

Intersection Control Evaluation



U.S. Department of Transportation
Federal Highway Administration

Intersections represent one-quarter of all traffic fatalities and one-half of all traffic injuries. Each intersection project is an incremental opportunity to enhance safety and take one more step toward zero deaths and serious injuries on our Nation's roads.

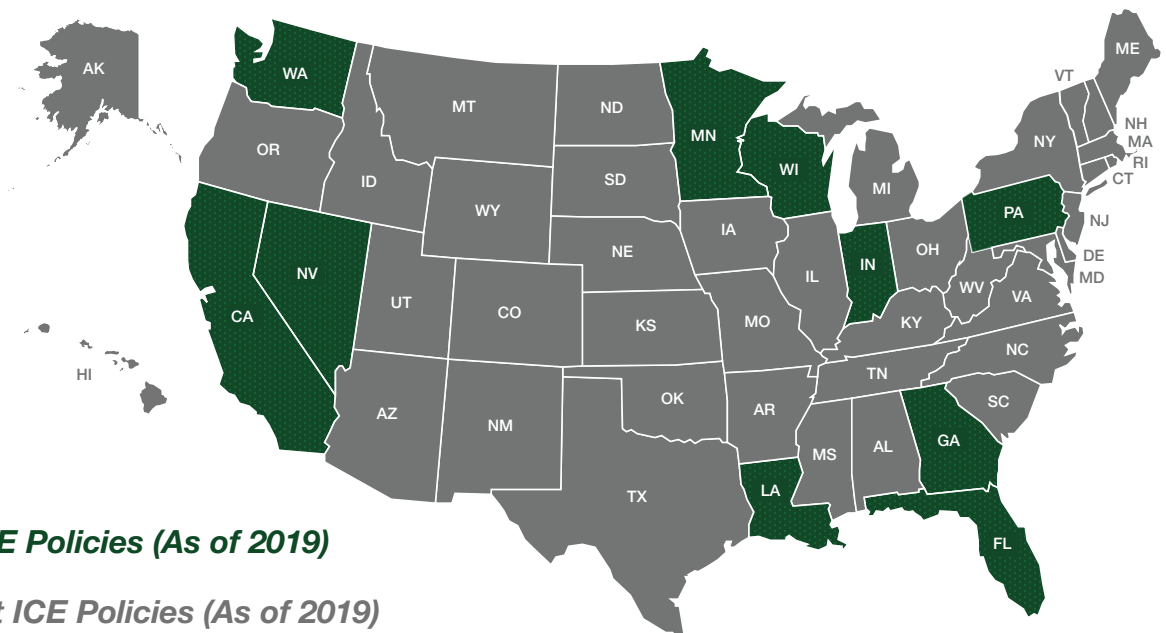
Using a performance-based approach, Intersection Control Evaluation (ICE) is used to screen alternatives and identify optimal geometric and control solutions for an intersection.¹ The goal of ICE is to help agencies make data-driven decisions when it comes to identifying and selecting strategies for intersection-related projects.²

By the end of 2019, 10 States had ICE policies and many more were developing ICE policies. Because ICE is a flexible and adaptable framework, specific policies and tools differ to allow each agency to best fit their program development and project delivery process. Some States have developed custom spreadsheet tools where users can input project-specific information and facilitate consistent documentation of design selections.

General benefits

States that have implemented ICE policies have seen many benefits,³ which include:

- Integration of safety into all decisions for intersection control.
- Implementation of more cost-effective solutions.
- Consistent documentation across projects.
- Increased awareness of innovative intersection solutions.
- Emphasis on objective performance metrics.
- Consolidation and streamlining of existing intersection-related policies.
- Flexible and scalable procedures.



¹ FHWA. "Primer on Intersection Control Evaluation (ICE)." FHWA-SA-18-076. n.d. <https://safety.fhwa.dot.gov/intersection/ice/fhwasa18076/fhwasa18076.pdf>. Accessed August 26, 2019.

² Jenior, P., Buttsick, A., Haas, P., and Ray, B. "Safety Performance for Intersection Control Evaluation (SPICE) Tool User Manual." FHWA, FHWA-SA-18-026. 2018. <https://www.pooledfund.org/Document/Download/8250>. Accessed August 26, 2019.

³ FHWA. "Primer on Intersection Control Evaluation (ICE)." FHWA-SA-18-076. n.d. <https://safety.fhwa.dot.gov/intersection/ice/fhwasa18076/fhwasa18076.pdf>. Accessed August 26, 2019.

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General Process

ICE should be conducted for new intersections or when substantive change is considered for the traffic control or geometry of existing intersections. ICE can be both a policy and process. Many States have produced flowcharts to more easily visualize their unique ICE processes.



Stage I

Stage I is a scoping stage to determine a short list from all possible alternatives that merit further consideration and analysis because they meet organizational goals, project needs, and are practical to pursue. Stage I screens out non-competitive options from being carried into Stage II.

Does the alternative...

- Address the project purpose and need?
- Improve safety performance?
- Improve or preserve operational performance?
- Consider pedestrians, bicyclists, and other users?
- Fit in with given site characteristics and context?
- Meet the needs and values of the local community and directly-affected stakeholders?

Needed inputs

- Crash assessment (historic and future).
- Traffic volumes for safety and operational analysis.
- Planning-level cost estimates.
- Possible ROW and environmental impacts.
- Stakeholder feedback (if available).



Stage II

Stage II is an alternative development and selection stage that objectively compares and differentiates among the alternatives brought forward from the Stage I scoping analysis. In this stage, the preferred alternative is determined based on more detailed evaluations that account for all users and are conducted during typical preliminary engineering activities, like safety performance, operational performance, lifecycle benefits and costs, environmental, utility, and right-of-way impacts, and specific multimodal accommodations.



Existing Resources and Tools

There are ICE tools available to analyze safety and operations at both intersection and interchange types, including roundabouts, U-turn based intersections, like Restricted Crossing U-Turn (RCUT) and Median U-Turn (MUT), and crossover-based junctions, like Displaced Left Turn (DLT) intersections and Diverging Diamond Interchanges (DDIs).

The FHWA Intersection Control Evaluation website (<https://safety.fhwa.dot.gov/intersection/ice/>) provides resources and tools that can help agencies create and conduct ICE policies and activities.

- The *Primer on Intersection Control Evaluation* was developed in 2018 to provide an overview of ICE, appropriate situations for ICE, and the general framework/process used by ICE States; it also highlights available resources and tools.
- The Capacity Analysis for Planning of Junctions (CAP-X) Tool conducts critical movement analysis to gauge the potential performance of various intersection and interchange types, and also characterizes bicyclist and pedestrian accommodations.
- The Safety Performance for Intersection Control Evaluation (SPICE) Tool performs basic predictive safety analysis of certain at-grade intersection alternatives/control types and ramp terminal intersections. It was developed to facilitate a user-friendly, HSM-based preliminary safety analysis for ICE Stage I



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