Developing Consistency in ITS Safety Solutions:
Intersection Conflict Warning Systems
• Intersection Conflict Warning Systems
• ENTERPRISE Project
  – Developing Consistency in ITS Safety Solutions
• Roadmap to Standardization
Intersection Conflict Warning Systems

- Intersection conflict warning systems
  - Used at stop-controlled intersections to provide drivers – on both major and minor roads – with dynamic warning of other vehicles approaching the intersection.
Intersection Conflict Warning Systems

Minor Road Warning
Intersection Conflict Warning Systems

Major Road Warning
Intersection Conflict Warning Systems
ENTERPRISE Project

• ENTERPRISE
  – Federal Highway Administration Transportation Pooled Fund since 1991
  – 16 members
    • Ontario Ministry of Transport and Transport Canada
  – Forum for collaborative ITS research, development and deployment ventures
ENTERPRISE Project

• Project scope
  – Bring together organizations that have developed and deployed intersection conflict warning systems
  – Develop a consistent approach for accelerated, uniform deployment and further evaluation of intersection warning systems
  – Recommend preliminary design and evaluation guidance for federal standards consideration
ENTERPRISE Project

• Anticipated results
  – Increase **awareness** of systems deployed
  – Develop **design guidance** to support accelerated and more consistent deployment
  – Establish **evaluation framework**
  – Create **roadmap for standardization** in Manual on Uniform Traffic Control Devices and Highway Safety Manual
ENTERPRISE Project

• Webinar (June 23, 2011)
  – Shared knowledge and educated each other on systems deployed
  – Identified challenges with future deployments

• Workshop #1 (July 28-29, 2011)
  – Discussed content of a preliminary design guidance
  – Discussed roadmap for standardization

• Workshop #2 (September 15-16, 2011)
  – Reviewed preliminary design guidance
  – Developed evaluation framework that may be used in future deployments
  – Discussed plans for future deployment and coordination plans
Developing Consistency in ITS Safety Solutions - Intersection Warning Systems
Related Documents/Links

This page includes a listing of related documents and links to the Developing Consistency in ITS Safety Solutions - Intersection Warning Systems ENTERPRISE project. If you would like to contribute to this listing or have any questions, please contact Ginny Crowson at crowson@acconsultants.org.

<table>
<thead>
<tr>
<th>Source</th>
<th>Related Document/Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTERPRISE</td>
<td>• Design and Evaluation Guidance for Intersection Conflict Warning Systems, Version 1 (December 2011)</td>
</tr>
<tr>
<td></td>
<td>• Intersection Conflict Warning Systems-Characteristics Summary (December 2011)</td>
</tr>
<tr>
<td></td>
<td>• Project Overview-Handout</td>
</tr>
<tr>
<td></td>
<td>• Project Overview-Presentation</td>
</tr>
<tr>
<td>FHWA</td>
<td>• Stop-Controlled Intersection Safety: Through Route Activated Warning Systems</td>
</tr>
<tr>
<td>Florida</td>
<td>• Innovative Operational Safety Improvements at Unsignalized Intersections - Post-Mounted Flashing Beacons and Vehicle Actuated Variable Message Signs</td>
</tr>
<tr>
<td>Gwinnett County, Georgia</td>
<td>• Proposed Guidelines for Traffic Actuated Warning Signs at Intersections with Limited Sight Distance</td>
</tr>
<tr>
<td>InterSafe (Europe)</td>
<td>• Part of the Integrated Project PREVENT, InterSafe is a European effort exploring accident prevention and mitigation potential of an integrated preventive safety system for intersections</td>
</tr>
<tr>
<td>Iowa</td>
<td>• Plan Set for Anamosa Intersection</td>
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<tr>
<td></td>
<td>• Plan Set for Dyersville Intersection</td>
</tr>
<tr>
<td></td>
<td>• Traffic Approaching When Flashing Signs</td>
</tr>
<tr>
<td>Maine</td>
<td>• Final Technical Report #01-2 Evaluation of the Norridgewock Intersection Collision Avoidance Warning System on Route 101A, Norridgewock, Maine</td>
</tr>
</tbody>
</table>

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## ENTERPRISE Project

### ENTERPRISE Developing Consistency in ITS Safety Solutions – Intersection Conflict Warning Systems: Characteristics Summary

**December 2011**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Roadway/Intersection Characteristics</th>
<th>Sign/Detection Placement</th>
<th>Message Set</th>
<th>Results</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Minor Road</td>
<td>Iowa — Byesville — US 20 (4-lane; 9,000 ADT) and 7th St (2-lane; 735 ADT) Iowa — Amesboro — US 151 (4-lane; 10,050 ADT) and Old Dubuque Rd (2-lane; 1,385 ADT) Problem: Gap acceptance Missouri — Lowery City — MO 13 (4-lane; 10,000 ADT) and 1st St (2-lane) Missouri — Osceola — MO 13 (4-lane; 10,000 ADT) and Truman Rd (2-lane) Missouri — B + other locations Problem: Gap acceptance</td>
<td>Sign (with yellow flashers): 25-79’ to the left of STOP on major road Detection (loops): 1000’ before intersection on major road</td>
<td>TRAFFIC APPROACHING WHEN FLASHING</td>
<td>Missouri: Simple before/after study • 32% reduction in all crashes • 48% reduction in angle crashes • 33% reduction in all severe crashes • 8% reduction in all severe angle crashes Isolated locations showed no improvement</td>
<td>Grid power with battery backup Iowa: 2010 installations $45,000 approximate cost per installation Missouri: 2009-09 installations Determining acceptable gap for detector placement was challenging</td>
</tr>
<tr>
<td>2. Minor Road</td>
<td>Minnesota — Goodhue County — US 52 (4-lane; 17,500 ADT) and Co Rd 9 (2-lane) Minnesota — Mille Lacs County — US 160 (4-lane; 15,200 ADT) and Co Rd 11 (2-lane) Minnesota — Lyon County — MN 23 (4-lane; 6,200 ADT) and Co Rd 7 near Marshall Wisconsin — Minong — US 85 (4-lane; 4,600 ADT) and WI 71 (2-lane; 3,950 ADT) Posted speed 80 MPH Problem: Gap acceptance</td>
<td>Sign (DMS): First on far-side, opposite corner from STOP and second on far-side corner from median STOP/YIELD Detection (loops): 1.5 to 2 seconds approximately 800’ second approximately 150’ before intersection and a third just after the intersection Symbol: Divided highway with color and do not enter indicators</td>
<td>Structured validation field test performed at Goodhue County site; included 48 participants from young, middle and senior age groups; additional 13 truck drivers completed study using a large truck Data collected: rejected gap sizes, lead gap size, maneuver type, lane change data, boarding, crossing and yield times, and safety margins Overall, results indicated that participants used sign to reduce their risk level at intersection and that drivers had a positive opinion of the sign Use of sign was associated with the rejection of shorter, unsafe gaps as evidenced by the increase in 80th percentile rejected gap 7.5 second critical gap threshold used by sign was shown to be in agreement with the driver’s gap selection performance No apparent effect on intersection crossing metrics of accepted gap length, lead gap length, or time-to-contact.</td>
<td>Part of the USDOT Cooperative Intersection Collision Avoidance Systems (CICAS) and Rural Safety Improvement programs Mille Lacs County site: Power cost estimated at $4,000-6,000 per year for full LED sign, could be less with addition of static sign</td>
<td></td>
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<td>3. Minor Road</td>
<td>Minnesota — Ramapo County — Co Rd 17 (2-lane; 3,156 ADT) and Landsdale Ln (2-lane; 100 ADT) Posted speed 40 MPH Problem: Sight distance</td>
<td>Sign (with yellow LED across-shaped flashers): Far-side corner from STOP Detection (radar): 750’ before intersection</td>
<td>LOOK FOR TRAFFIC</td>
<td>Simple before/after study • 54% reduction in traffic conflicts (sudden braking, sudden acceleration or swerving) 50% of survey respondents indicated they would pay more attention at intersection</td>
<td>Solar power with battery backup</td>
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<td>4. Minor Road</td>
<td>Minnesota — Washington County — Manning Ave/CSAH 15 (2-lane) and McKusick Rd/CR 64 (2-lane) Posted speed 55 MPH Problem: STOP running</td>
<td>Sign (8 LED lights on STOP): At STOP Detection (radar): STOP CROSS TRAFFIC DOES NOT STOP</td>
<td>STOP, CROSS TRAFFIC DOES NOT STOP</td>
<td>Not yet available</td>
<td>Commercial off the shelf sign Railroad crossing immediately south of intersection Alerts drivers of approaching stop ahead and to be more aware</td>
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Additional information about these systems is available at [http://www.enterprise-prog.org/Projects/2010_Present/developingconsistency/ITS/its_relateddocuments.html](http://www.enterprise-prog.org/Projects/2010_Present/developingconsistency/ITS/its_relateddocuments.html)
ENTERPRISE Project

• Design
  – Typical layouts based on current practice
  – Conditions, intended drivers use, options, notes and references

• Evaluation
  – Common framework
  – Goal, strategy, hypotheses and parameters
Roadmap to Standardization

2000 – 2011

Jun 2011

Jul 2011

Sep 2011

2012-13

2014

Webinar #1
Compile and assess lessons learned from individual development and field testing

- Florida
- Georgia
- Iowa
- Kansas
- Maine
- Michigan
- Minnesota
- Missouri
- North Carolina
- Pennsylvania
- Virginia
- Wisconsin

Workshop #1
Develop preliminary design guidance

- Function
- Placement
- Sign Size/Message
- Failsafe
- Liability
- Costs/benefits
- Vehicle vs. infrastructure

Workshop #2
Develop evaluation framework

- Review preliminary design guidance
- Develop evaluation framework
- Discuss future deployment plans

Further deployments and evaluation

Standard for MUTCD consideration

See details on next slide
Roadmap to Standardization

1. ENTERPRISE: Jon Jackels, MN
   a. Monthly board meetings
   b. Summarize webinar/workshop proceedings and guidance document
   c. Extend work to continue coordination and develop Con Ops and System Requirements

2. Design and Evaluation Guidance for ICWS: Athey Creek
   a. Develop and distribute final document December 16, 2011
   b. Develop support materials for summarizing webinar/workshop proceedings and guidance
   c. Provide periodic stakeholder updates and coordination support

3. FHWA MUTCD Team and Office of Safety: Jon Jackels, MN
   a. Small group webinar January 5, 2012
   b. Summarize webinar/workshop proceedings and guidance document
   c. Identify what may be required for interim compliance with existing MUTCD standards
4. ATSSA MarketPlace Solutions Seminar: Jon Jackels, MN
   a. ATSSA Annual Meeting, February 15, 2012 in Tampa, FL
   b. Summarize webinar/workshop proceedings and guidance document
   c. Request industry response to key questions about ICWS product development

5. Traffic Control Devices Transportation Pooled Fund 5(065):
   Julie Stotlemeyer, MO
   a. Annual meeting, April 18-19, 2012 in Kansas City, KS
   b. Summarize webinar/workshop proceedings and guidance document
   c. Consider human factors research of sign placement and message set

   a. Annual meeting, May 2012 in Washington, DC
   b. Summarize webinar/workshop proceedings and guidance document
   c. Consider coordination of national evaluation to begin in fall 2012
7. NCUTCD RWSTC: Tom Heydel (Matt Rauch), WI
   a. Meet June 20-22, 2012 in Orlando, FL
   b. Summarize webinar/workshop proceedings and guidance document
   c. Request consideration of task force to evaluate MUTCD prospects

8. AASHTO SCOTE: Bob Koeberlein (Gary Sanderson), ID
   a. Meet June 17-20, 2012 in Orlando, FL
   b. Summarize webinar/workshop proceedings and guidance document
   c. Request consideration of a recommendation to NCUTCD

9. Others...
   a. Institute of Transportation Engineers
   b. International Municipal Signal Association
   c. FHWA-NCHRP Unsignalized Intersection Information Guide in 2012
   d. Cooperative Transportation Systems TPF and Connected Vehicle
Contact Information

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