
Smart Work Zones... the use of Intelligent Transportation Systems (ITS) for Work Zone traffic management.

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- Overview
- Benefits
- Case Examples
- Systems Engineering

Overview

➤ What is it?

...using technology to support work zone management and traffic operations. It is used to analyze traffic flow in real-time and provide updated, accurate information and guidance to drivers.

➤ Primary Goal?

...to improve mobility while improving work zone safety for both the motorist and highway workers. The systems provide accurate, real-time information to road users so they can make informed choices. Drivers that are knowledgeable of hazards, delays, and expected actions improve the work zone's safety and reduces congestion.

➤ Why Systems Engineering?

... it is an interdisciplinary approach and means to enable the realization of successful systems. SE helps us to Define the Problem Before Implementing the Solution.

Benefits... of ITS for Work Zone traffic management.

- ✓ More informed public*
- ✓ Better relationships -- public/stakeholders
- ✓ Improved mobility and traffic management
- ✓ Quicker incident response
- ✓ Greater worker/traveler safety*
- ✓ Enhanced speed management
- ✓ Better understanding of traffic conditions
- ✓ Potential for cost savings*

Applications/Case Examples

- Worker Safety
- Speed Management
- Traffic Management*
- Incident Management
- Traveler Information*

I-35 Waco, Texas

(Traffic Management)

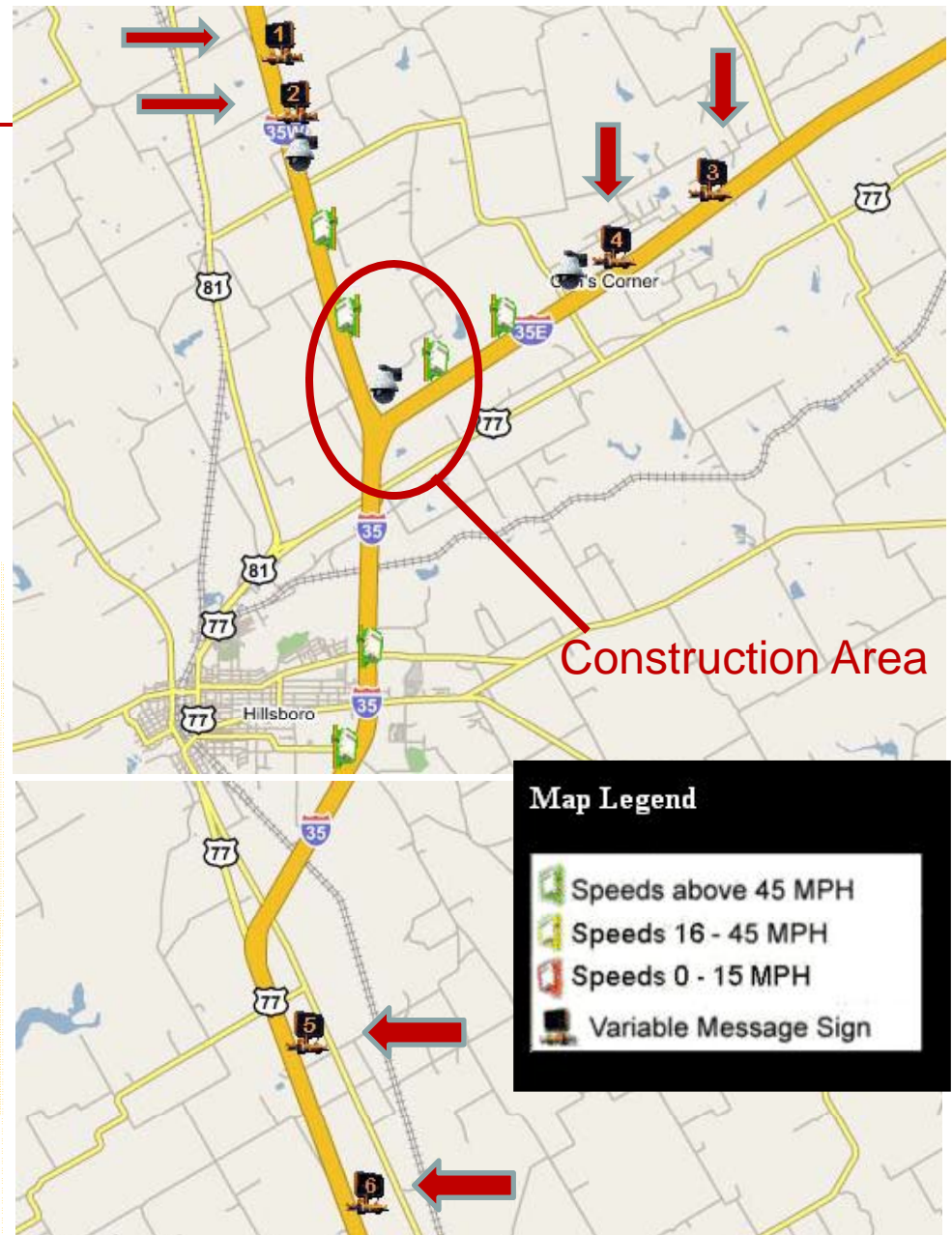
➤ System Components

- ✓ microwave sensors (6 ea.) ←
- ✓ message boards
- ✓ central processing unit
- ✓ communications unit
- ✓ wireless closed circuit video cameras.

The primary goal of the system: to monitor the work zones and automatically provide alternate route advisory information to the traveling public based on significant travel times through the work zone.

A secondary goal: congestion management of non-recurring traffic conditions because of high traffic volumes, weather, and incidents.

Smart Work Zone / ITS Applications



I-35 Waco, Texas (cont.)

➤ Focus of the Evaluation

- ✓ **Objective:** to reduce demand and congestion through active diversion of traffic approaching the work zone.
- ✓ **Results:** the system diverted an average of 10% of mainline traffic to alternate routes.

US-131 Kalamazoo, Michigan

Smart Work Zone / ITS Applications

(Traffic Management)

➤ System Components:

- (5) trailers 1500 ft. a part prior to the merge point
- Each equipped a Remote Traffic Microwave Sensor (RTMS) unit

➤ Goal:

To smooth traffic flow and reduce aggressive driving at the merge point

Dynamic Lane Merge System (DLM) Layout Along Northbound US-131



US-131 Kalamazoo, Michigan (cont.)

➤ Focus of the DLM Evaluation

▪ Objectives:

Smart Work Zone / ITS Applications

- ✓ Reduce aggressive driving at the merge point where two lanes were reduced to one in each direction.
- ✓ Smooth traffic flow through the merge area.
- ✓ Potentially reduce delay resulting from aggressive passing at the merge area.

▪ Results:

- ✓ The DLM system reduced the number of forced merges
- ✓ Reduced the number of dangerous merges

Michigan Dynamic Lane Merge System Deployment --Measures & Metrics

Hypothesis	Measures of Effectiveness	Data sources
The use of ITS in work zones will enhance the safety performance of the highway	Crashes, incidents, aggressive maneuvers, citations issued	Crash data, direct observations, citation logs
The use of ITS in work zones will reduce traveler delay	Travel times through the merge area, average speeds, and average and maximum queue lengths	Direct observations, system data, travel time runs

I-30 Little Rock to Benton, Arkansas

(Traveler Information)

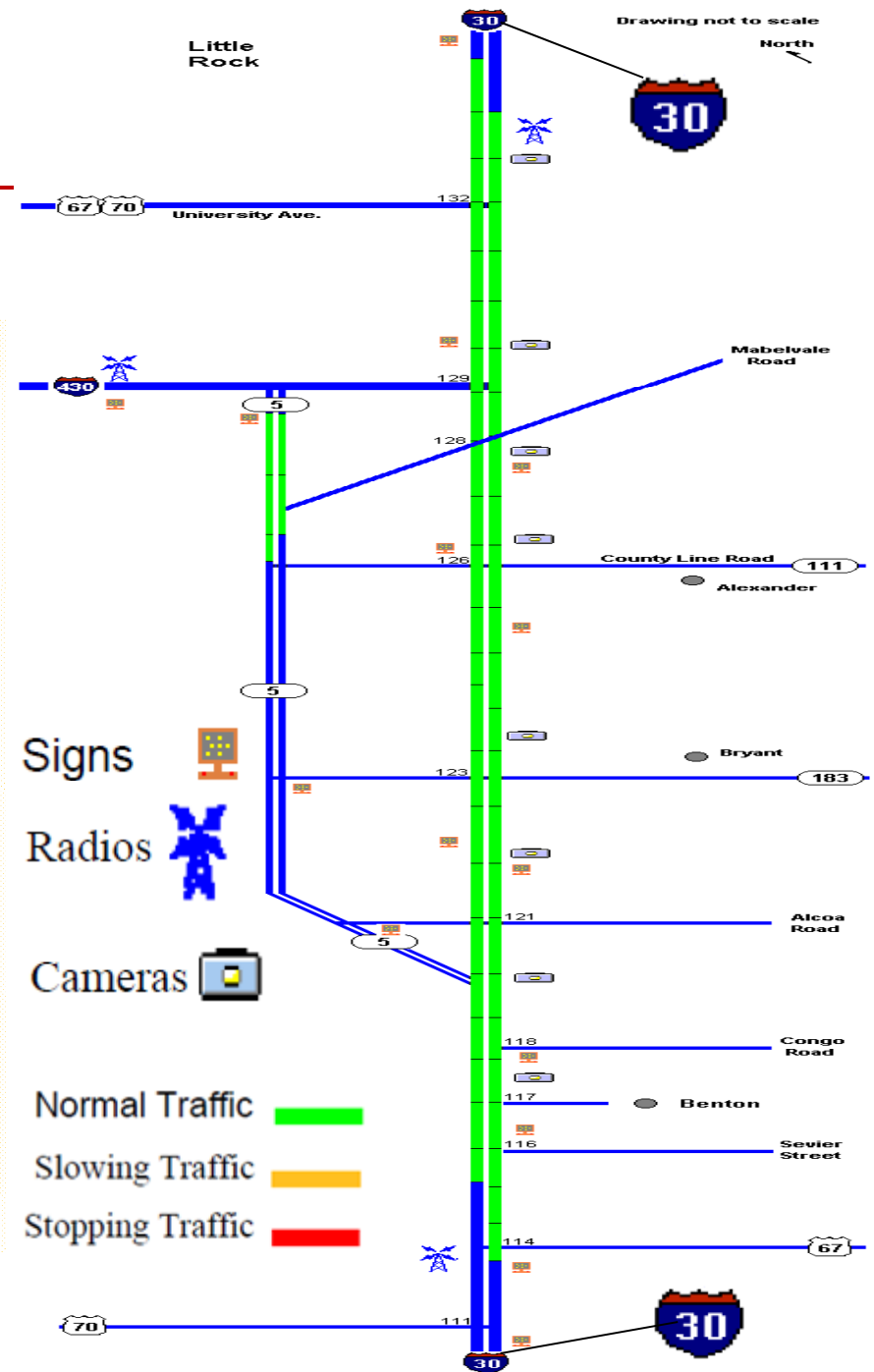
➤ Purpose

- To provide travelers advance warning of slowed traffic or congested downstream conditions

➤ System Components

- vehicle detector sensors (47 ea.)
- radio transmitters (4 ea.)
- dynamic message signs (DMS) (15 ea.)
- stationary video cameras mounted on trailers in & around the work zone (8 ea.)

Smart Work Zone / ITS Applications



I-30 Little Rock to Benton, Arkansas (cont.)

■ Focus of the Evaluation

■ Objectives:

- ✓ To improve the safety of travelers by providing advance warning of slowed traffic or congested downstream conditions.

■ Results:

- ✓ Drivers agreed that the Work Zone ITS improved their ability to react to slow or stopped traffic.
- ✓ WZ workers felt that ITS improved the safety of both the workers and the travelers.
- ✓ 33% of travelers said the use of ITS made them feel less bothered in the construction zone.

Advanced Wireless applications in work zones

(Traffic management & Traveler Information)

Measures travel times on alternate routes, forecast road capacity and peak period traffic flow...



Bluetooth Detection Data Integrated for Display on Overhead Signs

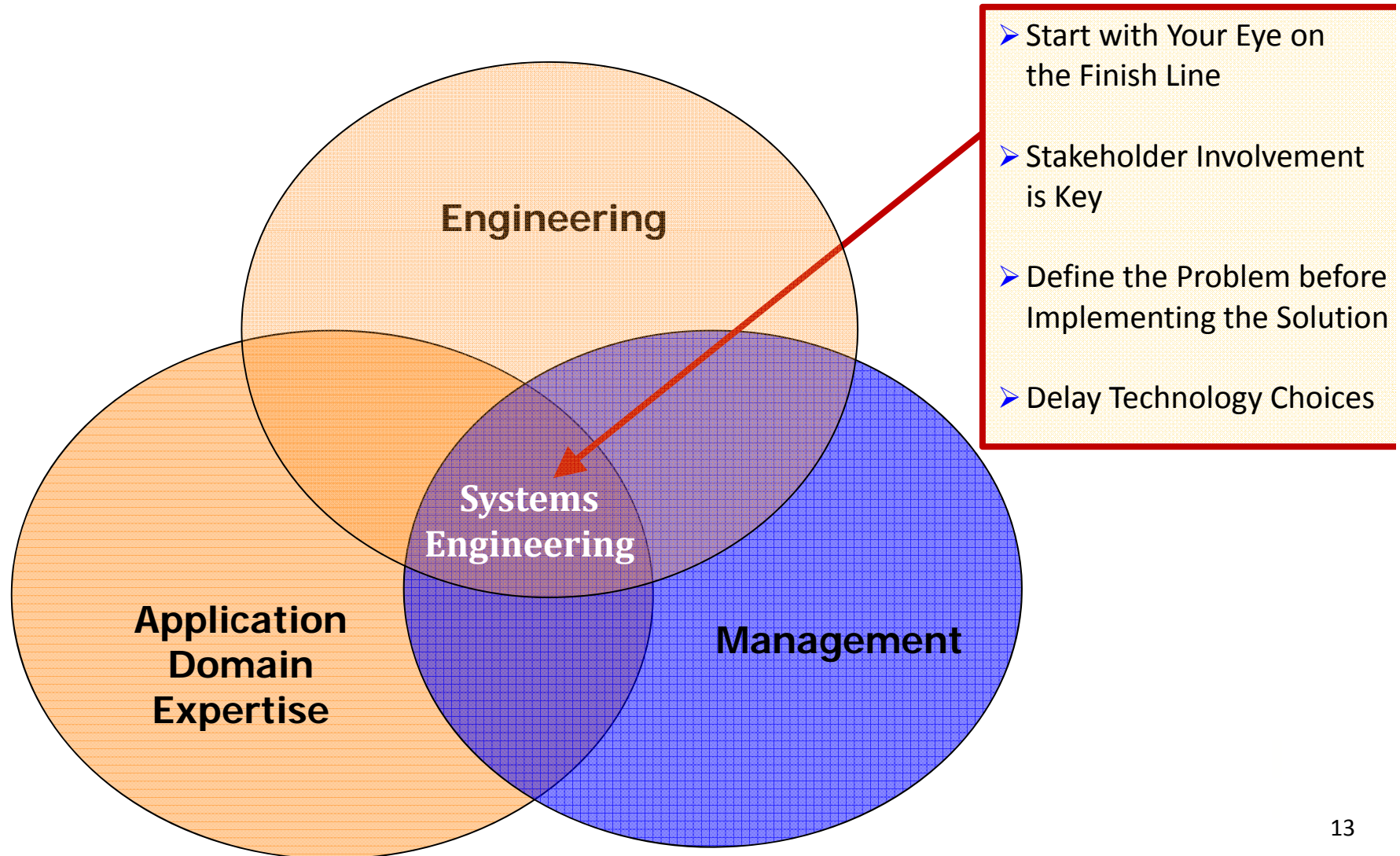
- Can mount on existing infrastructure
- Devices typically install in under an hour
- Portable... can move with a work zone
- Flexible deployment – either permanent or temporary



Disclaimer: FHWA promotes the use of wireless technologies for ITS applications. FHWA does not endorse private service providers/vendors discussed in this presentation.

Systems Engineering Principles

... an *inter-disciplinary approach* to enable the realization of successful operating systems.



FHWA Resources & Training

- Traffic Analysis Toolbox Volumes (IX, & XII)
 - Work Zone Modeling and Simulation - A Guide for Analysts
 - Work Zone Traffic Analysis - Applications and Decision Framework

- Safe and Effective Use of Law Enforcement Personnel in Work Zones (web-based- training)

- Systems Engineering Workshop

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