

2. Where an existing bridge or culvert can convey the design flow under pressure, it must be structurally sound and must be able to resist the resultant lateral and uplift forces.  
(Basis—SCVWD guideline)

#### D. Other Considerations:

1. Evaluate all bridges with debris loads on the piers. (suggest Corps practice of three times pier diameter as blockage)
2. Freeboard should also contain the flow defined by the 80 percent confidence

limit statistical parameter where practical to do so.

3. All channels with super-critical flow will use sequent depth plus freeboard.
4. All channels will include freeboard for super-elevation of water surface at curves in addition to requirements specified in Sections A, B, and C above.
5. In areas of the County where there is the possibility of continued land surface subsidence, additional freeboard allowances should be considered.

## GRADING OPTIONS NEXT TO STREAMS

### INTRODUCTION

The details in this Design Guide are intended to provide clarification to G&S V.A, which calls for all grading next to streams to address drainage and avoid the concentration of flow over the stream bank. For all major redevelopment and new development, grading should be addressed in stormwater permit provisions. The applicants will have to observe urban runoff pollution prevention regulations during grading operations. In addition, the following grading guidelines would also be useful to single family homeowners interested in minimizing erosion and saturation of the streambank and maintaining slope stability and riparian habitat.

### ADDITIONAL INFORMATION REQUIRED

In addition to the urban runoff pollution prevention regulations, permit applicants should also be asked to provide the following information:

- Existing trees that are to remain and those proposed to be removed
- The species of tree and its diameter at 4 feet from the ground
- Source of fill and hazmat certification

This will help in assess if the proposed grading method is the most appropriate for the site so as to avoid other impacts.

### OPTIONS FOR GRADING

This Design Guide provides 5 options of how to design grading. Any other proposal which satisfactorily meets the goals of preventing over-bank drainage and the placement of fill along the riparian protection area by future lot owners may be considered. The selection of a particular option will be influenced by a site's finished grades needed to provide for streets, building pads and positive drainage to the storm sewer system.

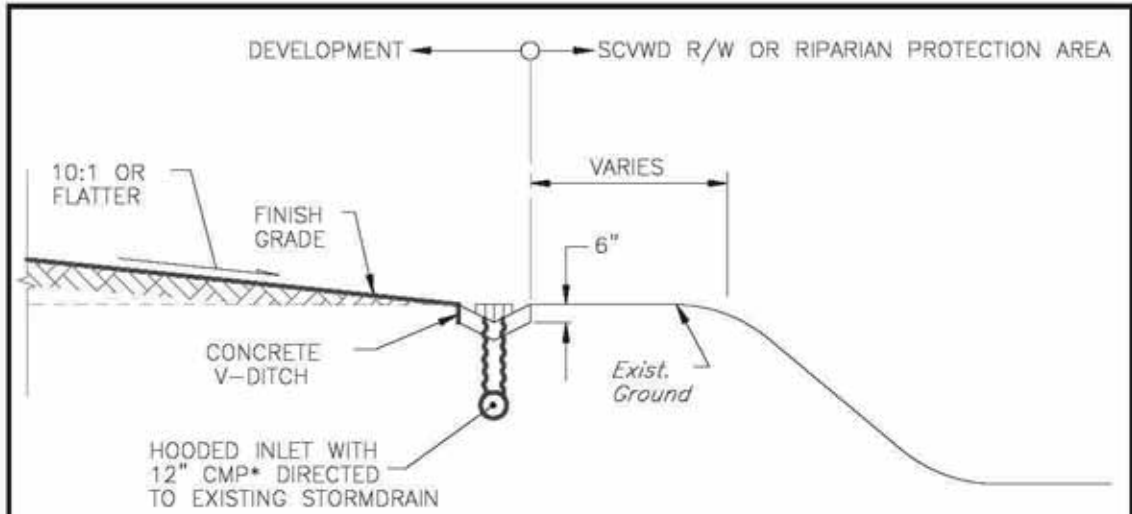
**Option #1 is the preferred option because it avoids disturbance to the riparian corridor and does not direct drainage over bank.**

In other cases, applicants might need to use one of the Options 2- 5, because of the need to raise the site elevation. Option 2 avoids disturbance to the riparian corridor and minimizes the drainage directed over bank. Options 3 and 4 are similar but more costly. Option 5 would only be suitable if there is no riparian vegetation and it conforms to adjacent property upstream and downstream. **Fill placed within the riparian area should be suitable for planting.**



## GRADING OPTIONS NEXT TO STREAMS

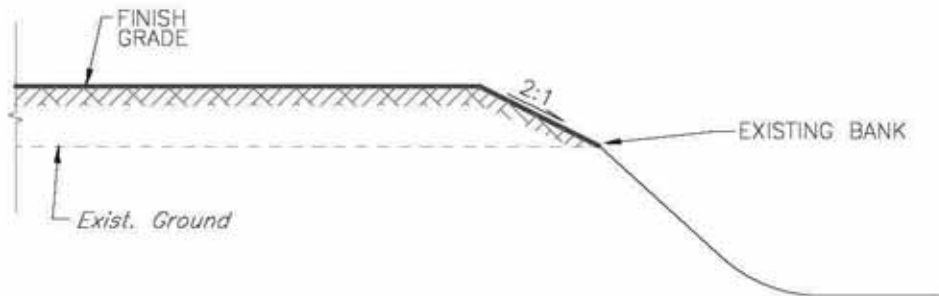
Option 5 is not the preferred option because placement of fill in riparian areas can damage stream side resources. If fill must be used in riparian areas, the type of fill used must support riparian vegetation and the area should be revegetated.



**14/5** DETAIL OPTION 4

\* CORRUGATED ALUMINUM OR STEEL PIPE

USE ONLY WHERE THERE IS NO RIPARIAN CORRIDOR



**14/4** DETAIL OPTION 5

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 Phone (408)265-2600

SCALE: N.T.S.

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### GRADING ADJACENT TO STREAMS

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# GRADING AND DRAINAGE

## Use of Vegetated Swales or Buffer Strips

### INTRODUCTION

The Guidelines and Standards Section V on Grading and Section VI on Outfalls and Site Drainage refer to the use of vegetated swales or buffer strips. A vegetated swale (a.k.a. grassed channel, dry swale, wet swale or biofilter) is a broad, shallow channel with a dense stand of vegetation designed to trap particulate pollutants (suspended solids and trace metals). Vegetated swales are fairly straight forward to design and can be easily incorporated into a project's site drainage plan. For all major redevelopment and new development, vegetated swales may be included in the stormwater permit; however, they are also a good practice for single family homeowners to consider incorporating in landscaping and design plans.

The benefits of using vegetated swales or buffer strips next to streams are that they:

1. Improve the quality of stormwater runoff and reduce or slow the velocity of runoff from hardened or paved areas
2. Allow for infiltration
3. Provide an opportunity for sediment and pollutants to be filtered and removed from the runoff.

The swales can be located within landscaped or turf areas and can collect runoff from patios, driveways, roof drains, parking lots. Discharge from the swale should be to a storm drain system, which will ultimately discharge to a stream.

### DESIGN ELEMENTS

- Gentle side slopes: 3 horizontal to 1 vertical slope maximum
- Minimal longitudinal slope: 1% to 2% recommended. If greater, install check dams to reduce velocity. Do not use swales on slopes greater than 6%
- Flowpath length: Minimum of 10 feet
- Bottom width: 2 to 8 feet. Consider access with mowing equipment if turf grasses are used.

### RECOMMENDED TYPES OF VEGETATION TO USE

There is a variety of vegetation, including trees, shrubs, groundcover and grasses that are suitable for periodic inundation. One goal is to select plants that will thrive at the site. Near streams, native plants and wetland vegetation are preferred to turf grasses as swale liners because they offer higher resistance to flow and provide a better environment for filtering and trapping pollutants from stormwater. However, turf grass, allowed to remain slightly high, can provide some benefits as well.

### MAINTENANCE

Turf maintenance consists of mowing and removal of grass clippings. Swales should be cleaned of any sediment accumulation and monitored for erosion with subsequent reseeding or replanting as necessary. Fertilizers should be applied before the rainy season to minimize conveyance of pollutants to the stream.