



Intersection Safety Technologies, Quick Reference Guidebook

May 2016
2016RIC10A

Intersection Conflict Warning Systems & LED STOP Signs



WHAT CRASH MITIGATION STRATEGY SHOULD I USE?

The MnDOT Traffic Safety Fundamentals Handbook recommends Intersection Safety Strategies for unsignalized intersections



Improve visibility of intersections by providing enhanced signing. This may include installing larger regulatory, warning, and guide signing and supplementary stop signs.



Improve visibility of intersections by providing enhanced pavement markings, such as adding or widening stop bar on minor-road approaches, supplementary messages (i.e., STOP AHEAD).



Clear sight triangles approaches to intersections; in addition to eliminating objects in the roadside, this may also include eliminating parking that restricts sight distance.



Reduce the frequency and severity of intersection conflicts through geometric design improvements



Choose appropriate intersection traffic control to minimize crash frequency and severity (roundabout or all-way stop).



Improve visibility of intersections by providing lighting (install or enhance) or red flashing beacons mounted on stop signs.



Deploy mainline dynamic flashing beacons to warn drivers of entering traffic



LED STOP signs provide increased visibility and awareness of the upcoming stop condition.

Comments that indicate consideration of LED STOP signs:

- “The driver just blew the STOP sign.”
- “I just didn’t see the STOP sign.”
- “People are always running that STOP sign.”

LED STOP signs reduce crash frequency and severity by 10 to 13%



Intersection Conflict Warning System (ICWS) have dynamic flashing signs and detection that provide active warning about traffic on the major road, minor road, or both roads at the intersection.

Comments that indicate the use of ICWS:

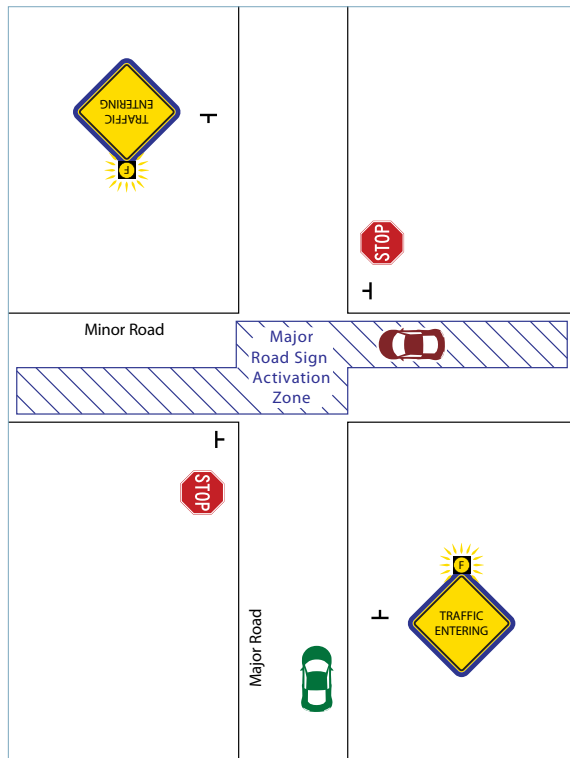
- “He was stopped and just pulled out right in front of me like I wasn’t even there.”
- “I didn’t see the car coming toward me and I pulled out.”
- “I didn’t think the truck was that close.”
- “I thought I could make it across before they got to the intersection.”

ICWS reduce the occurrence and severity of crashes by 17 to 27%

TYPES OF ICWS

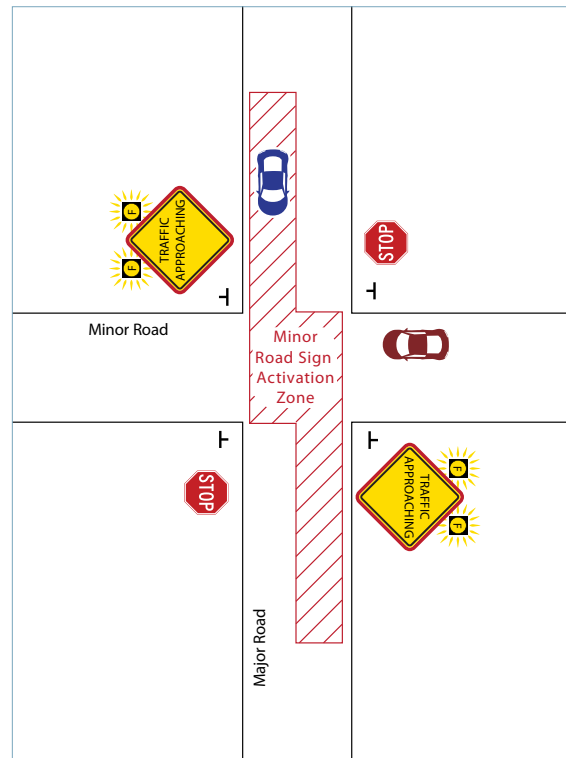
Major Road Only Warning

Warns major road drivers of traffic on the minor road



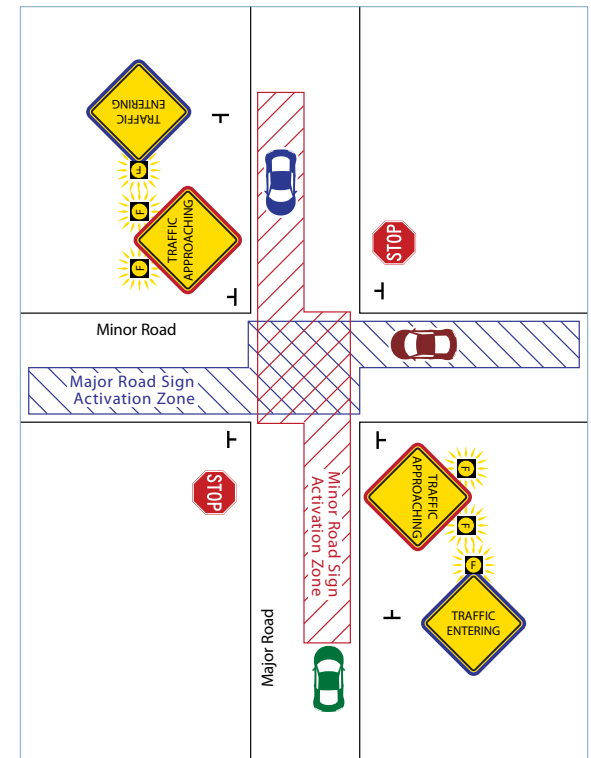
Minor Road Only Warning

Warns minor road drivers of traffic on the major road



Major and Minor Road Warning

Warns all drivers of traffic



Flashers are active whenever a vehicle is in the corresponding activation zone.

SIGNS

LED STOP Signs











ICWS Signs



SYSTEM OPTIONS

System Equipment

	Passive LED STOP Sign	Active LED STOP Sign	Major Road Only System	Minor Road Only System	Major & Minor Road Warning
Controller	None	Controlled by Detector	Controlled by Detector	Controlled by Detector	Signal Controller
Signs	 or 	 or 	 on mainline	 on major road	 on mainline  on minor road
Detection	No	Yes	Detect Minor Road Vehicles	Detect Major Road Vehicles	Detect all approaches
Malfunction Detection	No	No	Yes	Yes	Yes
Event Logging	No	No	Yes	Yes	Yes
System Cost	\$2,000	\$20,000	\$50,000	\$50,000	\$100,000–\$125,000

PLANNING FOR DESIGN

Higher Initial Cost – Less Routine Maintenance

Lower Initial Cost – Higher Routine Maintenance

Controller

Traffic Signal Controller

- Can be easily maintained by signal technicians
- Staff needs to be trained to operate signal controllers
- High Reliability – Low Down Time

Relay-Based or Simple Detector Control Method

- Data logging capability may be added to facilitate maintenance & troubleshooting
- Lower Reliability – Higher Down Time

Detection Options

Loop Detectors/"Microloops"

- Most reliable
- Requires wired connection

Non-Intrusive/Radar

- More options for wireless communication
- Low-cost sensors may be unreliable
- Routine maintenance required

Communication

Wired

- Most reliable
- Requires less routine maintenance

Wireless

- No underground utility location needed
- Routine maintenance required

Power

Commercial/Grid Power

- Most reliable
- May not be feasible if power is not accessible nearby

Solar Power/Battery

- Requires regular battery maintenance & replacement
- More susceptible to damage/vandalism
- Requires site with adequate sunlight for solar-powered systems

Maintenance

Contracted Maintenance

- Agency able to utilize personnel with more expertise
- Agency staff may need less system training

Agency-Provided Maintenance

- Agency staff can perform maintenance & troubleshooting as needed
- Does not rely on third parties



RESOURCES:

LRRB

<http://www.lrrb.org/>

Full Report

<http://www.lrrb.org/pdf/2016RIC10.pdf>

MnDOT State Aid

395 John Ireland Blvd MS 500
St. Paul, MN 55155
651-366-3800

