



Roundabout Design and Operation Facts



Jefferson St & Webb St roundabout, Daingerfield TX

Presentation For:

**TexITE Houston Section
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Why consider a Roundabout?

- 1) Intersections with a high amount of left or right turning movements
- 2) Intersections with non-perpendicular approaches
- 3) Improving the intersection to provide a traffic calming effect along a corridor

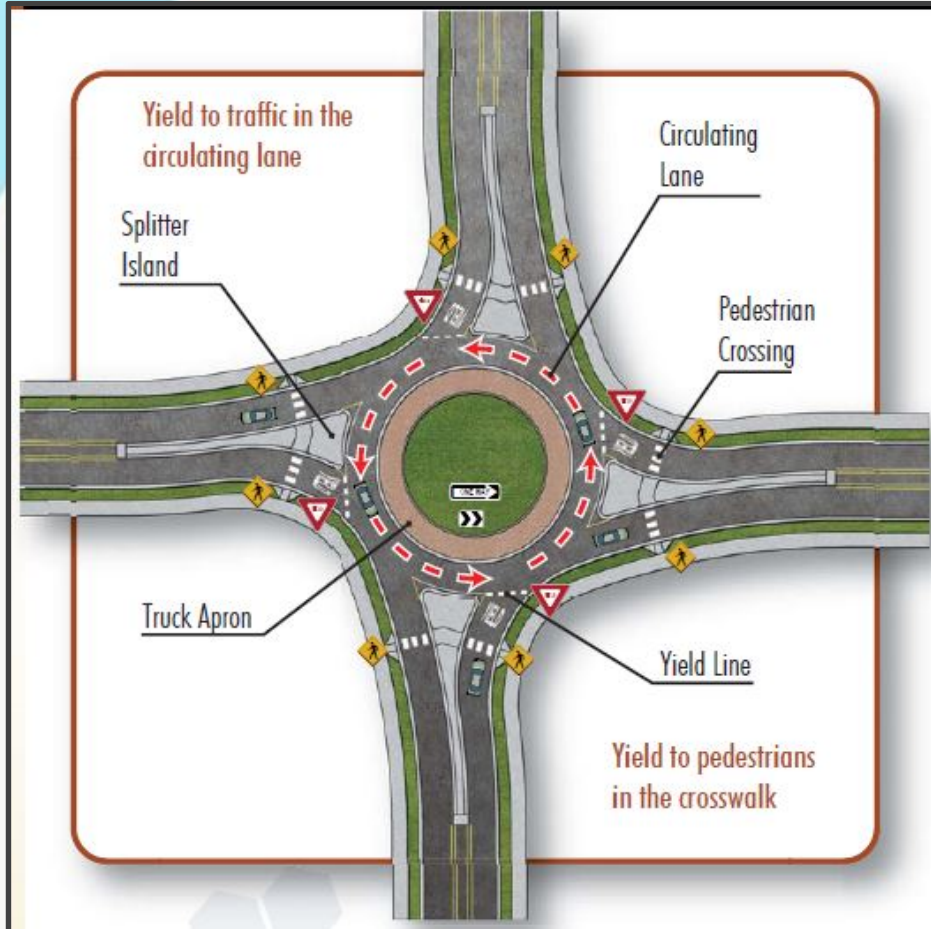


- 4) Improving the intersection to reduce accidents

FHWA shows that modern roundabouts provide a 76% reduction in injury crashes.



Roundabout Safety Study



North Carolina DOT completed their *Roundabout Safety Evaluation* in June 2011; for converting 30 existing intersections to roundabouts.

The study examined before and after conditions and determined a *46% reduction in total crashes* and a *75% reduction in injury-related crashes*.



Types of Circular Intersections

1

Roundabouts

2

Mini-Roundabouts

3

Turbo Roundabouts

4

Traffic Circles

5

Rotaries



Roundabouts and Traffic Circles

- Circular intersections have existed since the early 1900s. **Traffic circles** are known for having stop, yield, or no control on its approaches. They also have no limits on circle size.



Lake Pointe Parkway traffic circle, Sugar Land TX



Commonwealth Blvd and LJ Pkwy roundabout, Sugar Land TX

- The modern roundabout intersection was developed in the 1960s. **Roundabouts** only use yield control on its approaches and have limits on circle size and approach design elements.



Roundabout Factors

1

Traffic Volumes

5

Approach Speeds

2

Intersection
Geometry

6

Adjacent
Intersections

3

Design Vehicles

7

No Platoon Traffic

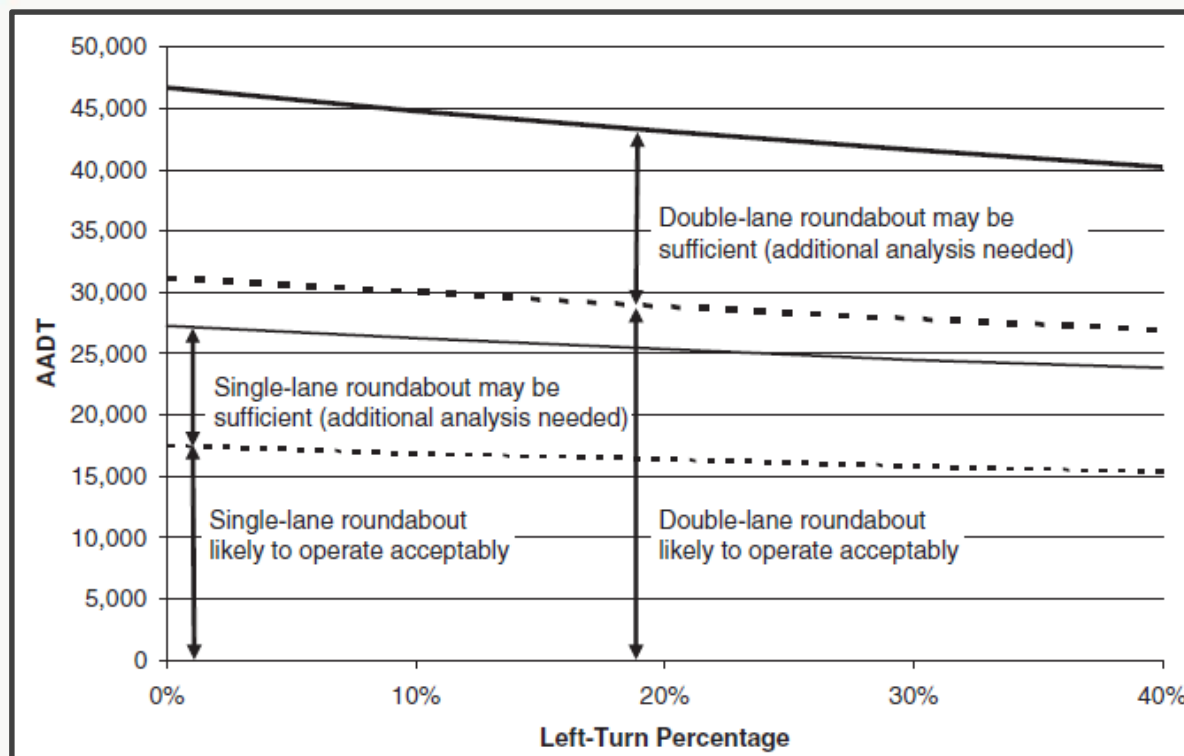
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Adjacent Land
Uses



Roundabout Sizing

NCHRP 672 provides guidelines for determining single and multi-lane approaches to roundabouts; based on the left turn traffic percentage and intersection AADT.



Single-lane roundabouts:
Recommended at less than 20,000 vpd

Multi-lane Roundabouts:
Recommended at more than 30,000 vpd

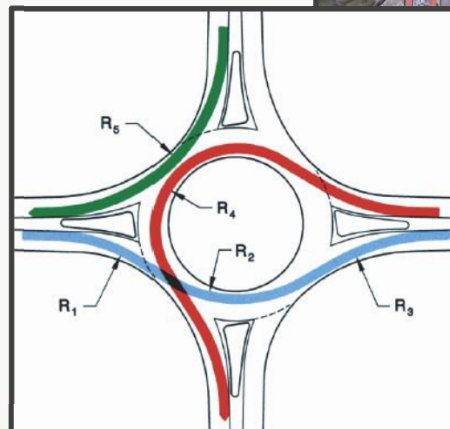
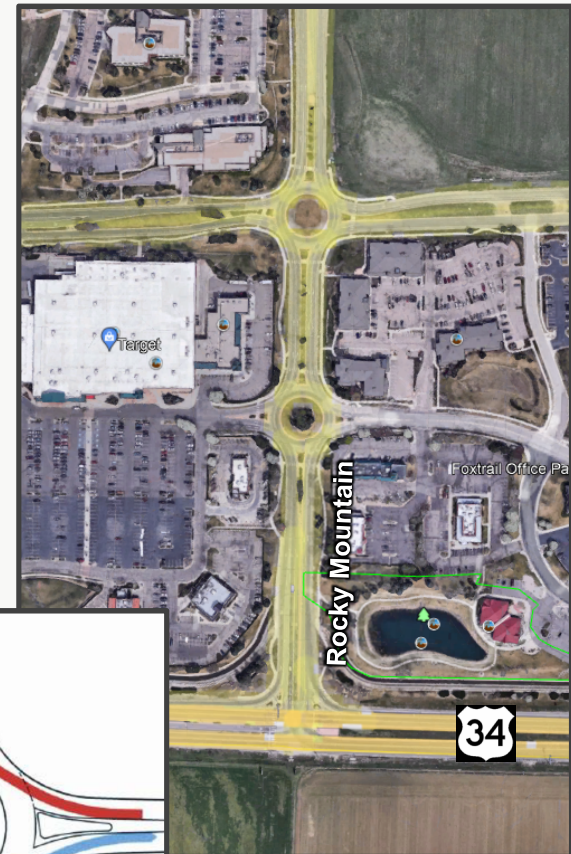


Speeds and Proximity

Due to its yielding and one-way traffic operations, roundabouts can be located close to a signalized or stop-controlled intersection. *Loveland CO* has roundabouts on *Rocky Mountain Ave* within 630 feet of a signalized intersection.

Roundabout design also needs to consider the fastest path speeds (maximum speed to navigate the roundabout).

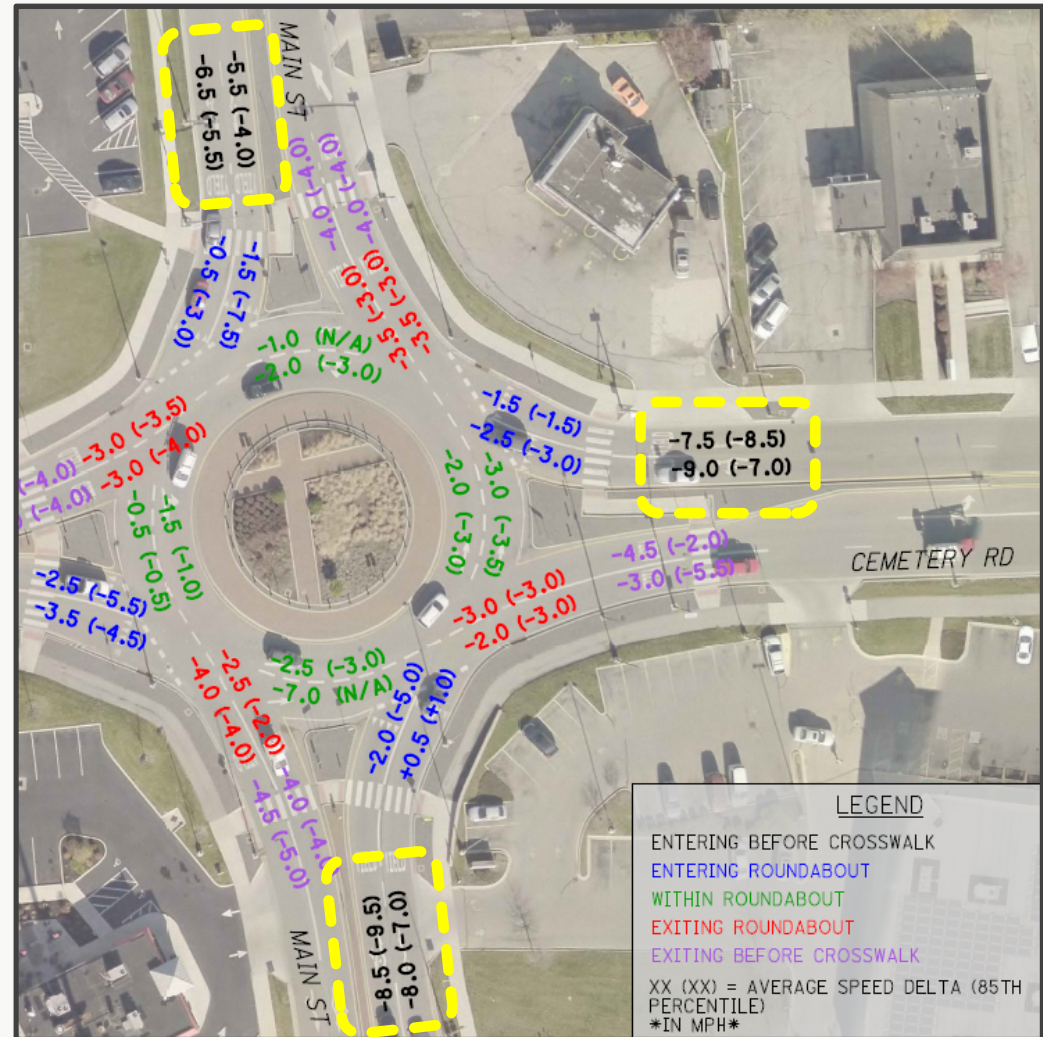
- Single lane approach: 25 mph
- Multi-lane approach: 30 mph





Raised Crosswalks

Roundabout approaches can be an area of speeding concern. If design includes deflection, then may consider raised crosswalks. *Hilliard OH* installed raised crosswalks at *Main St and Cemetery* and found speed reductions of 5-9 mph.

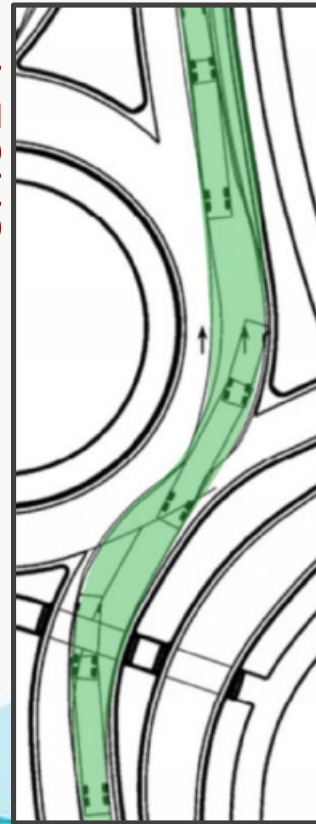




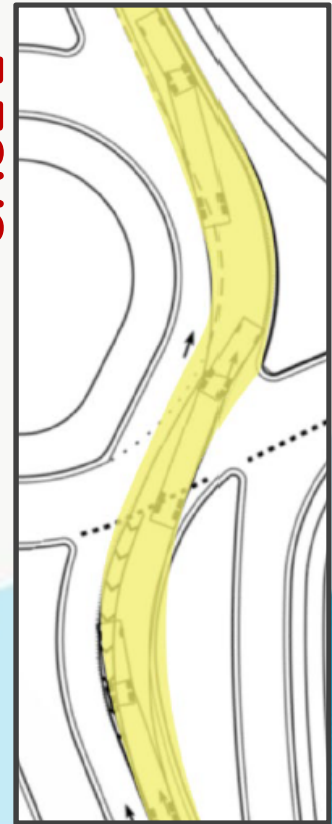
Oversized Vehicle Use

- Roundabout design includes the *truck apron*, which allows oversized vehicles (semitrailers, buses, fire trucks) to over-track the apron when circulating the roundabout.
- Multi-lane roundabouts are also designed to allow large vehicles to use one or both lanes on the approach and within the circular roadway.
 - **Case 1 Roundabout**
Approach: both lanes
Circular Road: both lanes
 - **Case 2 Roundabout**
Approach: single lane
Circular Road: both lanes

CASE 1



CASE 2





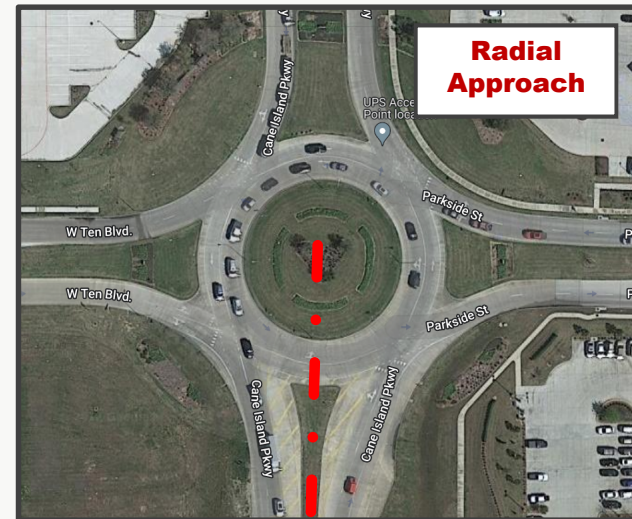
Approach Angles

NCHRP 672 provides multiple roundabout approach alignments (depending on the road geometry).

Most common alignments:

- Radial
- Offset Left

The preferred approach alignment is offset left, which provides deflection for reducing vehicles speeds entering the roundabout.



Cane Island Parkway roundabout, Katy TX

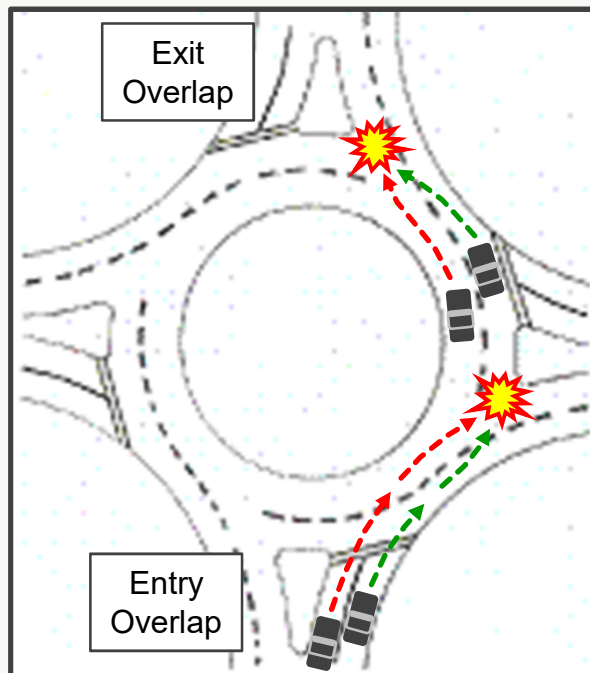


Ohio Dr & Warren Pkwy roundabout, Frisco TX



Path Overlap Crashes

Recommended to use tangent roundabout entries and exits, where the approach entries and departure exits align with the circular roadway.



Main St & US 41 roundabout, Green Bay WI

For multi-lane roundabouts, tangent entries and exits are preferred over a circular layout and helps reduce path overlap crashes, where one vehicle makes an illegal turning maneuver and sideswipes the adjacent vehicle.



Roundabout Education Materials

1

Websites

2

Brochures / Pamphlets

3

Videos

4

Driver Education Programs




Education Outreach

- A good starting reference for roundabout education materials is the FHWA Safety Programs' Roundabout page:
<https://highways.dot.gov/safety/intersection-safety/intersection-types/roundabouts>
- *Washington County MN* developed a roundabout education outreach page called *Roundabout U*. They started this program with the first roundabouts in 2007 (currently at 19 roundabouts).
- *City of Frisco TX* coordinates with drivers education classes; provides roundabout navigation brochures.

Roundabout U

Roundabout U **Modern Roundabout** Roundabout Advantages In Washington County

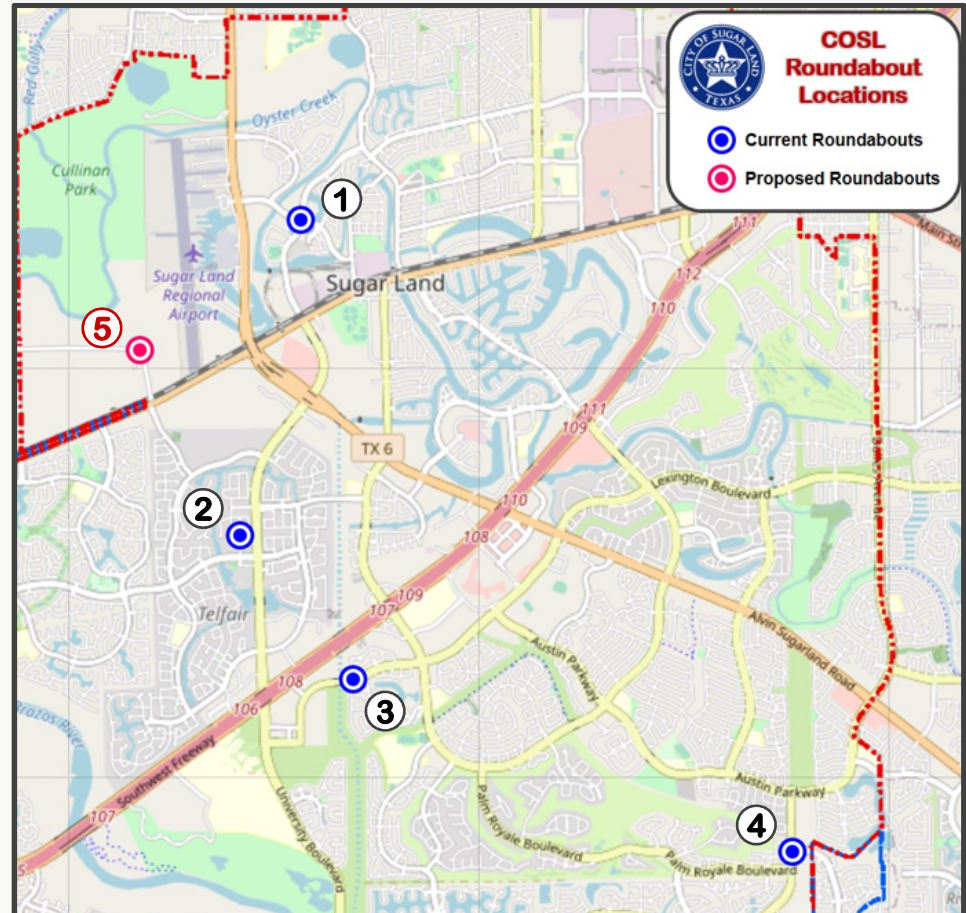
A modern roundabout is one of several types of intersections in which traffic flows around a circular center island. A modern roundabout is NOT the same as high-speed rotary interchanges, once common in the Northeast states. Rotaries are larger and operate poorly because they require merging to enter and require risky lane changes to exit. See [Rotaries vs. Roundabouts](#). A modern roundabout also is NOT the same as a traffic circle or circle road, such as within the Tamarack Village shopping area in Woodbury, where lane changes may be made within the circle and circulating traffic makes right or left turns to exit the circle road. See [Traffic Circles vs. Roundabouts](#).





City of Sugar Land Roundabouts

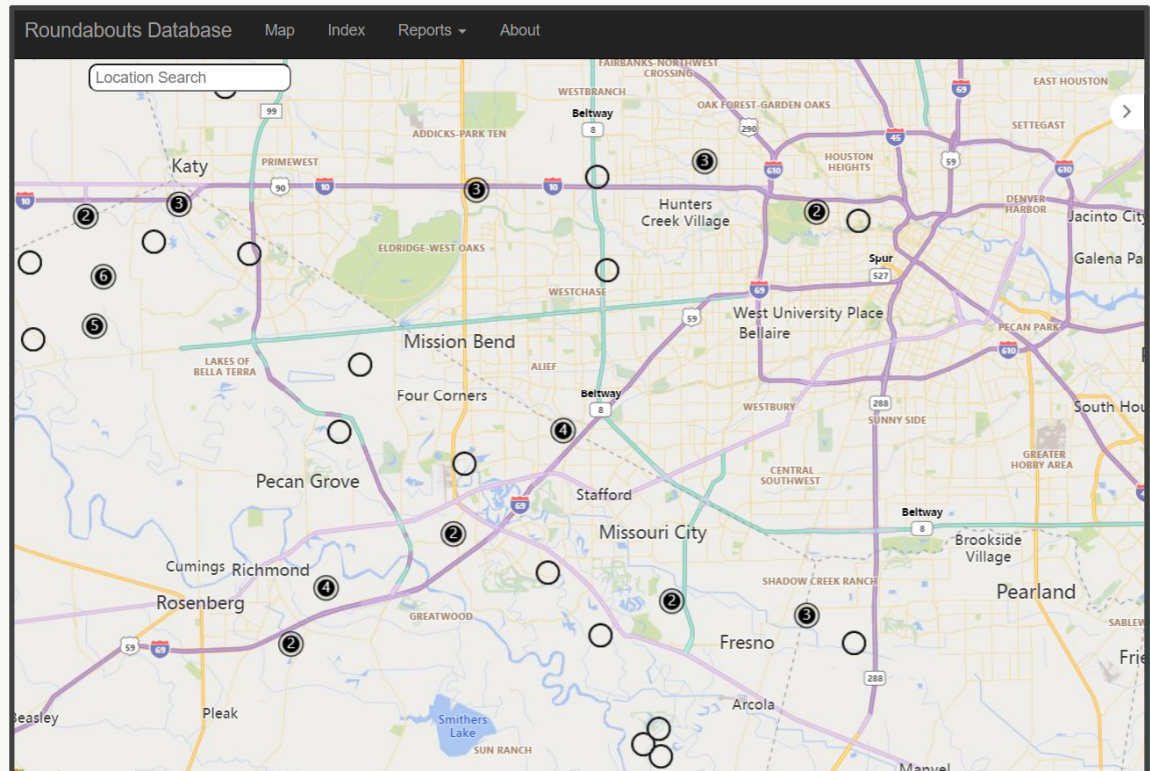
- ① **Imperial Blvd at Stadium Dr**
 - Multi-lane roundabout operational in March 2012
- ② **Savannah Heights roundabout**
 - Compact single lane roundabout operational in March 2012
- ③ **Lexington Blvd at Oxbow Dr**
 - Single lane roundabout operational in February 2013
- ④ **Commonwealth Blvd at LJ Pkwy**
 - Single lane roundabout operational in July 2016
- ⑤ **Owens Rd roundabout**
 - Multi-lane roundabout currently in design





Roundabout Resources

- **Kansas State Roundabout Listserv:** developed by Dr. Gene Russell (geno@ksu.edu) → roundabouts@listserv.ksu.edu
- **Kittelson Roundabout Mapper:** developed by Lee Rodegerdts
<https://roundabout.kittelson.com/>
- **ITE Roundabout Standing Committee**
Chair: Ken Sides, PE, Florida
Vice Chair: Joseph Baskus, PE, PTOE, Connecticut
- **TexITE Roundabout Committee**
Chair: Abram Van Elswyk, PE, TxDOT
Waco





Questions?



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Lexington Blvd and Oxbow roundabout, Sugar Land TX



Works Cited

- (2) Federal Highway Administration – Roundabouts: A Safer Choice brochure (FHWA-SA-08-006)
- (7) National Cooperative Highway Research Program (NCHRP) Guide 672, Transportation Research Board, 2010
- (9) City of Hilliard, Ohio – Before and After Speed Study for the Main St and Cemetery Roundabout
- (10) Truck Assumptions about Roundabout Design, April 2021 TRB Presentation, Brian Walsh, Michael Mastaglio, Andrew Thompson
- (14) Washington County, Minnesota – Roundabout U education program (<https://www.co.washington.mn.us/490/Roundabout-U>)