



# Remaining Traffic Factor (RTF) Work Zone Lane Closures

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# Remaining Traffic Factor Work Zone Lane Closures



Florida Department of Transportation

RESEARCH CENTER

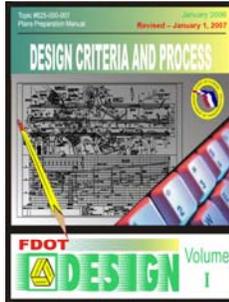


**UF** UNIVERSITY of  
**FLORIDA**  
*The Foundation for The Gator Nation*

FDOT Contract BD-545, RPWO #61, Part C  
"Modeling Diversion Propensity at Work Zones"



## Remaining Traffic Factor Work Zone Lane Closures



### PPM - Chapter 10

Peak-Hour Traffic Volume < Restricted Capacity with a Lane Closure?

$$\text{Peak-Hour Volume} = \text{ATC} \times \text{P/D} \times \text{D} \times \text{PSCF} \times \mathbf{RTF}$$

Where:

ATC = actual traffic counts

P/D = peak traffic to daily traffic ratio

D = directional distribution of peak hour traffic

PSCF = peak season conversion factor

RTF = remaining traffic factor



## Remaining Traffic Factor Work Zone Lane Closures

### Traffic Diversion Rates at Work Zones

- Vary substantially (0% to more than 35%)
- May change with the time of day
- Are directly dependent on congestion levels at the work zone and the alternate routes



# Remaining Traffic Factor

Work Zone Lane Closures

## Existing Traffic Diversion Tools

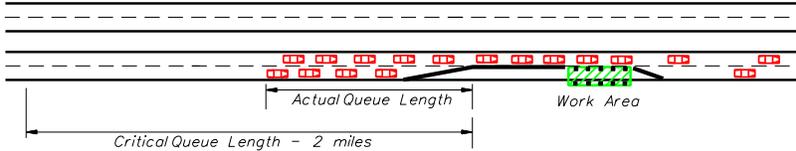
- QUEWZ-98 (Texas Transportation Institute)
- Quickzone (Mitretek Systems / FHWA)
- Engineering Judgment / Best Guess



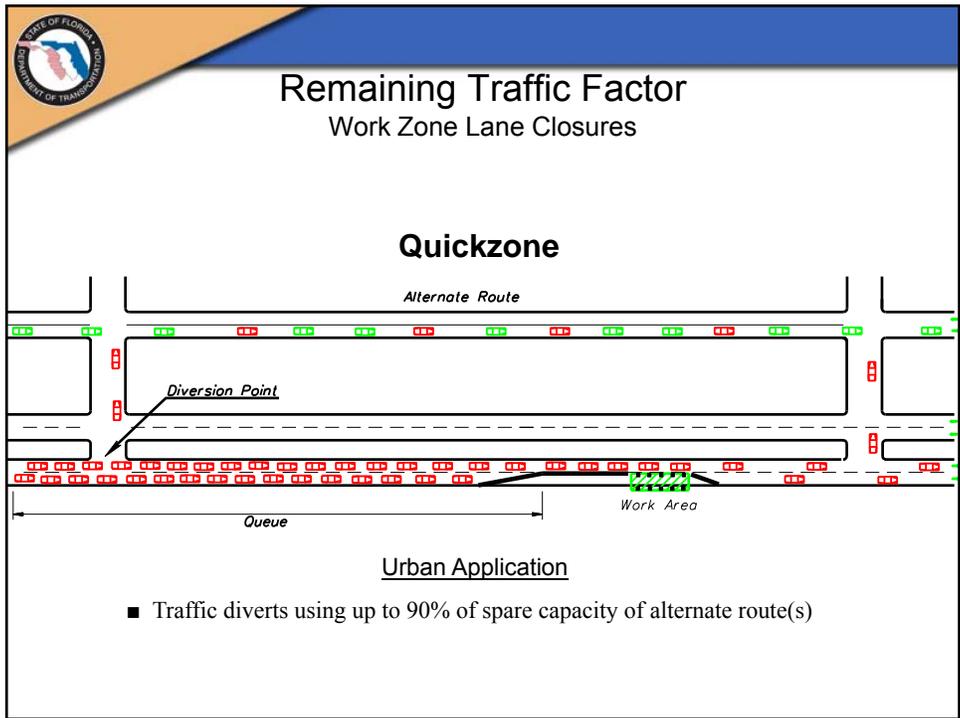
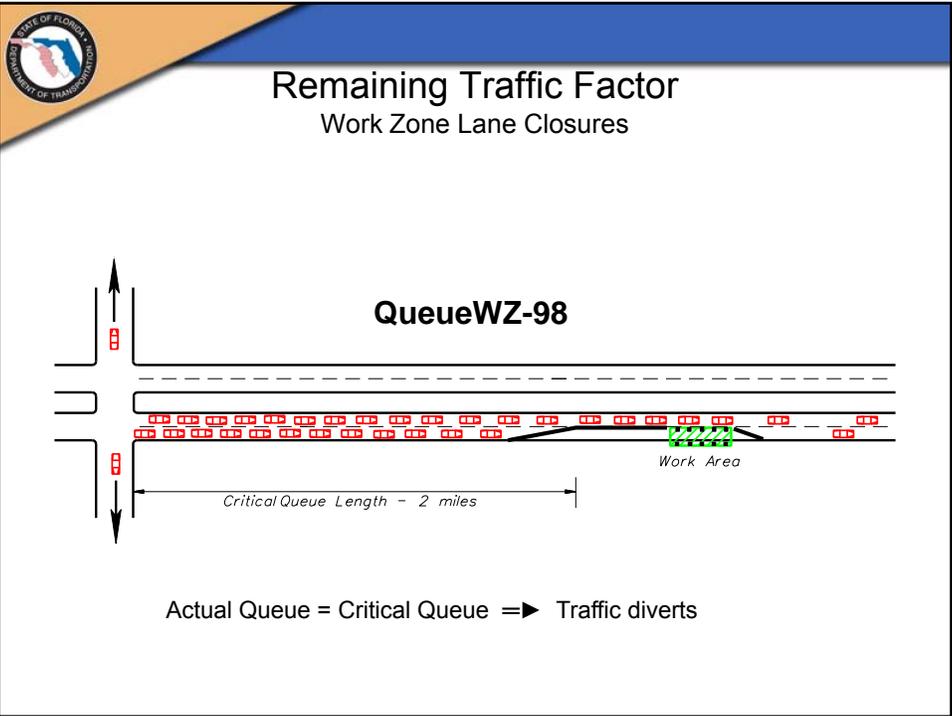
# Remaining Traffic Factor

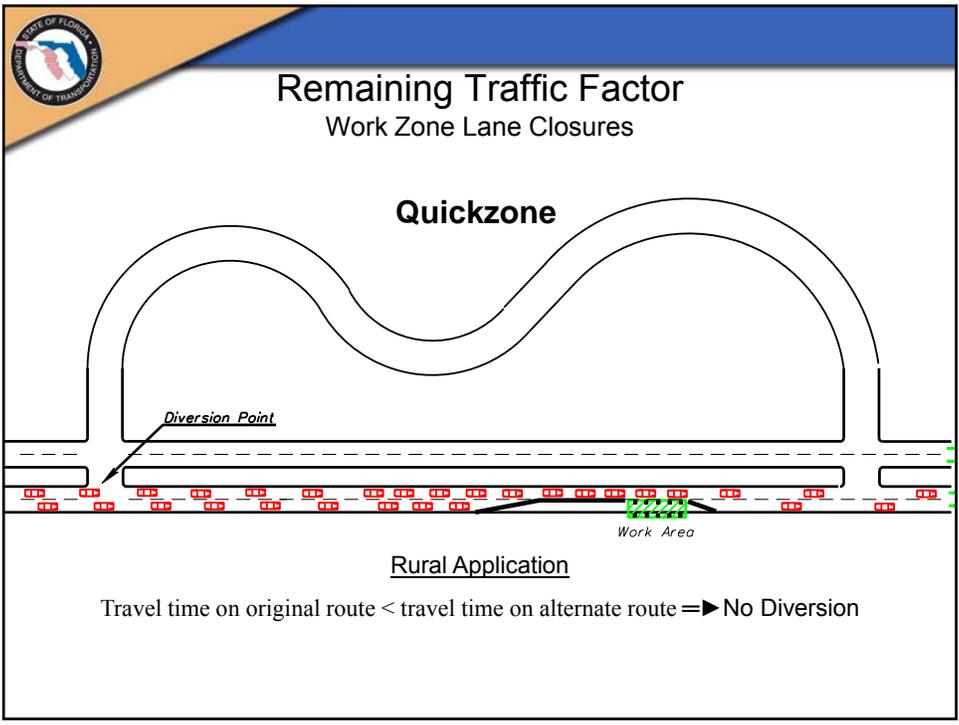
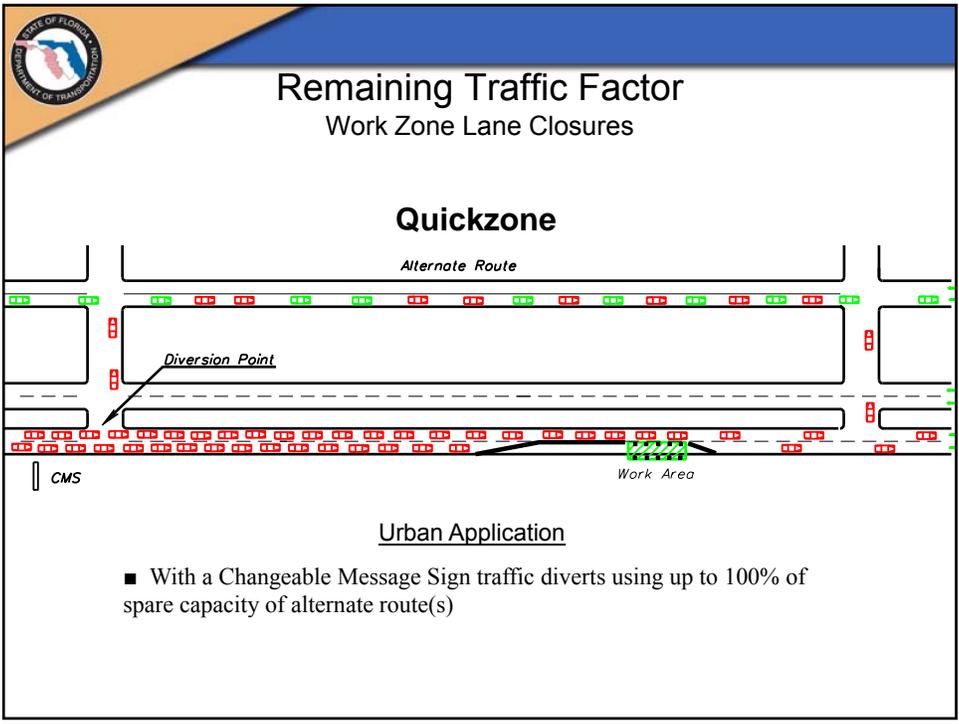
Work Zone Lane Closures

## QueueWZ-98



Actual Queue < Critical Queue => No traffic diversion

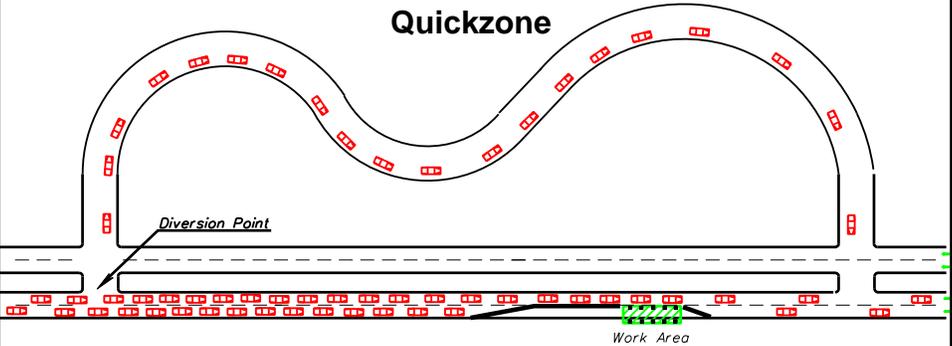






## Remaining Traffic Factor

### Work Zone Lane Closures



**Quickzone**

*Diversions Point*

*Work Area*

Rural Application

Travel time on original route > travel time on alternate route

Diversion Depends On:

- Percent of local traffic
- Spare capacity



## Remaining Traffic Factor

### Work Zone Lane Closures



Avoid part of route?



New Method

- Calibrated binary logit model that incorporates driver behavior



## Remaining Traffic Factor Work Zone Lane Closures

$$RTF = \frac{1}{1 + e^x}$$

where;

$$x = 0.1416 (t_{org} - t_{alt}) + \rho$$

$t_{org}$  = travel time of the original route

$t_{alt}$  = travel time of the alternative route

$\rho$  = parameter that reflects the weather condition and the work zone location

$\rho$		Work Zone Location	
		Rural	Urban
Weather Condition	Normal	-0.6166	0.1054
	Bad	-0.2207	0.5013



## Remaining Traffic Factor Work Zone Lane Closures

- Reflects diversion behaviors of drivers
- Stated Preference Surveys  $\Rightarrow$  measure people's preferences



- Travel Time
- Location
- Purpose of the Trip
- Weather Conditions
- Traveler Attributes



## Remaining Traffic Factor

Work Zone Lane Closures

### **Possible Diversion Factors**

- ◆ Travel Time – time to travel the routes
- ◆ Location – rural or urban?
- ◆ Purpose of the Trip – going to work?
- ◆ Weather Conditions – normal or bad?
- ◆ Traveler Attributes – Age? Married? Gender? Income?



## Remaining Traffic Factor

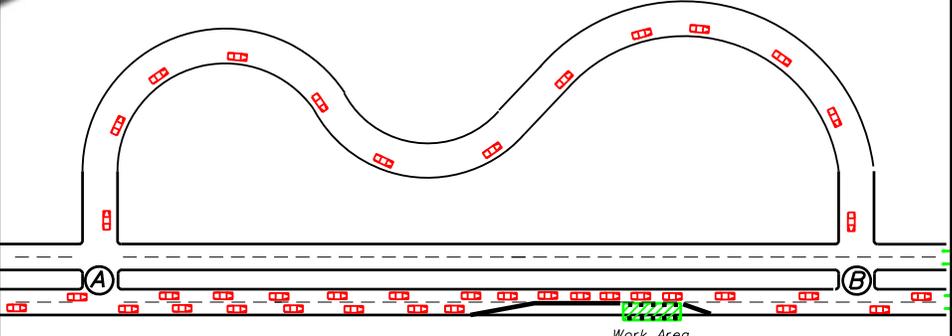
Work Zone Lane Closures

### **Statistically Significant Factors**

- Travel Time – longer route times are less attractive
- Location – drivers tend to use the original route in rural areas
- Weather Conditions – drivers are more likely to divert in bad weather



## Remaining Traffic Factor Work Zone Lane Closures



$t_{org} = 15$  minutes  
 $t_{alt} = 23$  minutes  
 $\rho = -0.6166$

		Work Zone Location	
		Rural	Urban
Weather Condition	Normal	-0.6166	0.1054
	Bad	-0.2207	0.5013



## Remaining Traffic Factor Work Zone Lane Closures

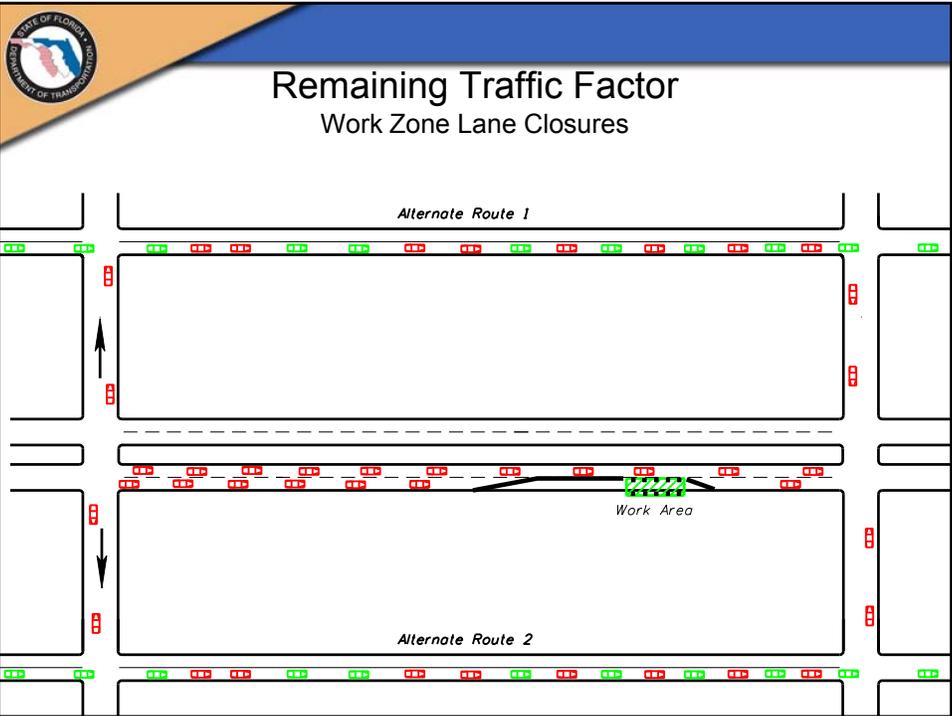
$$RTF = \frac{1}{1 + e^x}$$

where;

$$x = 0.1416 (t_{org} - t_{alt}) + \rho$$

$t_{org} = 15$  minutes  
 $t_{alt} = 23$  minutes  
 $\rho = -0.6166$

$$= \frac{1}{1 + \exp[0.1416 (15 - 23) - 0.6166]} = 0.85$$



**Remaining Traffic Factor**  
Work Zone Lane Closures

$$t_{alt} = \frac{t_{alt1} + t_{alt2}}{2} = \frac{15 + 20}{2} = 17.5 \text{ min.} \quad \begin{array}{l} t_{alt1} = 15 \text{ minutes} \\ t_{alt2} = 20 \text{ minutes} \end{array}$$


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RTF =  $\frac{1}{1 + e^x}$       where;

$x = 0.1416 (t_{org} - t_{alt}) + \rho$   
 $t_{org} = 12 \text{ minutes}$   
 $t_{alt} = 17.5 \text{ minutes}$   
 $\rho = 0.1054$

$$= \frac{1}{1 + \exp[0.1416 (12 - 17.5) + 0.1054]} = 0.66$$



## Remaining Traffic Factor Work Zone Lane Closures



Let Good Judgment Prevail!



## Remaining Traffic Factor Work Zone Lane Closures

*That's all folks!* 