

- [1320.01 General](#)
- [1320.02 Roundabout Types](#)
- [1320.03 Capacity Analysis](#)
- [1320.04 Geometric Design](#)
- [1320.05 Pedestrians](#)
- [1320.06 Bicycles](#)
- [1320.07 Signing](#)
- [1320.08 Pavement Marking](#)
- [1320.09 Illumination](#)
- [1320.10 Road Approach, Parking, and Transit Facilities](#)
- [1320.11 Geometric Design Peer Review](#)
- [1320.12 Documentation and Approvals](#)
- [1320.13 References](#)

- [Exhibit 1320-1 Suggested Initial Design Ranges](#)
- [Exhibit 1320-2 Radii-Speed Relationship on Approach Legs and R Value Relationships](#)
- [Exhibit 1320-3 Intersection Sight Distance](#)

1320.01 General

Modern roundabouts are near-circular intersections at grade. They are an effective intersection type with fewer conflict points and lower speeds, and they provide for easier decision making than other intersection types. They also require less maintenance than traffic signals. Well-designed roundabouts have been found to reduce crashes (especially fatal and severe injury collisions), traffic delays, fuel consumption, and air pollution. They also have a traffic-calming effect by reducing vehicle speeds using geometric design rather than relying solely on traffic control devices.



Roundabout

Roundabout design is an iterative process.

A well-designed roundabout achieves a balance of safety and efficiency.

Good design is a process of creating the smooth curvature, channelization, and deflection required to achieve consistent speeds, well-marked lane paths, and appropriate sight distance.

The decision to install a roundabout is the result of an Intersection Control Evaluation (ICE) (see [Chapter 1300](#)) approved by the region Traffic Engineer or other designated authority.

New roundabouts and changes to existing roundabouts that either add or reduce capacity, or change the geometric configuration require a Peer Review (see Section [1320.11](#))

1320.02 Roundabout Types

There are five basic roundabout types: mini, compact, single-lane, multilane, and teardrop described in the following sections.

1320.02(1) Mini-Roundabouts

Mini-roundabouts are small single-lane roundabouts generally used in 25 mph or less urban/suburban environments. Because of this, mini-roundabouts are typically not suitable for use on higher-volume (greater than 6,000 AADT) state routes. In retrofit applications, mini-roundabouts are relatively inexpensive because they normally require minimal additional pavement at the intersecting roads. A 2-inch mountable curb for the splitter islands and the central island is desirable because larger vehicles might be required to cross over it.

A common application is to replace a stop-controlled or uncontrolled intersection with a mini-roundabout to reduce delay and increase capacity. With mini roundabouts, the existing curb and sidewalk at the intersection can sometimes be left in place.

1320.02(2) Compact Roundabouts

Compact roundabouts are a hybrid of attributes found in mini- and single-lane roundabouts. Similar to a mini-roundabout, a compact roundabout may require minimal additional pavement, has a completely mountable center island, and in many cases existing curb or sidewalk can be left in place. As a result, compact roundabouts rarely require the purchase of right of way. Compact roundabouts are similar to single-lane roundabouts regarding design vehicle assumptions, ability to process traffic volumes, and signing.



Compact roundabouts

1320.02(3) Single-Lane Roundabouts

Single-lane roundabouts have single-lane entries at all legs and one circulating lane. They typically have mountable raised splitter islands, a mountable truck apron, and a landscaped central island.



Single-lane roundabout

1320.02(4) Multilane Roundabouts

Multilane roundabouts have at least one entry or exit with two or more lanes and more than one circulating lane. The operational practice for trucks negotiating roundabouts is to straddle adjacent lanes.



Multilane roundabout

1320.02(5) Teardrop Roundabout

Teardrops are usually associated with ramp terminals at interchanges: typically, at diamond interchanges. Teardrop roundabouts allow the “wide node, narrow link” concept. Unlike circular roundabouts, teardrops do not allow for continuous 360° travel resulting in less vehicle conflicts as traffic traveling on the crossroad (link) between ramp terminal intersections (nodes) does not encounter a yield as it enters the teardrop intersections. At higher ADT locations this lack of conflicting vehicles can result in a higher throughput, but can also result in limited gaps for the off ramp approach. Consult HQ or region Transportation Operations Office for guidance.



Teardrop roundabouts

1320.03 Capacity Analysis

Use the capacity analysis completed as part of the Intersection Control Evaluation (see [Chapter 1300](#)) to verify the number of lanes required for every individual movement in the design year.

1320.04 Geometric Design

1320.04(1) Selecting Shape and Placement

Roundabout shape is an important decision, because the shape can affect design elements that affect safety performance and operation of the roundabout.

1320.04(1)(a) Circular

The circular shape is the most desirable roundabout shape when constraints allow. If a circular shape is not feasible, contact the region Transportation Operations Office to investigate other shapes described below. Sometimes a circular shape can be used by slightly offsetting the placement of the roundabout.

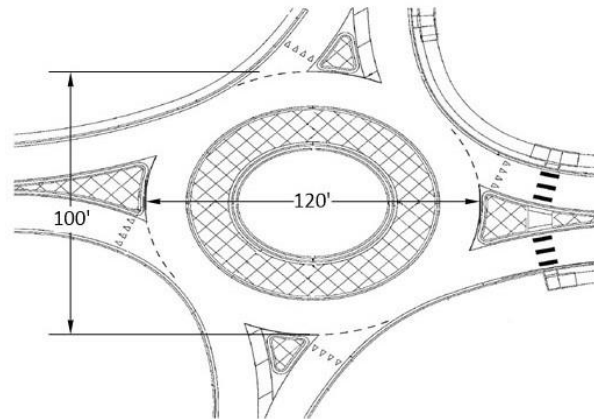


Circular shape

1320.04(1)(b) Non-Circular

A non-circular roundabout is a good choice when constraints such as right of way, existing roadway alignments, buildings, and/or environmentally sensitive areas influence the shape.

Experiment with different roundabout sizes and radii, and use design vehicle turning software (such as AutoTURN®) to refine the shape to find the best operation while retaining desired speeds.



Non-circular roundabout with example dimensions

1320.04(2) Roundabout Design Elements

This section provides guidance for roundabout design elements. The photo below labels many of them.



Roundabout design elements

1320.04(2)(a) Curbing

All curbing within a roundabout should be drivable. The type of curbing appropriate for a roundabout is shown in the Standard Plan Roundabout Cement Concrete Curbs: F-10.18.

Exception: existing curb untouched as part of a mini or compact roundabout installation may remain.

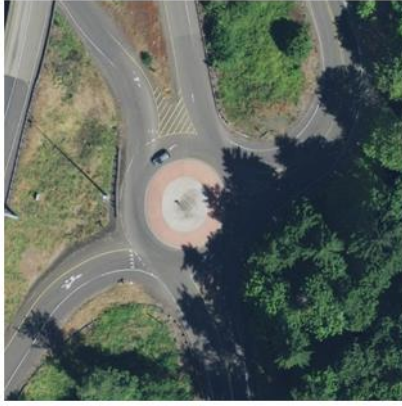
1320.04(2)(b) Truck Apron

A truck apron is the mountable portion of the central island used to accommodate the turning path of a design vehicle larger than a passenger vehicle or BUS, and helps to minimize the overall footprint of the roundabout. Generally, the truck tractor can traverse the roundabout in the circulating lane while the trailer is allowed to off track onto the apron. The apron is slightly raised vertically above the circulating travel path with a different pattern or color to provide lane guidance to drivers in the circulating lane.

A truck apron's width is based on the needs of the design vehicle. If a bus uses the intersection for any movement routinely, the designer should try to minimize apron use of the bus, however this is not a requirement. Use turn simulation software (such as AutoTURN®) to fine tune the width of apron needed, so as not to design too large of an apron width that won't be used.

There are rare circumstances where a combination of frequent low clearance trucks such as lowboys, roadway grades or other roadway features may lead to consideration of a truck apron height of less than 3 inches. Contact with HQ Transportation Office for guidance. Changing the apron height from 3" requires a Design Analysis.

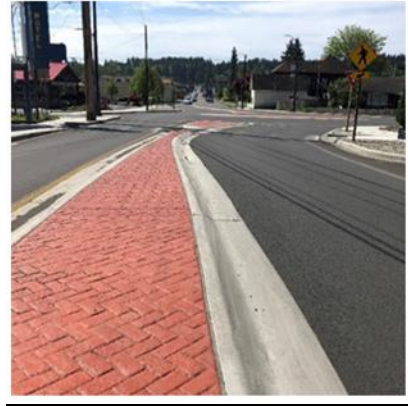
The apron color should be distinguishable in contrast with the adjacent circulating roadway and pedestrian facilities. WSDOT practice generally includes encouraging the use of a red color with brick texturing. The use of grey or darker colors alone does not provide adequate contrast. However, designs using a mixture of color, textures, and geometric shapes such as incorporation of central island landscaping, or chevron patterns can provide desirable contrast to the adjacent circulating roadway. Work with the region Landscape Architect (HQ Roadside and Site Development Section for regions without a Landscape Architect) and HQ Transportation Operations Office for color, texture, and design options.



Roundabout showing two-color mountable central island. Location is State Route 432 at Exit 36 on Interstate 5 in Kelso, WA



Roundabout apron with a chevron pattern at West 100th Ave and Northbound ramp terminal at the Walter J. Hickel Parkway, Anchorage, AK



Roundabout showing red concrete with brick texturing for the splitter island and central island, and river rock buffer between the roadway and sidewalk. Location is West Alder St at 1st St in Shelton, WA



Roundabout showing red concrete with brick texturing for the splitter island and central island, landscaped central island, and gravel and natural plantings at the edge of pavement. Location is State Route 9 at Francis Rd in Skagit County, WA



Roundabout that provides range of textures, colors, and shapes to achieve contrast. This example includes a rock blanket on the splitter islands, sidewalk buffer, and a wave pattern on the central island. Contrasting the rock blanket in the central island is tan concrete with brick texturing. Further contrast is provided by the red brushed concrete apron and a small circular landscaped area in the central island. The truck apron is red brushed concrete. The rock blanket could be placed in pervious concrete if needed for stormwater management purposes. Location is Handford Armona Rd at Exit 84 on State Route 198 in Handford, CA.

1320.04(2)(c) Central Island

The central island is the portion of the roundabout that is inside of the circulating roadway and typically includes an inside truck apron and a landscaped area (except for mini-roundabouts and compact roundabouts, which have no landscaped area and are entirely mountable).

Central island shape is a function of the site-specific needs of a roundabout intersection. It doesn't have to be an identical shape of the inscribed circle diameter (ICD) dimensions, but should support the design principles of deflection and low speeds, and the accommodation of the design vehicle.

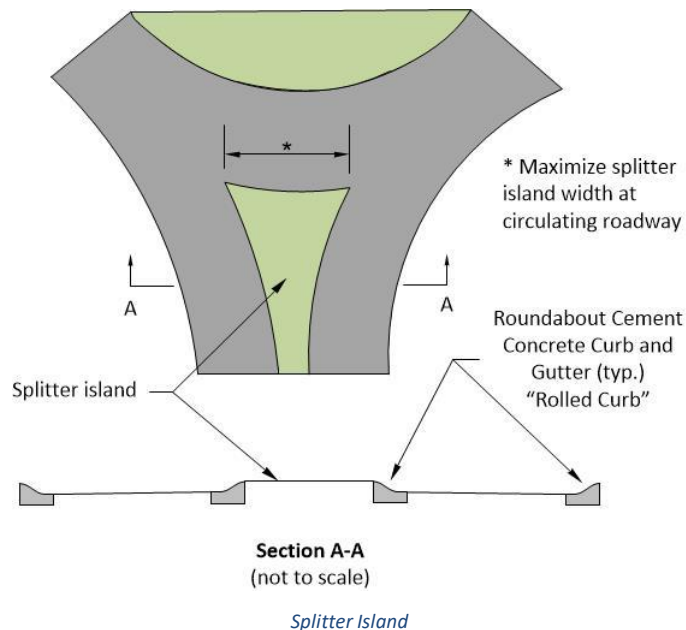
Roundabouts present opportunities to create community focal points, landscaping, and other gateway features within an intersection.

The central island may include enhancements (such as landscaping, sculptures, or fountains), which serve both an aesthetic purpose and provide visual indication of the intersection for approaching motorists (this is particularly important for high speed approaches). Ideal central island treatments fit the context and result in minimal consequence to any vehicle that may encroach on the non-mountable portion of the central island. These treatments should not attract pedestrians to the central island, as pedestrians should never cross the circulating roadway. Work with the region Landscape Architect (HQ Roadside and Site Development Section for regions without a Landscape Architect) for central island features. See [Chapter 950](#) for policy and guidance.

1320.04(2)(d) Splitter Island

A splitter island is the raised island at each two-way leg between entering and exiting vehicles, designed primarily to control the entry and exit speeds by providing deflection. They also discourage wrong-way movements, and provide pedestrian refuge. Splitter islands can have different shapes based on entry angle requirements and exit design speeds.

Raised channelization, or the appearance of raised curbing, is important, as research shows that drivers will slow down when they perceive that the driving width is narrowing.



The length of the splitter island will vary (typical lengths: 30 ft. to 350 ft.) based on the terrain, access considerations, site-specific mainline and crossroad operational speeds and the stepdown speeds to the final

desired entry speed, which is usually 15–25 mph. (See [1320.04\(3\)\(a\)](#) for using chicanes on higher-speed roadways.)

Try to maximize the splitter island width adjacent to the circulating roadway. The larger achieved width, the better a driver approaching the roundabout can perceive whether a driver in the circulating lane will exit or continue inside the roundabout. This results in better gap acceptance. This may also support a better pedestrian refuge design.

The splitter island should be distinguishable in contrast with the adjacent roadway and pedestrian facilities. See discussion and guidance for truck aprons in Section [1320.04\(2\)\(b\)](#).

1320.04(2)(e) Inscribed Circle Diameter

The Inscribed Circle Diameter (ICD), that is, the overall outside diameter of a roundabout, is determined by the variables design vehicle, design speed, and the number of circulatory lanes.

The ranges of ICD in [Exhibit 1320-1](#) are only suggestions to start a roundabout design. The ICD for noncircular shapes should be defined with dimensions along the X and Y axis.

Exhibit 1320-1 Suggested Initial Design Ranges

Design Element	Mini [1]	Compact	Single-Lane	Multilane
Number of Lanes	1	1+	1	2+
Inscribed Circle Diameter [2]	45' – 80'	65' – 120'	80' – 150'	120' – 165'
Circulating Roadway Width	N/A	N/A	14' – 19'	29'
Entry Widths	N/A	N/A	16' – 18'	25'

Notes:

The “+” symbol used here means that a portion of the circulating roadway may have more than one lane.

[1] Reserved for urban/suburban intersections with a 25 mph or less posted speed.

[2] The given diameters assume a circular roundabout; adjust accordingly for other shapes. Some conditions may require ICDs outside ranges shown here.

1320.04(2)(f) Entry

1. Deflection

Ideal alignment offers an entry design that provides deflection, speed control, and reasonable view angles to drivers while balancing property impacts and costs. While most intersections are at 90° angles and most through movements are straight, deflection contributes to the safety performance of a roundabout. Deflection is primarily achieved with the central island and supporting it with splitter islands on all entries to the roundabout.

2. Alignment Offset

There are three alignment choices for attaching entry legs to the circulatory roadway:

- The offset left alignment is preferred. It constrains the entry, slowing a vehicle’s approach speed, and opens up the exit for efficient egress.
- The symmetrical alignment (if needed) is acceptable for lower speed contexts such as 30 mph.
- The offset right alignment tends to allow faster entry speeds and constrains the exit; it is undesirable.



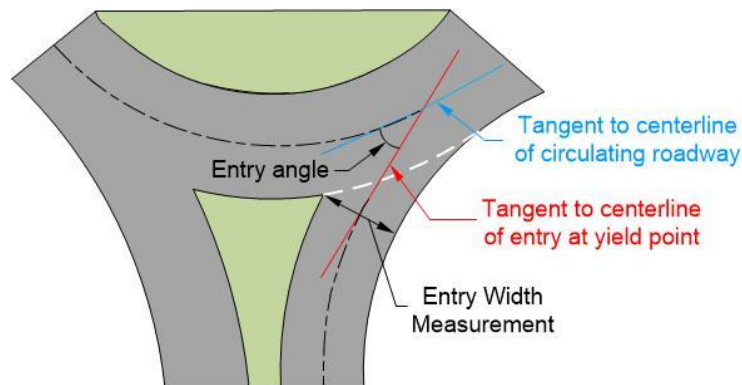
Offset left alignment (preferred)

3. Entry Angle

To achieve the proper amount of deflection for each approach to a roundabout, there is a range of angle values that are desirable. This range is usually between 20 and 40 degrees. The purpose of entry angle is so vehicles don't hit broadside.

4. Entry Width

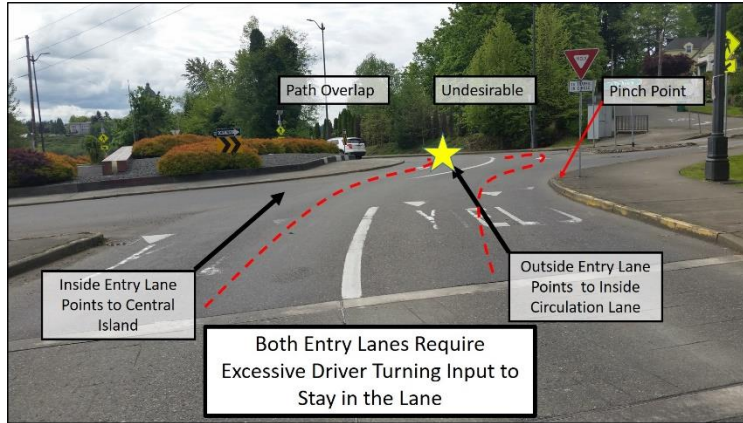
Entry width is determined by the turning template of the design vehicle turning through the entry curve at the desired entry speed. The ranges of entry widths in [Exhibit 1320-1](#) are only suggestions to start a roundabout design.



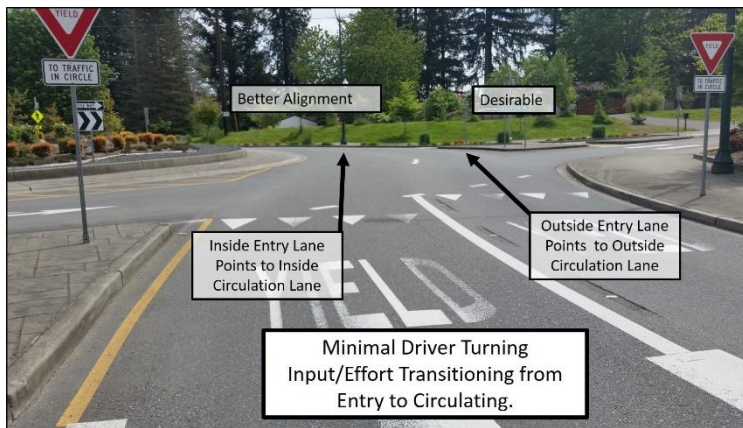
Entry angle and width

5. Path Overlap

In a multilane roundabout, if the vehicles in the entry are aligned toward the central island or the truck apron, the vehicle on the right is pointed toward the inside lane and tends to go in that direction, while the vehicle on the left tends to be squeezed to the right toward the vehicle on the right. Avoid path overlap. Avoid a design that aligns an entering vehicle at the incorrect lane in the circulatory roadway. As a vehicle enters the circulatory roadway it should be headed directly toward its respective lane within the circulatory roadway. For multilane roundabouts, if inside lane is pointing at truck apron this is also considered to be path overlap. If right entry lane is pointing to left circulatory lane, then there is path overlap.



Path overlap conflict

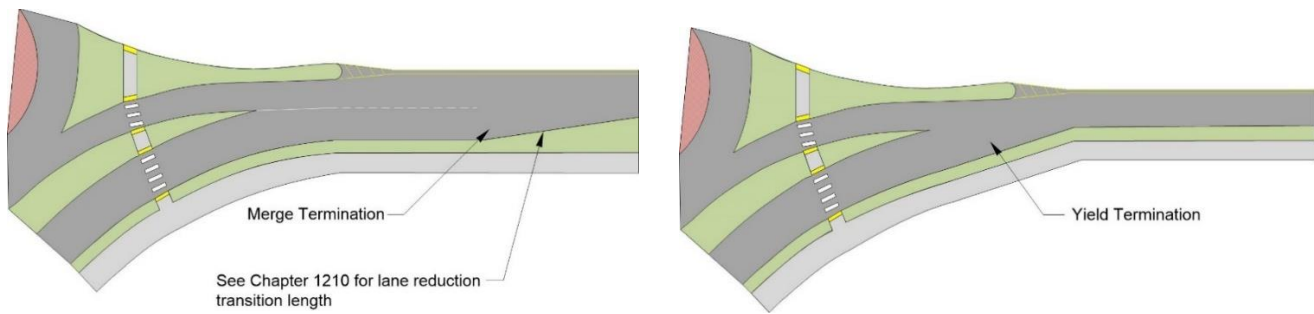


Good path alignment

1320.04(2)(g) Right-Turn Slip Lanes

Right-turn slip lanes are a proven way to increase the “life” of an intersection by removing traffic that would otherwise enter the roundabout and reduce the available capacity to other movements. If a right-turn movement has 250 vehicles/hour or more, or if over 40% of the total approach volume is taking right turns, a slip lane should be considered.

The conflicting volume of vehicles on the merge will influence the length of merge lane prior to termination. Speeds can be very low and vehicles can take turns at these low speeds. Multimodal considerations will influence the length based on crosswalk location and bicycle use.



Right-turn slip lanes showing merge and yield termination

1320.04(3) Speed Control

Roundabout operation performance is dependent on low, consistent vehicle speeds. Low and consistent operating speeds facilitate appropriate gap acceptance by an entering driver. Design for travel path operating speeds between 15 mph and 25 mph (see Section 1320.04(3)(b)). Design to have low-speed differentials (12 mph or under) between entering and circulating traffic. Multilane roundabouts might have higher speeds along their respective travel paths, but generally 30 mph or less.

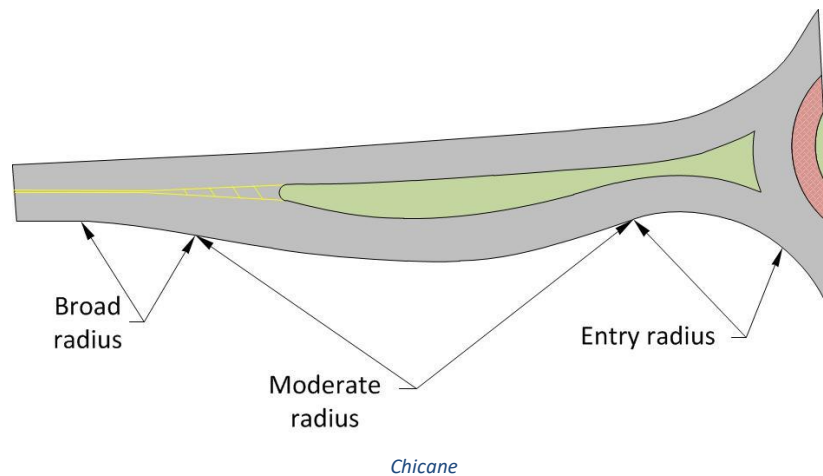
The ideal design speed mechanism has the entry and circulating speeds being similar. This varies due to size, shape and context of the roundabout.

The vehicle then moves into and through the circulation lane, being controlled all along by the design speed of the circulating lane. The circulating design speed controls the exit speed; therefore, the exit design speed, as calculated in the Travel Path section below, is not as critical.

Designing geometric entry speed control encourages lower speeds and lower speed differentials at conflict points, which reduces the potential for collisions.

1320.04(3)(a) Chicanes

Chicanes are a type of horizontal deflection used in traffic calming to reduce the speed of vehicles. Research has shown that chicanes have value in slowing down higher approach speeds.

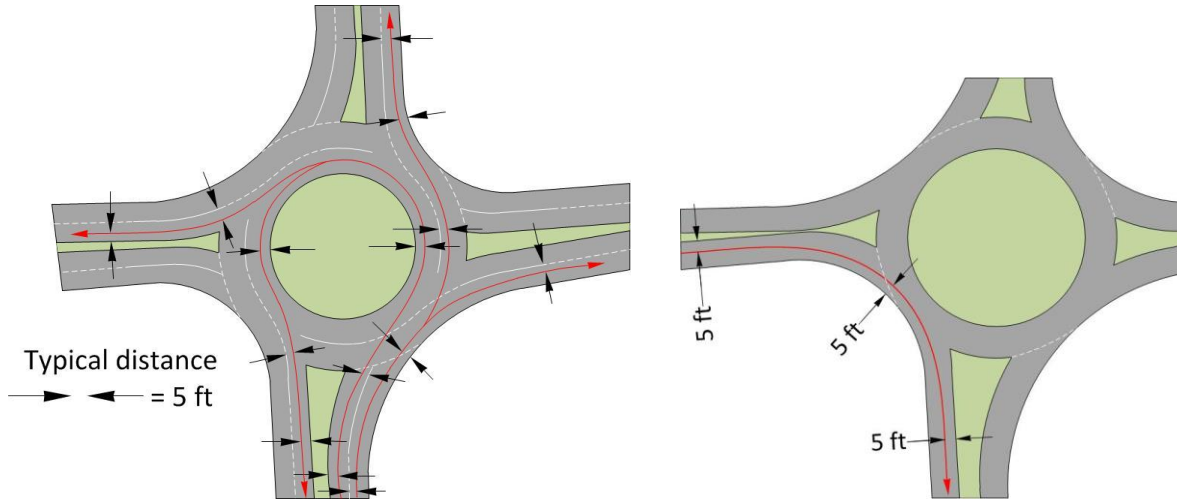


Consider chicanes where posted speeds near the roundabout are 45 mph or higher. Design chicane curves with successively smaller radii in order to successively reduce vehicle speeds approaching the roundabout entry. Use Exhibit 1320-2 to determine the radii-speed relationship (the radii are measured using the offsets recommended in the Travel Paths section). The normal cross slope (superelevation in Exhibit 1320-2) is 2% however, site conditions may require more based on how you tilt the plane of the roundabout for site specific conditions. A minus (-) 2% drains toward the central island.

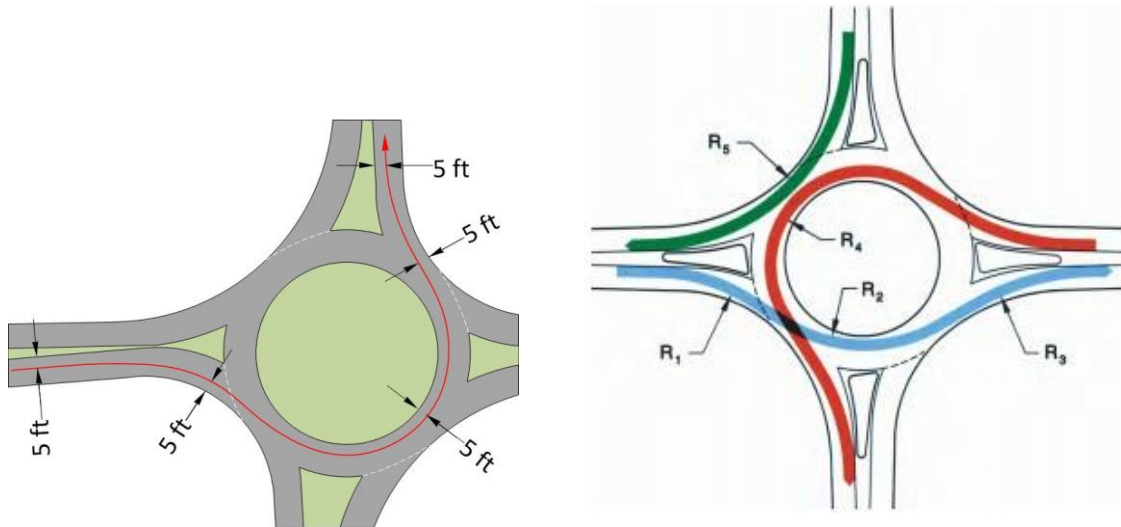
Also, consider the grade of the roadways that enter the roundabout, because a vehicle can more easily slow down on an upgrade than on a downgrade. Adjust the length of the deceleration based on the "Adjustment Factors for Grades Greater Than 3%" in Design Manual Exhibit 1360-11.

1320.04(3)(b) Travel Paths

Travel path calculations can be used on all roundabout designs to get an understanding of speeds for different paths throughout the roundabout. A travel path is the shortest path through the roundabout, no closer than 5 feet from any curb face or lane line as shown. Use Exhibit 1320-2 and R1 through R5 to determine Travel Path speeds.

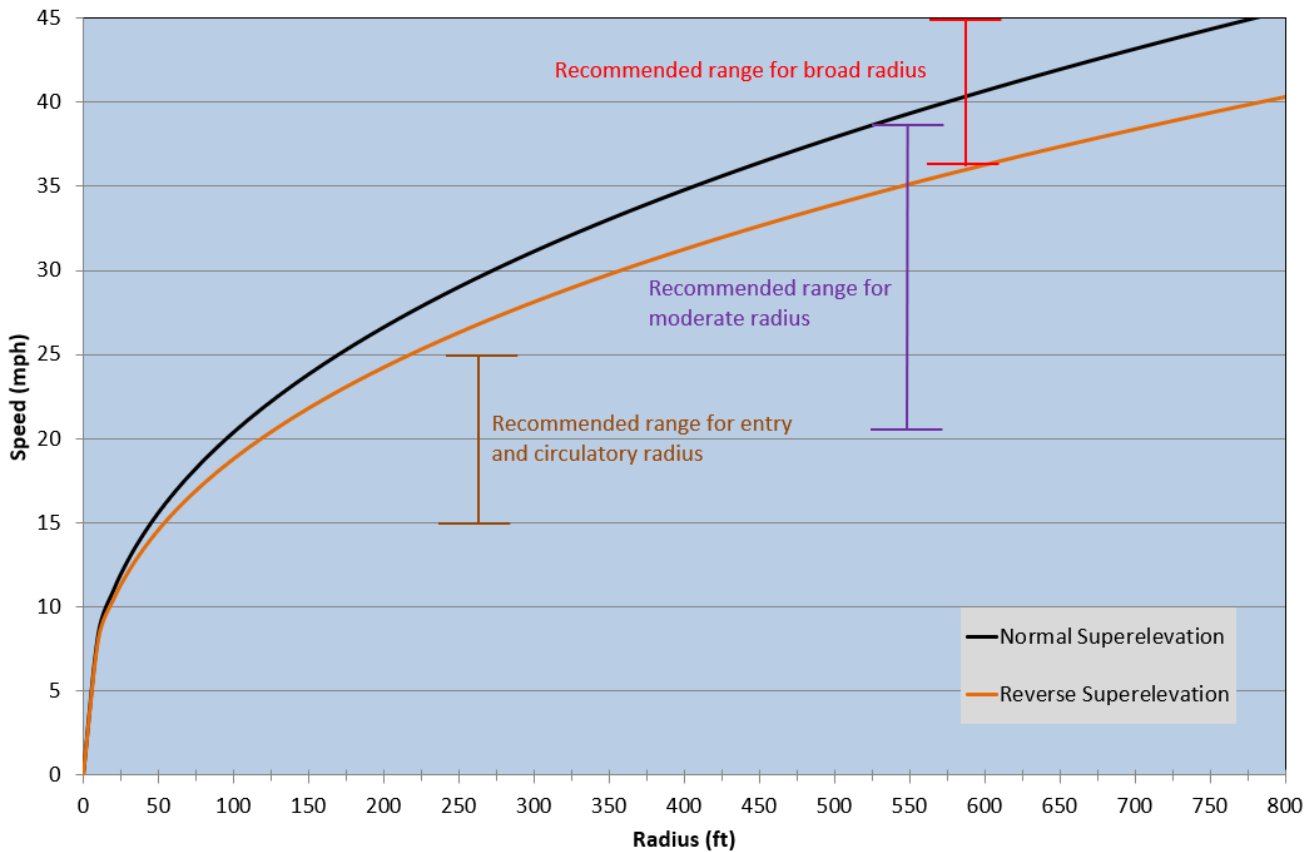


Travel paths



Source: NCHRP

Exhibit 1320-2 Radii-Speed Relationship on Approach Legs and R Value Relationships



1320.04(4) Grades

Do not use grades as a constraint during scoping to rule out a roundabout. Be aware of how the profiles mesh with sight distances and ADA pedestrian requirements.

1320.04(4)(a) Circulatory Roadway

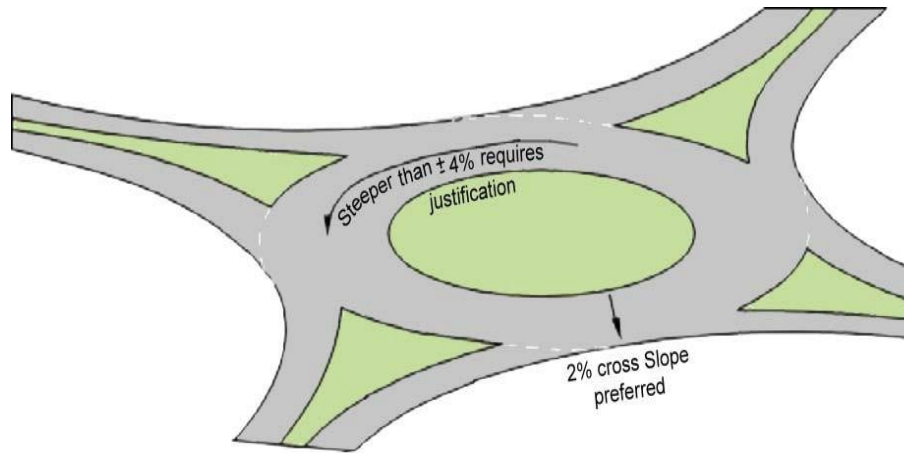
The circulatory roadway grade value should not exceed 4%. Terrain may require benching the roundabout to fit conditions.

1320.04(4)(b) Grade Transitions for Roadway Entry and Exit to the Circulatory Roadway

Consider the grade transitions and make them as long as feasible. When designing for pedestrians see [Chapter 1510](#) and work with region ADA subject matter expert to ensure that grades for ADA compliance at all pedestrian crossing are met.

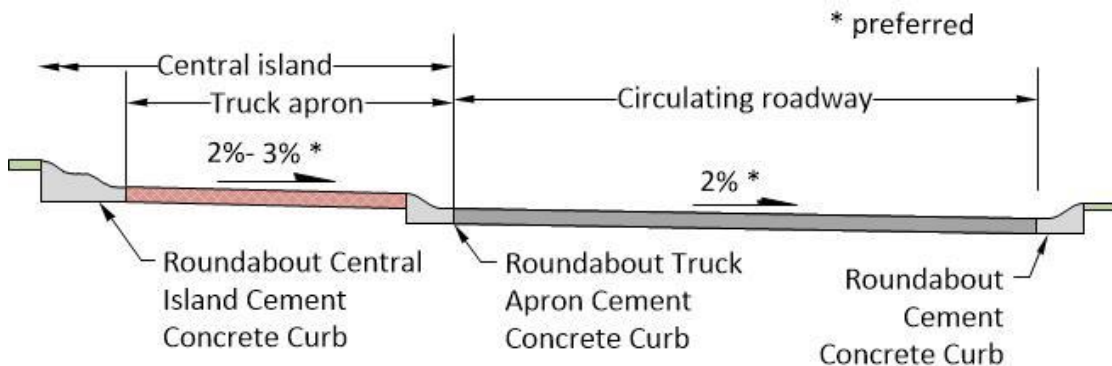
1320.04(5) Circulatory Roadway Profile and Cross Slope

The preferred profile grades of the circulatory roadway of a roundabout are $\pm 4\%$ or flatter radially around the circulatory lane(s). Profile grades steeper than $\pm 4\%$ require **justification**. It is preferred to bench the roundabout if practicable to reduce profile grade.



Preferred grades and cross slopes

The preferred circulatory roadway cross slope may range from 1.5% to 4.0% (2.0% preferred), away from the central island to promote lower circulating speeds, improve central island visibility, minimize breaks in cross slope of entry and exit lanes, and facilitate drainage of water to the outside of the roundabout.



Drawing shows preferred cross slopes. Site conditions and drainage may require slopes outside these ranges.

1320.04(6) Design Tools

During the scoping or preliminary geometric design process, do not use truck turning paths alone as a constraint to eliminate a roundabout at an intersection. There are several design tools available to aid in the design of a roundabout. It is important to understand how the software works, its default settings, and its application to the design process.

1320.04(6)(a) Vehicle Swept Path Flexibility

Managing vehicle speeds is a goal in roundabout design. Therefore, selection of a design vehicle that fits the transportation and land use context while balancing vehicle speed and accommodation is a key first step. Section 1103.03(4), states, "WSDOT policy provides flexibility when choosing the intersection design vehicle. The purpose for this policy is to balance user needs and avoid the unnecessary expense of oversizing intersections." Once vehicle(s) have been selected for both design and accommodation, there are certain assumptions that must be made with software programs that replicate vehicle swept paths. Determine which defaults are to be used or modified so that different movements can be modeled. Every effort should be made to minimize swept paths using modeling software. Swept paths of infrequent vehicles also have the added benefit of drivable

curbing that adds flexibility and redundancy to designs. See Section [1103.03\(4\)](#) and [1310.02\(5\)](#) for guidance on determining modal priority and design vehicles.

1320.04(6)(b) Truck Swept Path

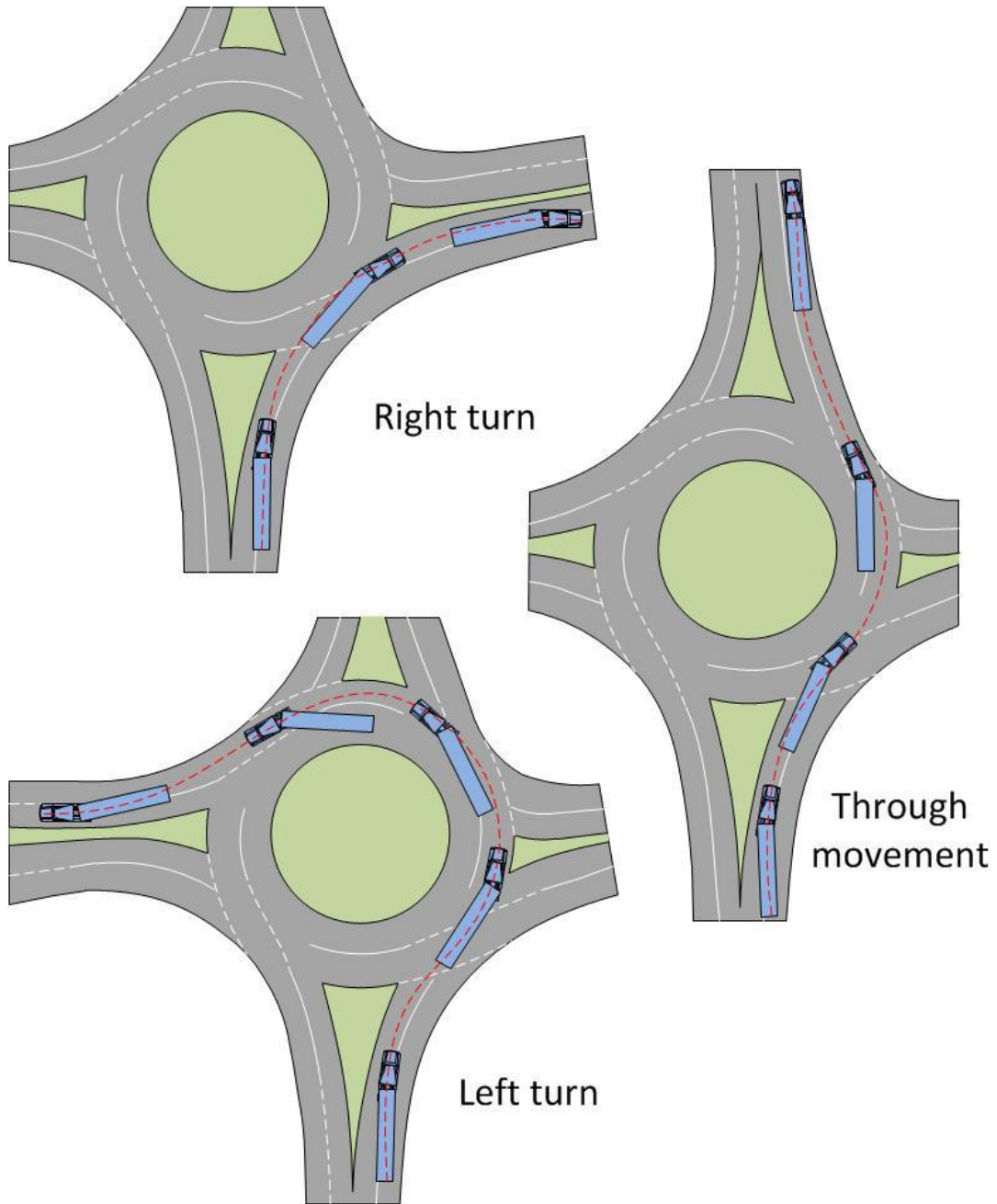
In some cases, roundabouts of the perfect circular variety with symmetrical roadway attachments require less specific knowledge of truck-turning software and its applications. However, when looking at a non-circular shaped roundabout where the combination of the truck's speed, its turning angle settings, its rear axle locations, and its alignment are the critical design elements to address, a mastery of the software is required. Designers that are unfamiliar with how to apply the software inputs accurately to model a truck's swept path need to contact HQ [Transportation Operations Office](#) for guidance. Poor alignment of a truck swept path can result in unnecessarily large roundabout footprints, higher than desired Travel Path speeds, or uncomfortable driving maneuvers by the freight community.

Assume that a truck will travel much slower through a roundabout than the Travel Path speed calculated for passenger vehicles (see Section [1320.04\(3\)\(b\)](#)). Adjust the software input to allow a slower truck speed in order to make a good engineering judgment about how fast a truck may use a roundabout (for example, for AutoTURN[®] use 5 mph). Design tool default settings don't necessarily allow the maximization of the tool and can prohibit the designer from getting a good, balanced design between passenger car speeds and truck accommodation.



Single lane roundabout - Truck using the truck apron

When using a truck-turning software tool like AutoTURN[®] on multilane roundabouts, assume a truck's travel path will occupy (straddle) parts of two adjacent lanes.



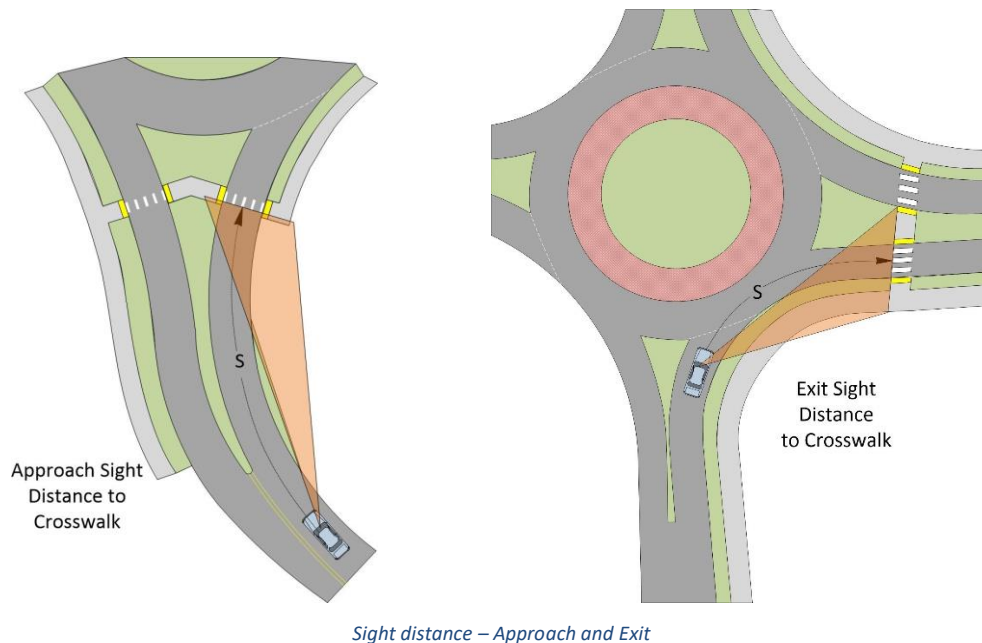
Multilane roundabout - truck straddles lanes

1320.04(7) Sight Distance

Sight distance is an important design consideration at roundabouts. Restricting sight distance across the central island with strategic landscaping may enhance the intersection by making the intersection a focal point and encouraging lower speeds. Work with the region Traffic Engineer and Landscape Architect (HQ if there is no region contact) to determine this balance. Provide sight triangle plan sheets for consideration of landscape design.

1320.04(7)(a) Stopping

Use the design stopping sight distance in [Chapter 1260](#). Anticipated speeds throughout the roundabout can be calculated using [Exhibit 1320-2](#), based on the Travel Path radius and direction of the particular curve. The design stopping sight distance is measured along the vehicle's path as it follows the curvature of the roadway; it is not measured as a straight line.

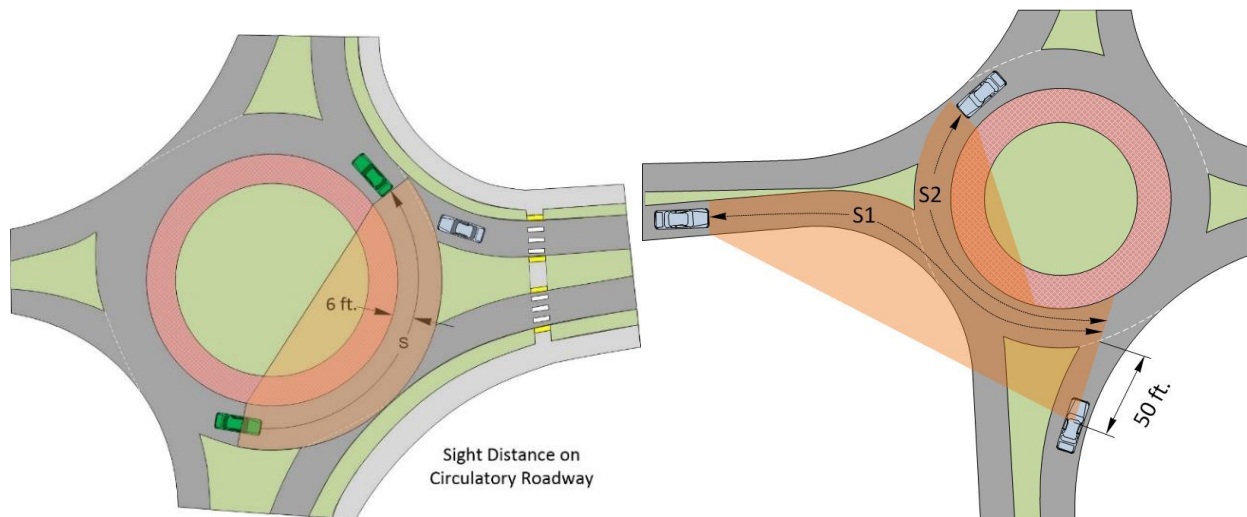
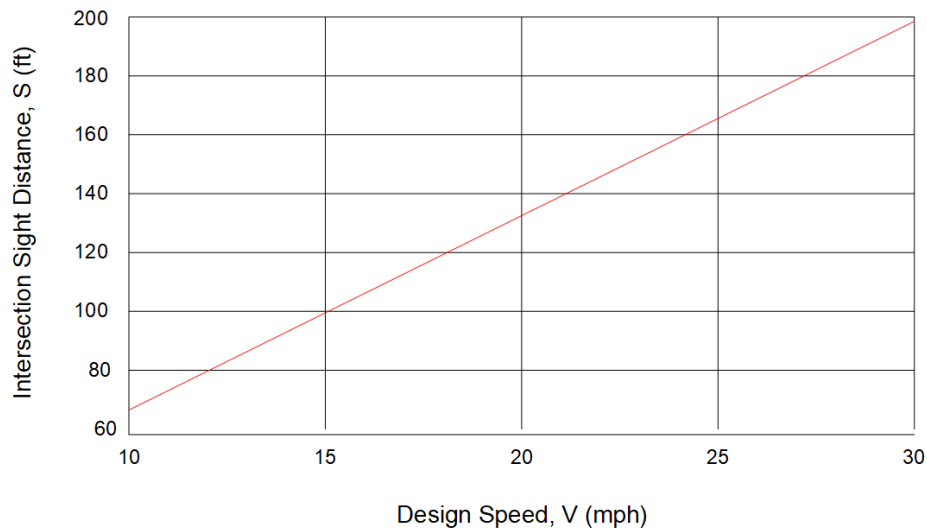


1320.04(7)(b) Intersection

Provide minimum intersection sight distance. Longer sight distances can lead to higher vehicle speeds that reduce gap opportunities for entering vehicles. For intersection sight distance at roundabouts, provide entering vehicles a clear view of traffic on the circulating roadway and on the immediate upstream approach in order to aid in judging an acceptable gap.

The intersection sight distance at roundabouts is given in [Exhibit 1320-3](#). The S_1 intersection sight distance is based on the average of the entering and circulating speeds, and the S_2 intersection sight distance is based on the left-turning speed. The sight distance may also be calculated using the intersection sight distance equation given in [Chapter 1310](#) using a time gap (tg) of 4.5 seconds.

Exhibit 1320-3 Intersection Sight Distance

**1320.04(8) Railroad Crossings**

Although it is undesirable to locate any intersection near an at-grade railroad crossing, this situation exists at many locations on the highway system. Experience shows that a roundabout placed near a crossing has some operational advantages. If there is a railroad crossing near the roundabout contact HQ Transportation Operations Office for further guidance.

1320.05 Pedestrians

As part of the approved ICE it has already been determined whether pedestrians will use the roundabout and, if so, which legs (see [Chapter 1300](#)).

With the knowledge of where pedestrian facilities are needed, design the roundabout while keeping in mind the ADA requirements for crosswalks, sidewalks, paths, and other pedestrian facilities.

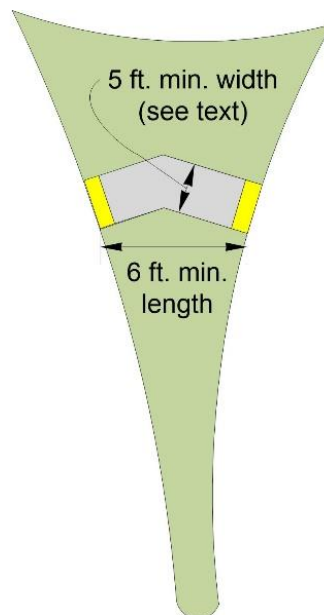
1320.05(1) Crossing Location

The pedestrian crossing located on the entry side of a roundabout leg should be at least 20 feet from the yield line so that a pedestrian can walk behind a vehicle that is waiting at the yield line. If there is an extremely large truck percentage, consider moving the crossing to accommodate the most common truck.

The crossing located in the exit side of the roundabout leg can be closer to the roundabout, because as the vehicles leave the roundabout, they accelerate and make it harder to find a break in traffic. As speed increases, drivers are less likely and less able to stop. Verify that no significant, large sight obstructions are located within the sight lines.

1320.05(2) Splitter Island Pass Through

Design the splitter island pass through a minimum of 5 feet wide, or the width of the sidewalk, whichever is greater. The length of the pass through (measured back of curb to back of curb of the splitter island) is to be a minimum of 6 feet long measured along the shortest section of the pedestrian path. Consider a “V” shape pass through as shown.



Splitter island pass through

1320.05(3) Buffers

Wherever feasible, separate sidewalks from the curb with a buffer. Landscaping or colored concrete are acceptable for the buffer. See WSDOT [Standard Plan F10-18](#) for dimension details. Do not compromise required vehicle sight triangle needs.

The buffer discourages pedestrians from crossing to the central island or cutting across the circulatory roadway of the roundabout. It also helps guide pedestrians with vision impairments to the designated crosswalks, and can accommodate the occasional inexperienced truck driver who encroaches up onto a curb while traversing through the roundabout.

1320.05(4) Curb Ramps

Roundabouts with buffers typically have combination-type curb ramps; otherwise, parallel curb ramps are normally used. (See [Chapter 1510](#) and the [Standard Plans](#) for curb ramp information.)

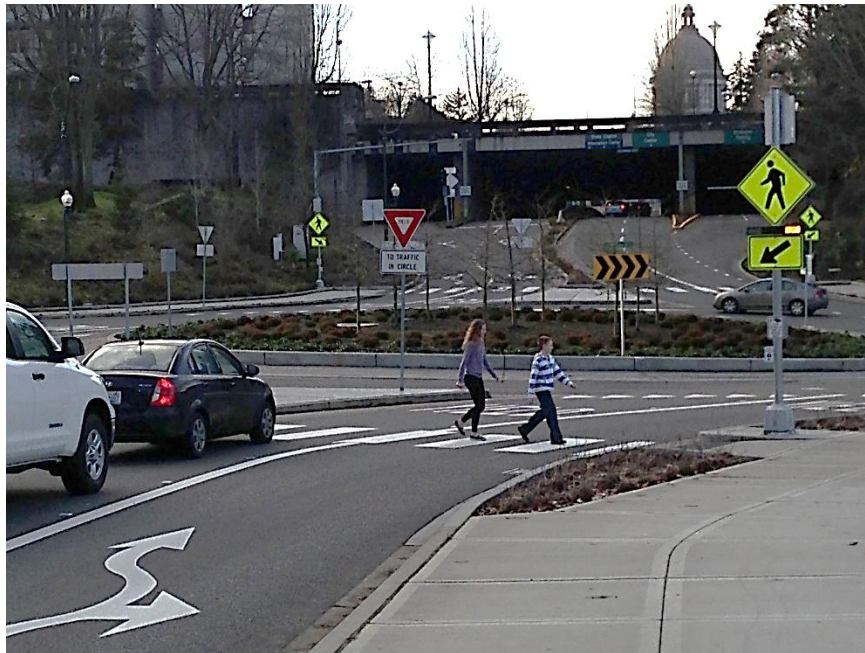
1320.05(5) Sight Triangles

A vehicle sight triangle specific to pedestrians (see Section [1320.04\(7\)](#)) must include the whole curb ramp, including the landing, where pedestrians are likely to wait to cross.

It is also important that pedestrians are also able to see approaching vehicles.

1320.05(6) Pedestrian Beacons

On multilane roundabouts, consider installing pedestrian beacons to warn drivers when a pedestrian wants to cross the roadway. Work with the region Traffic Engineer on types and locations of pedestrian beacons.



Pedestrian beacons

1320.06 Bicycles

Provide bicyclists with similar options to negotiate roundabouts as they have at other intersections. Consider how they navigate either as motor vehicles or pedestrians depending on the size of the intersection, traffic volumes, their experience level, and other factors.

Bicyclists are often comfortable riding through single-lane roundabouts in low-volume environments in the travel lane with motor vehicles, as speeds are comparable and potential conflicts are low.

At larger or busier roundabouts, cyclists may be more comfortable using ramps connecting to a sidewalk around the perimeter of the roundabout as a pedestrian. Where bicycle lanes or shoulders are used on approach roadways, they should end before the geometry changes the approach to the roundabout.

Contact the HQ Design Office for bicycle ramp design options.



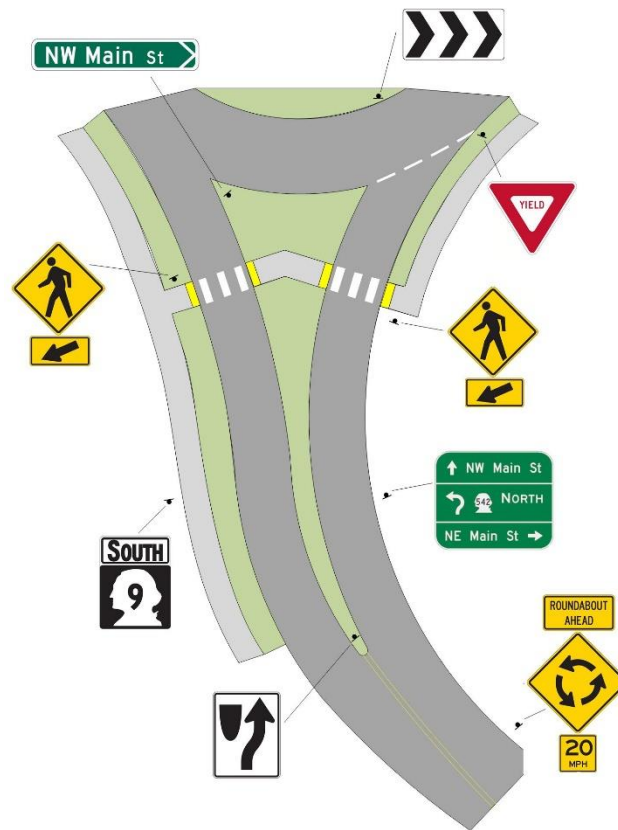
Bicycle rider using lane

1320.07 Signing

The graphic shown is an example of potential signing for a single-lane roundabout. For additional information, refer to the MUTCD, Plan Sheet Library, and the *Standard Plans* for details on signing.

A preliminary sign plan is developed to identify existing and proposed signing on state highways. Sign plans on state routes are to be reviewed and approved by the region Traffic Engineer and then furnished to the HQ Transportation Operations Office for review.

The plan provides an easily understood graphic representation of the signing, and it provides statewide uniformity and consistency for regulatory, warning, and guide signs at roundabouts on the state highway system. For roundabouts located near a port, industrial area, or route that accommodates oversized loads, consider using perforated square steel posts.



Signing example

1320.08 Pavement Marking

See *Standard Plan M-12.10* for roundabout pavement marking details. Consult region Traffic on traffic pavement markings and materials.

1320.09 Illumination

Provide illumination for each of the conflict points between circulating and entering traffic in the roundabout and at the beginning of the raised splitter islands. Illuminate raised channelization or curbing. Position the luminaires on the upstream side of each crosswalk to improve the visibility of pedestrians. Light the roundabout from the outside in toward the center.

This improves the visibility of the central island and circulating vehicles to motorists approaching the roundabout. Ground-level lighting within the central island that shines upward toward objects in the central island can also improve their visibility. Consult with the region [Transportation Operations Office](#) for illumination design. (See [Chapter 1040](#) for additional information on illumination.) On higher-speed approaches, consider internally illuminated bollards (IIB) in lieu of other illumination.

1320.10 Road Approach, Parking, and Transit Facilities

Road approach (road or driveway) connections to the circulating roadway are not allowed at roundabouts unless they are designed as a leg to the roundabout. It is desirable that road approaches not be located on the approach or departure legs within the length of the splitter island.

The minimum distance from the circulating roadway to a road approach is controlled by corner clearance using the outside edge of the circulating roadway as the crossroad. When minimum corner clearance cannot be met, document the decision in accordance with [Chapter 530](#) and [Chapter 540](#).

If a parcel adjoins two legs of the roundabout, it is acceptable to provide a right-in/right-out driveway within the length of the splitter islands on both legs. This provides for all movements; design both driveways to accommodate their design vehicles.

Roadways between roundabouts may have restrictive medians with left-turn access provided with U-turns at the roundabouts.

Parking is not allowed in the circulating roadway or on the entry or exit roadway within the length of the splitter island.

Transit stops are not allowed in the circulating roadway, in the approach lanes, or in the exit lanes prior to the crosswalk. Locate transit stops on the roadway before or after the roundabout, in a pullout, or where the pavement is wide enough that a stopped bus does not block the through movement of traffic or impede sight distance.



Right in / right out driveways

1320.11 Geometric Design Peer Review

Conduct a peer review for new roundabouts and changes to existing roundabouts that either add or reduce capacity, or change the geometric configuration. The Peer review should be held soon after the conceptual roundabout layout is developed.

Invite the following participants:

- Region Traffic Office
- Assistant State Traffic Engineer
- Region Project Development Engineer or Engineering Manager
- Assistant State Design Engineer

The intent of this peer review is to review, discuss, evaluate, and provide feedback on the 2-D roundabout layout design in order to finalize the channelization plan.

1320.12 Documentation and Approvals

Refer to [Chapter 300](#) for design documentation and approval requirements.

1320.13 References

1320.13(1) Federal/State Laws and Codes

See [Chapter 1510](#) for Americans with Disabilities Act Policy and references

[Revised Code of Washington \(RCW\) 47.05.021](#), Functional classification of highways

[Washington Administrative Code \(WAC\) 468-58-080](#), Guides for control of access on crossroads and interchange ramps

1320.13(2) Design Guidance

Roundabout Cement Concrete Curbs: *Standard Plan F-10.18-01*

Roundabout Pavement Markings: *Standard Plan M-12.10*

Manual on Uniform Traffic Control Devices for Streets and Highways, USDOT, FHWA, as adopted and modified by [Chapter 468-95 WAC](#) "Manual on uniform traffic control devices for streets and highways" (MUTCD)

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21 01, WSDOT

Standard Specifications for Road, Bridge, and Municipal Construction (Standard Specifications), M 41-10, WSDOT

1320.13(3) Supporting Information

Roundabouts: An Informational Guide (First edition 2000), FHWA-RD-00-067, USDOT, FHWA

www.fhwa.dot.gov/publications/research/safety/00067/index.cfm

Roundabouts: An Informational Guide (Second Edition 2010), NCHRP Report 672, Transportation Research Board, 2010 <http://nacto.org/docs/usdg/nchrprpt672.pdf>

Highway Capacity Manual 2010 (HCM 2010), Transportation Research Board, National Research Council, Washington D.C., 2000

A Policy on Geometric Design of Highways and Streets (Green Book), AASHTO

"Crash Reductions Following Installation of Roundabouts in the United States," Insurance Institute for Highway Safety, March 2000

www.dot.ny.gov/main/roundabouts/files/insurance_report.pdf

Understanding Flexibility in Transportation Design – Washington, WSDOT, 2005

www.wsdot.wa.gov/research/reports/600/638.1.htm

