The purpose of this memorandum is to summarize information about roundabouts so local decision makers may compare the benefits and constraints of roundabouts to standard intersections. Exhibit 1, located at the end of this memorandum, contains a brief summary comparing roundabouts to standard intersections.

Definition
Roundabouts are a type of circular intersection that are designed to safely and efficiently move vehicles through an intersection without the use of traffic signals or stop signs. Drivers entering a roundabout yield to the circulating traffic; go counterclockwise around a raised center island; and proceed to an exit. Traffic signs and pavement markings guide drivers through the roundabout.

Roundabouts should not be confused with the neighborhood traffic calming devices placed in the middle of intersections to slow traffic. Roundabouts also are not the large traffic circles or rotaries that were used years ago in England and along the northeast coast of the United States. Roundabouts have a much smaller circle and speeds are substantially lower.

Roundabout Trends
Roundabouts are becoming more popular in the United States because communities are looking for ways to address traffic congestion, improve safety, conserve fuel and reduce air pollution. While roundabouts have been widely used in Europe since the 1960’s, roundabouts did not show up in the United States until the 1990’s when the first roundabouts were constructed in the western states of Nevada, Utah and Colorado.

According to the Wisconsin Department of Transportation (WisDOT), Wisconsin currently has 43 operating roundabouts associated with the State Highway System and at least 42 roundabouts are operating on local roads. The number of roundabouts throughout the state is expected to increase substantially because WisDOT is required to consider roundabouts when a four-way stop or major intersection improvement is planned. Also, several communities around the state are evaluating roundabouts or planning to construct roundabouts.

Locally, roundabouts have been constructed along Canal Street at the 6th Street Viaduct in Milwaukee’s, at the ramp terminals of I-43 and Moorland Road in New Berlin, and at the ramp terminals of I-43 with Racine Avenue in Muskego. Several roundabouts have also been built in Brown County including roundabouts in Green Bay, De Pere, Allouez, Suamico and Howard. Many Departments of Transportation and communities in neighboring states are also building roundabouts. In Minnesota, several suburban communities near Minneapolis including Brooklyn Park, Maple Grove, Burnsville, and Richfield have constructed roundabouts.

27th Street Roundabouts
WisDOT is planning for the reconstruction of 27th Street in Franklin and Oak Creek. As part of phase one for this project, WisDOT is evaluating the use of roundabouts at all intersections along
27th Street north of Drexel, including College, Rawson and Drexel. If constructed, all roundabouts along 27th Street would need to be multi-lane to accommodate current and projected traffic flows.

**Vehicle Safety**

Research has shown roundabouts are safer than standard intersections because they are designed to slow speeds and reduce traffic conflict points. A study of 23 urban, suburban and rural intersections in the United States that were converted from traffic signals or stop signs to single or multi-lane roundabouts:

- Reduced all crashes by 40%;
- Reduced injury crashes by 80%; and
- Reduced fatal crashes by 90%.

Roundabouts are designed with a slight curve at the entrance to naturally slow traffic and make entering vehicles yield to traffic already in the circle. The deflection of traffic around the circle and the relatively tight turning radius maintains slow travel speeds through the roundabout. Also, the circular shape of a roundabout keeps vehicles moving in the same direction and prevents drivers from turning into on-coming traffic. This nearly eliminates head-on and left-turn collisions that occur frequently in standard intersections and are the most severe types of crashes.

Despite these safety benefits, some crashes still occur in roundabouts, although they tend to be less severe. A study of 38 single and double-lane roundabouts in Maryland found run-off-road, rear-end, sideswipe, and collisions between entering and circulating vehicles accounted for nearly all crashes. No head-on or left-turn collisions occurred and no crashes were fatal. Injury crashes were also low, with three quarters of the crashes only involving property damage. Collisions at the entrance to roundabouts were the most common type of crash, accounting for three quarters of all collisions. In many cases, high approach speeds played a significant role in the crashes. In more recent years, larger signs, pavement makers and landscaping have been used to improve the safety of roundabouts by alerting drivers to slow down as they approach a roundabout.

**Pedestrian and Bicycle Safety**

Roundabouts are able to safely accommodate pedestrians and bicyclists. Sidewalks are provided on the perimeter of the roundabout and bicyclists have the option to ride through the roundabout or enter the sidewalk and proceed as a pedestrian. European studies have found roundabouts reduce pedestrian crashes by about 75 percent. The following reasons explain why roundabouts are safer for pedestrians in comparison to standard intersections:

- The slower speeds in roundabouts are less harmful to pedestrians when crashes occur.
- Pedestrians only have to cross traffic in one direction at roundabouts.
- Pedestrian refuge islands provide short crossing distances at roundabouts.
- Roundabouts eliminate left turn movements, which are the most common type of pedestrian crash in standard intersections.
- Crosswalks at roundabouts are set back so drivers can react to pedestrians before entering the circle.

Despite the facts, some people worry roundabouts make pedestrian crossing more difficult because vehicles do not have to come to a complete stop. This concern increases during peak travel periods when a constant stream of vehicles are entering and exiting a roundabout. Even though state law requires vehicles to stop for pedestrians in the crosswalk, vehicles often do not. As a result, pedestrians must force vehicles to stop by stepping into the cross walk and making eye contact.
Visually impaired persons have raised concerns about roundabouts because blind persons have a difficult time finding the crosswalk and determining when it is safe to cross. Federal Highway Administration guidance acknowledges roundabouts pose several areas of difficulty for visually impaired pedestrians and suggests potential remedies. However, no conclusive evidence has been reported on this topic and no specific design standards have been adopted. All cross walks at roundabouts, like any other intersection, must meet Americans with Disabilities Act requirements. A national study being undertaken by the Transportation Research Board's National Cooperative Highway Research Program is evaluating methods to improve pedestrian crossings at multi-lane roundabouts for visually impaired (NCHRP 3-78A).

**Traffic Operations**
Slow moving traffic through a roundabout does not mean longer travel times. In fact, roundabouts more efficiently move traffic through intersections because vehicles do not have to wait for a green light. Researchers at the Insurance Institute for Highway Safety studied 10 standard intersections. They calculated that if those intersections were converted to roundabouts, vehicle delays would have been reduced by 62 – 74 percent, a combined savings of 325,000 hours every year. In addition to less delay, roundabouts provide more capacity at intersections with a high volume of left turns in comparison to intersections with traffic signals, which may reduce the need to add new travel lanes.

Roundabouts are able to accommodate trucks and other vehicles with large turning radii. Roundabouts are constructed with a truck apron between the roadway and the center island that allows the rear wheel to pass over.

**Sustainability**
Roundabouts are considered more environmentally friendly than standard intersections. Fuel consumption and air pollution are reduced because there is no stopping and starting or idling. A 2004 study of roundabouts in the United States showed roundabouts:

- Reduced carbon monoxide emissions by 32%;
- Reduced nitrous oxide emissions by 34%;
- Reduced carbon dioxide emissions by 37%; and
- Reduced hydrocarbon emissions by 42%.

In addition, a study showed replacing traffic signals with roundabouts reduced fuel consumption by about 30 percent. A study of 10 intersections in Virginia showed fuel consumption was reduced more than 200,000 gallons per year after roundabouts were installed.

**Construction Costs**
The cost to construct a roundabout depends on its size and complexity and is generally comparable in cost to a standard intersection. Roundabouts may need more right of way within the actual intersection, but less right of way is required on the streets approaching the roundabout. Standard intersections generally require more right of way on the approaching streets to store vehicles waiting for a green light or to accommodate multiple left turn lanes.

As shown in Table 1, preliminary estimates by WisDOT for 27th Street show right of way requirements for the expanded intersection alternative would be similar to the roundabout alternative. Building acquisitions is slightly higher for the roundabout alternative.
Another consideration is the cost of signals. If WisDOT permits a special exception and Franklin and Oak Creek choose non standard signals, this cost would be paid for by the communities. As a result, roundabouts may actually cost Franklin and Oak Creek less because signals would not be installed. WisDOT would be responsible for the full cost of roundabouts with the exception of landscaping.

**Operating and Maintenance Costs**

Roundabouts generally have lower maintenance costs in comparison to standard intersections because they eliminate the maintenance and electricity costs associated with traffic signals. Roundabouts require regular landscape maintenance, occasional sign replacement and lighting.

**Community Acceptance**

Roundabouts often meet public resistance because drivers are not familiar with how to drive a roundabout and as a result, feel less safe. However, a public opinion survey found people’s opinions after roundabouts are installed substantially change in favor of roundabouts. The study showed the percentage of drivers that said they favored roundabouts changed from 31 percent prior to construction and 63 percent after construction. Those who were strongly opposed to roundabouts dropped from 41 percent to 15 percent after construction.

**Aesthetics**

Roundabouts provide opportunities to include aesthetic elements, such as landscaping within the center island that can help beautify an area or create a gateway marker. Roundabouts may have less visual clutter in some areas because signals are not required. However, sign bridges may be required in roundabouts with a three lane approach, which could add visual clutter in those areas.

**Economic Development**

No known studies have been conducted on how roundabouts affect economic development and businesses. Often business owners are concerned roundabouts may negatively impact their business. They are worried people will not come to the area to avoid the roundabouts. However, this may only be a short term effect or no effect at all. Research has shown peoples’ opinions about roundabouts substantially change in favor of roundabouts after they are installed. Interviews with businesses along suburban corridors where roundabouts have already been installed may be the best way to determine if roundabouts have an impact on businesses.

Another factor to consider is the 27th Street Access Management Plan that will be implemented as part of the 27th Street reconstruction project and as development occurs along the corridor. The access management plans will limit left turns in and out of businesses, reduce the number of median breaks, and prohibit U-turns. These restrictions will improve the through traffic flow along the corridor, but may limit access to individual properties (especially at intersections) along the corridor. In this situation, roundabouts may have an advantage for businesses over standard intersections because they would provide opportunities for vehicles to turn around at intersections, which would improve access to businesses. If standard intersections are installed, patrons of the corridor may have to travel up to one mile before turning around.

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<th>Alternative</th>
<th>Right of Way (acres)</th>
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<td>8</td>
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<td>Roundabout intersections</td>
<td>5.22</td>
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Furthermore, roundabouts will create a unique identity along this stretch of 27th Street, which could help attract additional people and businesses to the corridor. Roundabouts are also considered to be more environmentally sustainable in comparison to standard intersections, which was a key component of the 27th Street corridor planning objectives.

References:


Research has shown roundabouts are safer than standard intersections because they are designed to slow speeds and reduce traffic conflict points.

Roundabouts have shown to improve pedestrian safety because speeds are slower, crossing distances are shorter and vehicle/pedestrian conflict points are reduced. Some concern has been raised about visually impaired persons’ ability to cross roundabouts.

Roundabouts more efficiently move traffic through intersections because vehicles do not have to wait for a green light. Roundabouts also provide more capacity at intersections with a high volume of left turns.

Roundabouts reduce fuel consumption and air pollution because there is no stopping and starting or idling.

Roundabouts require more right of way in the intersection and standard intersections require more right of way on approaching streets. Standard intersections may cost Franklin and Oak Creek additional money if non-standard signal poles are chosen.

Roundabouts eliminate the maintenance and electricity costs associated with traffic signals. Roundabouts do require landscaping maintenance, which is less costly than traffic signals.

Roundabouts often meet public resistance because drivers are not familiar with how to drive a roundabout.

Roundabouts provide opportunities to include landscaping within the center island that can help beautify an area or create a gateway marker.

Business owners are often concerned roundabouts may negatively impact their business. However, roundabouts provide improvements to access and circulation that may benefit businesses.