ROUNDABOUTS

Roundabouts are a circular intersection control where the turning movements are physically separated by a central island, and traffic moves along the travel lanes surrounding the central island. Vehicles leave the intersection by executing a right-turn maneuver at the appropriate leg.

Roundabouts have been proven safer and more efficient than stop-controlled and signalized intersections.[21] They provide advantages for all road users as they reduce the need for a full stop and enable continuous movement through the intersection when conflicting traffic is not present. Roundabouts are the preferred intersection design in Grand Rapids, though implementation in a constrained urban environment is a challenge due to the amount of right-of-way required.

USE

- Roundabouts are a yield-control method instead of the use of signalized intersections and can be designed to accommodate a range of vehicle volumes.
- Roundabouts can be single-lane or double-lane, but generally feature slower vehicle speeds (15-25 MPH), throughout the roundabout. Single-lane roundabouts are preferred.
- Limited right-of-way is a constraint.

21 Roundabouts reduce the types of crashes where people are seriously hurt or killed by 78-82% when compared to conventional stop-controlled and signalized intersections, per the AASHTO Highway Safety Manual.

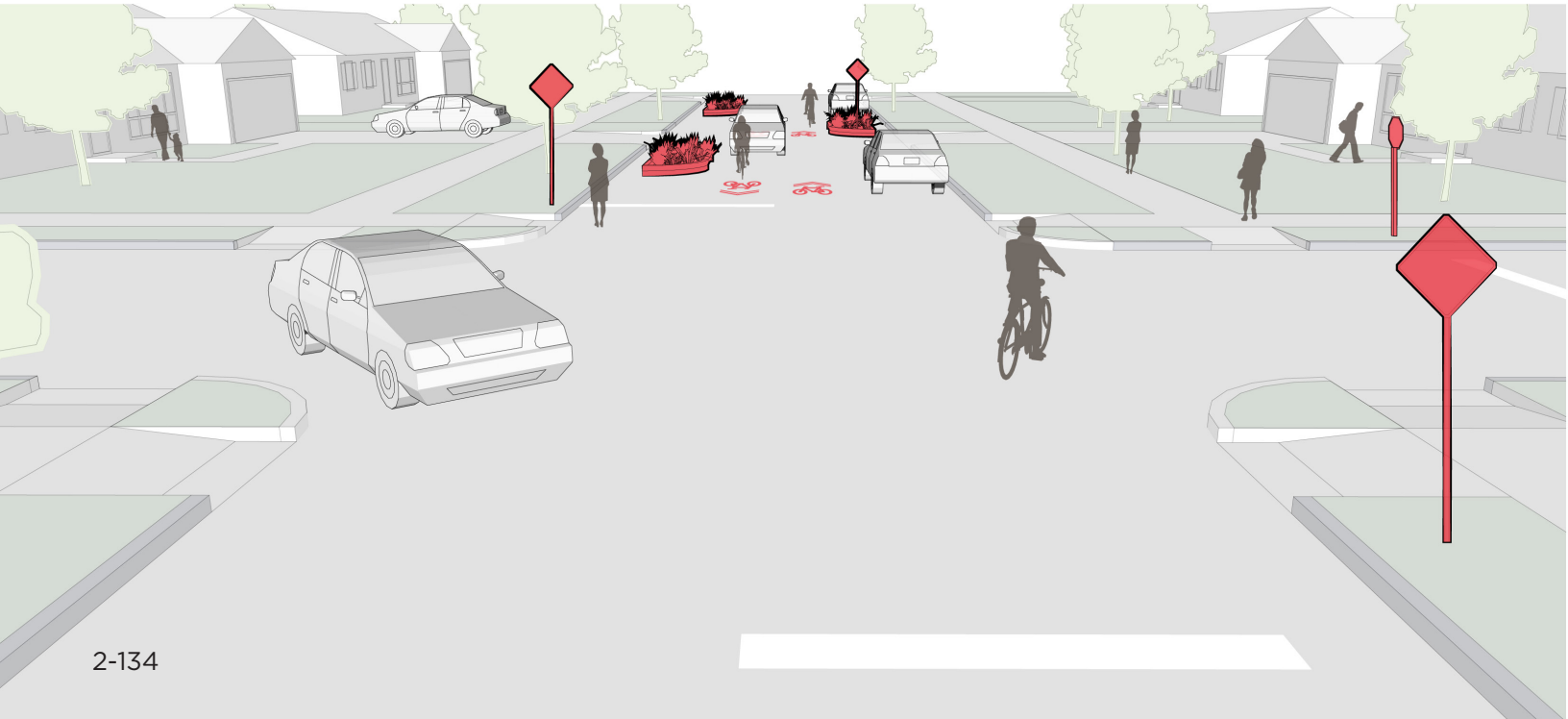
DESIGN

- Roundabouts should have the appropriate number of lanes and lane assignment to achieve adequate capacity, lane volume balance, and continuity of lanes through the roundabout.
- A mountable curb/curb apron should be provided at roundabouts where large trucks or emergency vehicles require access in constrained spaces.
- Crosswalks should be marked to clarify where pedestrians should cross and that they have priority. Marked crosswalks are required to be set back at least 20 feet from the entry of the roundabout. Sight distance for drivers entering the roundabout should be maintained to the left so that drivers are aware of vehicles and bicycles in the circle as well as to the right when exiting the roundabout for pedestrian crossings.
- ADA-compliant ramps and detectable warnings are required to ensure safe pedestrian crossings.
- Splitter islands are medians or pedestrian refuge islands that increase pedestrian safety. These allow pedestrians to cross one direction of traffic at a time and guide traffic into the roundabout, physically separating entering and exiting vehicles. Additionally, splitter islands can be used as a place for mounting signs.
- Regulatory and/or warning signage should be provided to remind traffic to proceed counterclockwise around the circle.

- Designs should incorporate intersection crossing markings to guide bicyclists through the intersection.
- If a bicycle facility is present on an approach roadway, the roundabout can have bicycle take-off and re-entry ramps to allow bicyclists to either merge with traffic or move onto the sidewalk or shared use path.
- Roundabout designs should maintain visibility with paint and reflectors and sight distances.
- Roundabout designs should achieve smooth channelization that is intuitive to drivers and results in vehicles naturally using the intended lanes.
- Landscaping in roundabouts reduces the impervious surface area in the roadway, allowing stormwater infiltration or retention in the exposed soil.
- Any street trees or other vegetation included in roundabout intersections should avoid blocking sight lines of all users to ensure safety. Street trees are not recommended in the center island.
- Roundabouts are ideal locations for art or neighborhood gateway treatments; however, these elements must not obstruct visibility.

SPECIAL CONSIDERATIONS

- Education and awareness may be needed in areas where people are unfamiliar with roundabouts.
- Careful attention should be paid to the available lane width and turning radius used with roundabouts.
- In emergency routes, roundabouts should be designed for large trucks, including a special purpose apparatus such as a ladder fire truck. This is accomplished by using features such as:
  - Wider entry and exit lanes for efficient movement of traffic through the roundabout.
  - Mountable aprons and curbs intended for use by vehicles with a wide and/or long wheelbase.
  - Curvature and radii that allow for easy turning movements, including U-turns.
- If plantings are incorporated, they should require minimal maintenance and access paths for maintenance crews should be incorporated into the overall design.



- Designs should consider the speed of the intersecting roadways. Multi-lane roundabouts require additional considerations and can be more challenging to implement due to right-of-way constraints, traffic control in relation to other intersections, and potential driver abilities. A feasibility analysis should be required to model the intersection during planning.
- Access to underground utilities should be considered.

OPERATIONS AND MAINTENANCE

- Roundabouts should be designed with snow removal in mind. They can be used for snow storage when necessary, although this may negatively impact planted materials and can block sight lines along the roadway.
- Roundabouts should allow adequate width in the adjacent travel lane to accommodate snow removal vehicles, as well as turn radii that facilitates snow clearing and removal.
- Sweeping/snow cleaning in pedestrian refuge islands.

REFERENCES

- City of Grand Rapids Street Classification Policy, 1996
  - Section 12. Traffic Calming, 12.3
- NACTO: Urban Street Design Guide, 2013
  - Intersections: Minor Intersections
  - Mini-Roundabout http://nacto.org/publication/urban-street-design-guide/intersections/minor-intersections/mini-roundabout/
- AASHTO: Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004
  - Section 3.3.2: Crossing Distance Considerations
  - Section 3.3.3: Turning Movements
- AASHTO: Guide for the Development of Bicycle Facilities, 2012
  - Section 4.12.11: Bicycle Travel at Roundabouts
- ITE Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, 2010
  - Chapter 10. Intersection Design Guidelines: Modern Roundabouts http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad
- ITE/FHWA: Traffic Calming: State of the Practice, 1999
  - Chapter 3: Toolbox of Traffic Calming Measures
  - Horizontal Measures http://library.ite.org/pub/48b037de-a555-47f5-2651-bb412d17bab5
- Chapter 4: Engineering and Aesthetic Issues
  - Geometric Design Dimensions: Traffic Circles and Roundabouts http://library.ite.org/pub/e27821e7-2354-d714-51e1-e3d3096ec30b
- MMUTCD, 2011
  - Part 2 Signs: Chapter 2B. Regulatory Signs, Barricades, and Gates http://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdpart2b_2011.pdf
  - Part 2 Signs: Chapter 2C. Warning Signs http://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdpart2c_2011.pdf
  - Part 2 Signs: Chapter 2D. Guide Signs – Conventional Roads http://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdpart2d_2011.pdf
  - Part 3 Markings: Chapter 3C. Roundabout Markings http://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdpart3_2011.pdf

DETAILS

- MDOT Pavement Marking Standards
  - PAVE-951-A Roundabout Markings http://mdotcf.state.mi.us/public/tands/Details_Web/mdot_pave-951-a.pdf
- MDOT Standard Highway Signs
  - SHS-E01-REG "R" Regulatory Signs http://mdotcf.state.mi.us/public/tands/Details_Web/mdot_signs_e01_regulatory.pdf
  - SHS-E02-WARN "W" Warning Signs http://mdotcf.state.mi.us/public/tands/Details_Web/mdot_signs_e02_warning.pdf
  - SHS-E08_D_GUIDE "D" Guide Signs http://mdotcf.state.mi.us/public/tands/Details_Web/mdot_signs_e08_d_guide.pdf