



## *Office of the County Engineer*

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County Engineer

# **ROUNABOUT DESIGN DIRECTIVES AND GUIDELINES (REVISION 11/1/2017)**

## **1. PURPOSE:**

This directive sets forth the Lucas County Engineer's guidelines for the design of roundabouts.

## **2. SCOPE:**

These guidelines apply to the County highway system and to local roads where County funding is used. These also apply where State or Federal funds will be used. Roundabouts must be approved according to an Engineering Study and Approval by the County Engineer prior to beginning design.

## **3. GUIDELINES:**

### **A. General**

1. For additional information not detailed within these guidelines, see the Ohio Department of Transportation's (ODOT) Location and Design (L&D) Manual and FHWA's Roundabouts: An Informational Guide (NCHRP Report 672).
2. All movements, including bicycle and pedestrian movements, should be accounted for in the design.
3. A roundabout should be designed for opening day peak hour traffic at the time of construction. Design traffic for years beyond opening day shall be approved by the County Engineer during the preliminary design process prior to beginning design. Design traffic should be based on an Engineering Study and the likelihood of actual traffic increases if additional lanes in the roundabout are being proposed.
4. A roundabout should be planned for a 20 year design life with the inscribed circle large enough to accommodate lanes for the future traffic volumes. No additional right of way should have to be acquired to construct additional lanes.

## **B. Operational**

1. If these guidelines are not followed, with a County/Village/City joint cooperation agreement, the agreement must state that if the roundabout fails within the first year then the County is not responsible for any construction or re-engineering costs.
2. Driveways should not be allowed within the limits of the splitter island. (Exceptions are to be approved by the County Engineer.)

## **C. Geometry**

1. All Roundabouts
  - a. All speed control shall take place prior to the yield point on entry. The recommended design speed for all vehicles entering the roundabout is 15 mph. Remove any reverse curvature between the entrance and exit radii and join with straight curb sections.
  - b. The offset left alignment is preferred, the radial alignment and the offset right alignment requires a design exception to be approved by the County Engineer. (See Figure 1.2)
  - c. Approach legs should be designed as perpendicular to each other as possible.
  - d. Entry width should be designed per the ODOT L&D Manual, Section 403.4.4. Entry widths are to be designed using AutoTURN or similar design software.
  - e. Circulatory roadway width should accommodate buses and fire trucks. All other trucks may have to use the truck apron.
  - f. Exit radius should be between 400' – 600'. (Exceptions are to be approved by the County Engineer.)
  - g. Use a WB-67 for the design vehicle. (Exceptions are to be approved by the County Engineer.)
- h. Truck Aprons
  1. Width of the truck apron shall be determined from AutoTURN or similar design software, and should have an approximate cross slope of 2 percent, however shall not exceed 3 percent away from the central island.
  2. See Figure 1.1 for more detail.
- i. The length of the splitter island measured along the approach should be long enough to accommodate a crosswalk and pedestrian refuge area. In accordance with ODOT L&D Manual 305.3.2, longer islands or extended raised medians should not be used in areas with high approach speeds.

- j. Straight vertical face curbs or curb and gutter are required in the area of the splitter island on both sides of the roadway and on the splitter island. The approach nose of the splitter island may be tapered down.
  - k. The vertical face of the concrete curb or curb and gutter, as well as the adjacent concrete walk should taper down to match the paved shoulder on the approach. Continue the curb or curb and gutter on the edge of the travel way through the roundabout entrance and along the outside diameter to the various exits.
2. Single Lane Roundabouts
    - a. The inscribed circle shall be at least 110' diameter, not to exceed 150'.
    - b. The circulatory width should be approximately 18', excluding the truck apron pavement and the mountable curb.
    - c. The inscribed circle of urban mini roundabout designs maybe less than 110'.
  3. Multi-Lane Roundabouts
    - a. The inscribed circle shall be at least 150' diameter, 180' preferred.
    - b. Gore striping shall be used between entry lanes to keep 12' lane widths for passenger vehicles.
    - c. If possible, design for a one (1) lane exit.
    - d. Outside lane can only exit while inside lane can exit or keep circulating.
    - e. Vehicle Path Overlap
      1. Striping shall not be used to mitigate vehicle path overlap.
      2. A diagram should be furnished illustrating that vehicle path overlap does not exist. Designers should determine the natural vehicle path overlap by assuming the vehicles stay within their lane up to the yield point. At the yield point the vehicle maintains its natural trajectory into the circulatory roadway. The vehicle will then continue into the circulatory roadway and exit with no sudden changes in curvatures or speed.

**D. Pedestrians**

1. Pedestrian facilities are designed in accordance with the current edition of the Ohio Department of Transportation (ODOT) Location Design Manual, Volume I, Section 306. This Section of the L & D Manual references the Access Board's publication Accessible Right of Way – A Design Guide and the Federal Highway Administration (FHWA) publication Designing Sidewalks and Trails for Access, Part 2, Best Practices Design Guide and other publications.
2. Raised splitter islands are utilized on each approach to deflect and slow approaching traffic and separate entering from exiting traffic. The size of the splitter islands are designed to provide a sufficient storage space and “refuge area” for pedestrians to cross the road in two

stages and navigate only one direction of traffic at a time. This involves traversing one side of the road to the splitter island and then continuing from the splitter island to the other side of the road.

3. The splitter island storage space and “refuge area” is constructed at grade through the raised splitter island and designed with traversable slopes to be flush with the adjacent pavement to allow pedestrians, wheelchairs, strollers, and bicycles to pass through.
4. Pedestrian crosswalks are set back from the yield line and roundabout traffic by one or more vehicle lengths. The purpose is to shorten the crossing distance (as compared to locations adjacent to the roundabout outer circle), separate vehicle- vehicle and vehicle-pedestrian conflict points, and allow the approaching driver to devote full attention to crossing pedestrians while waiting for the driver ahead to enter the circulatory roadway.
5. Crosswalks, and crosswalk ramps, are aligned perpendicular to the pedestrian’s line of travel through the pedestrian storage space and refuge area within the splitter island.
6. Tactile “detectable warnings” are utilized at all crosswalk locations where pedestrians enter the roadway, including locations at splitter islands.
7. All crosswalk locations are delineated with the use of pavement markings in compliance with the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).
8. Supplemental “Pedestrian Crossing” (W11-2) warning signs used in combination with a diagonal downward pointing arrow (W16-7P) plaques are utilized for both directions of travel at each crosswalk on all approaches.
9. Stopping sight distance to the crosswalk shall be provided.

#### **E. Bicycles**

1. End all shoulders and bike lanes at or in advance of the splitter island. The design should encourage experienced bicyclists to take the travel lane in the roundabout or otherwise dismount and utilize the sidewalks to traverse the roundabout.
2. Concrete curb & walk shall transition to paved shoulders prior to the beginning of the splitter island on each approach. The slope of the transition from standard curb & walk shall be no greater than 1” per foot, shall be concrete, and shall begin a minimum 8 feet in advance of the adjacent cross walk directed at the splitter island on each approach.

#### **F. Transit**

1. Bus pullouts shall not be located on the circulatory roadway.
2. A bus stop is best situated:
  - a. On an exit lane in a pull out located just past the crosswalk or the transition from the walk to the paved shoulder.

- b. On an approach leg in a pullout located 60' upstream from the crosswalk or the transition from the walk to the paved shoulder.

### **G. Signing**

1. Signing shall be designed in accordance with the OMUTCD.

### **H. Pavement Markings**

1. Pavement markings shall be designed in accordance with the OMUTCD.

### **I. Landscaping**

1. It is the intent that the County Engineer not be responsible for the upkeep of the landscaping. A permit/agreement shall be sought to be signed with the local community and/or private organization to upkeep the landscaping.
2. Landscaping Guidelines should follow ODOT's L&D Manual, Sections 905.3.3 and Figure 905-5 with exceptions and additions contained herein.
3. Provide two conduits to the central island, 1 for water and 1 for electrical.
4. No hard wall, fountains or any object that would encourage pedestrians shall be allowed in the center island.
5. Select plantings to ensure adequate sight distance and to minimize maintenance for the life of the project. Plants should be native species when possible.
6. Keep at least the outside 6' of the center island clear of sight distance obstructions.
7. Splitter islands should not contain trees, planters or light poles.
8. Do not obstruct the sight triangle.
9. Avoid landscaping within 50' in advance of the yield point.
10. Use low profile landscaping in the corner radii if a crosswalk is provided.

### **J. Illumination**

1. Light standards at a minimum should be located in advance of the crosswalk. Make sure pedestrian crosswalks are not "back lit".
2. At a minimum street lighting should be provided on the approaches and in the center landscape island.

**4. APPLICATION OF GUIDELINES:**

These guidelines apply immediately to all new installations.

**5. OTHER ISSUANCES AFFECTED:**

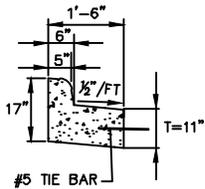
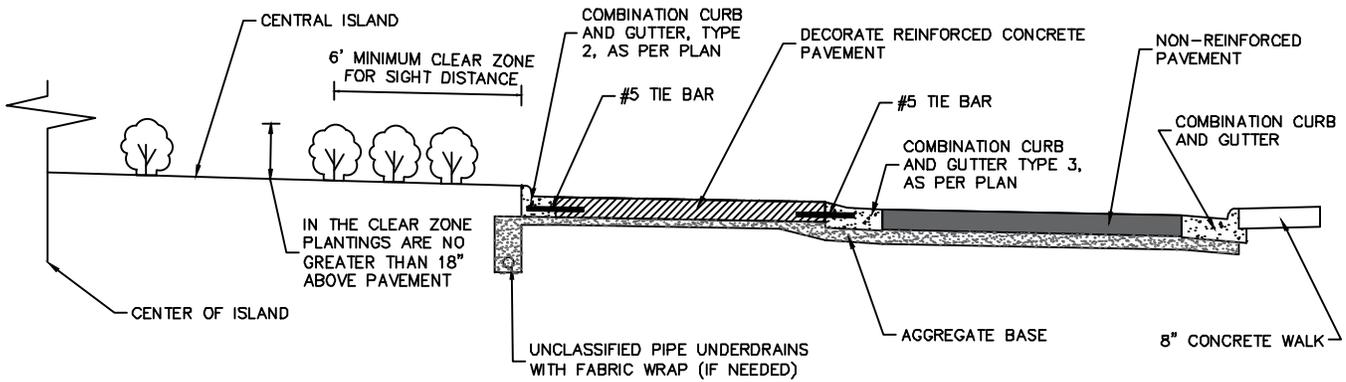
All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.

**6. IMPLEMENTATION:**

This directive will become effective immediately upon issuance.

  
Keith G. Earley, PE, PS  
Lucas County Engineer

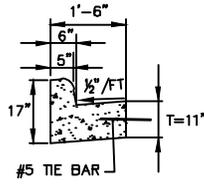
### Figure 1.1 Central Island Cross-Section



COMBINATION CURB AND GUTTER, TYPE 2, AS PER PLAN

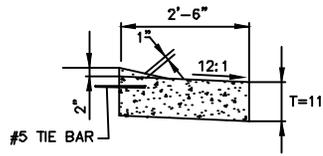
NOTE:  
CONSTRUCTION MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH ODOT SECTION 609 AND BP-5.1. #5 TIE BAR SHALL BE USED TO CONNECT CURB AND GUTTER TO TRUCK APRON/CONCRETE PAVEMENT IN ACCORDANCE WITH BP-2.1

GUTTER SLOPE DIRECTION IS DETERMINED BY THE ADJACENT PAVEMENT



COMBINATION CURB AND GUTTER, TYPE 3, AS PER PLAN

NOTE:  
CONSTRUCTION MATERIALS AND METHODS SHALL BE IN ACCORDANCE WITH ODOT SECTION 609 AND BP-5.1. #5 TIE BAR SHALL BE USED TO CONNECT CURB AND GUTTER TO TRUCK APRON IN ACCORDANCE WITH BP-2.1

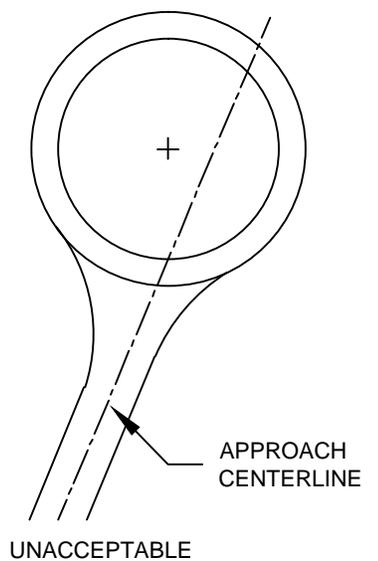
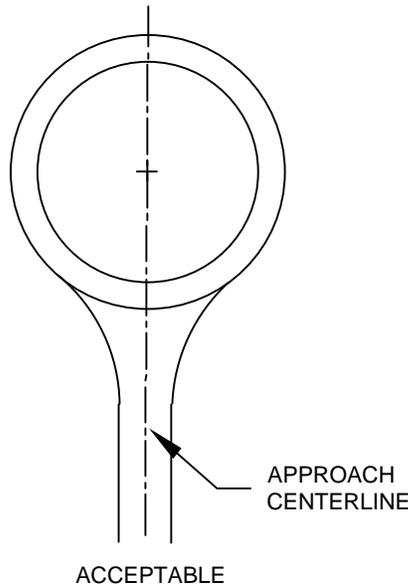
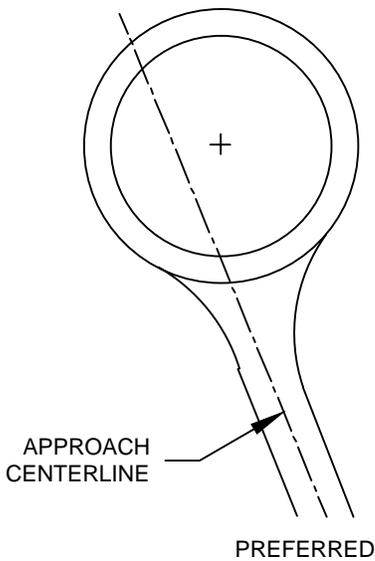


### Figure 1.2 Roundabout Alignment

ALIGNMENT OFFSET LEFT

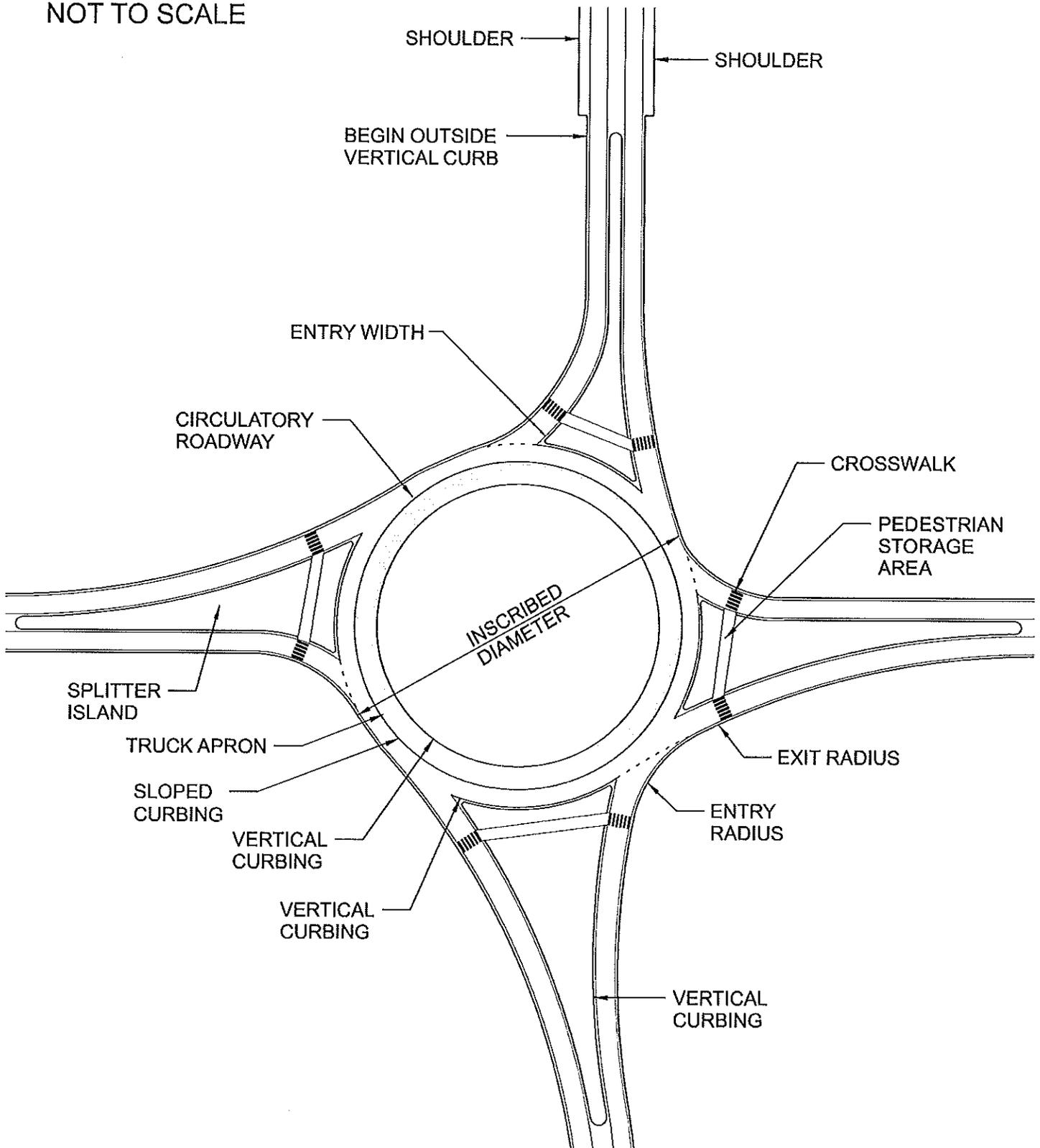
RADIAL ALIGNMENT

ALIGNMENT OFFSET RIGHT



# Figure 1.3 Roundabout Parts

NOT TO SCALE



CONCEPTUAL SKETCH ONLY  
NOT INTENDED FOR DESIGN