

Practice Note on Control of Visual Impact of Slopes

Avoid Large Slopes

1. Designers of Public Works projects should bear in mind that large slopes are expensive to construct and maintain. It is also difficult to finish them satisfactorily to blend with the environment. These slopes may sometimes be avoided or reduced in size by amending the project layout, or in some cases by the use of caverns to contain the development (eg. Stanley Sewage Treatment Plant).

Preserve Vegetation on Slopes

2. In order to reduce the visual impact of man-made slopes and improve the environment, designers should try to make the finished slopes look as natural as possible. Whilst, the main objective of a slope design is safety, it should also achieve a final sculptural form which fits into the general formation of the surrounding land so that, once completed, the modified new form appears to be a natural extension of the original.

3. One important consideration is to identify and preserve, wherever practical, mature trees existing on slopes and near their crests and toes. Whenever possible vegetation should be used as the primary surface protection for all engineered slopes in soil and weathered rock. Large areas of concrete or chunam should be avoided and the slope surfaces should be grassed by hydroseeding or turfing. Bearing in mind that grassed surfaces are not in themselves mature forms of vegetation in this sub-tropical region, initial hydroseeding or turfing should be followed up with the planting of seedling trees and shrubs. This may require specialist advice on the selection of species used so as to ensure the final vegetation composition will be stable, self generating and hence maintenance free. A suitable mix of selected shrub and tree seed may be added to the hydroseeding mix to promote tree growth. For slopes where trees are required to be established more quickly, it may be necessary to transplant healthy shrubs and trees after hydroseeding.

4. It may be difficult to grow grass on steep slopes. The maximum slope gradient for the establishment of grass will depend on the soil and runoff conditions at the particular location. This can be roughly assessed by observing other successfully grassed slopes in the vicinity of the proposed slope. Where the proposed slope is too steep to permit grassing, and Government land exists immediately beyond the slope, consideration should be given to further cutting or filling in order to reduce the slope to an angle suitable for grassing and seedling planting. In such cases, it would be necessary to take into account not only the extra cost of so doing but also the additional natural vegetation required to be removed and the resulting reduction in the amount of unallocated Government land available for other purposes.

5. Where it is not feasible to form the slope to a flatter angle, hydroseeding may still be possible if the slope is protected by an erosion control mat made from natural fibre or synthetic material and sometimes with an additional wire mesh cover. Another alternative is to provide a toe retaining wall and fill slope in combination with planting. In this case, the appearance of the retaining wall may need to be improved by a special finish or masonry facing to the concrete surface.

6. Hard surfacing is sometimes required on a slope by virtue of the nature of the slope material or its steepness. In this case, it may be possible to reduce the adverse impact on the

environment by planting trees in rings formed on the surface. Tree planting can provide screening to the hard surface, particularly at the base of a slope. Where tree planting is not possible, thought should be given to the use of creeping plants at the top and bottom of the slope and on berms in planters. The watering and maintenance requirements for these plants should be considered.

7. If tree felling is unavoidable, early consultation with the relevant departments (USD, RSD or AFD, as appropriate) is necessary.

Avoid the Use of Chunam or Shotcrete

8. The use of chunam or shotcrete on slopes should only be considered as a last resort and only after other techniques have been explored and found not practical. Consideration may be given to introduce some graphic or wall painting design on slopes where the use of chunam or shotcrete is unavoidable.

Improve Surface Treatment for Rock Slopes

9. Where a rock face is highly fractured or with closely spaced joints and needs restraint, wire mesh should be used where possible as it is less visually obtrusive than shotcrete. Large concrete buttresses and dentition areas on rock slopes should be provided with a suitable surface finish to reduce their visual impact. The use of masonry facing may be considered in order to blend with the natural rock face. Shotcrete should be avoided over the bottom 3m of a slope as this is the main area visible to passers-by. Stone pitching is aesthetically more pleasant. For large areas with a uniform surface finish, a design to break the monotony should be considered.

10. Whenever possible, in designing for the layout of a rock slope, a sufficiently wide verge at the toe of the proposed slope should always be allowed, to provide flexibility in cutting the slope to a flatter gradient in case the conditions of the materials in the slope turns out to be not as good as predicted. This will also provides space for construction of rock traps, planting beds or protective tree barriers should a highly fractured rock face be encountered.

Improve Detailing of Associated Features

11. Attention should also be paid to detailing and location of features such as surface channels, stairways, catchpits and drainage channels on slopes so as to minimise their visual impact. Concrete aprons on either side of channels, or in some cases complete drainage systems, can be designed using grasscrete, geotextiles or other bioengineering techniques. Stairways should be routed with care to minimize visual impact, with their widths reduced as far as possible and railings painted in sympathetic unobtrusive colours. Sharp edges to cuttings and other supporting structures should be rounded off to give a more natural appearance. Consideration should be given to appropriate slope contouring to avoid large monotonous "flat" slopes.

Related Information

12. Recommendations on the design and construction of the surface protection measures are given in Sections 8.4, 8.5 and 9.6 of the Geotechnical Manual for Slopes. Detailed specification for surface protective materials can be found in the General Specification for Civil Engineering Work, Hong Kong Government. Information on tree species suitable for slope planting can be found in the booklet "Tree Planting and Maintenance in Hong Kong", published by Information Services Department.
13. For the design of large scale projects such as major road cuttings, borrow areas and site formations, appropriate professional advice should be sought from landscape architects. The designer may have to strike a balance between the cost of the works and reducing any adverse environmental impact caused by the works. Where significant environmental impact could be involved DEP should be notified in accordance with Works Branch Technical Circular No. 14/92 (PELB TC No. 2/92).
14. Landscaping units currently exist in Highways, Architectural Services and Territory Development Departments. Other Works Departments without in-house expertise in landscaping should contact TDD for advice.
15. For slope works to be carried out within a country park, comments from Agriculture and Fisheries Department should be sought at an early stage to determine the acceptable range of surface treatment works on slopes in a given locality. In this regard, a high standard of visual quality is expected. In country parks, the use of vegetation for landscaping the slopes should always be the priority and the use of chunam or shotcrete on slopes should be avoided.
16. For slopes which may be used for recreational purposes, e.g. rock climbing or dry slope skiing, Urban Services Department or Regional Services Department, as appropriate, should be consulted.
17. Government projects are increasingly scrutinised by the Town Planning Board which may impose conditions governing slope treatment. The designer should make sure whether such conditions have been imposed by the Town Planning Board.