersection Advance Warning System
VEHICLE DETECTION
ADVANCE WARNING SYSTEM

$144,000.00 Federal STIP Dollars Awarded to Wright County
VEHICLE DETECTION
ADVANCE WARNING SYSTEM
Request For Proposals
Design Build

A. Provide a Warning to a Stopped Motorist at the Intersection that an Oncoming Vehicle is Approaching on the Cross Street.

B. Provide a Warning to a Vehicle on the Thru Roadway that a Vehicle is Stopped at or Approaching from the Side Street.
Request For Proposals
Design Build

- Modular & Scalable
- Radio Based Wireless Communications
- Radar Detection
- Solar Powered
- Battery for Power System Stored Below Ground
Request For Proposals
Design Build

• System Configured with On Board Keypad & Display

• Develop Customized Warning Signs

• Mount Systems on Sign Post Structures Provided by the County

• Train County Personnel in the Use & Operation of the Systems
Request For Proposals
Design Build

Proposals Sent to Four Firms that Expressed Interest
PROJECT AWARDED TO

• SHORT ELLIOT HENDRICKSON, INC.

In Association with,

• NETWORK TRANSPORTATION TECHNOLOGIES, LLC
MAINLINE STRUCTURE

SOLAR Panel

Doppler Radar

Control Box
SIDE STREET STRUCTURE

- Solar Panel
- Fault Indicator
- Telespar Slip Base Breakaway
- Whip Antennae
- Sonic Radar
- Doppler Radar

Look for Traffic
UNIQUE ISSUES

• Mounting Flasher Bracket to Square Tube

• Strength of Mounting Hardware

• Placement of Battery Box

• Proper Angle of LED Sign to Motorist
UNIQUE ISSUES
UNIQUE ISSUES

SPECIAL BRACKET
UNIQUE ISSUES

- Advance Detection was Added to the Project
- Placement Location of Sonic Radar for Stop Bar Detection.
- Larger Solar Panels Were Required to Sufficiently Charge the Batteries.
SYSTEM INSTALLATION
SYSTEM INSTALLATION
SYSTEM INSTALLATION
SYSTEM INSTALLATION
SYSTEM INSTALLATION
RUSSIAN VISIT
PROJECT COSTS

- Initial System Price $39,780.00
- Additional Advance Radar $3,978.00
- County Slip Base Posts $2,129.00
- Larger Solar Panels $1,850.00

- TOTAL SYSTEM COST $47,737.00
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HORIZONTAL CURVES

• Chevron Signing
• Guide Marker Plates
• ITS – Curve Warning System
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• Chevron Signing

• Criteria – Typically 45 MPH Curve or Less
Chevron Signing
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- Guide Marker Plates
- Criteria – Typically 50 MPH Curve or More (when used)
Guide Marker Plates
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Intelligent Transportation Systems

Curve Warning System
Curve Warning System Concept

- Radar-based detection to monitor speed profile of vehicle approaching a horizontal curve
- Provide a flashing warning of the curve ahead based on speed
  - Within normal stop profile – No warning
  - Excessive speed detected – flashing lights to alert driver
Curve Warning System
Line of Sight
Curve Warning System
Wright County, MN
CSAH 37
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SPEED CONTROL

- Dynamic Signing
- Experimental Striping
Dynamic Speed Display Signs

Display Actual Speed

Driver Speed Awareness Sign

Below Regulatory Sign Flashes if Over Limit

Permanently Mounted
THANK YOU FOR ATTENDING

Drive Safely !!