

# Constructing and Maintaining Traffic Calming Devices

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The City of Seattle has been installing traffic circles and other traffic calming devices on its city streets for about twenty five years. By their very nature, traffic calming devices tend to be considerably more expensive than the more traditional signing alternatives. Seattle has gained experience using a variety of devices and construction methods. Aging infrastructure and dwindling maintenance budgets have necessitated careful consideration of on-going maintenance needs for any new devices. The lessons learned have helped create effective traffic calming devices that are attractive additions to the neighborhoods, keep construction costs down, and keep maintenance costs to a minimum.

## **Function**

Traffic calming devices control driver behavior by channelizing their movements. The challenge is to achieve the desired result in an environment with competing and sometimes conflicting demands. The devices must be restrictive enough to slow overall traffic speeds without restricting access for emergency and service vehicles. The devices need to be substantial enough to discourage their being run over by general traffic, while being forgiving to the erring motorist. The devices also must be low maintenance and able to withstand being run over by the occasional large truck while looking attractive, so that they are accepted by both drivers and residents. These requirements have been accommodated with a combination of careful design, mountable curb, and landscaping.

## **Design**

Over 700 traffic circles have been installed in Seattle since 1973. Figure 1 shows a typical traffic circle. Nearly all of the circles have been installed on local residential, non-arterial streets. While this has helped reduce the conflicts with large trucks, the circles must accommodate fire trucks. Design standards for traffic circles (and other traffic calming devices on local streets) are based on allowing a single unit truck, with a 45 foot turning radius, to pass by the traffic circle without having to mount the curb. If the straight through movement at the intersection can be accommodated, left and right turns in front of the circle can also be made without mounting the curb.



Figure 1. Landscaped Traffic Circle

The traffic circles are designed “in house” by staff in the Neighborhood Transportation Services Division of Seattle Transportation. This arrangement allows the staff, who have worked with the community groups through the problem identification process, to be directly involved in providing the solution. Traffic circles are individually designed to fit the intersection without modifying the existing curbs. Typical streets in Seattle are 25 feet wide with 20 foot radii on the corners of the intersections. A typical traffic circle on a standard street would be 16 feet in diameter. The diagram in figure 2 illustrates the optimum criteria for sizing traffic circles. Off-set distances between the edge of the circle and the extension of the curb line vary between 5.5 feet and 3.5 feet. The opening width between the traffic circle and the corners varies from 20 feet to 16 feet. Intersections with unusual geometry or varying street widths are designed using turning templates.

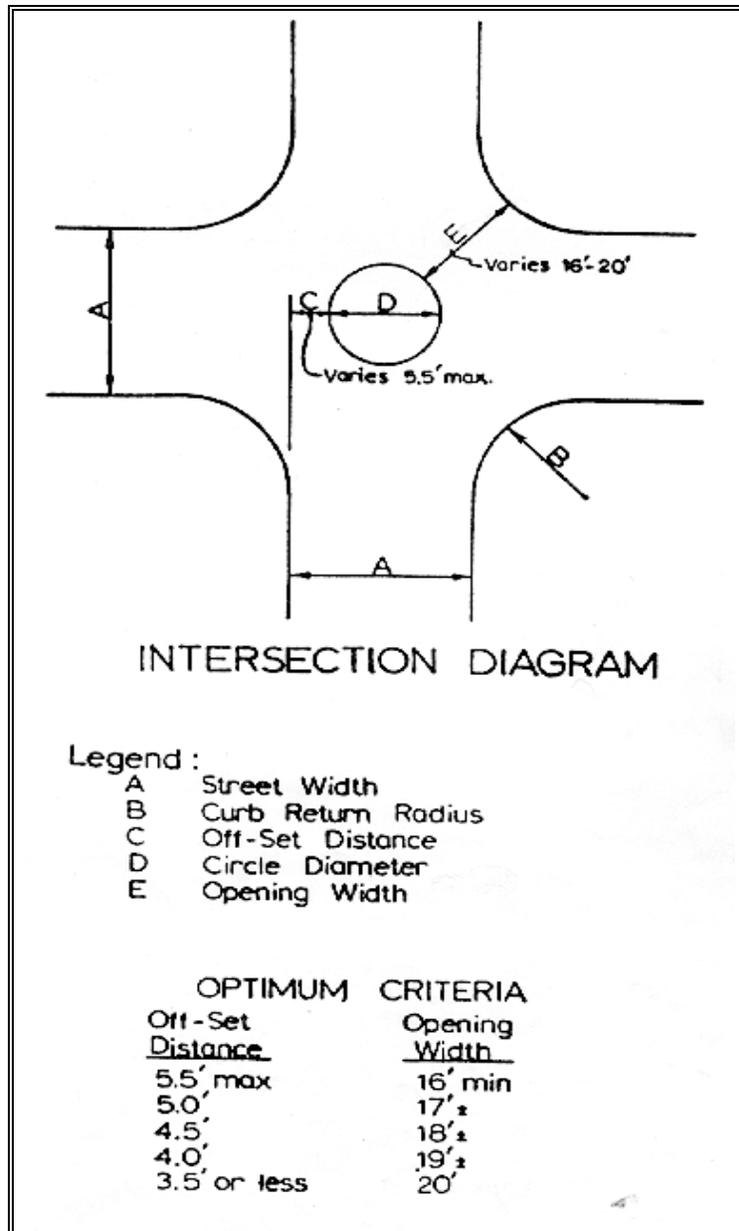


Figure 2. Optimum Design Criteria

### **Construction Details**

While traffic circles and other traffic calming devices are designed to allow emergency vehicles to pass by them, occasionally larger vehicles such as moving vans may need to mount the circle in order to travel through the intersection. Emergency vehicles may also find that cars parked illegally close to the intersection prevent them from passing around the circle and require them to go over a portion of it. These needs are provided for with a two foot wide curb which forms the ring of the circle. Figure 3 shows the construction details for the two foot wide mountable curb which is 4 inches high on the traffic side and

slopes up to a 6 inch height on the inside. Reinforcing steel is used to strengthen the curb and curb dowel is used to secure it to the existing street surface.

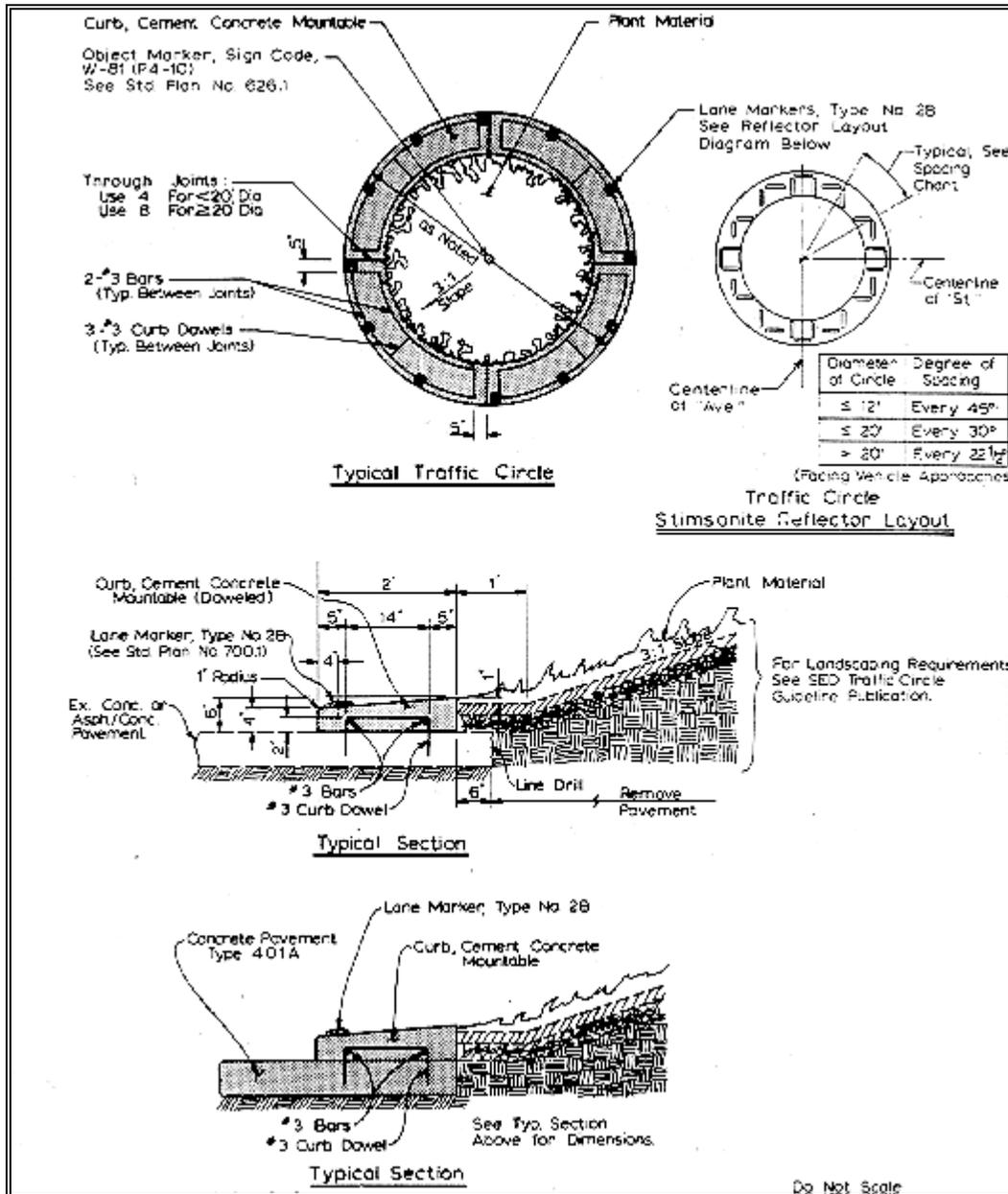


Figure 3. Traffic Circle Standard Plan

## Signing

Signing consists of object markers mounted in the traffic calming devices and reflectorized lane markers mounted on the curbing. Traffic circles are signed using 18" X 18" type I object markers mounted on a single post, facing all four approaches. Reflectorized lane markers are placed in an angled pattern on top

of the curb so that they are visible as drivers travel around the circle. (see figure 3) Advanced warning signs are used only when the approach grade is in excess of +10% or where the reflective lane markers become visible less than 90 feet from the circle. The advance warning sign is a 30" X 30" diamond showing the outline of an intersection with a black dot in the center. A 50 foot shear line of reflective lane markers is installed with the advance warning signs to indicate to approaching drivers that they should begin to move to the right as they approach the traffic circle.

### **Construction staging**

Construction of the traffic calming devices is relatively simple. However, due to the various work that's required and the specialization of the crews, coordination and timing requires special attention. The work of sign crews, concrete paving crews, utility crews, survey crews, and landscape crews must each follow in the proper sequence for construction to proceed quickly and smoothly. Construction generally begins by marking the exact location of the mountable curbing, followed by the installation of any advance warning and construction warning signs. Holes are drilled for the curb dowel and for the concrete form supports. The forms for the curb are installed next along with the reinforcing steel. The curb is paved and the forms stripped as quickly as possible in order to avoid damage caused by vehicles striking the forms.

Survey crews are next on the scene to install a survey monument in the curb. The new monument is needed to replace any monuments that are removed when the existing pavement in the center of the device is broken out to allow for landscaping. After the pavement is broken out and removed, landscape crews fill the center of the device with topsoil. The topsoil is mounded to provide room for root growth and proper drainage. The final step is completed by the sign crews who install the object markers in the planting area and reflectorized lane markers on the curb.

### **Landscaping**

Landscaping plays an important role in traffic calming devices. Since acceptance by the local community is essential to the success of any traffic calming device, an attractive "green space" is more likely to be viewed favorably than plain concrete or asphalt with brightly colored signs and markings. The landscaping also helps with the overall calming effect, by breaking up long vistas of pavement and adding mass to the appearance of the device. This increases the visibility of the device and the effect it has on driver behavior. In order to maintain visibility of pedestrians and other traffic, bushes and shrubs are limited to 30 inches in height and trees must have limbs trimmed to six feet above the street level. Landscaping can also increase demands on limited maintenance budgets or, if not properly maintained, become an "eyesore" in the middle of the street.

## **Landscape Maintenance**

In order to limit the maintenance responsibility, residents are required to maintain the plantings in Seattle's traffic calming devices. Traffic calming devices are not planted unless a resident volunteers to be responsible for the plantings. By carefully selecting the right plant types, that will not grow to block visibility and are drought tolerant, the maintenance required of the residents is also limited. Watering is necessary for the first two to three summers until the plantings are well established. Water service is not provided in the devices to keep construction costs low, so residents must use hoses from nearby houses to provide the water. Most devices are kept in a reasonable condition, usually reflective of how well the private yards are kept up in the neighborhood.

A number of steps have been taken to increase the level of maintenance of the landscaping by local residents. One step has been to hold training workshops for landscape volunteers to help them understand how best to care for the plantings. Another step has been to have the neighborhood residents help install the landscaping. Volunteers from civic groups and city staff team up with the local residents to install the plantings on one weekend each year. City landscape crews drop off the ground cover and trees and the volunteers plant them. This seems to help give the local residents more of a sense of ownership of the plants and increase the likelihood that they will care for them.

Another step that has helped residents take ownership of their traffic circles is including the neighborhood logo in the curbing. Figure 4 shows the Maple Leaf neighborhood logo which was designed by a neighborhood artist. A plywood cut out was used to press the design into the concrete after the standard broom finish was applied. Plaques have also been embedded in the curb, as personalizing touches, that recognize donors or landscape maintenance partnerships.

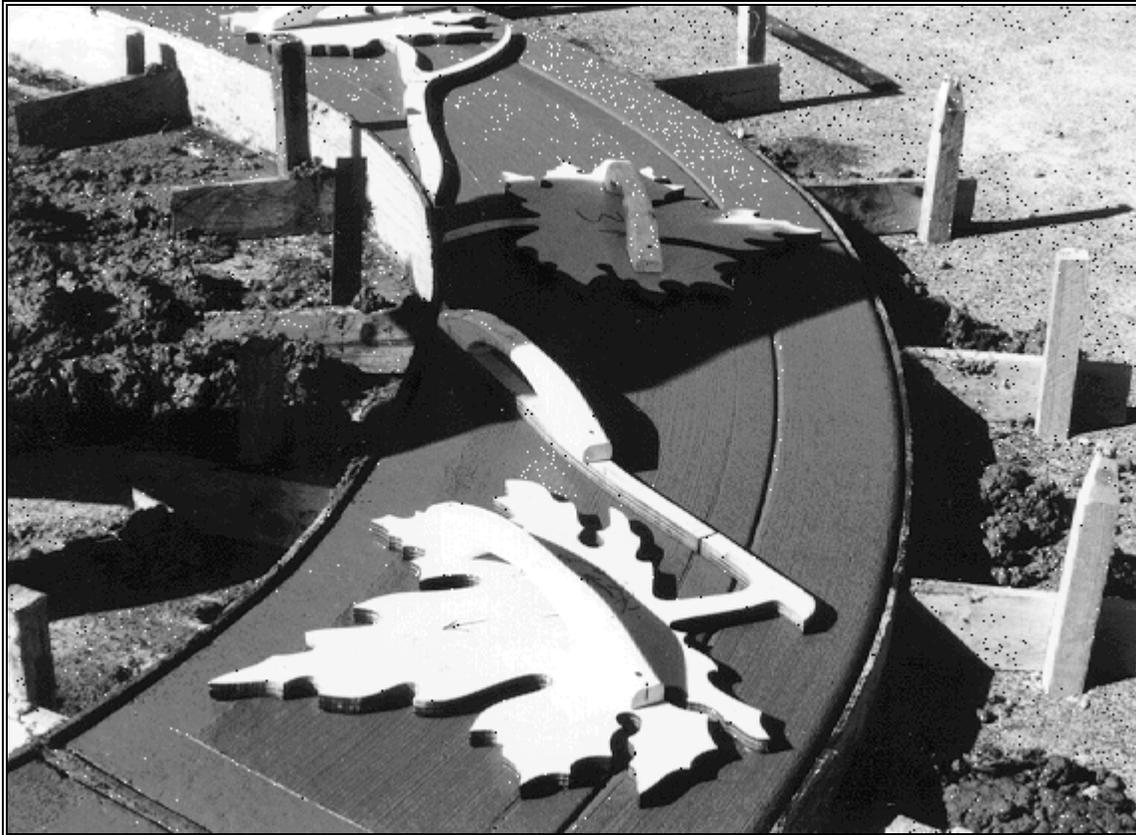


Figure 4. Maple Leaf logo

In spite of these efforts, some traffic calming devices become overgrown with weeds each year. Sometimes a gentle reminder to the landscape volunteer is all that is needed. Most of the time, the volunteer has moved or is no longer willing to care for the plantings. When this happens, notices are sent to the residents within a block of the device, asking for a new volunteer. Assistance in cutting back overgrowth or hauling away weeds and trimmings is sometimes offered as an incentive to get a new volunteer. The residents are also told that if a volunteer is not found, and the plantings begin to create a safety concern, the city will remove the plants and pave the device with asphalt. Generally, the assistance and warnings result in the devices getting cleaned up and none have had to be paved over.

### **Curb Maintenance**

The two foot wide mountable curbing has held up very well and has needed very little maintenance work. Only one curb on a traffic circle has been damaged enough to require it to be reconstructed. This circle was struck by a large truck that caught the edge of the circle and broke it into quarters along the construction joints. The entire circle was moved about one foot and the curb doweling was pulled loose from the street pavement. However, the individual sections of the circle stayed in tact and were able to be moved back into place until permanent repairs could be made.

## **Sign Maintenance**

Object marker signs in traffic calming devices such as traffic circles are given a high priority for replacement when knocked down, similar to that of stop signs. Traffic circles that have well maintained landscaping have fewer sign knock downs than new circles that are not yet landscaped or circles built without landscaping. Lane markers mounted on the curbing stay clean and aren't frequently knocked loose because they are out of the travel lane. The signs and markings related to traffic calming devices add to the total inventory that must be maintained. However, the inventory related to traffic calming is relatively small when compared to the number of other signs and markings throughout the city, such as for parking regulations or lane markers on arterials. Keeping the signing in the devices simple and avoiding unnecessary signing, helps reduce the demands for maintenance.

## **Conclusion**

Seattle has been installing traffic calming devices on its residential streets for 25 years. The experience gained has been applied to develop construction and landscape standards that keep maintenance costs low. Traffic calming devices are constructed so that traffic speeds are reduced, emergency vehicle access is maintained, and the devices are attractive additions to Seattle's neighborhoods. The result is a popular and successful program that continues to make Seattle's neighborhoods better places to live.

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