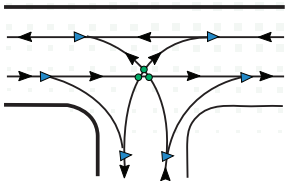
Intersection Treatments (1 of 2)

DESCRIPTION AND DEFINITION

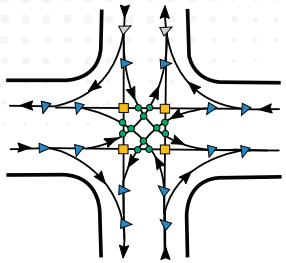
Safety research suggests that intersection crash rates are related to the number of conflicts at the intersection. Conflict points are locations in or on the approaches to an intersection where vehicles paths merge, diverge, or cross.

Some vehicle movements are more hazardous than others. The data indicates that minor street crossing movements and left turns on a major street are the most hazardous (possibly because of the need to select a gap from two directions of oncoming traffic). Left turns from the major street are less hazardous than the minor street movements, and right turn movements are the least hazardous.

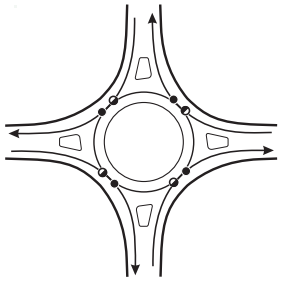
Full Access



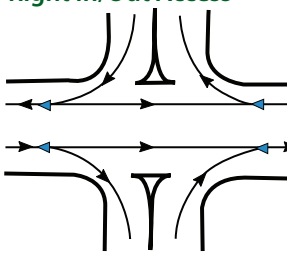
Full Access



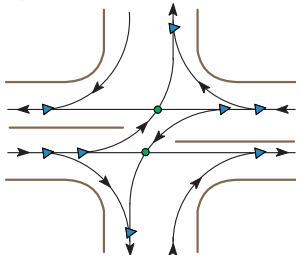
Roundabout Access



Right In/Out Access

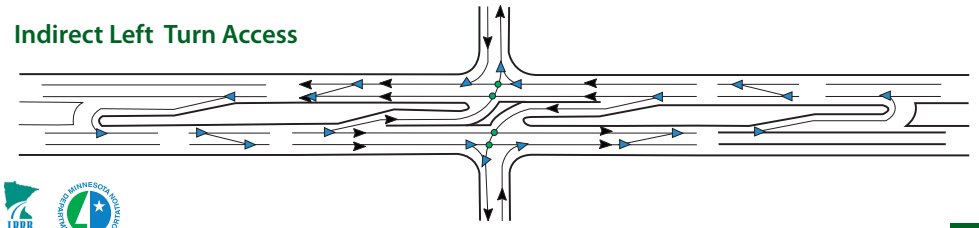


3/4 Access



CONFLICT TYPE
- Crossing
- Turning
- Merge/ Diverge

Indirect Left Turn Access



Analysis of crash data has proven that the most frequent type of severe intersection crash is the right-angle crash. In response, agencies are implementing intersection designs that reduce or eliminate the at-risk crossing maneuvers by substituting lower-risk turning, merging, and diverging maneuvers. Two designs being implemented are roundabouts and indirect turn treatments.

SAFETY CHARACTERISTICS

Crash rates at restricted access intersections (¾ access design and right-in/out) are typically lower than at similar four-legged intersections. Prohibiting or preventing movements at an intersection will likely reduce the crash rate.

Number Of Conflict Points By Intersection Type

	Crossing	Turning	Merge/ Diverge	Total	Typical Crash Rate (crashes per million entering vehicles)
Full Access (+)	4	12	16	32	0.3
Full Access (T)	0	3	6	9	0.3
¾ Access	0	2	8	10	0.2
Right-in/out Access	0	0	4	4	0.1
Roundabout	0	0	8	8	0.2
Indirect Left Turn	0	4	20	24	0.1

PROVEN, TRIED, INEFFECTIVE, OR EXPERIMENTAL

- Eliminating or restricting turning maneuvers by providing channelization or closing median openings is considered a **PROVEN** strategy. NCHRP Report 420 found the crash rate for a roadway with a non-traversable median to be about 30 percent less than a two-way left turn lane configuration.
- The one study in the FHWA Crash Reduction Clearinghouse that looked at converting an intersection to a roundabout found a crash reduction of 40 to 70 percent.

Intersection Treatments (2 of 2)

- The one study in the FHWA Crash Reduction Clearinghouse that looked at converting an intersection to an indirect left turn access had a crash reduction of 30 to 60 percent for serious injury crashes, but an increase of 20 to 30 percent of sideswipe crashes.

TYPICAL CHARACTERISTICS OF CANDIDATE LOCATIONS

- Divided roadways on urban and suburban arterials provide the most opportunity for access modification with the ability to use the median for restricted and channelization strategies.
- Coordination with access management guides—restricted and channelized medians reinforce partial access for minor roadways.

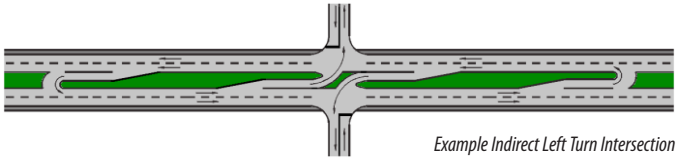
ROADWAY OPERATIONS

Restricting access as a safety treatment strategy does not reduce the capacity of the roadway. The treatments may slow vehicles (as they maneuver through a roundabout, for example), but provide improved safety.

TYPICAL COSTS

- Access modification = $10,000 to $100,000
- Roundabout = $800,000 to $1,000,000
- Indirect left turn = $500,000 to $750,000

Example Roundabout



Example Indirect Left Turn Intersection

SOURCES

How About a Roundabout? The Minnesota Experience – DVD (www.dot.state.mn.us/research/videos.html)
How About a Roundabout? A Minnesota Guide – Brochure (www.lrrb.org/pdf/FinalRoundaboutBrochure.pdf)
What is a J-Turn? Missouri DOT video (www.youtube.com/watch?v=Kfu6yx9kgCY)
Unconventional Arterial Intersection Design Interactive Website, University of Maryland Applied Technology and Traffic Analysis Program (http://attap.umd.edu/uaid_agus.php?UAIDType=25&Submit=Submit&iFeature=1)
Access Management Manual, Transportation Research Board, 2003.

Intersection Treatments Policy

POLICY PURPOSE/INTRODUCTION

The purpose of this policy is to establish uniformity and consistency in the application and installation of intersection configurations and traffic control on ***<Insert Agency>***'s roadway system.

DEFINITIONS

Functional Classification: The classification of a roadway that defines the purpose, use, and attributes necessary for it to provide safe and efficient movement of vehicles. Typical classifications include arterial, collector, and local streets.

POLICY

It is the policy of ***<Insert Agency>*** to provide a balance between operations, safety, access, and multimodal accessibility in the design of intersections on its roadways.

POLICY CRITERIA

<Insert Agency> will provide the lowest level of traffic control that provides a balance between operations and safety. With the understanding that some vehicle movements are more hazardous than others, and the fact that increasing the level of control increases overall delay and the number of crashes, the design of intersections will consider both the type of movements allowed and the type of traffic control used to permit movements. Various research indicates that:

- Minor street crossing movements and left turns on the major street are the most hazardous (possibly because of the need to select a gap from two directions of oncoming traffic)
- Left turns from the major street are less hazardous than the minor street movements
- Right turn movements are the least hazardous

Based on this information, the type of intersection geometry that is implemented at any given location will be based on the expected crash rate, depending on the type of traffic control, along with the level of access it provides.

Based on functional classification, a hierarchy will be used to determine traffic control on roadways; the same type of process is used in development of access management guidelines. The intersections of functionally classified roadways will have the following types of traffic control, unless otherwise recommended based on engineering judgment:

- *Local Street/Local Street*—No control unless engineering study documents need for STOP control
- *Local/Collector*—Through/STOP with local street stopping
- *Collector/Arterial*—Through/STOP with collector stopping
- *Arterial/Arterial*—Traffic signal/roundabout based on engineering study

Consideration for Roundabouts

When a project includes reconstructing or constructing new intersections that require signals, a roundabout alternative must be analyzed to determine if it is a feasible solution based on site constraints, including right-of-way, environmental factors, and other design constraints.

Exceptions to this requirement are locations where the intersection:

- Has no current or anticipated safety, capacity, or other operational problems
- Is within a well-working, coordinated signal system in a low-speed urban environment with acceptable crash characteristics
- Is where signals will be installed solely for emergency vehicle preemption
- Has steep terrain, graded at 5 percent or more for the circulating roadways
- Has been deemed unsuitable for a roundabout by a previous study