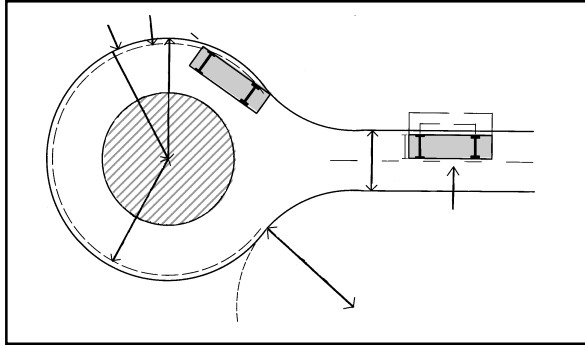


# Impervious Surface Reduction Cul-de-Sac Design



## Description

Careful cul-de-sac design can greatly reduce the amount of impervious surface in subdivisions. To do this, cul-de-sacs (also called turnarounds or dead-ends) should use the smallest practical radius. A 40-foot turning radius will accommodate turning of most emergency, service, and maintenance vehicles, while a 30-foot radius will require the largest of these vehicles to make one backing movement in order to turn around.

Simply changing the radius from 40 feet to 30 feet can reduce the impervious coverage by about 50 percent (Schueler, 1995).

Additionally, a landscaped island can be created in the center of the cul-de-sac, where driving does not occur. This island can be designed as a depression to accept stormwater runoff from the surrounding pavement, thus furthering infiltration. A flat apron curb will stabilize roadway pavement and allow for runoff to flow into the cul-de-sac's open center.

A T-shaped (or hammerhead) turnaround reduces impervious surface even further—yielding a paved area less than half that of a 30-foot radius turnaround. Since vehicles need to make a three-point turn to drive out, T-shaped turnarounds are most appropriate on streets with ten or fewer homes.

## Advantages

- Cul-de-sac designs like those suggested here result in less stormwater runoff requiring management and less impact on downstream water bodies.
- Planted cul-de-sac islands are attractive amenities
- Less paving can lower development costs

## Purpose

|                         | Water Quantity                      |
|-------------------------|-------------------------------------|
| Flow attenuation        | <input type="checkbox"/>            |
| Runoff volume reduction | <input checked="" type="checkbox"/> |
|                         | Water Quality                       |
| Pollution prevention    |                                     |
| Soil erosion            | <input type="checkbox"/>            |
| Sediment control        | <input checked="" type="checkbox"/> |
| Nutrient loading        | <input checked="" type="checkbox"/> |

|                                     |                             |
|-------------------------------------|-----------------------------|
| <input checked="" type="checkbox"/> | Primary design benefit      |
| <input checked="" type="checkbox"/> | Secondary design benefit    |
| <input type="checkbox"/>            | Little or no design benefit |

# Impervious Surface Reduction Cul-de Sac Design

---

- Reducing pavement lessens the urban heat island effect—the increase in air temperature that can occur when highly developed areas are exposed to the sun.
- Reducing pavement can help reduce the increased runoff temperature commonly associated with impervious cover.

## Limitations

- City ordinances may not accommodate small radii cul-de-sacs, due to accommodations for emergency vehicles. (Some older vehicles require very large turning radii.)
- Hammerhead turnarounds require vehicles to make a three-point-turn to drive out.
- In first two to three years, planted islands require more maintenance than paving.

## Requirements Design

- If traffic volume is low (10 or fewer homes), consider a T-shaped turnaround. A dimension of 20 by 60 feet will accommodate most vehicles. (See Fig. 4)
- Design circular cul-de-sacs with a radius of 30 feet or less whenever possible. (See Fig. 2)
- Include an unpaved, depressed island, using whatever radius will allow a 20-foot-wide road. (See Fig. 3)
- To make turning easier, the pavement at rear of center island may be wider. (See Fig. 2)
- In the island, plant attractive, low-maintenance perennials or shrubs appropriate for the soil and moisture conditions.

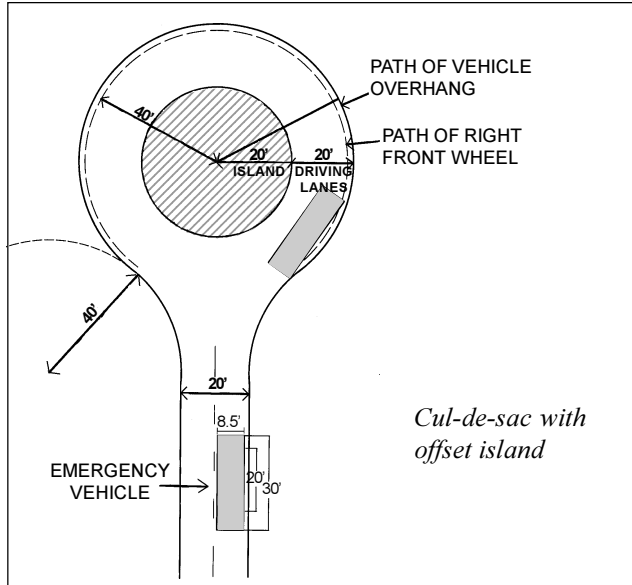
## Construction

- During paving, care should be taken to avoid compacting soil in center island. Should compaction occur, it may be necessary to rip or till soils to a depth of 2 feet.
- Choose plants that will thrive when rainfall is high, as well as during droughts without watering. See On-Lot Infiltration BMP for plant list.

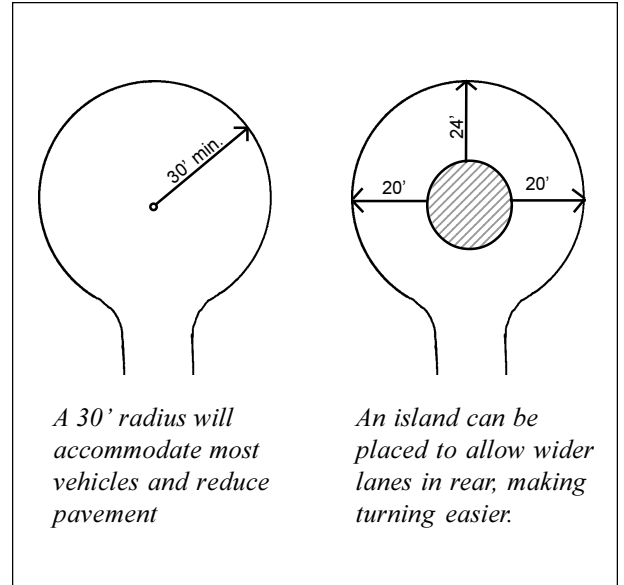
## Maintenance

- Cul-de-sac island planting areas must be weeded monthly during the first two to three years. After that, weeding once or twice a growing season may suffice.

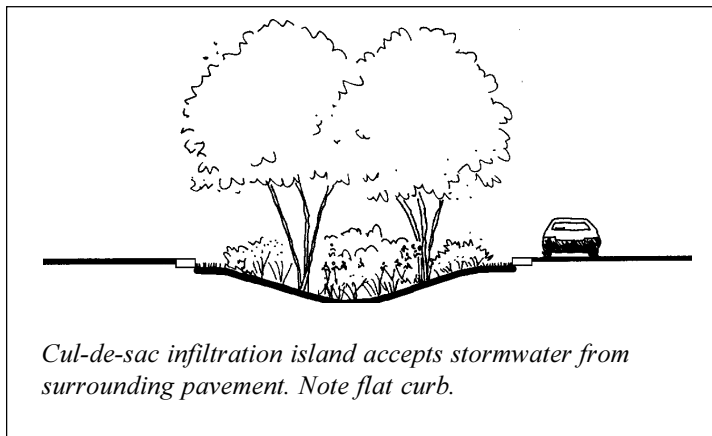
# Impervious Surface Reduction Cul-de-Sac Design



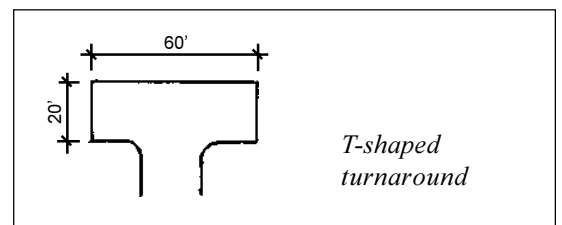
**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**

Sources: Adapted from Schueler, 1995, and ASCE, 1990.

# Impervious Surface Reduction Cul-de Sac Design

---

## Sources

1. American Society of Civil Engineers, National Association of Home Builders and Urban Land Institute. 1990. *Residential Streets*. Washington, D.C.
2. Harris, Charles W. and Nicholas T. Dines. 1988. *Time-Saver Standards for Landscape Architecture*. McGraw-Hill, New York.
3. Schueler, Tom. 1995. *Site Planning for Urban Stream Protection*. Center for Watershed Protection, Silver Spring, MD.
4. Valley Branch Watershed District. 2000. *Alternative Stormwater Best Management Practices Guidebook*. Lake Elmo, MN.