


Tools for Work Zone Traffic Impact Analysis



SAFER ROADS SAVE LIVES

About This Course

 This material is based upon work supported by the Federal Highway Administration (FHWA) under grant agreement No. DTFH61-06-G-00004



Developed & Presented by

***American Traffic Safety
Services Association***



SAFER ROADS SAVE LIVES

Course Objectives



To provide guidance to agencies and/or individuals considering modeling and simulation tools for work zone traffic impact analyses

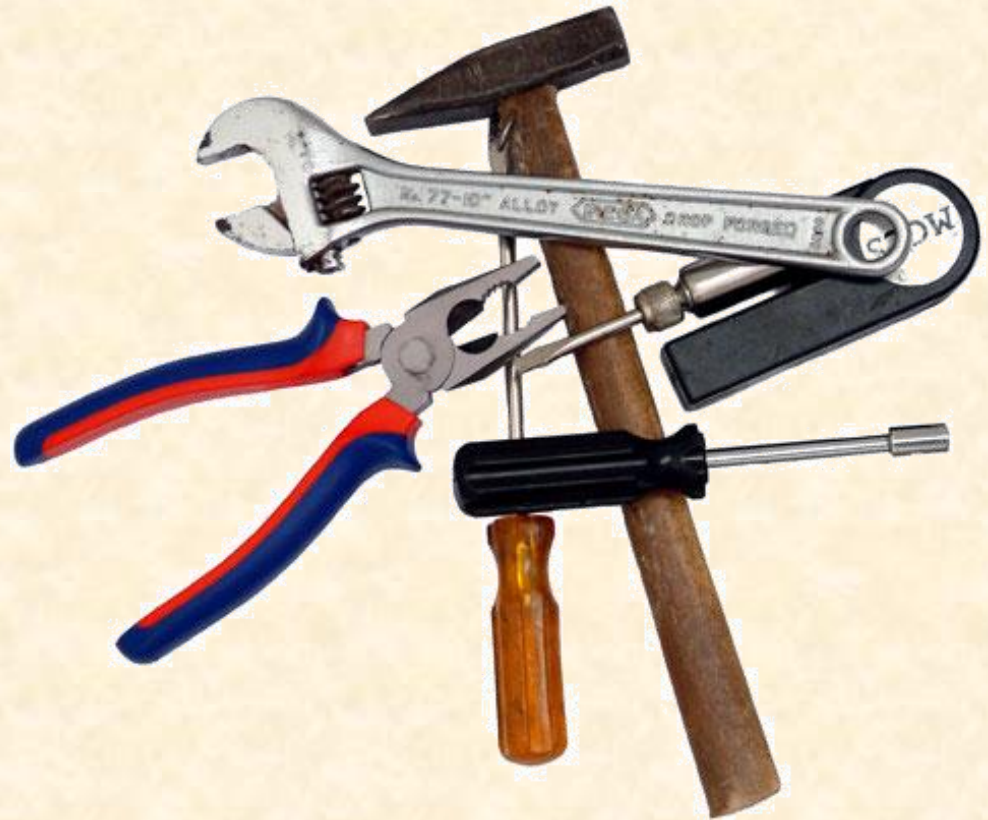


To provide a broad, fundamental understanding of how these analytical tools can be used to support work zone design

Course Objectives (cont.)



To list and discuss some available tools for work zone traffic impact analysis



This Course:

◆ Discusses the classes of **analytical tools** available to support work zone analyses

◆ Strengths

◆ Weaknesses

◆ Level of detail



This Course:

- ◆ Explores the factors to find the best match between the project requirements and available tools, considering:
 - ◆ Data availability and quality
 - ◆ Work zone characteristics
 - ◆ Measures of effectiveness
 - ◆ Resources available

Intended Audience



Engineers and others responsible for deciding upon work zone strategies to implement



Decision-makers considering work zone analytical tools



Course Goal



To enable participants to understand how available analytical tools can be used to assess and evaluate the **impact of highway work zones on safety and mobility**



Course Materials

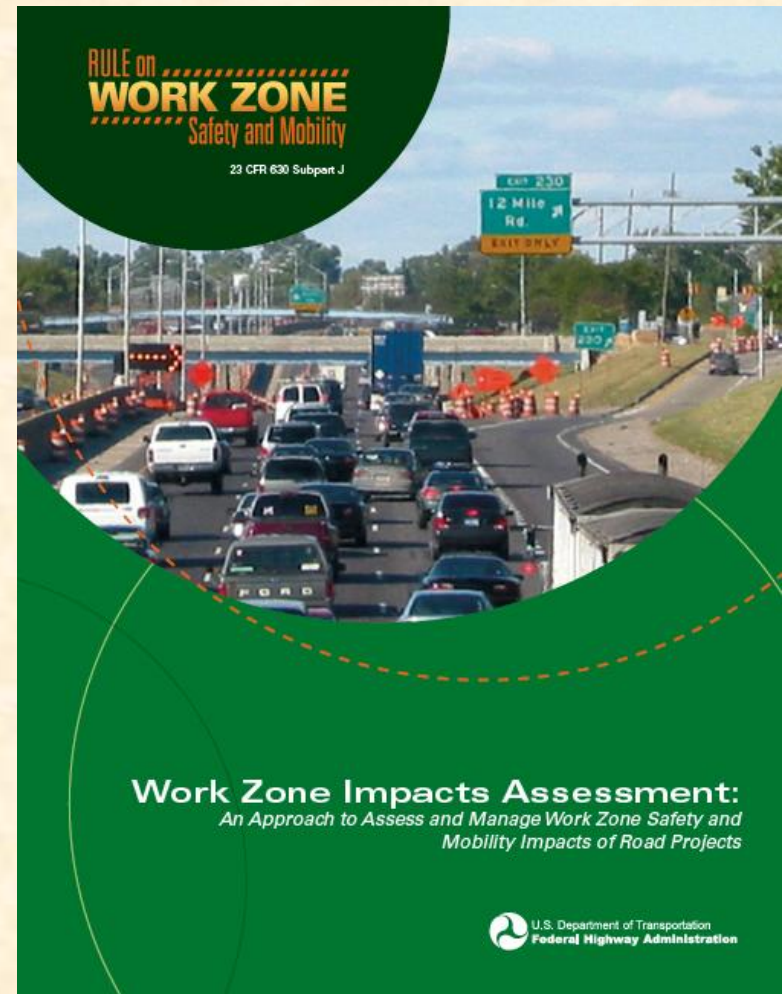


Course notebook



*Work Zone
Impacts
Assessment*

***Yours
to keep!***



Course Modules

1	Background – Challenges & Issues
2	Impact Analysis Fundamentals
3	Approaches & Methodologies
4	Result Applications
5	Tool Selection Considerations
6	Case Study Snapshots

Exam

25 True/False questions

 4 pts each = 100 pts

 30 minutes

 Open book, open notes

 Passing grade = 80%

EXAM

About the Tools Discussed






- ◆ The course will highlight tools developed by the **public sector**
- ◆ Privately developed software may also be available and may be mentioned in the course



-MODULE 1- Background – Challenges & Issues

Module Objectives

-  Discuss why and when to consider work zone traffic impact analysis
-  Discuss issues and challenges associated with highway work zones
-  Discuss the Transportation Management Plan (TMP) requirements

WZ Issues and Challenges

- ◆ Safety (users and workers)
- ◆ Mobility
 - ◆ Improper designs
- ◆ Public relations
- ◆ Others?



***WZ traffic impact analysis
can help improve these!***

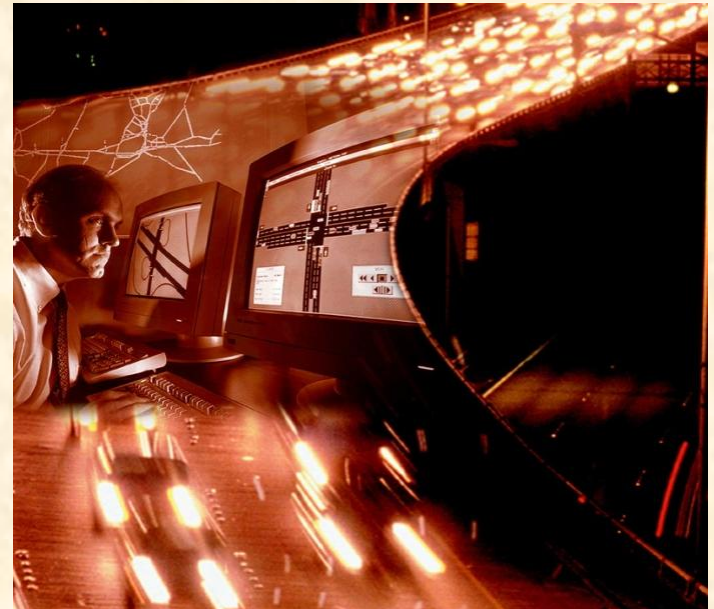
When to Consider Analytical Tools



- ◆ To compare multiple TTC strategies
 - ◆ Example: Day versus Night work
- ◆ To justify additional funds
- ◆ To minimize the WZ impact

Why Work Zone Traffic Impact Analyses?

- ◆ To gain a clear understanding of the project's **mobility & safety** issues
- ◆ Constructability
- ◆ Identify management strategies
- ◆ **May be required!**

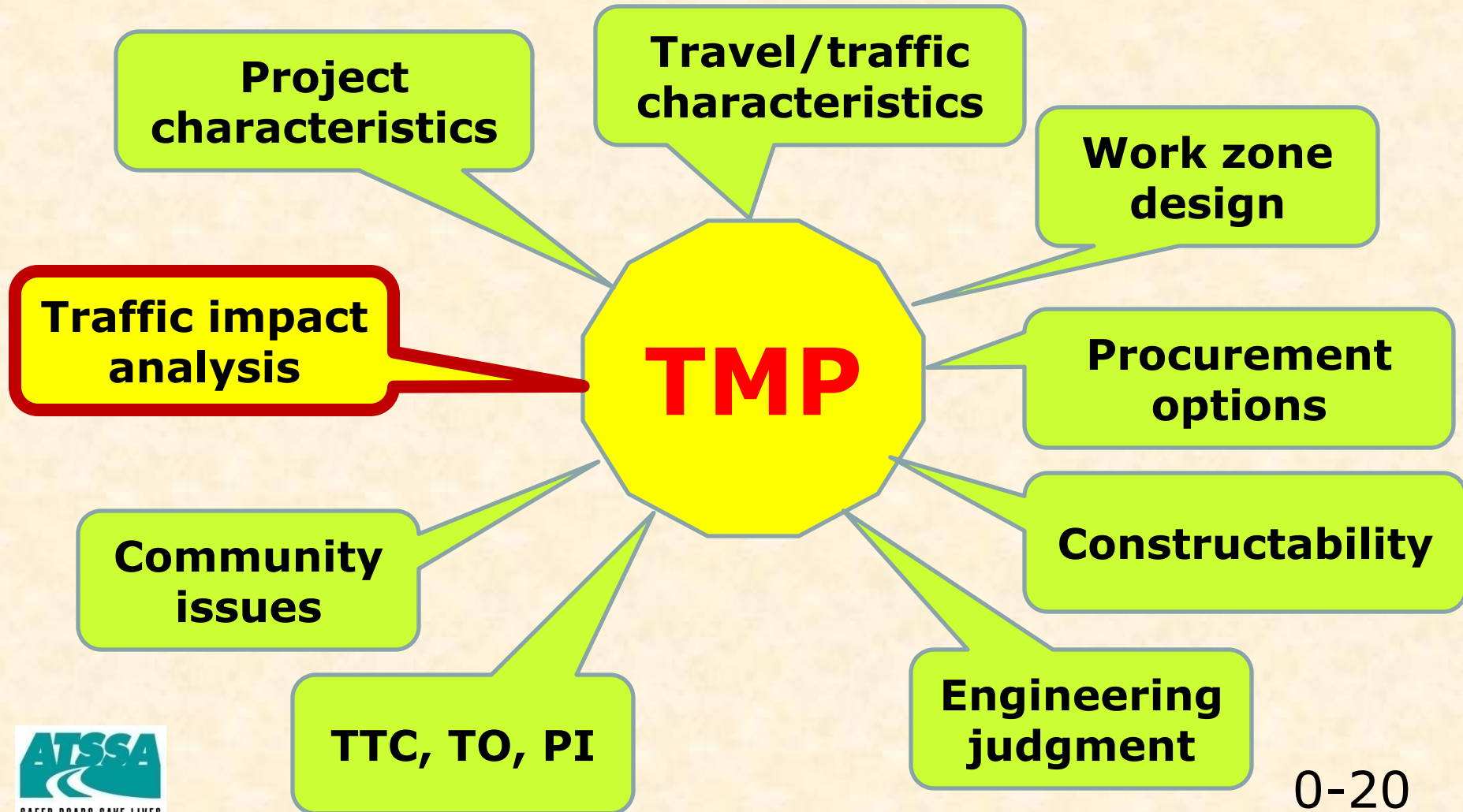


Why Work Zone Traffic Impact Analyses?

It is important to systematically assess the work zone impacts of projects and take appropriate action to manage these impacts



Putting it all Together



Module Recap

- ❖ Why do we need to analyze WZ traffic impacts?
- ❖ Approximately, how many work zone fatalities are there in the USA?
- ❖ What is the WZ designer's role?
- ❖ What is a TMP and its TO component?
- ❖ What is a "Significant Project"?



-MODULE 2- WZ Traffic Impact Analysis Fundamentals

Module Objectives

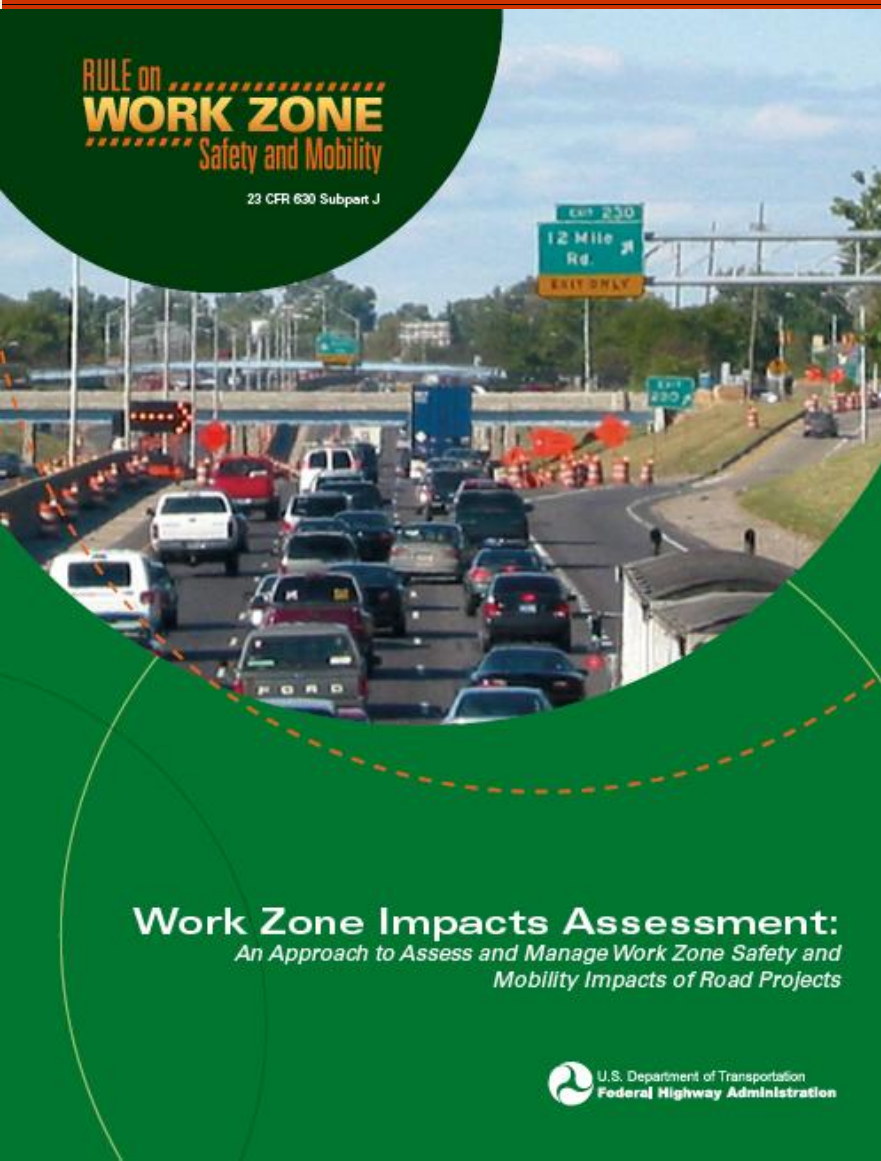





Discuss impact analysis assessment process



During the project life cycle

Work Zone Impacts Assessment

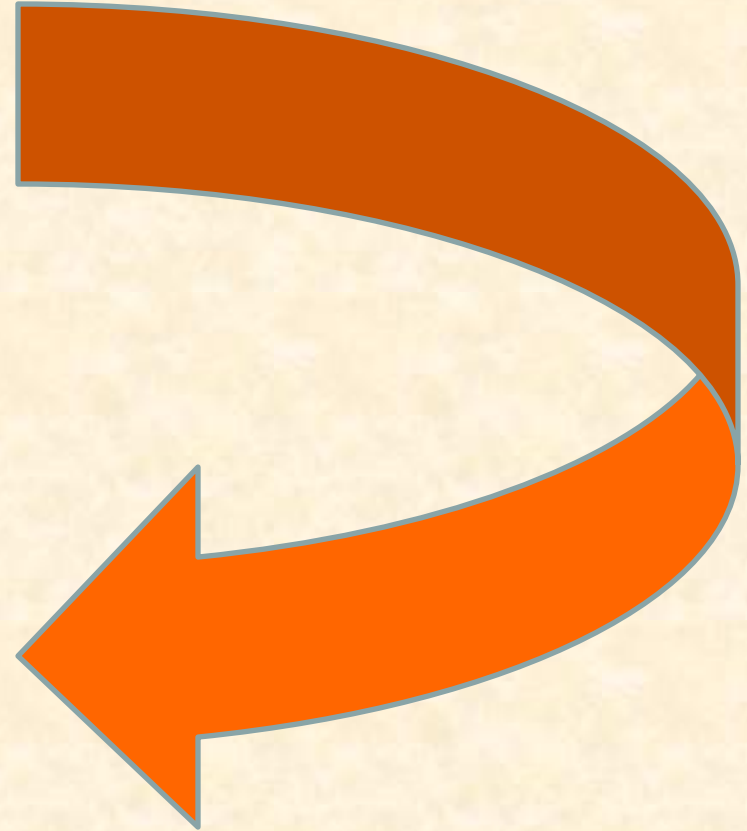


-  *An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects*
-  Developed to provide guidance
-  Module is based on this report

What is WZ Impacts Assessment?

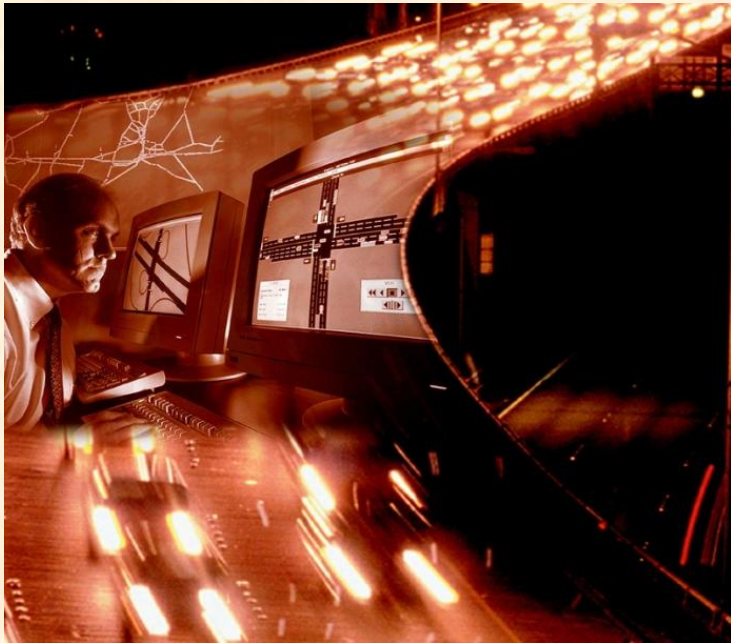


The process of understanding the safety and mobility impacts of a road construction/maintenance/rehabilitation project



Module Recap

- ◆ What is a WZ impacts assessment?
- ◆ When do we perform a WZ impacts assessment?
- ◆ During which part of the project should we perform a WZ impacts assessment?
- ◆ What constitutes a WZ impacts assessment?



-MODULE 3- Analysis Approaches and Methodologies

Module Objectives

- ◆ Discuss analysis (problem-solving) approaches and their application to WZ analysis
- ◆ Discuss methodologies used when deploying work zone impact analysis tools
- ◆ Discuss various tools available for work zone impact analysis: Strengths and weaknesses

Impact Analysis Methodologies and Tools

- ❖ Several, varying in level of complexity & capabilities, are available
- ❖ Some designed specifically for WZ applications
- ❖ Others, although not designed specifically for WZ, can be used

Three Levels of Detail

Increasing
accuracy

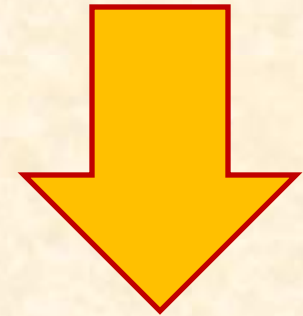


ESTIMATES

**DETERMINISTIC
TOOL**

**SIMULATION
MODEL**

Increasing
complexity

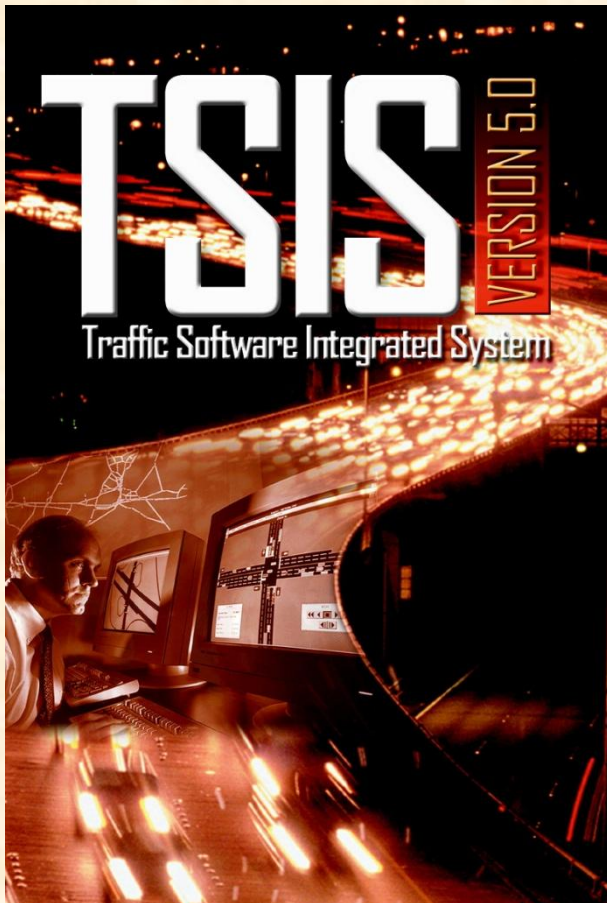


Mesosopic Models

- ◆ Macro level with the ability to “zoom” areas to a micro level
- ◆ Represent the flow of vehicles on a link, but not individually



CORSIM



- ❖ **COR**ridor micro **SIM**ulation model developed by FHWA
- ❖ Part of the **TSIS** Suite
- ❖ NETSIM + FRESIM
- ❖ FRESIM component has WZ applications, programmed as “incidents”

WZ-Specific Analysis Tools

1. QuickZone
2. QUEWZ-98
3. Construction Analysis
for Pavement
Rehabilitation
Strategies (CA4PRS)
4. Dynasmart-P
5. IDAS



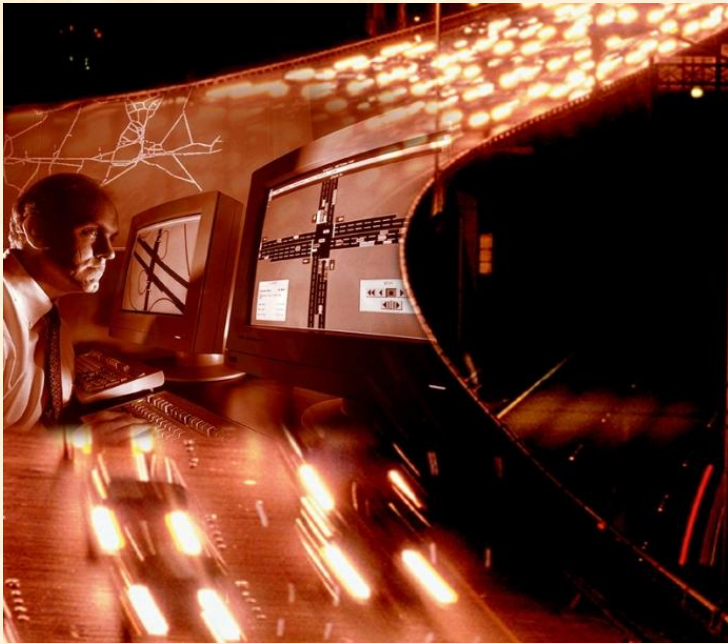
Challenges and Limitations

1. Availability of quality data
2. Limited empirical data
3. Limited funding
4. Training limitations
5. Limited resources
6. Data input and the diversity and inconsistency of data

Module Recap

- ◆ What's the difference between deterministic and stochastic models?
- ◆ What's the difference between microscopic and macroscopic models?
- ◆ Name the three modeling methodologies
- ◆ Name three challenges and limitations in the use of traffic analysis tools

-MODULE 4- Result Application



Module Objectives

- ◆ Discuss the application of work zone traffic impact analysis (and tools)
- ◆ Discuss how to use (apply) the results given by the models

Now that we have results, what can we do?



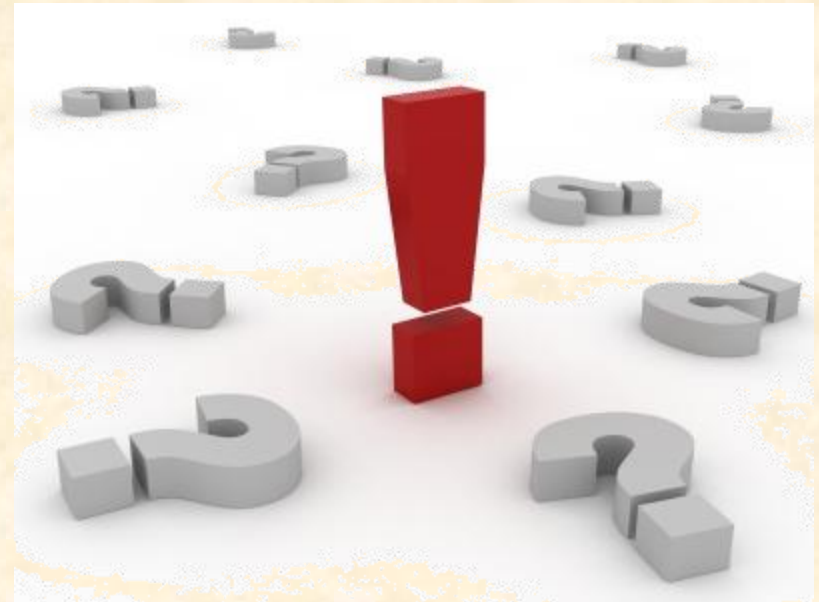
Revise the design/
construction
strategy






Revise the
staging approach
for the project



Answer key
questions



Results Help With Design Decisions

-  Reassess and confirm whether the project is a “Significant Project”
-  Develop recommendations for final construction approach and construction staging
-  Identify final design and contracting strategies – consider innovative design and contracting approaches

Module Recap

- ◆ What can we do with the results of the analysis tools?
- ◆ How can the model results help shape a TMP? A TCP?
 - ◆ Provide a few examples



-MODULE 5- Tool Selection Considerations

Module Objectives

- ◆ Discuss factors that must be considered when deploying analytical tools
- ◆ Discuss questions to ask when choosing an analytical tool
- ◆ Present a methodology for selecting an analytical tool

Deployment of Analytical Tools



Best accomplished when the analytical capability is well-matched to the context for analysis

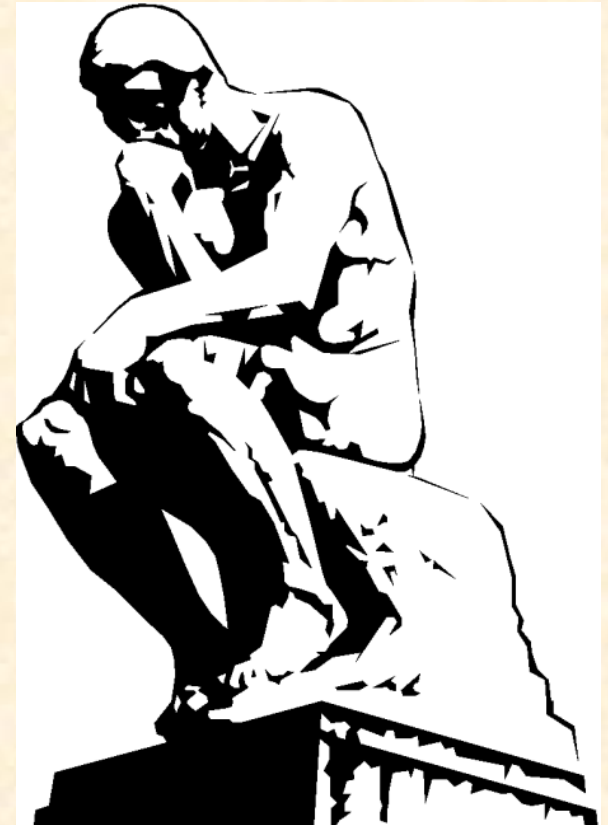


The tool must match the needs



Factors to Consider

1. Data availability and quality
2. Work zone impact area geography
3. Agency resources
4. Measures of effectiveness



Possible WZ Performance Measures

- ◆ Will the model report the MOEs that are important to you and your objectives?
- ◆ Important to set acceptable levels
 - ◆ Example: Certain LOS requires night work
- ◆ Let's look at typical WZ MOEs

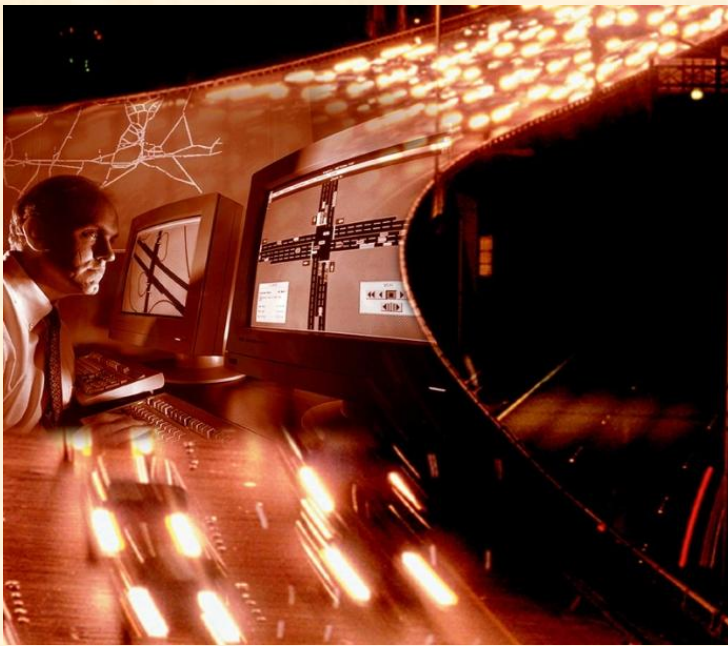
Tool Selection Principles

- ◆ No single tool can do everything
- ◆ Multiple tools may be necessary at different levels of project development
- ◆ FHWA does not require a specific tool be used
- ◆ Select the simplest tool that best matches the needs of your project

Module Recap

- ◆ Name the 4 factors to consider when considering WZ impact analysis tools
- ◆ How do data needs affect model selection?
- ◆ Name the three network typologies
- ◆ Which are some of the questions to ask when selecting a tool?

-MODULE 6- Case Study Snapshots



Module Objectives

- ❖ Provide snapshots of successful case studies that utilized the tools we have discussed

QuickZone Case Study Snapshots

- ◆ FHWA Website includes eight
- ◆ Three will be highlighted here
- ◆ For others:
 - ◆ www.tfhrc.gov/its/pubs/quickzone.htm



QUICKZONE
A NEW WORK ZONE DELAY ESTIMATION TOOL

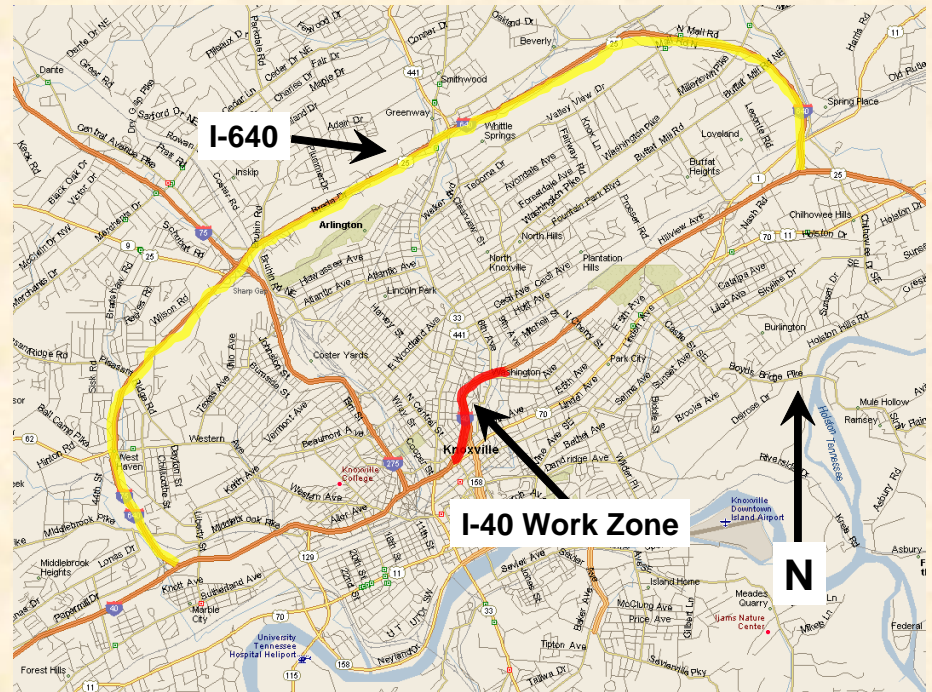
Snapshot #1: I-40 Full Closure Feasibility Assessment



Rehabilitation project on I-40 east of downtown Knoxville, TN



TDOT considered the use of a full closure



Module Recap



What have these case studies demonstrated re: WZ analytical tools?

End of Course

1	Background – Challenges & Issues
2	Impact Analysis Fundamentals
3	Approaches & Methodologies
4	Result Applications
5	Tool Selection Considerations
6	Case Study Snapshots

Module Objectives

- ◆ Review the “Parking Lot”
- ◆ Review course objectives
- ◆ Complete course evaluation form
- ◆ Take exam
- ◆ Adjourn!

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