



Smart Work Zone Deployment Initiative

A pooled fund study

June 2018

SWZDI History

- ❑ Established in 1999
- ❑ Four states originally
 - Kansas, Missouri, Nebraska, & Iowa
- ❑ Wisconsin joined later (2001)
- ❑ Funds pooled for research studies of innovative work zone products and methods
- ❑ Approximately \$200k annually



Pooled Fund Structure

- ❑ Board of Directors (BOD)
 - State DOT Representatives
 - FHWA Representatives
- ❑ Project Technical Advisory Committees (TACs)
- ❑ Administrated by Institute for Transportation (InTrans) at Iowa State University on behalf of the Iowa DOT
- ❑ Annual contributions from five states



SWZDI Objective

Evaluate new products and
coordinate/promote related research
focused on the enhancement of safety &
mobility in highway work zones



General Accomplishments

- ❑ Projects focused on issues of safety and operations within work zones
- ❑ About 100 studies, evaluations, and syntheses completed
- ❑ Reports, etc. accessible at:
<http://www.intrans.iastate.edu/smartwz/>



General SWZDI Research Topics

- Traditional “products” and technologies
 - Static device evaluations
 - Related policies
 - Stand alone warning systems
 - Real-time integrated systems
 - Miscellaneous
- More Specific: Safety Impacts, Analysis and Evaluation Tools, Traffic Impacts, Performance Measures, Signing/Marking, Policies, Technologies and Protective Devices, and Others
- Smart Work Zone Implementation, Safety, and Operations



Examples of Recent Research

- ❑ Best Practices for Managing Work Zone Data (2017)
- ❑ Data-Driven Traffic Impact Assessment Tool for Work Zones (2017)
- ❑ Evaluation of Alternative Work Zone Signing (2017)
- ❑ Length of Need and Minimum System Length for F-Shape Portable Concrete Barrier (2017, partial)
- ❑ Setting Work Zone Speed Limits (2017)
- ❑ Testing and Evaluation of MASH TL-3 Transition between Guardrail and Portable Concrete Barriers (2017, partial)
- ❑ Traffic Impact Assessment of Moving Work Zone Operations (2017)
- ❑ Safety Assessment Tool for Construction Zone Work Phasing Plans (2016)



2018 Project Completions

- ❑ Analytical Methods for Work Zone Travel Time Reliability
- ❑ Orange Work Zone Pavement Marking Midwest Field Test
- ❑ Understanding the Impacts of Work Zone Activities on Traffic Flow Characteristics



Analytical Methods for Work Zone Travel Time Reliability

- Objective: Develop a framework for predictive analytical modeling of work zone travel time reliability incorporating factors such as hourly volume, work zone configuration, and type of work zone activity
- Findings
 - Travel times increased during peak periods but not at every site
 - Travel time reliability appears to be loosely related to traffic volumes
 - Model has limited predictive value due to limitations of data, etc. but a framework is provided for future modeling & data collection

Orange Work Zone Pavement Marking Midwest Field Test

- ❑ Objectives: Literature review, in-person and video field observation, survey of public acceptance, and agency personnel interviews
- ❑ Conclusions
 - Results are preliminary and suggestive (one control & test site)
 - Lateral lane placement similar
 - Vehicle speed somewhat higher with orange markings
 - Out-of-position vehicle proportions similar
 - Road user survey: general preference for orange in the day, but less so at night and adverse weather
 - Field engineers: orange superior by day, equal or slightly better than white at night and wet weather

Understanding the Impacts of Work Zone Activities on Traffic Flow Characteristics

- Goals: Study the cause and effect relationship between type of work activity and traffic mobility through a work zone and develop traffic flow characteristic curves
- Conclusions
 - Two single-regime models (Newell-Franklin and Van Aerde) and one two-regime model (Gipps) were calibrated
 - Capacity reduction factors ranged from 0.68 to 0.95
 - Variation in capacity values was lower for bridge-related work than pavement-related work
 - Van Aerde model performed the best and is recommended for developing speed-flow curves in the future



Ongoing Projects

- ❑ Design Optimal and Effective Queue Detection and Notification
- ❑ Testing Non-Proprietary Devices to MASH 2016 Criteria
- ❑ Extension of Safety Assessment Tool for Construction Work Zone Phasing Plans
- ❑ Smart Work Zone App
- ❑ Development of Adjustment Factors for HCM Six Edition Freeway Work Zone Capacity Methodology
- ❑ Guidance on Active Work Zone Data Archival

Questions



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Project information at -

www.intrans.iastate.edu/smartwz



Typical Annual Process

- ❑ State DOTs provide annual contribution
- ❑ Problem statements for research ideas are solicited
 - Board members
 - Researchers in eligible Universities
 - Vendors
- ❑ Topics for study are discussed, summarized, selected, etc. and a request for proposals released



Typical Annual Process (Cont.)

- ❑ Proposals for research are ranked by BOD
- ❑ Funding provided to top ranked projects
- ❑ Annual SWZDI workplan developed
- ❑ Contracts developed & research work undertaken
- ❑ As studies are completed, draft final reports are reviewed by TAC and then Board



Technical Advisory Committee (TAC) Involvement

- ❑ Included in each proposal
- ❑ Usually 2 to 4 members with interest and background in subject
- ❑ One member of Board is the project monitor and a member of TAC
- ❑ Ongoing guidance and regular meetings (quarterly or milepost points)
- ❑ Review draft final report