Advancing Roundabouts with Intersection Control Evaluation

Roundabouts historically have either been overlooked or not seen as a viable alternative by some agencies during the project development process. The adoption of a performance-based policy like Intersection Control Evaluation (ICE) has created a transparent approach for agencies to consider intersection alternatives based on performance metrics, such as safety, operations, cost, environment, and footprint/right of way impacts and document the decisions. ICE is a data-driven, performance-based framework and approach established to identify the optimal investment and solution for highway access issues and needs considering all users. ICE has allowed consideration and implementation of innovative intersection designs such as roundabouts, RCUTs (Median U-turn), DDIs, and DDLs—all encouraged under FHWA Every Day Counts safety initiative—by comparing key performance metrics.

ICE is typically a two-stage/phase process where

- Stage 1 is a high-level assessment that considers all possibilities but filters down to short list, and
- Stage 2 is a more rigorous assessment of key performance criteria for the short-listed alternatives (typically w/ prelim engineering).

The ICE process involves screening all possible alternatives for an intersection project, which is important because it stresses all designers and decision makers to look beyond the traditional designs and control for every project; consider short term, interim and long term goals; and construction costs and life cycle cost consideration.

Furthermore, ICE policies and procedures can help states achieve safety performance management targets across the entire highway program by setting intersection designs that reduce the number and rate of fatal and injury crashes.

Five states have ICE policies, including MN, WI, CA, IN, and WA, and three states are working on ICE policies, and at least 10 other states are considering ICE policies, as shown on the map below. Both Minnesota and Wisconsin DOTs updated their original ICE policies in 2017.

Lessons learned from states who have implemented ICE policies include a need to:

- Enhance the importance of multimodal criteria to consider for pedestrians, bicyclists, transit, freight;
- Include community desires, context, values as a consideration along with the quantity performance metrics;
- Provide clear purpose to two-phased approach and requirements;
- Expand innovative intersection designs options explicitly in the ICE;
- Include provisions for phased improvements/interim layout for roundabouts if additional lanes are not needed beyond 10-15 years;
- Discount perception that ICE creates more paperwork when it really streamlines the intersection alternative analyses process;
- Include safety performance resources and methodology for consistent use across alternatives; and
- Include analysis tools to compare alternatives, for example
  - FHWA CAP-X
  - NCHRP 03-110 Estimating the Life Cycle Cost of Intersection
  - CMF clearinghouse
  - Highway Safety Manual
  - KY IDAT tool
  - FHWA resource links page

State DOT ICE web links:

- MN (update 2017) - http://www.dot.state.mn.us/trafficeng/safety/ice/

California Department of Transportation ICE Directive

Caltrans implemented an ICE policy (Traffic Operations Policy Directive 13-02) in 2013. When this policy was implemented Caltrans had approximately 20 roundabouts on the state highway system. They now have over 30 roundabouts constructed and over 50 in the planning and design phase. ICE was instrumental in accelerating the implementation of roundabouts being considered on projects and also brought awareness of other innovative intersections that reduce conflicts like DDIs.

The first roundabout on the state system in District 12 (Southern CA) was also one of the first projects to use the ICE process after the Directive was in place. The intersection of Valle Rd/LeRoi Ave/1-5 NB hook ramps was complex and new development was planned for this area. This offset stop control intersection had operational issues and the City and a developers team desired to improve the intersection. Several signal alternatives were considered along with a roundabout. The City, developer team, Caltrans and FHWA worked as a team to vet the alternatives using the ICE process.

Caltrans San Juan Capistrano Project Details

Example of State DOT ICE Process Diagrams

Indiana DOT—Intersection Decision Guide (Stage 1 Screening)

Minnesota DOT—Intersection Control Evaluation Process

Wisconsin DOT—Intersection Control Evaluation Project Triggers

- New traffic control
- A change in traffic control
- A new or alternative type of intersection or interchange
- Introduction of access/median restrictions on the State Truck Network
- Off-setting intersections

Source: FHWA Office of Safety

Source: GettyImages.com

Source: Gary Warkentin, Michael Baker

Source: Brad Orien, MUROW|CM

Source: Hillary N. Isebrands, PE, PhD

Source: FHWA Resource Center Safety & Design TST
hillary.isbrands@dot.gov