

ROUNDABOUTS 101 – GOING IN CIRCLES

What is a Roundabout?



- Intersection (circulatory roadway) with traffic flowing around a center island
- Perception is typically negative for drivers not used to roundabouts
 - Associate them with traffic circles and rotaries
- Typically, they have circulating speeds of 15-20 miles per hour

Modern Roundabout



Image: KLJ
Location: Independence, MN

Traffic Circle



Image: Richard Drdul/Flickr
Location: unknown

Rotary



Image: University of Massachusetts Transportation Center
Location: Greenfield, MA

Yielding at entry vs multitude of entry controls vs merging and diverging in the circular roadway
Right sized and designed for traffic vs low capacity (visual appeal) vs large and inefficient with heavy traffic

Types of Roundabouts



Roundabout Feature	Mini-Roundabout	Compact Roundabout	Single-lane Roundabout	Multilane Roundabout
Central island	Traversable	May be traversable	Non-traversable, but typically includes truck apron	Non-traversable, but typically includes truck apron
Splitter islands	May be traversable with one-stage pedestrian crossing	May be traversable with one-stage pedestrian crossing	Non-traversable with one-stage or two-stage pedestrian crossing, depending on dimensions of pedestrian refuge	Non-traversable with two-stage pedestrian crossing
Common ICD range	45 ft to 90 ft (14 m to 27 m)	65 ft to 120 ft (20 m to 37 m)	90 ft to 180 ft (27 m to 55 m)	150 ft to 200 ft (46 m to 61 m)
Maximum number of circulating lanes conflicting with each entry	1	1	1	2+



Image: KLJ



Image: KLJ

NOTE: ICD values are not to be used as design constraints or targets. See Chapter 10 for further discussion.

Source: *Guide for Roundabouts* (NCHRP Research Report 1043), Exhibit 2.9



Image: North Dakota Department of Transportation Location: Fargo, ND

Roundabout Type	Approximate Construction Cost (2026)
Mini Roundabout < 90' ICD	< \$1.25 Million
Compact Roundabout 110-130' ICD	\$1 – 1.75 Million
Single Lane Roundabout 135' – 180' ICD	\$1.5 – 4.5 Million
Multi Lane Roundabout 165' and larger ICD	\$3 – 6 Million

North Dakota State System Roundabout Data



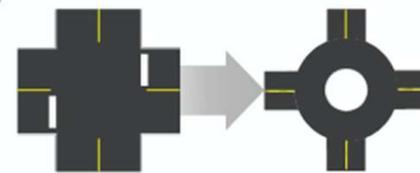
80% reduction in fatalities.

59% reduction in severe crashes.

36% reduction in all crashes.

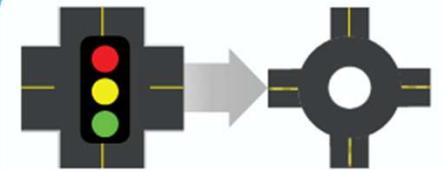
National Roundabout Data

Two-Way Stop-Controlled Intersection to a Roundabout



82%
reduction in fatal and injury crashes.¹

Signalized Intersection to a Roundabout



78%
reduction in fatal and injury crashes.¹

¹(CMF ID: 211,226) AASHTO. *The Highway Safety Manual*, American Association of State Highway Transportation Professionals, Washington, D.C., (2010).

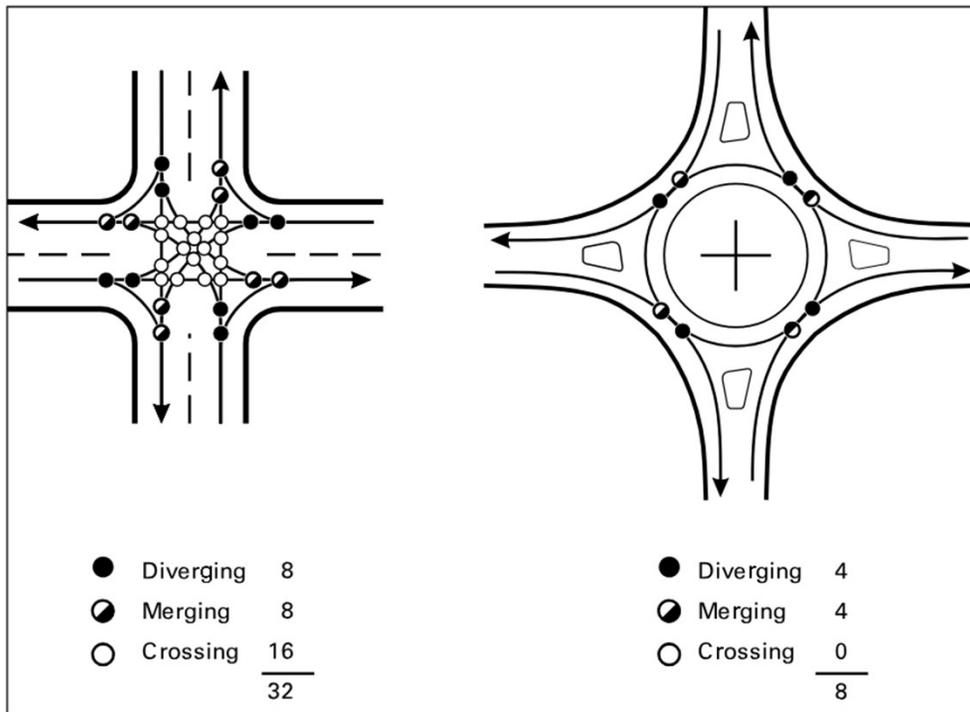
Source: <https://www.dot.nd.gov/travel-and-safety/highway-safety/roundabouts>

Source: <https://highways.dot.gov/safety/intersection-safety/intersection-types/roundabouts>

Why Roundabouts are Safer



Fewer conflict points



Lower speeds



Roundabout geometrics require motorists to move at lower speeds to enter and circulate the intersection
(15 – 25 mph)

Improved Intersection Operations



No Waiting at Red Lights for Nothing

Roundabouts let you keep moving whenever there's a safe gap in traffic



Easier Decisions for Drivers

You only need to watch for cars coming from one direction instead of watching multiple lanes from different directions (e.g., at a minor-leg stop-controlled intersection)



Handles Just as Much Traffic

Roundabouts can accommodate about 20,000 vehicles per day (design-dependent)



Traffic Keeps Moving

Instead of stopping and waiting for a green light, cars flow through continuously whenever there's a gap

Maintenance Operations



No Signal Equipment to Maintain

No traffic signal maintenance costs, electrical costs and maintenance efforts providing savings of up to \$5,000/yr.



Straightforward Snow Removal

Sized right, roundabouts allow easy snowplow operations to maneuver through the circulatory roadway. Snow storage opportunities on the outside and in the central island.



No Traffic Impacts with Power Outages

No traffic impacts during power outages – intersection operates as designed.



Limited Drainage Infrastructure

Appropriately designed roundabouts can greatly reduce the number of inlets / structures for maintenance to one, allowing the use of standard culverts and ditches for conveyance.



Reduced Property Damages

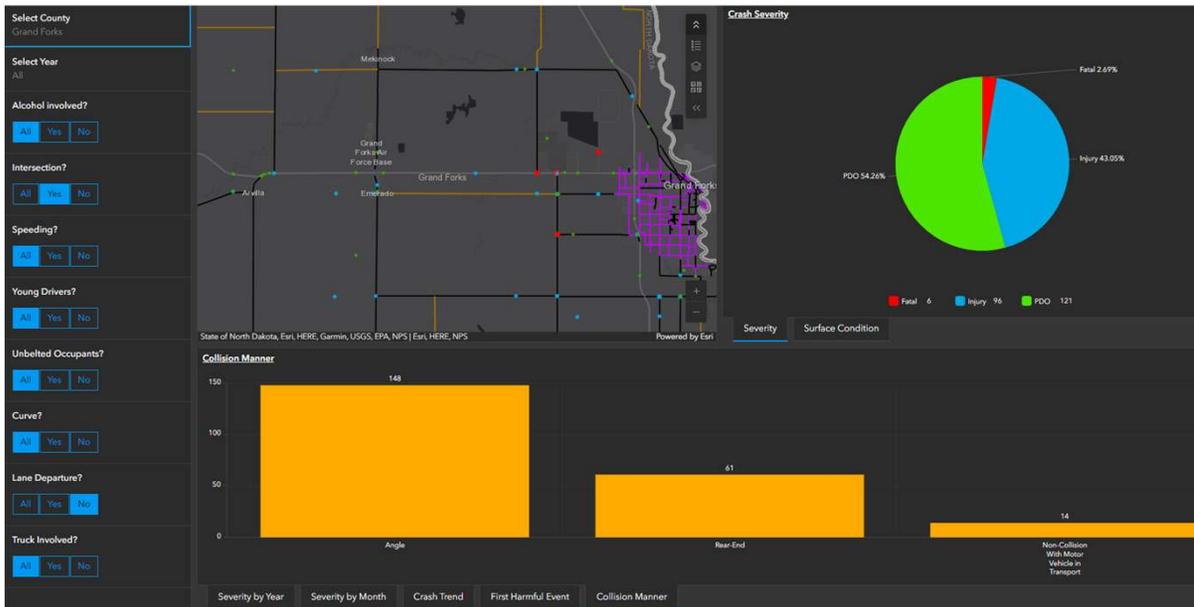
Slower speeds reduce serious crashes and damage to County owned property or personal property, requiring maintenance staff on-site to clean up debris.

Implementation of Roundabouts



- Identify the Need (Safety / LOS / Access Control)
 - DOTSC has an excellent Crash Dashboard

- Obtain Funding
 - HSIP (Highway Safety Improvement Program)
 - FLEX (Flexible Transportation Fund Program)
 - Prairie Dog Funds
 - Federal Aid / Grant Opportunities



Source: <https://ndsu.maps.arcgis.com/apps/dashboards/93a0ca93e706476f89e927a84e247155>

Scoring Area	High	Medium	Low
PE funded in previous Flex Fund round	Yes	-	No
Roadway Network*	Closes a gap in the existing network	Reduces gap in the existing network	No improvements, or expands the existing network
Safety*	Removes hazard or roadway limitation (load limit, height restriction, single lane, etc.)	Widens roads or reduces ditch inslopes	No changes in existing road characteristics
ADA Improvements*	Required ADA improvements are being completed	-	Required ADA improvements are not being completed
Multimodal Project*	Added mode along existing network (adding sidewalk or bike lane)	Expansion of existing modes along existing network (sidewalk expanded to shared use path)	No changes to multimodal transportation
LPA Coordination	Coordination or partnership with adjacent LPA	-	No coordination with adjacent LPA
Reduces need for maintenance costs*	Removes ongoing issues that require extensive resources regularly	Reduces personnel time (snow removal, blading, patching, etc.)	No change in maintenance cost or an increased maintenance cost
Bid Ready	Yes	-	No
Project Expansion of projects receiving outside funding*	Adds road reconstruction to a project receiving funding for the replacement of other infrastructure (water mains, or sewer, etc.)	Expands project receiving outside funding to additional streets, or additional length to the project	Would not increase project size or scope.
Outside Funding	Outside funding > 50% of project costs	Outside funding < 50% of project cost	No outside funding
Local Funding	Local funding > 50% of project costs	Local funding < 50% of project costs	No local funding
Local Corridor*	Yes	-	No

*Should be addressed in the Project Need section of the application

Source: <https://www.dot.nd.gov/sites/www/files/documents/local-gov/flex-fund/Flex-Fund-Guidance.pdf>

Implementation of Roundabouts



- > Community Buy-In (Public Engagement)
- > Poncha Springs example: 3:1 in favor of Roundabout; previously the town through a non-starter



Interactive Map

Leaves comments directly on the project map.

Concepts 1 and 2 are overlaid on the map.

START 1 May 2023

END 29 Jun 2023

Get Started



Vote on the Concepts

Choose between a roundabout or a stop at the intersection of Hwy 50 and Tallwind St./Co. Rd. 127.

START 1 May 2023

END 29 Jun 2023

Cast Your Vote



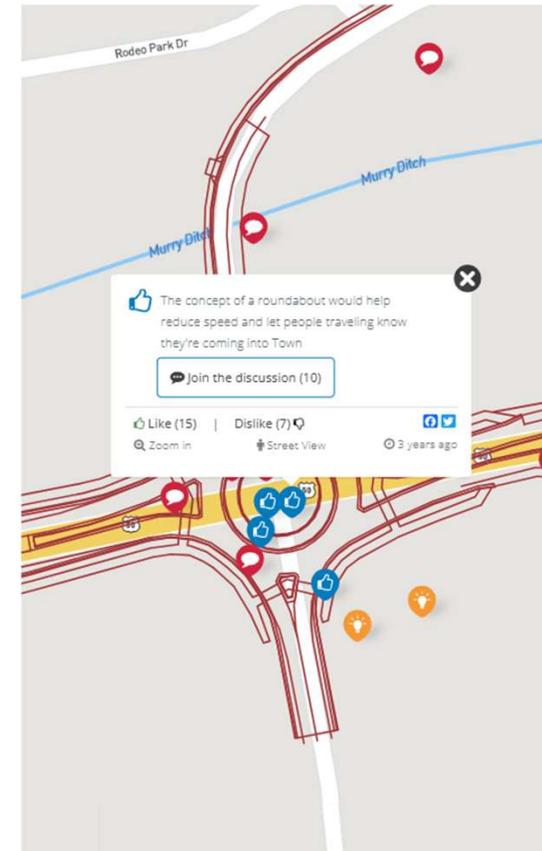
Vote on Multimodal Options

Choose between a bike lane on the road or a shared-use path separated from the roadway.

START 1 May 2023

END 29 Jun 2023

Cast Your Vote

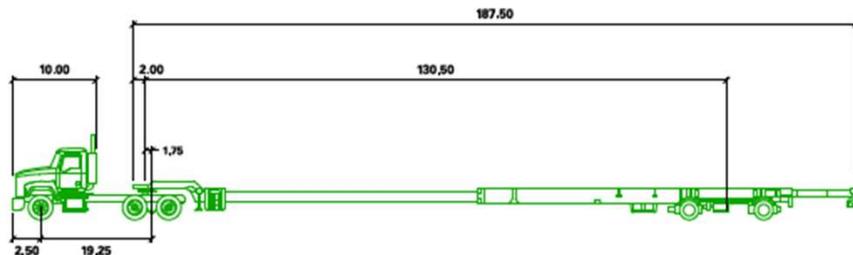


Source: <https://klj.mysocialpinpoint.com/hwy-50/>

Implementation of Roundabouts

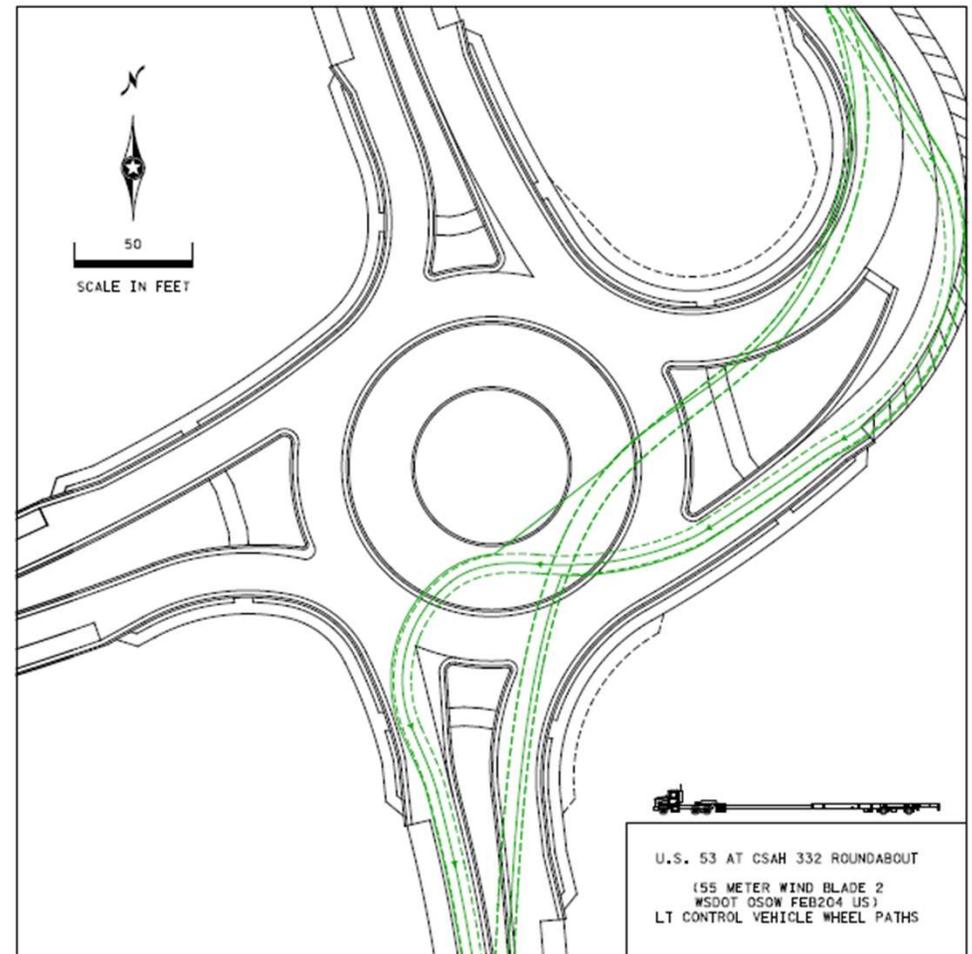


- > Design
 - > Account for **oversized loads** and **agricultural vehicles** – right sized for the location
 - > Engage heavy commercial operations using the intersection early on
- > Construction
 - > Typically, an 8-to-12-week construction window (full closure vs construct under traffic)



Control Vehicle = 55 Meter Wind Blade – 205.5' Total Length – Fixed Rear Axle

feet	
Tractor Width	: 8.50
Tractor Track	: 2.50
Trailer Width	: 3.00
Trailer Track	: 8.00
Lock to Lock Time	: 12.0
Steering Angle	: 40.0
Articulating Angle	: 90.0



Source: KLJ Location: US 53 International Falls, MN

Cost Saving Measures



- Inscribed Circulatory Diameter Size
 - Many single lane RAB's in ND > 200' ICD
 - 150'-160' ICD works well for 95% oversized
 - Removable signs / mountable splitter islands – low cost and high success
- Surfacing Material
 - Concrete has longer design life > cost
 - Increase asphalt oil 1 grade level + 1" additional pavement showing great success and reduced cost. Easier for maintenance staff.
- Drainage
 - Removal of exterior curb and gutter, using contrasting shoulders (if no ped facilities)



Source: KLJ

Videos of Trucks in Roundabouts



Tanker truck maneuvering a Single Lane Roundabout



Source: Jackson County Public Works
Location: Alpha, MN

Videos of Trucks in Roundabouts



Logging truck maneuvering a Single Lane Roundabout

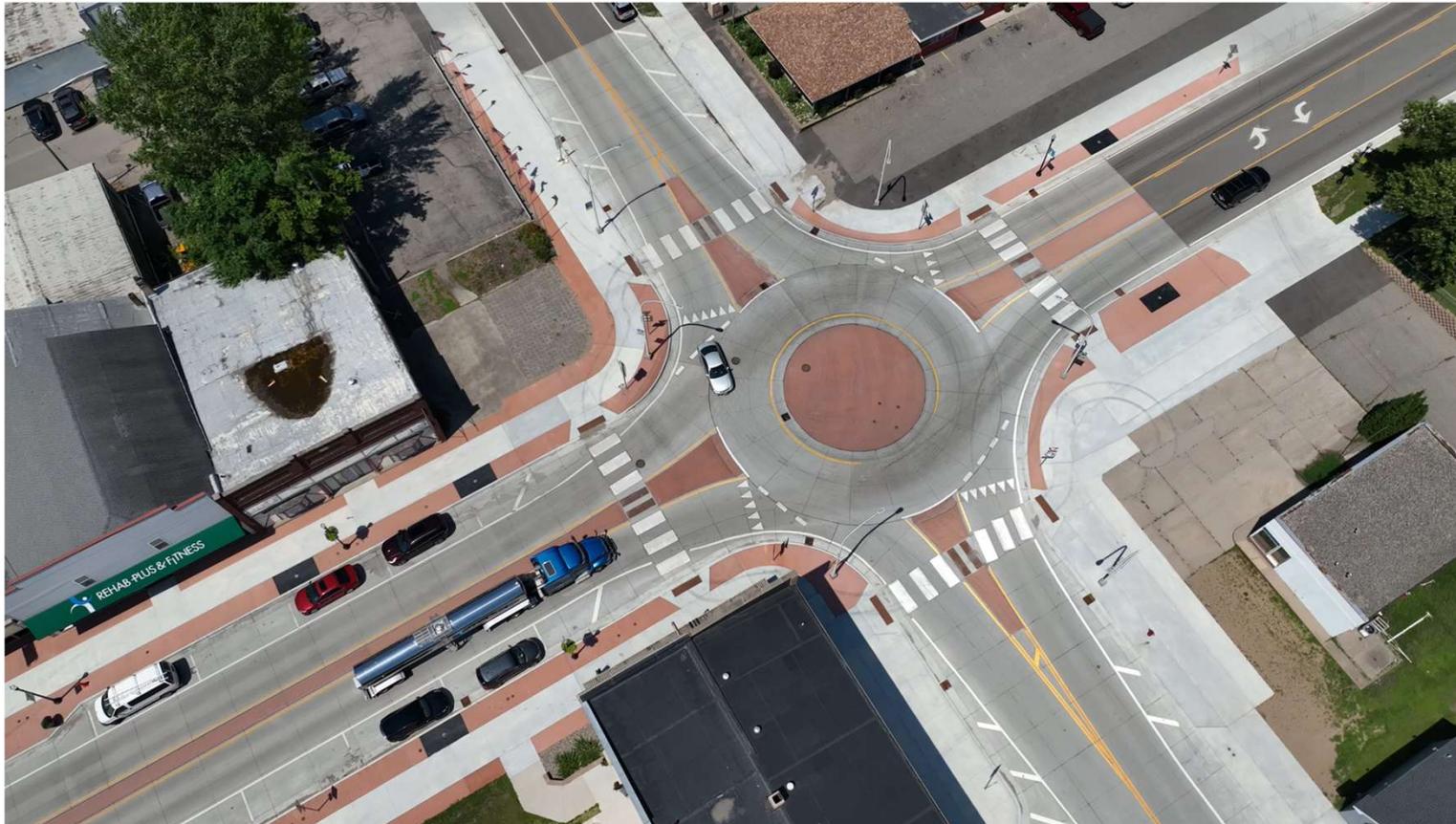


Source: Koochiching County Public Works
Location: International Falls, MN

Videos of Trucks in Roundabouts



Tanker truck maneuvering a Mini Roundabout



Source: KLJ

Location: Pelican Rapids, MN

