U.S. Department of Transportation

Federal Highway Administration

WZITS Tool V2.0

Planning and Decision Support for Work Zone Intelligent Transportation System (WZITS) Implementation

National Work Zone Management Conference

March 17, 2021

Images Source: Federal Highway Administration (FHWA)

Smarter Work Zones (SWZ) and WZITS

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Innovative strategies designed to optimize work zone safety and mobility:

- Policies and practices used to incrementally and continuously improve work zone operations
- Tools to reduce work zone crashes and delays
- Tools to enhance work zone management strategies

Images Source: FHWA

SWZ Technology Applications

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Deployment of Intelligent Transportation System (ITS) in work zones for dynamic management of traffic impacts:

- Real-Time Traveler Information
- Queue Warning
- Dynamic Lane Merge
- Incident Management
- Variable Speed Limits
- Automated Enforcement
- Entering/Exiting Construction Vehicle Notification
- Performance Measurement

Images Source: FHWA

WZITS Implementation Guide

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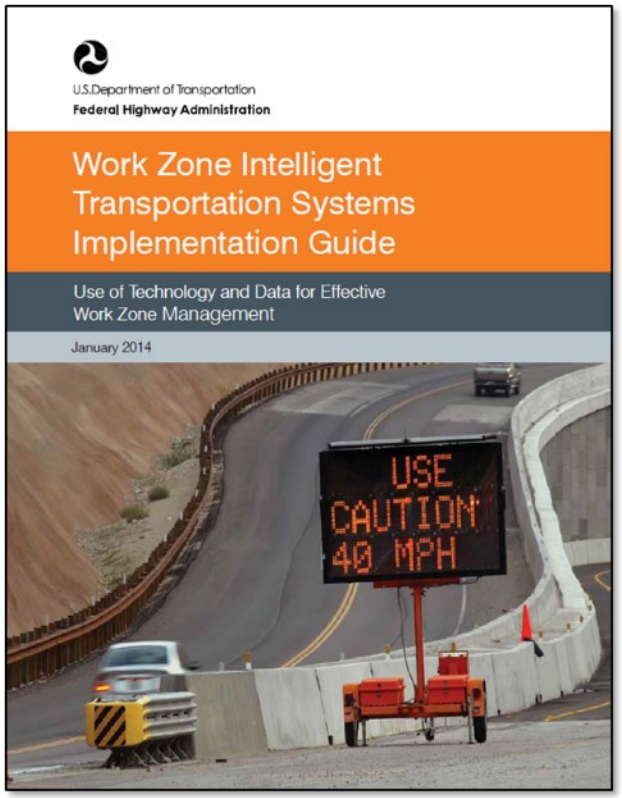
- One of the most frequently requested publications from FHWA Smarter Work Zone Library
- Provides guidance on implementing ITS in work zones to assist public agencies, design and construction firms, and industry stakeholders
- Presented through a 6-step Systems Engineering Approach to WZITS implementation
- Available at https://ops.fhwa.dot.gov/publications/fhwahop14008/index.htm



Images Source: FHWA

WZITS Tool

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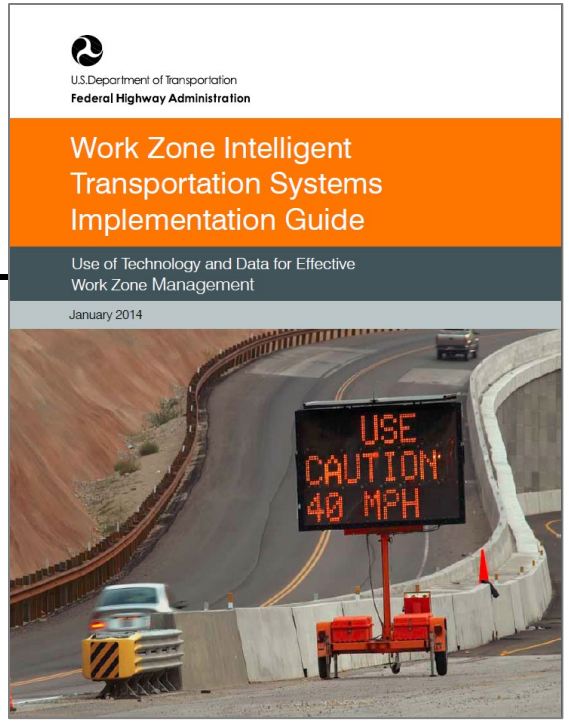
- Software companion tool to the Guide to help bridge the gap between principles and practice
- Assists in walk-through of ITS deployments steps following logic and methodology described in the Guide
- Provides analytical decision support tools for key steps

Source: FHWA WZITS Tool Screenshot

Images Source: FHWA

Guide vs. Tool

- Guide provides background and documentation of Tool steps
- Steps and sub-steps largely identical in both
- Some re-organization in tool to better match workflow
- Added practitioner-focused decision-support ‘wizards’ (i.e. automated logic to calculate scores in various steps)



Images Source: FHWA

Primary Tool Functions

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1. **Technical Recommendations** → Provide specific recommendation of what ITS technology to consider as a result of the inputs provided.
2. **Project Management** → Guide the user through the various steps and sub-steps of the Guide and assist with data entry and general navigation of the WZITS process. The tool clearly establishes the sequence of decision-making and facilitates use of the Guide.
3. **Content Management** → Establish a record of decision-making and store interim information from the various steps in the guide, including listing of outputs, contact information for stakeholders, and records of decisions made along the way.

Images Source: FHWA

Decision Support Wizards

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- Volume-to-Capacity Wizard
  - Screens for potential bottlenecks and congestion
- Goal Wizard
  - Helps agencies define goals for WZITS deployment
- Feasibility Wizard
  - Estimates feasibility score for WZITS
- Stakeholder Wizard
  - Defines project stakeholders and project team
- Application Wizard
  - Identifies potential WZITS technologies for project

Images Source: FHWA

Key Updates in WZITS V2.0

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- Enhanced user-friendliness and interface facelift
- Streamlined installation process (independent of Java)
- New Volume-to-Capacity (V/C) Wizard
- Ability to change wizard scoring by agency
- Streamlining Steps 3-6 of WZITS Guide
- Fact sheet improvements
- Comment fields for most data entries
- Pop-up windows for most fields
- Bug fixes and minor updates

Images Source: FHWA

Interface

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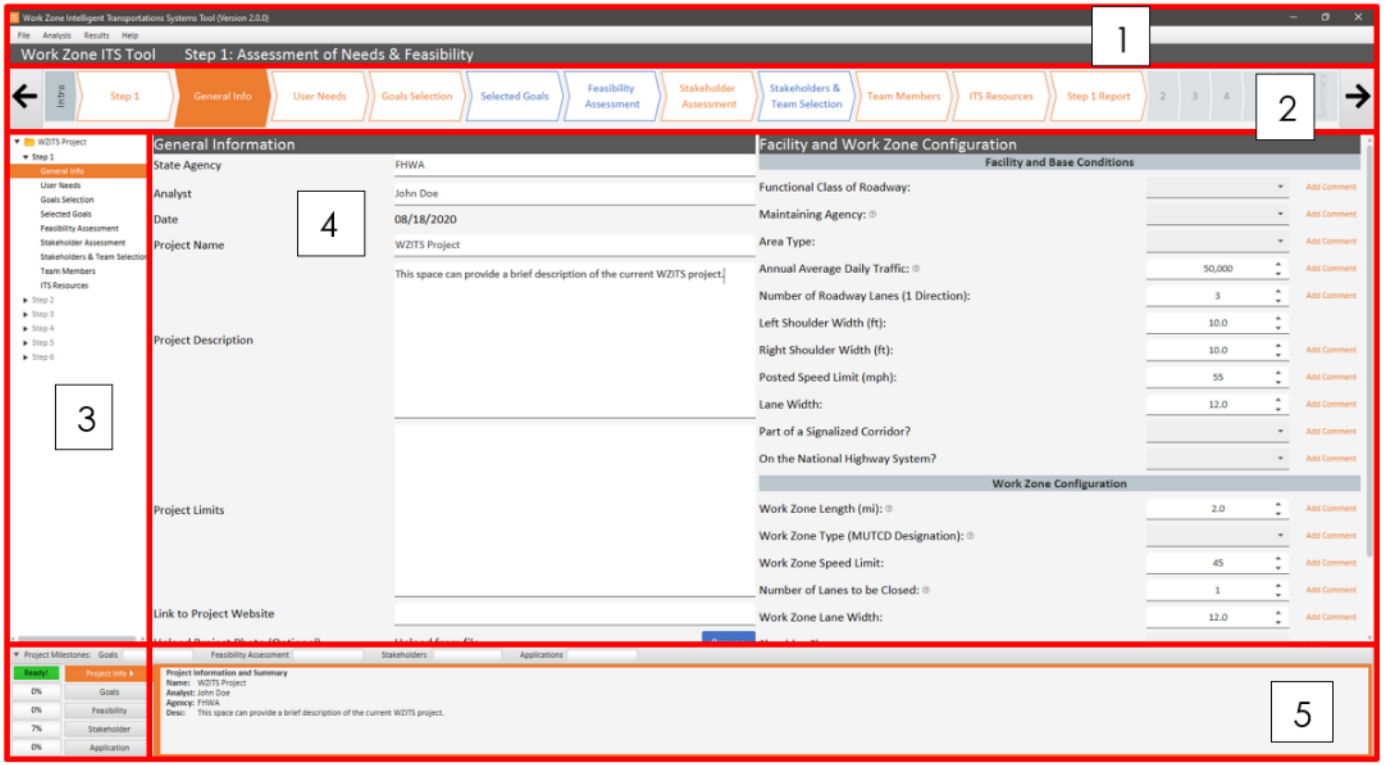
1. Menu Bar
2. Workflow Toolbar
3. Step Navigator
4. Main Input Window
5. Project Dashboard



Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

Tool Navigation

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(a) Collapsed State

(b) Expanded State

Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

General Layout

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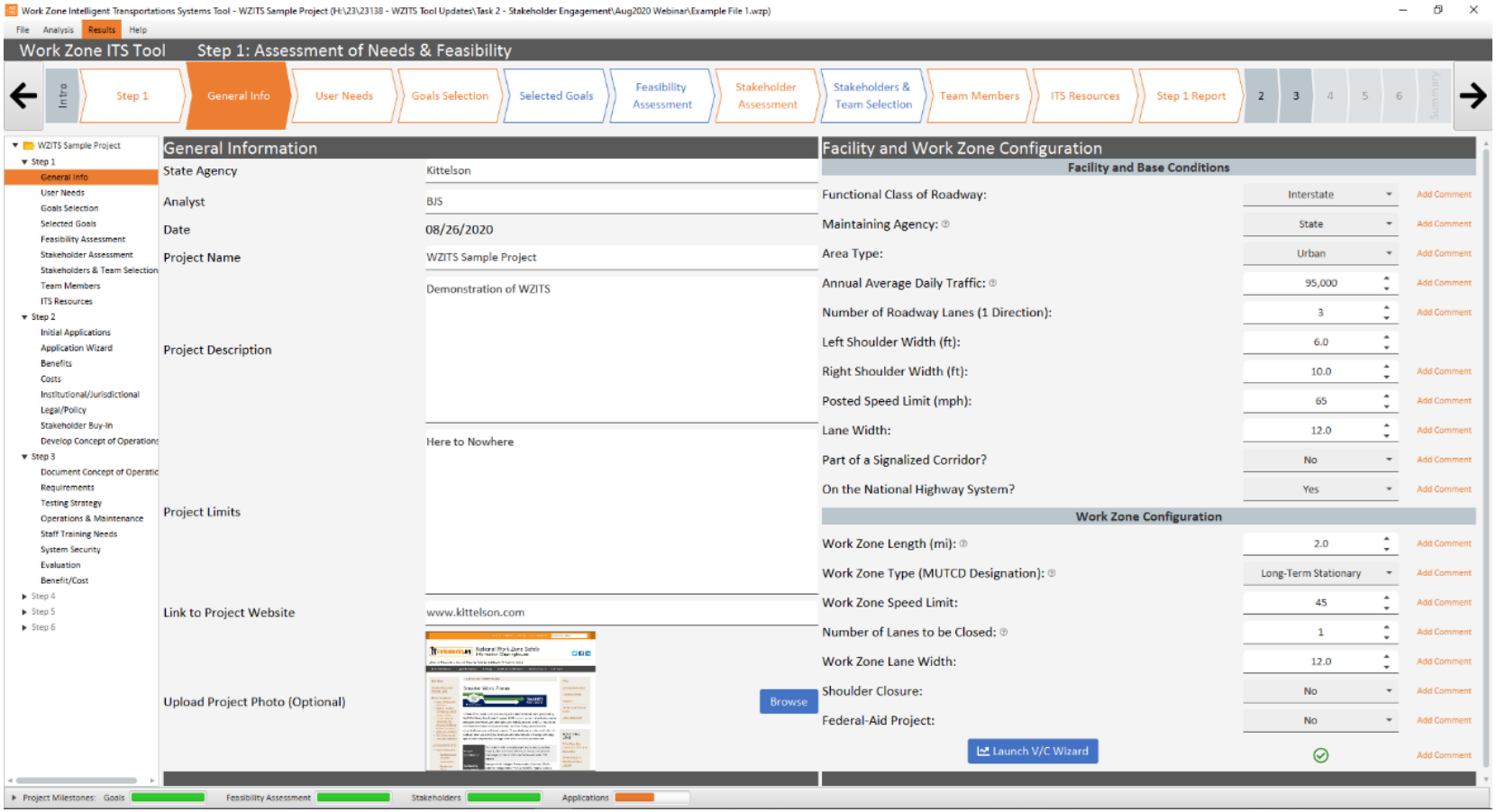

Images Source: FHWA

Source: FHWA WZITS Tool V2.0 Screenshot

Installation Process

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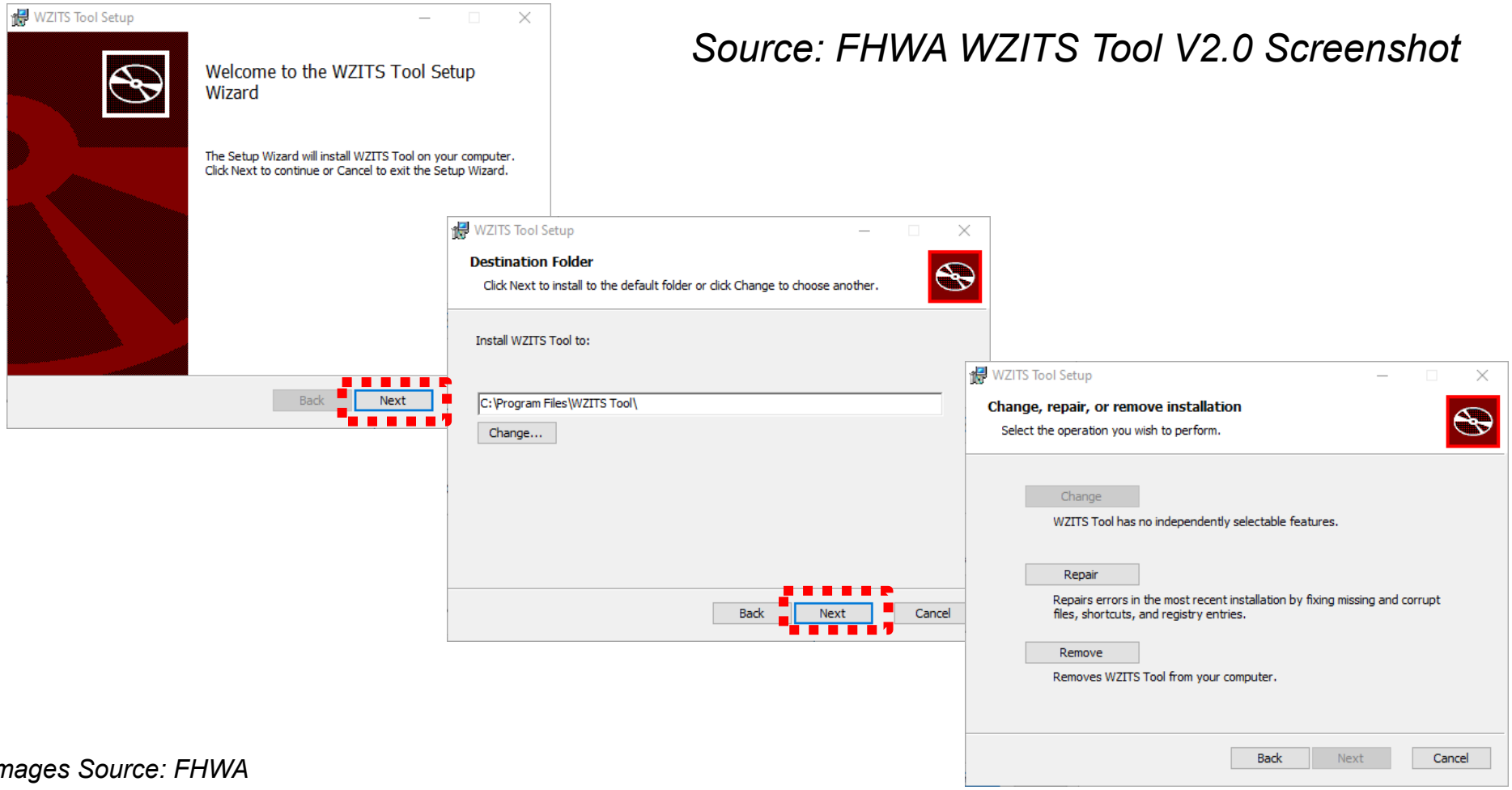
Source: FHWA WZITS Tool V2.0 Screenshot



Images Source: FHWA

Feasibility Wizard Example

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Feasibility Assessment

#	Input Question	User Response	Contributed Score
1	What is the duration of long-term stationary work?	4-10 months	5
2	To what extent will users be impacted for the duration of the work zone?	Moderate	5
3	During which time periods are noticeable traffic impacts expected to occur?	During most of the morning and afternoon peak ...	3
4	How long are queues expected to extend?	At least 2 miles for at least 2 hours per day	8

#	Mark All That Apply	User Response: Yes	User Response: No or N/A	Contributed Score
1	Is traffic speed variability expected to occur?	☑	☐	1
2	Do you expect back of queue and other sight distance issues?	☑	☐	3
3	Are high speeds/chronic speeding expected to occur?	☐	☑	0
4	Is driver diversion expected onto alternate routes? (See User Needs #2)	☑	☐	1
5	Are merging conflicts and hazards at work zone tapers expected to occur?	☐	☑	0
6	Do you expect the work zone layout to cause driver vonfusion or trouble wayfinding?	☐	☑	0
7	Will frequently changing operating conditions for traffic be used?	☑	☐	3
8	Will variable work activities occur?	☑	☐	3
9	Are oversize vehicles expected?	☑	☐	3
10	Do you expect a contruction vehicle entry/exit speed differential relative to traffic?	☐	☑	0
11	Will data be collected for work zone performance measures?	☑	☐	3
12	Do you expect any unusual or unpredictable weather patterns to occur?	☑	☐	3

Feasibility Score:	41	30 or more: ITS is likely to provide significant benefits and should be considered as a treatment to mitigate impacts.

Additional Justification: Edit/View

Images Source: FHWA

Source: FHWA WZITS Tool V2.0 Screenshot

Editable Scoring Matrices

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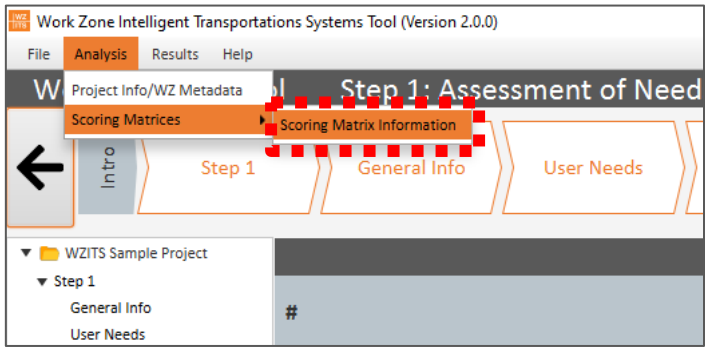
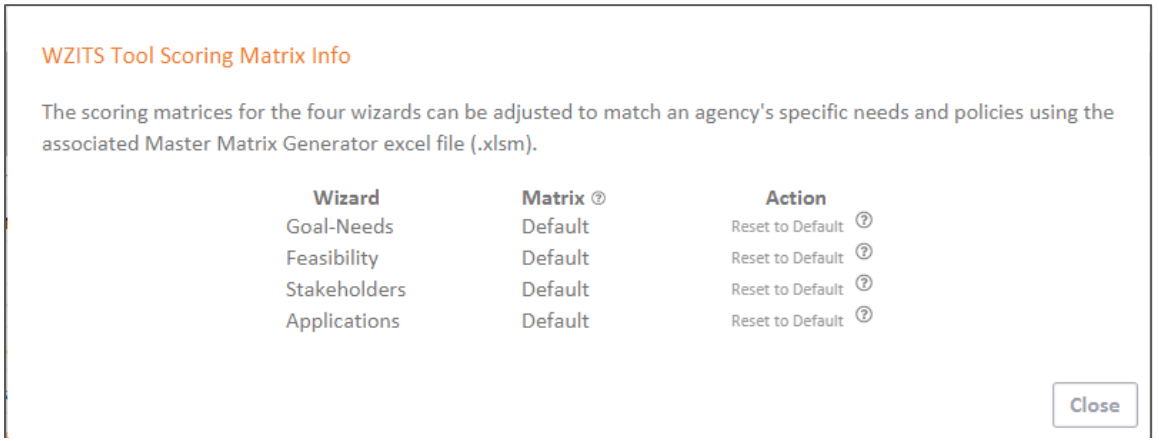
- Agency feedback desiring customizable scoring defaults
- Unlikely to change by project, but may be desired to change by agency





Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

Editing Scoring Matrices through Configuration Spreadsheet

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This worksheet contains the underling WZITS Feasibility Matrix. The Yellow backgrounded cells can be edited by the user to reflect custom scores for a specific question.

Export Feasibility Matrix

Criteria	Question	Answer	Score	Response	Points
1 Duration of work zone					
	What is the duration of long-term stationary work?	>1 construction season	8	No	0
		4-10 months	5	No	
		<4 months	1	No	
2 Impact to traffic, businesses, other destinations, or other users (e.g. extremely long delays, high risk of speed variability, access issues)					
	To what extent will users be impacted for the duration of the work zone?	Significant	8	No	0
		Moderate	5	No	
		Minimal	1	No	
3 Queuing and delay					
	How long are queues expected to extend?	At least 2 miles for at least 2 hours per day	8	No	0
		1-2 miles for 1-2 hours per day	5	No	
		Less than one mile for less than one hour per day	1	No	
4 Temporal Aspects of Traffic Impacts					
	During which time periods are noticeable traffic impacts expected to occur?	More than morning and afternoon peak hours in both directions	6	No	0
		During most of the morning and afternoon peak hours in either	3	No	
		During most of a single peak hour in a single direction	1	No	
		Unpredictable	0	No	
5 Specific Issues					
	How many of the following issues are expected to occur? (Select all that apply)	Is traffic speed variability expected to occur?	1	No	0
		Do you expect back of queue and other sight distance issues?	3	No	
		Are high speeds/chronic speeding expected to occur?	2	No	
		Is driver diversion expected onto alternate routes?	1	No	
		Are merging conflicts and hazards at work zone tapers expected to occur?	3	No	
		Do you expect the work zone layout to cause driver vonfusion or trouble wayfinding?	3	No	
		Will frequently changing operating conditions for traffic be used?	3	No	
		Will variable work activities occur?	3	No	
		Are oversize vehicles expected?	3	No	
		Do you expect a contruction vehicle entry/exit speed differential relative to traffic?	2	No	
		Will data be collected for work zone performance measures?	3	No	
		occur?	3	No	
Score					
	30 or more	ITS is likely to provide significant benefits and should be considered as a treatment to mitigate impacts			0
	10 to 29	ITS may provide some benefits and should be considered as a treatment to mitigate impacts			
	less than 10	ITS may not provide enough benefit to justify the associated costs			

- Use the Export button to generate a custom scoring matrix for the standalone WZITS Tool.
- If there is a valid installation of the WZITS Tool (Version 2.0) on the computer, the matrix will be automatically created as a resource file for the tool.
- Any changes will be reflected once the WZITS tool is next opened.

Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

Volume-to-Capacity (V/C) Wizard

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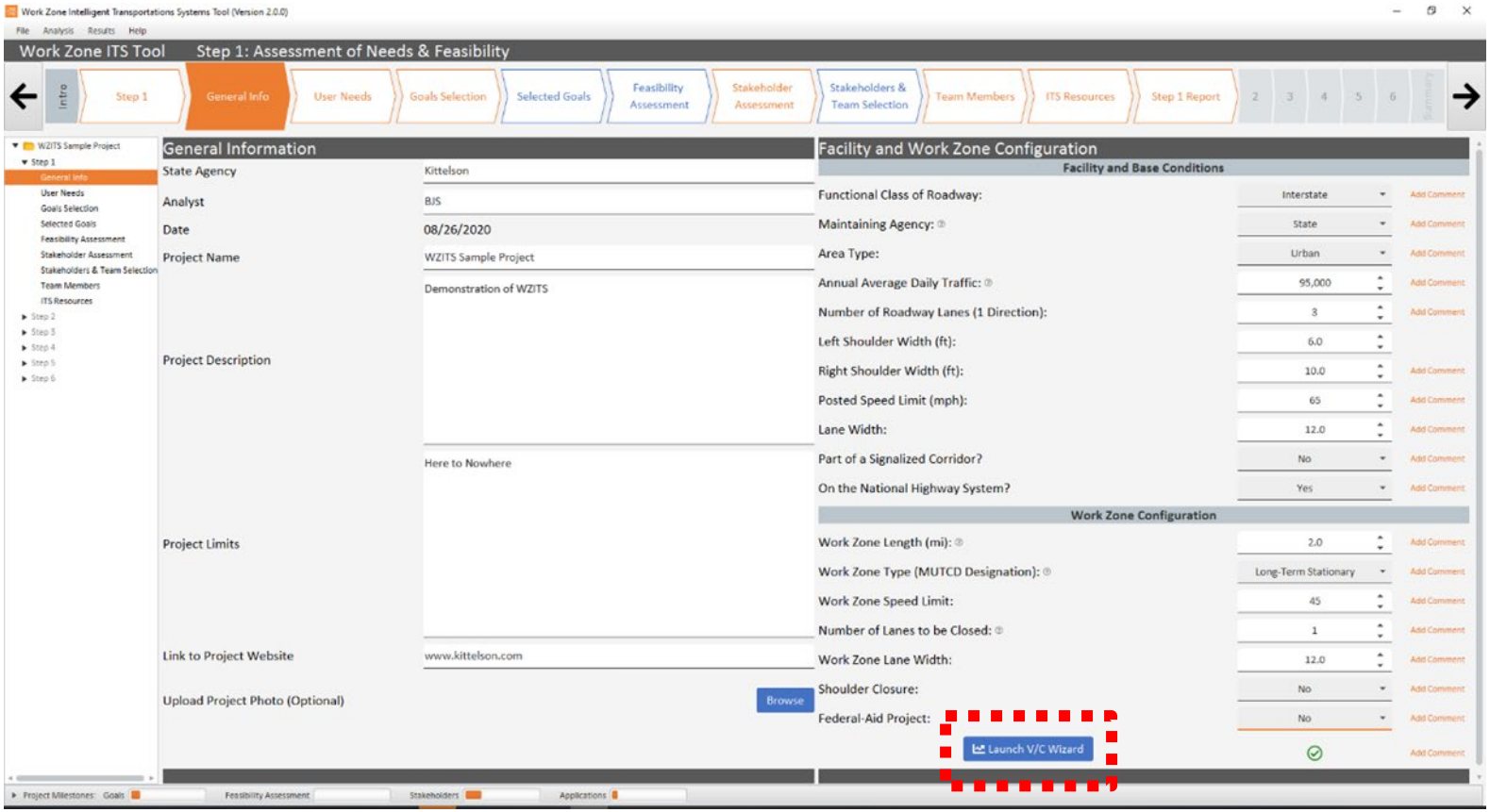

Images Source: FHWA

Source: FHWA WZITS Tool V2.0 Screenshot

V/C Wizard (2 of 4)

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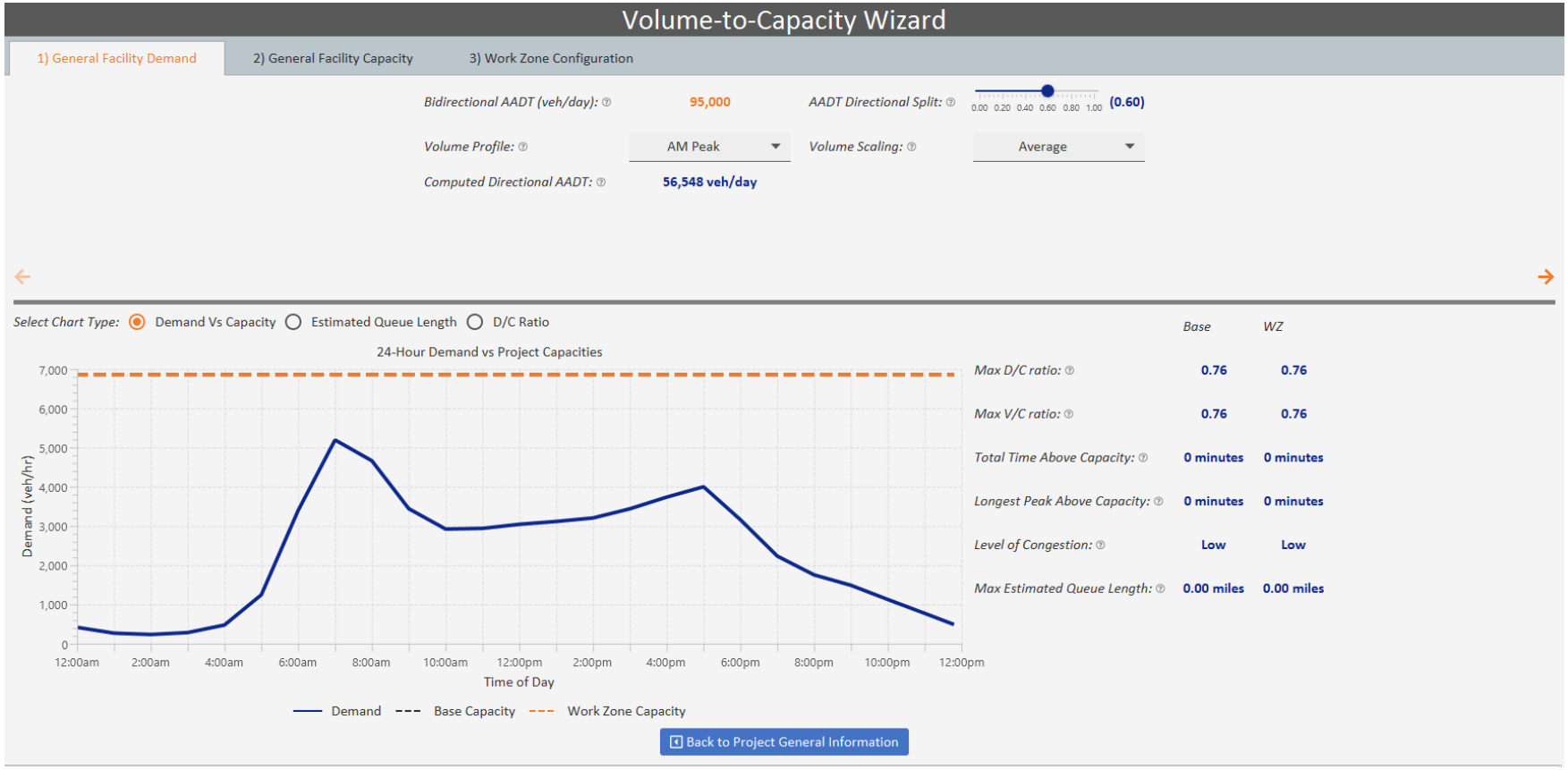

Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

V/C Wizard (3 of 4)

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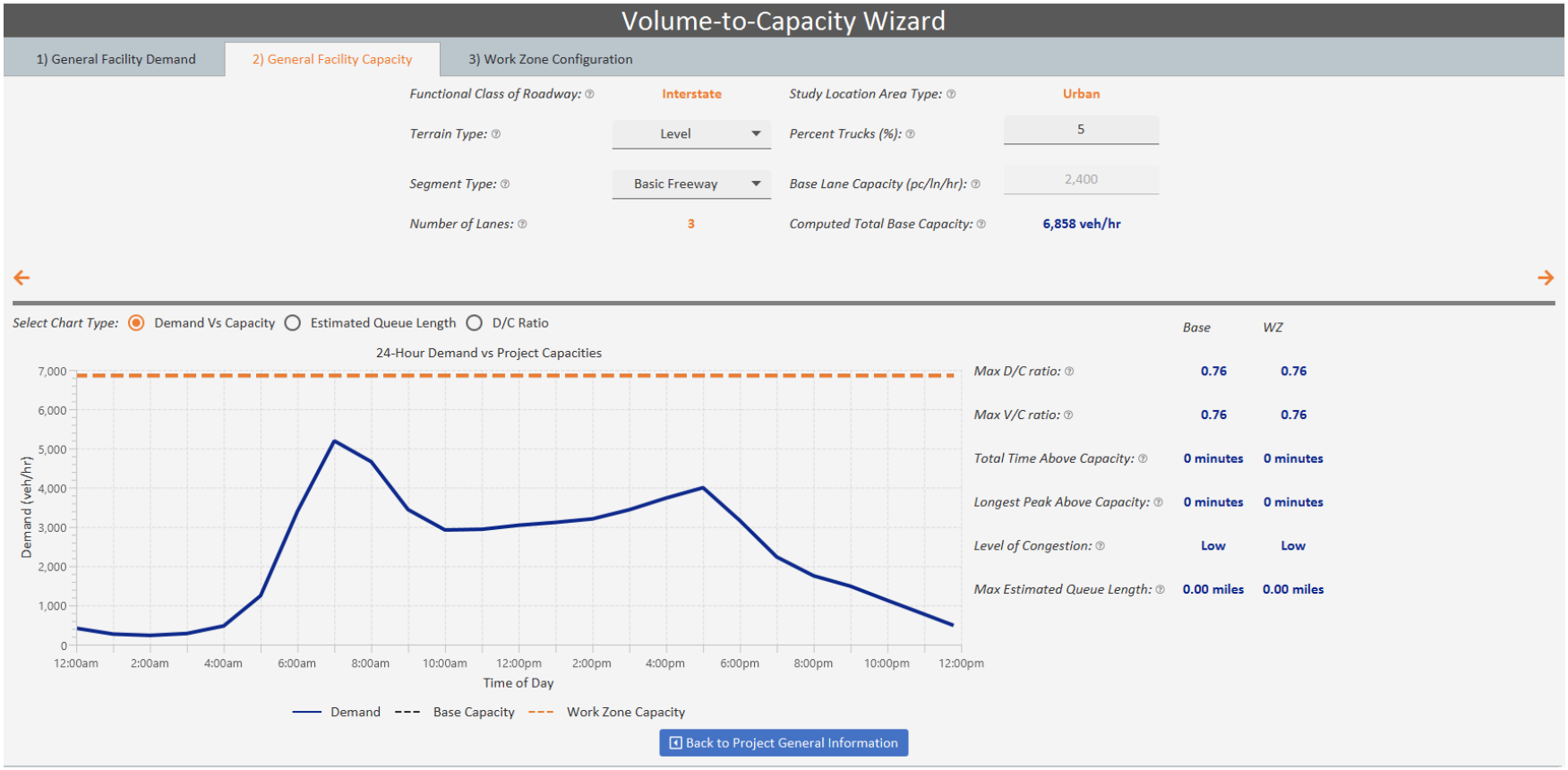

Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

V/C Wizard (4 of 4)

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Source: FHWA WZITS Tool V2.0 Screenshot

Images Source: FHWA

Fact Sheet Export

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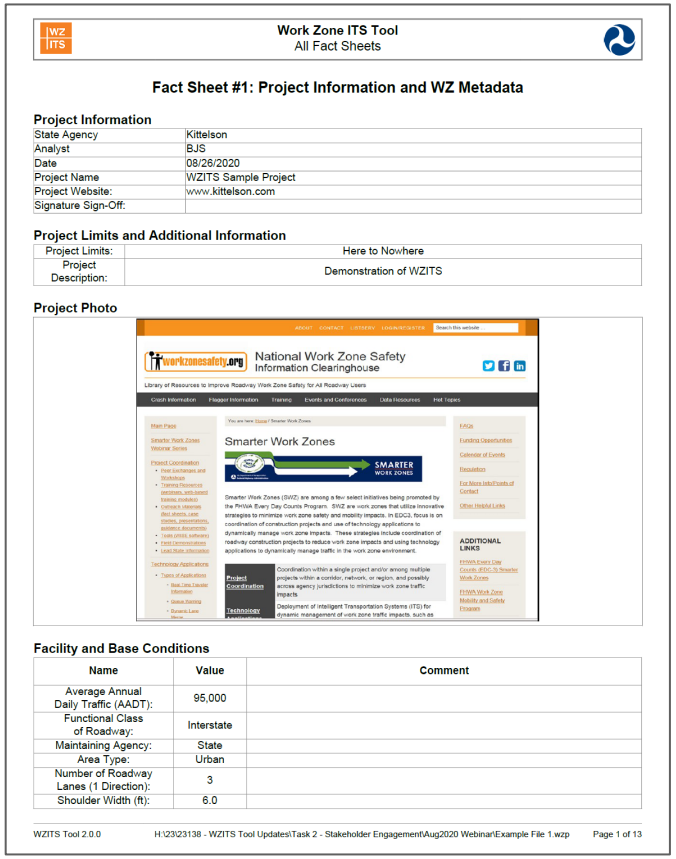


Work Zone ITS Tool
All Fact Sheets

Fact Sheet #1: Project Information and WZ Metadata

Project Information

State Agency	Kittelson
Analyst	BJS
Date	08/26/2020
Project Name	WZITS Sample Project
Project Website:	www.kittelson.com
Signature Sign-Off:	

Project Limits and Additional Information

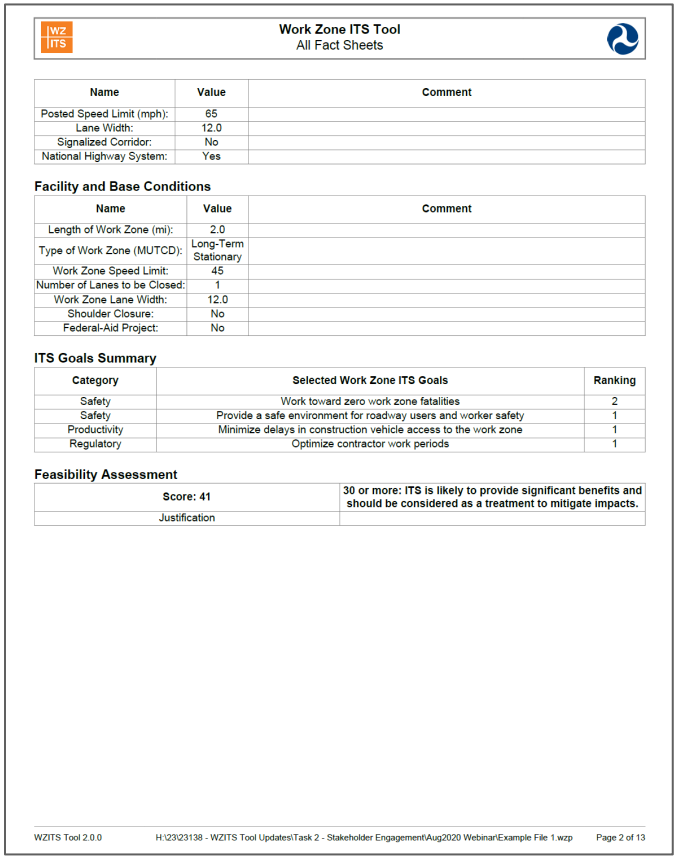
Project Limits:	Here to Nowhere
Project Description:	Demonstration of WZITS

Project Photo

Facility and Base Conditions

Name	Value	Comment
Average Annual Daily Traffic (AADT):	95,000	
Functional Class of Roadway:	Interstate	
Maintaining Agency:	State	
Area Type:	Urban	
Number of Roadway Lanes (1 Direction):	3	
Shoulder Width (ft):	6.0	

WZITS Tool 2.0.0 H:\23\23138 - WZITS Tool Updates\Task 2 - Stakeholder Engagement\Aug2020 Webinar\Example File 1.wzp Page 1 of 13



Work Zone ITS Tool
All Fact Sheets

Name	Value	Comment
Posted Speed Limit (mph):	65	
Lane Width:	12.0	
Signalized Corridor:	No	
National Highway System:	Yes	

Facility and Base Conditions

Name	Value	Comment
Length of Work Zone (mi):	2.0	
Type of Work Zone (MUTCD):	Long-Term Stationary	
Work Zone Speed Limit:	45	
Number of Lanes to be Closed:	1	
Work Zone Lane Width:	12.0	
Shoulder Closure:	No	
Federal-Aid Project:	No	

ITS Goals Summary

Category	Selected Work Zone ITS Goals	Ranking
Safety	Work toward zero work zone fatalities	2
Safety	Provide a safe environment for roadway users and worker safety	1
Productivity	Minimize delays in construction vehicle access to the work zone	1
Regulatory	Optimize contractor work periods	1

Feasibility Assessment

Score: 41	**30 or more: ITS is likely to provide significant benefits and should be considered as a treatment to mitigate impacts.**
Justification	

WZITS Tool 2.0.0 H:\23\23138 - WZITS Tool Updates\Task 2 - Stakeholder Engagement\Aug2020 Webinar\Example File 1.wzp Page 2 of 13

Images Source: FHWA

Source: FHWA WZITS Tool V2.0 Screenshot

Obtaining the Tool

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- Access WZITS Tool and User Guide at https://github.com/kittelson/WZITS_Tool/releases
  - Download and run WZITS.Tool-2.0.0.msi
  - Download WZITS User Guide V2_0.pdf

Images Source: FHWA

FHWA Training Workshops

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Federal Highway Administration

- Agency-specific or multi-agency
- Available to state or local agencies upon request
- Full-day workshops to train participants on how the tool can be implemented into their agency's project development process

Images Source: FHWA

Contact Info for Training and Feedback

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Federal Highway Administration

- **Email Todd Peterson (todd.peterson@dot.gov) if you…**
  - Have recommendations for updates, improvements, or enhancements to the tool to improve its functionality or increase its usefulness
  - Would like to conduct a tool training workshop at your agency or participate in a tool training workshop conducted elsewhere
  - Would like more information on the existing tool

Images Source: FHWA

Questions

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Images Source: FHWA