

## DESIGN DETAILS: Dealing With Steep Topography



SOURCE: NEVUE NGAN ASSOCIATES

**Figure 5-16:** A steep residential street condition in San Mateo County.



SOURCE: WWW.SEATTLEGOV.U/INDEX.ASP

**Figure 5-17:** Terraced concrete weirs allow for a vegetated swale to be graded with a slope less severe than the adjacent street's grade.



SOURCE: NEVUE NGAN ASSOCIATES

**Figure 5-18:** Closely spaced check dams help terrace the interior landscape of this stormwater curb extension project. The slope of this street is approximately 6%.

There are many steep slope conditions found within San Mateo County. The primary land use type in these conditions is low and high-density residential development with relatively narrow right-of-ways. Although these narrower streets may not generate large volumes of stormwater runoff, the velocity of stormwater runoff from developed hillsides is a potential concern. Hence, a good approach is to design stormwater facilities that help slow runoff as much as possible. There are several methods that can be used.

First, look for ways to improve the overall site design so that space can be provided for stormwater facilities. Second, build terraced stormwater planters and swales that help flatten the interior slopes of landscape areas compared to the steepness of a street or parking lot. Closely-spaced check dams and weirs can then help slow down the flow of water, mimicking a more natural condition. Depending on the underlying soil conditions, some of this water might also infiltrate into the native soils.

A geotechnical engineer should be consulted during the design process to evaluate and analyze steep areas for susceptibility to landslides.

### Using Check Dams and Weirs

Check dams and weirs are the “speed bumps” of stormwater management. They are designed and strategically placed within a stormwater facility to slow the flow of runoff. Check dams are structures in the landscape that retain stormwater. Weirs are a notch within a checkdam with an adjustable height to allow for varied amounts of stormwater retention. Check dams should retain stormwater to relatively shallow depths, with a maximum ponding depth of 6-12 inches of runoff during storm events.

Both check dams and weirs can be made from a variety of construction materials, such as rock, concrete, metal, wood, or any other

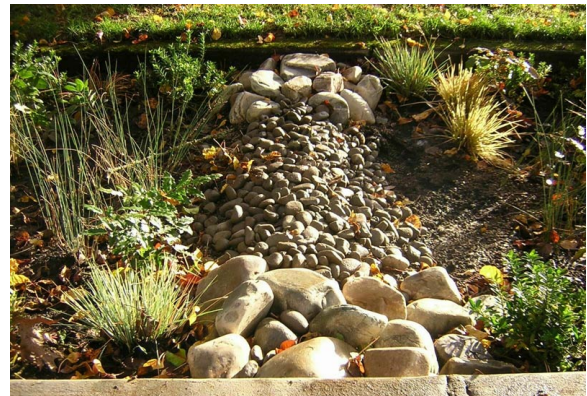
durable material. The number and spacing of check dams is largely dependent on the stormwater goal of a project and the particular site conditions. For green street and parking lot applications, slopes greater than 4% should have a check dam at least every 25 feet. In steeper conditions, checkdams will need to be placed at a greater frequency and may need to be made from the most durable hardscape materials to withstand the forces of the water.

Check dams may also be placed within swales and planters that have little or no longitudinal slope in order to promote infiltration. This should be done only where soil conditions are conducive to infiltration (Class A or B soils) or where there is an underdrain system installed in the stormwater facility.



SOURCE: NEVUE NGAN ASSOCIATES

**Figure 5-19:** This adjustable weir can control how much water is to be retained within a rain garden.



SOURCE: NEVUE NGAN ASSOCIATES

**Figure 5-20:** Simple checkdams made of stacked rocks or gravel can be used on gently sloped stormwater facilities.

