

# Safety Performance for Intersection Control Evaluation (SPICE) Tool

This poster summarizes the forthcoming FHWA SPICE Tool. The author thanks the other members of the project team: Kittelson & Associates, Inc. – Brian Ray, Lake Trask; KLS Engineering –Leverson Boodlal, Kevin Chiang. The author also wishes to thank the project sponsor, Federal Highway Administration (Jeffrey Shaw)

## What is Intersection Control Evaluation (ICE)?



An objective policy to choose control at an intersection.

## Who has an ICE policy?

Six states have policies in place and two are developing policies.

## Why have an ICE policy?

Ensure that good but “new” solutions are not missed, such as roundabouts and alternative intersections

## What is evaluated?

Traffic operations, safety, multimodal needs and accommodation, community and stakeholder preferences, and cost to name a few.

## SPICE Tool - Intersection Types Included

### At-Grade Intersections

- Traffic Signal (conventional)
- Minor-road Stop Control
- All-Way Stop
- Roundabout (yield control)
- Displaced Left Turn (DLT)
- Median U-Turn
- Restricted Crossing U-Turn (RCUT) (signalized and unsignalized)
- Continuous Green-T Intersection
- Jughandles

Facility type, # of legs, # of lanes specified by user for tool to choose appropriate SPF

### Ramp Terminal Intersections of Diamond Interchanges

- Traffic Signal (conventional)
- Minor-road (i.e. ramp) Stop Control
- Roundabout (yield control)
- Single-point Traffic Signal (of a signal point diamond)
- Crossover Traffic Signal (of a diverging diamond)



## Platform

Macro-powered Excel Workbook

## Features

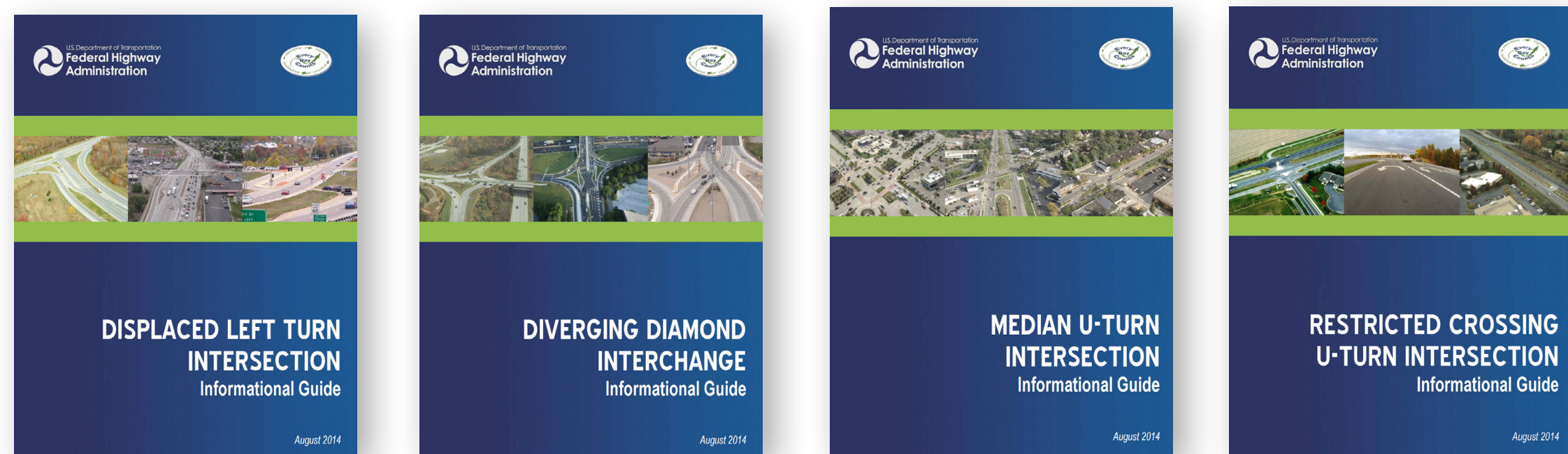
- Planning-level analysis or full HSM analysis
- Opening year and design year analysis
- Optional input of local calibration factors or local CMFs

## Safety Analysis for ICE is Challenging

Many crash modification factors (CMFs) for alternative intersections - which are “best”?

Predictive method sometimes requires inputs not available at planning level

New safety performance functions (SPFs) for some intersection forms (including roundabouts) not incorporated into software/spreadsheet tools



Alternative	Base Conditions		Traffic Signal	Minor Road Stop
Opening Year Major Road AADT	25000	Optional AADT Overrides	25000	25000
Opening Year Minor Road AADT	20000		20000	20000
Design Year Major Road AADT	50000		50000	50000
Design Year Minor Road AADT	45000		45000	45000
Number of Major (Uncontrolled) Approaches with Left-Turn Lanes	Additional Required Control Strategy Inputs		0	0
Number of Major (Uncontrolled) Approaches with Right-Turn Lanes			0	0
Reset Planning Inputs to Defaults		Planning Level Defaults (Optional Overrides)		
		A yellow cell indicates the value may be used in the SPF computation	N/A	0
Skew Angle			Yes	Yes
Lighting Present			0	
# of Approaches Permissive LT Signal Phasing			0	
# of Approaches Perm/Prot LT Signal Phasing			0	
# of Approaches Protected LT Signal Phasing			0	
Number of Approaches with Right-Turn-on-Red Prohibited			0	
Red Light Cameras Present			No	
Number of Major Street Lanes (Including Turn Lanes)			0	
Number of Minor Street Lanes (Including Turn Lanes)			0	
# of Major St Approaches w/ Right-Turn Channelization			0	
Number of Approaches with U-Turn Prohibited			0	
Pedestrian Volume by Activity Level			Low (20)	
User Specified Sum of all daily pedestrian crossing volumes			20	
Max # of Lanes Crossed by Pedestrians		5		
Number of Bus Stops within 1000' of Intersection		0		
Schools within 1000' of Intersection		No		
Number of Alcohol Sales Establishments within 1000' of Intersection		0		

Required Inputs

Optional Inputs (defaults provided for planning-level analysis)

## SPICE Outputs

Crash Prediction Summary				
Control Strategy	Crash Type	Open Year	Design Year	Total Project Life Cycle
Traffic Signal	Total	3.88	5.47	103.47
	Fatal & Injury	3.57	5.03	95.16
Minor Road Stop	Total	4.42	6.55	121.28
	Fatal & Injury	1.72	2.46	46.19
Displaced Left Turn (DLT)	Total	3.41	4.82	91.05
	Fatal & Injury	3.14	4.43	83.74
Median U-Turn (MUT)	Total	3.30	4.65	87.95
	Fatal & Injury	2.50	3.52	66.62
Signalized RCUT	Total	3.30	4.65	87.95
	Fatal & Injury	2.78	3.93	74.23



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