

# Work Zone Panel Presentation



Missouri Department Of Transportation

Dr. Praveen Edara, UMC

Troy Pinkerton, MoDOT

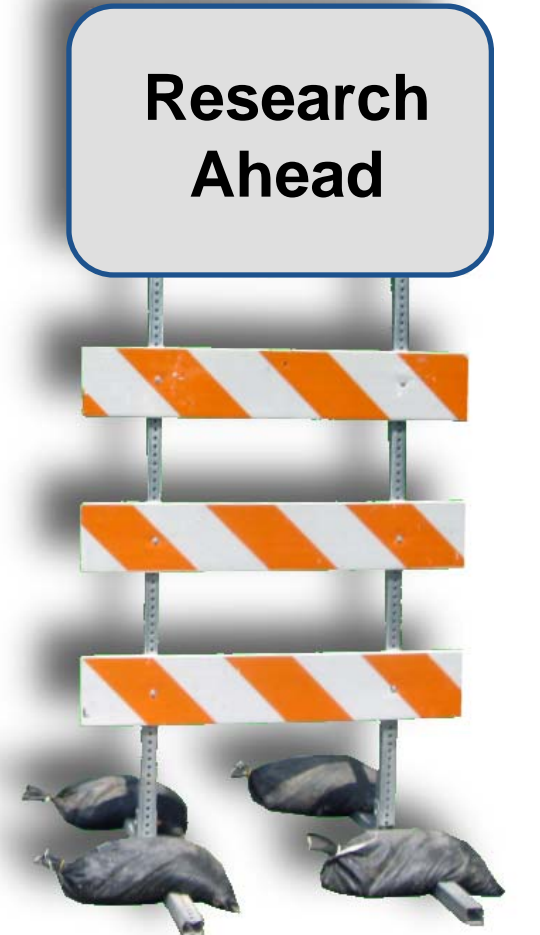
Bill Stone, MoDOT

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# Background

- MoDOT interested in improving management of work zones
- Look for tools that develop effective management plans
- MoDOT met with UMC in Fall 2007 to discuss work zone software tools for estimating traffic impacts
- UMC started a research study in Spring 2008 to identify tools for different work zone configurations





# Work Zone Analysis Software

- **Software evaluated in this study**
  - Quick Zone
  - CA4PRS
  - VISSIM
  - Custom Spreadsheet (newly created in this study)
- **Evaluation consisted of**
  - Literature review
  - Survey of select state DOT practice on software use
  - Case studies





# Study Findings

- Software programs were compared based on
  - Accuracy of results, ease-of-use, input data requirements, output options, and interpretation of results
- Study recommendations
  - Rural interstates (with 2 lanes per direction), divided roadways, and multilane undivided highways
    - Spreadsheet > CA4PRS > VISSIM > Quick Zone
  - Urban roadways
    - VISSIM (driver behavior parameters for MoDOT lane capacities were recommended in the study)
  - Two way one lane (TWOL) with flagger operation
    - Quick Zone, if the input volumes are not high
    - VISSIM, for all other situations





# Spreadsheet Demonstration

Custom Spreadsheet - Revised Aug 26 [Compatibility Mode] - Microsoft Excel

Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

## MoDOT WORK ZONE IMPACT ANALYSIS SPREADSHEET

Developed by University of Missouri - Columbia

TOTAL NUMBER OF LANES	2	NUMBER OF LANES OPEN	1
TRUCK PERCENTAGE	0	OPEN LANE CAPACITY	1600

TOTAL CAPACITY OF WORKZONE: 1240  
(The capacity value is consistent with MoDOT's recommended value for the chosen lane configuration)

USER COST	TRUCKS	\$23.58	Start Time	8
	CARS	\$24.53	Duration of closure	8

MONDAY	TIME	DEMAND	CAPACITY	TOTAL ARRIVALS	TOTAL DEPARTURES	QUEUED VEHICLES	QUEUE LENGTH	DELAY
AM	0:00	350	3200	350	350	0	0.00	0.00
	1:00	335	3200	685	685	0	0.00	0.00
	2:00	279	3200	964	964	0	0.00	0.00
	3:00	281	3200	1245	1245	0	0.00	0.00
	4:00	333	3200	1578	1578	0	0.00	0.00
	5:00	428	3200	2006	2006	0	0.00	0.00
	6:00	685	3200	2691	2691	0	0.00	0.00
	7:00	808	3200	3499	3499	0	0.00	0.00
	8:00	956	1240	4455	4455	0	0.00	0.00
	9:00	1072	1240	5527	5527	0	0.00	0.00
	10:00	1091	1240	6618	6618	0	0.00	0.00
	11:00	1064	1240	7682	7682	0	0.00	0.00
PM	12:00	1074	1240	8756	8756	0	0.00	0.00
	13:00	968	1240	9724	9724	0	0.00	0.00
	14:00	1234	1240	10958	10958	0	0.00	0.00
	15:00	1370	1240	12328	12198	130	0.31	6.29
	16:00	1429	3200	13757	13757	0	0.00	0.00
	17:00	1211	3200	14968	14968	0	0.00	0.00
	18:00	1157	3200	16125	16125	0	0.00	0.00
	19:00	878	3200	17003	17003	0	0.00	0.00
	20:00	804	3200	17807	17807	0	0.00	0.00
	21:00	655	3200	18462	18462	0	0.00	0.00
	22:00	512	3200	18974	18974	0	0.00	0.00
	23:00	463	3200	19437	19437	0	0.00	0.00

MAX DELAY	Minutes	6.29
AVE DELAY		0.40
COST (\$)		\$334.32
MAX QUEUE LENGTH		0.31



# VISSIM Customization

- Default driving behavior parameters in VISSIM do not produce MoDOT capacities for different lane closure configurations
- We recommend parameters for 2 to 1 lane and 3 to 2 lane closure configurations for different truck percentages
- Two car-following and one lane changing parameters were found to be critical in determining capacity of lane closures
- Based on *Exhaustive Search technique* total of 900 unique combinations of these parameters were created and simulated for 30 random seeds





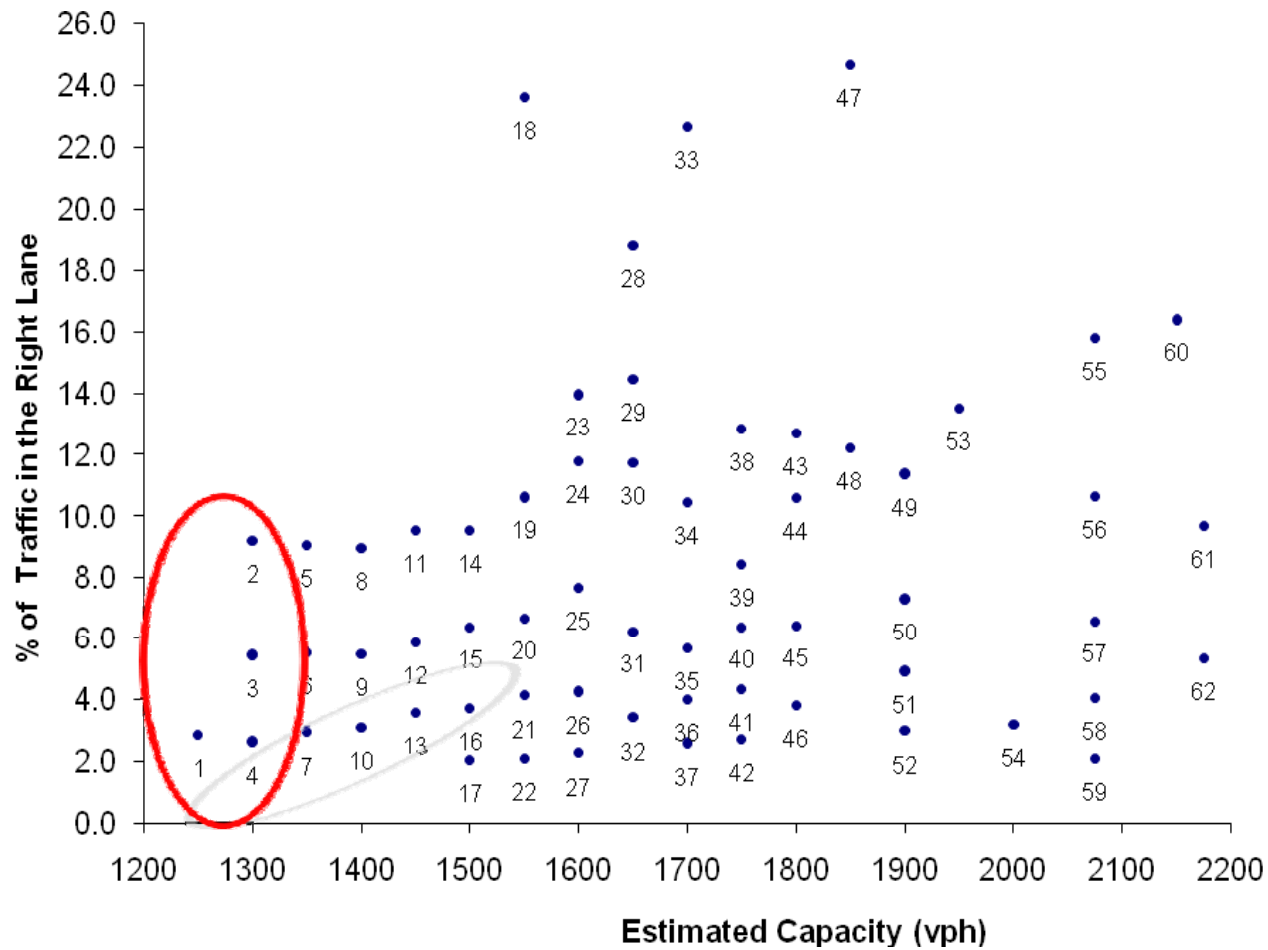
## Example: Parameter values for 2 to 1 lane closure

<b>Index</b>	<b>CCI</b>	<b>CC2</b>	<b>SRF</b>	<b>Index</b>	<b>CCI</b>	<b>CC2</b>	<b>SRF</b>	<b>Index</b>	<b>CCI</b>	<b>CC2</b>	<b>SRF</b>
1	1.8	55	0.6	43	1	40	0.55	85	1.7	20	0.3
2	1.8	45	0.6	44	1.2	30	0.4	86	1.6	25	0.4
3	1.8	45	0.5	45	1.2	30	0.35	87	1.8	15	0.2
4	1.8	45	0.5	46	1.3	25	0.25	88	1	55	0.5
5	1.7	45	0.6	47	1.4	15	0.2	89	1	55	0.55
6	1.7	45	0.55	48	1.4	15	0.15	90	1.2	45	0.5
7	1.7	45	0.5	49	1.1	30	0.4	91	1.2	45	0.55
8	1.6	45	0.6	50	1	35	0.4	92	1.6	20	0.3
9	1.6	45	0.55	51	1	35	0.35	93	1.7	15	0.2
10	1.6	45	0.5	52	1	35	0.3	94	1	50	0.45
11	1.5	45	0.6	53	1.3	15	0.15	95	1	50	0.5
12	1.5	45	0.55	54	1	30	0.25	96	1.1	45	0.5
13	1.5	45	0.5	55	1	25	0.35	97	1.5	20	0.3
14	1.4	45	0.6	56	1	25	0.3	98	1	45	0.4
15	1.4	45	0.55	57	1	25	0.25	99	1	45	0.45
16	1.4	45	0.5	58	1	25	0.2	100	1	45	0.5
17	1.4	45	0.45	59	1	25	0.15	101	1.3	30	0.35
18	1.8	15	0.2	60	1.1	15	0.15	102	1.4	25	0.3
19	1.4	40	0.55	61	1	20	0.2	103	1.4	20	0.3
20	1.4	40	0.5	62	1	20	0.15	104	1.5	15	0.2
21	1.4	40	0.45	63	1.8	55	0.55	105	1	40	0.4
22	1.4	40	0.4	64	1.8	55	0.6	106	1	40	0.45
23	1.5	30	0.45	65	1.8	45	0.6	107	1.2	30	0.35
24	1.4	35	0.5	66	1.7	45	0.5	108	1	40	0.5
25	1.4	35	0.45	67	1.6	50	0.6	109	1.1	35	0.45
26	1.4	35	0.4	68	1.7	45	0.6	110	1.5	15	0.15





# Example: Parameter values for 2 to 1 lane closure





# Work Zone Quality Circle

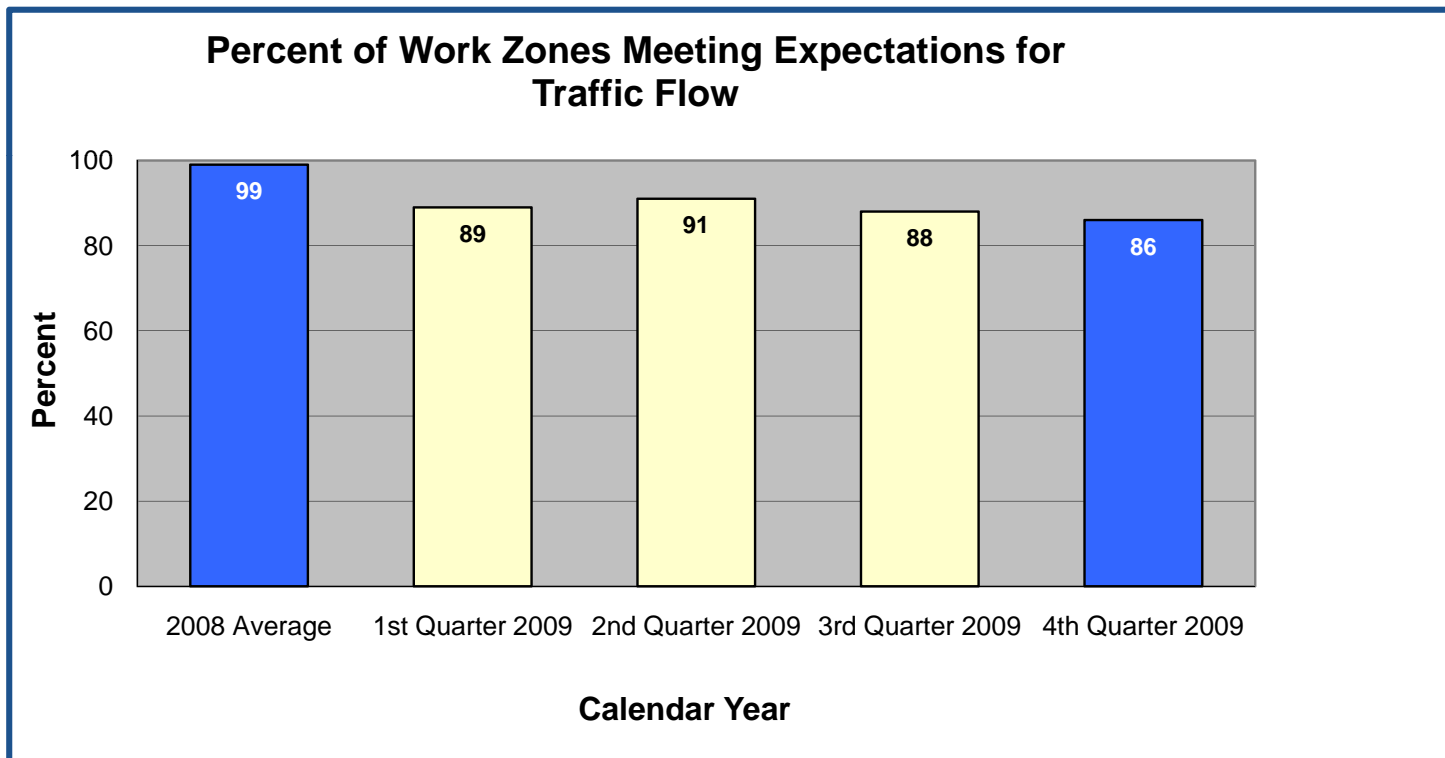
- **Work Zone Coordinator in each District**
  - Oversees District work zone activities
  - Shares information and best practices at Work Zone Quality Circle meetings
  - Coordinates work zone technical reviews
  - Involved with District Core Team activities





# Work Zone Performance Measures

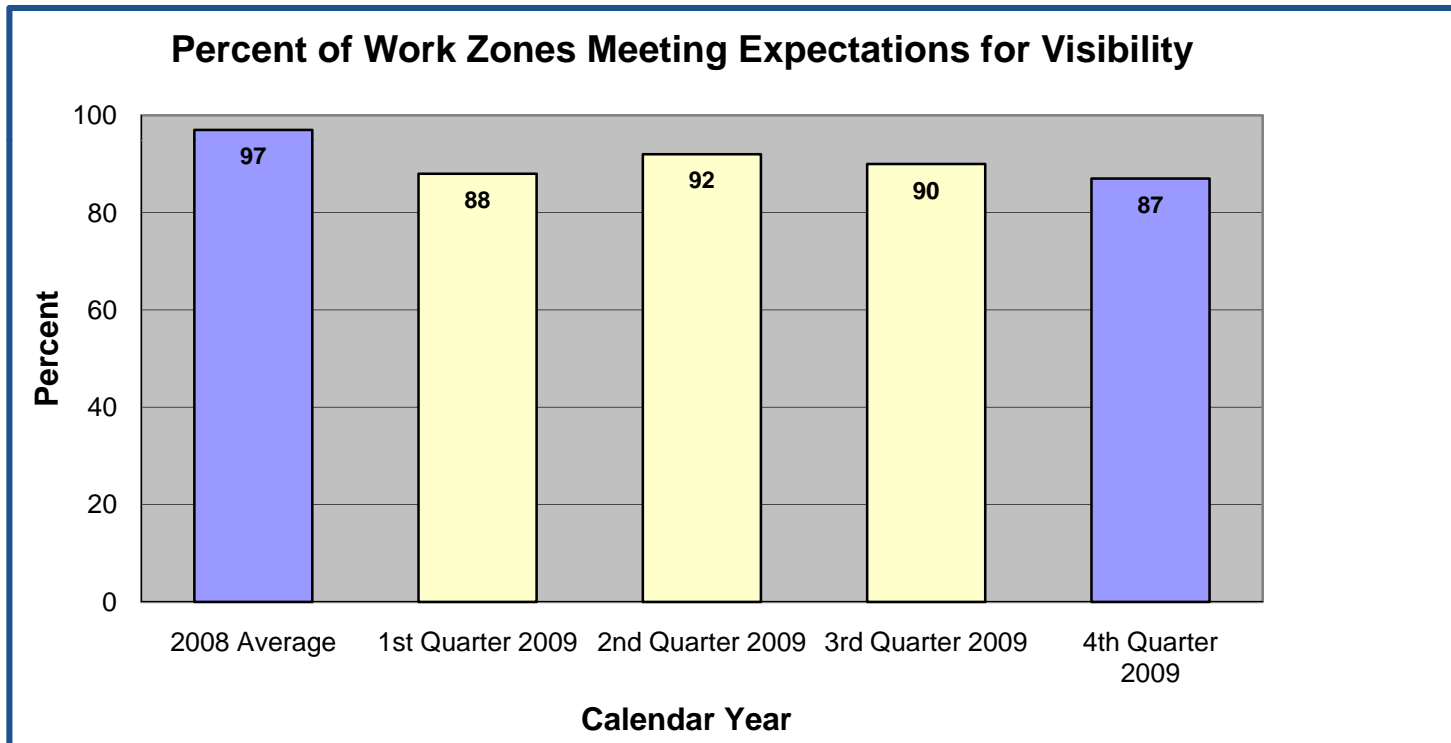
- Tracker Measure – Expectations (1g)





# Work Zone Performance Measures

- Tracker Measure – Visibility (4d)





# Work Zone Customer Survey



## MoDOT Work Zone Customer Survey

Name (optional) \_\_\_\_\_ District (optional) \_\_\_\_\_

Road or Highway Name and Direction \_\_\_\_\_ County \_\_\_\_\_

Nearest Intersection \_\_\_\_\_

Date: \_\_\_\_\_ Time \_\_\_\_\_ am/pm

1. Did you have enough warning before entering this work zone? Yes or No
2. Were the signs and/or traffic signals easy to see? Yes or No
3. Did the signs provide clear instructions? Yes or No
4. Did you understand the flagger's directions? Yes or No / No Flagger
5. Did the cones, barrels, or striping guide you through the work zone? Yes or No / None Present
6. Was the posted speed limit appropriate for the work zone activity? Yes or No
7. Did you make it through the work zone in a timely manner? Yes or No  
If "No", please provide the reason for the rating.
8. Did the work zone look neat, clean, and organized? Yes or No
9. Were you able to travel safely in the work zone? Yes or No  
If "No", please provide the reason for the rating.

Additional Comments:

**Weather:**

- Clear
- Cloudy
- Rain
- Snow
- Ice
- Windy

**For Immediate Concerns:**  
888 ASK MODOT (273-6636)

**Please Send All Forms To:**  
MoDOT - Traffic Division  
P.O. Box 270  
Jefferson City, MO 65102  
Fax: (573) 526-0120  
Email: WZSurvey@modot.mo.gov

**Vehicle:**

- Car/Pickup
- Recreational
- Commercial





# Work Zone Resources

- **Associated General Contractors (AGC)**
- **ATSSA (American Traffic Safety Services Association)**
- **University Researchers**





# Work Zone Priorities

- Work zone Management
- Design consistency
- WZ Speed limits and changes in speed limits after initial design
- Law enforcement for night work as a bid item
- Other tools
  - *Early and Later Merge parameters*
  - *Ramp Metering*
  - *Variable Speed limits*
  - *Smart systems*





# Research through Pooled Funds

## SWZDI Smart Work Zone Deployment Initiative

[SWZDI Home](#) [Projects](#) [Board of Directors](#) [Events](#) [Search](#)

### ABOUT THE SMART WORK ZONE DEPLOYMENT INITIATIVE

In 1999, the states of Iowa, Kansas, Missouri, and Nebraska created the Midwest States Smart Work Zone Deployment Initiative (MWSWZDI). Through this pooled-fund study, researchers investigate better ways of controlling traffic through work zones. Their goal is to improve the safety and efficiency of traffic operations and highway work. In 2001, Wisconsin joined the MWSWZDI consortium.

The project is part of the Transportation Pooled Fund Program, [Study Number TPF-5\(081\)](#). The name has changed slightly by dropping "Midwest" from the title. The project is now administered by Iowa State University's [Center for Transportation Research and Education](#). The lead agency is the Iowa Department of Transportation.

#### Sample projects

During the first four years of MWSWZDI, a total of 35 technologies were deployed and evaluated in the five states. Some of the technologies evaluated include

- **The Wizard Work Zone Alert and Information Radio.** It is designed to give drivers of heavy trucks enough advance warning of upcoming delays at construction sites or incidents to enable them to stop safely before encountering lines of halted vehicles.
- **The Portable Traffic Management System.** Real-time traffic-responsive information is provided to drivers through a variable message sign to advise drivers of a work zone ahead and encourage them to divert to an alternate route when there is congestion in the work zone.
- **Temporary Work Zone Rumble Strips.** Several different versions were evaluated.
- **D-25 Speed Advisory Sign System.** The system detects the presence of slow moving or stopped traffic on the approach to the work zone and provides warning to drivers via speed messages displayed on trailer-mounted variable message signs. The speed messages advise approaching motorists of the traffic speed ahead.

#### Award-winning program

In 2001 this program (then called the Midwest Smart Work Zone Deployment Initiative) won a national highway safety award. [Read more about it.](#)

#### News

##### Recently completed research

- [Microsimulation of Freeway Work Zones to Assess Flow and Capacity](#)
- [Evaluation of Technology-Enhanced Flagger Devices: Focus Group and Survey Studies in Kansas](#)
- [Evaluation of Rapid Deployment Mesh Networking for Work Zones](#)
- [Freeway Work Zone Lane Capacity](#)

#### Smart Work Zone list serv

To add or delete your name from the list serv, please complete this form:

Name:

Email:

- Add me to the list  
 Remove me from the list

Listserv members can be contacted via [smartwkzone@iastate.edu](mailto:smartwkzone@iastate.edu).



# Questions

