

Guidelines on the Use of Vegetation and Shotcrete Cover on Roadside Slopes

(A) **Slopes of Negligible Consequence-to-Life**

Shotcreting should not be applied on slopes of consequence-to-life Category 3 (along roads with low to very low traffic densities, e.g. Facility Groups 4 or 5), particularly in country parks or remote areas. Please refer to the maintenance manual of the slope for consequence-to-life category and consult Geotechnical Advisory Unit (GAU), HyD for geotechnical advice if in doubt.

(B) **Soil Slopes**

GEO Publication No. 1/2009 contains guidance on prescriptive application of suites of vegetation cover as slope surface protection to soil slopes up to an angle of 55 degrees (see the following table for summary), to be used in conjunction with other items of prescriptive measures recommended in this publication.

Prescriptive Use of Vegetation Cover for Soil Slopes

Slope Gradients	Erosion Control Measures	Types of Suitable Vegetation
Slope gradient $\leq 35^\circ$	Temporary degradable erosion control mat	Creepers, herbaceous plants, grass, shrubs and/or trees
$35^\circ < \text{slope gradient} \leq 45^\circ$	Long-term non-degradable erosion control mat	Creepers, herbaceous plants, grass, shrubs and/or trees
$45^\circ < \text{slope gradient} \leq 55^\circ$	Long-term non-degradable erosion control mat and wire mesh	Creepers, herbaceous plants, grass and/or shrubs

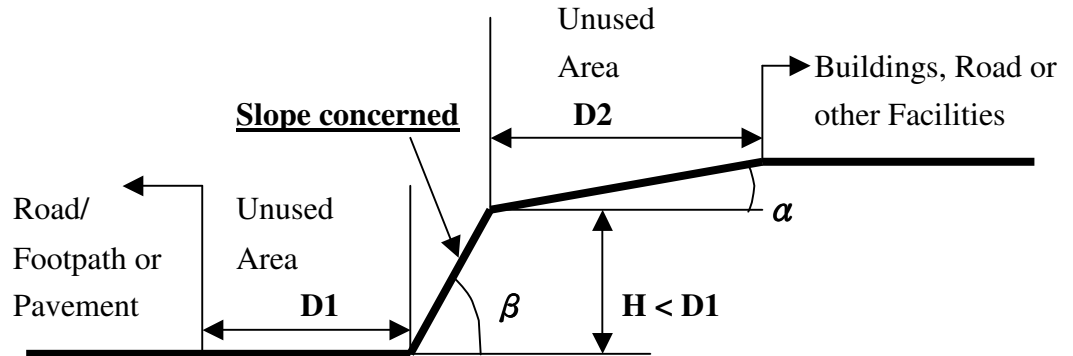
In particular **no shotcrete** should be applied in the following cases:

Case 1

All slopes with maximum height less than 3 m, which are below the Geotechnical Engineering Office (GEO) registration criterion for a slope.

Case 2

Slope height (**H**) less than offset distance (**D1**) from road at toe (see figure below)



Case 3

Slopes with an existing gradient (β) no more than 55 degrees and slopes where cutting back to 55 degrees is feasible, taking into consideration the potential traffic, land and environmental impact.

(The data **D2** and α are collected for consideration of the cutting back option.)

(C) **Rock Slopes**

Rock surfaces should generally be left exposed or protected with rock net. Highly fractured or open-jointed rock or small boulders on the soil surface can be covered with shotcrete if necessary. Guidance is given in para. 2 of Appendix A to WBTC No. 17/2000.

(D) Emergency Repair to Slopes after Landslip

Follow recommendations of the GEO.

(E) Vetting of Shotcreting Proposal

The following slope shotcreting proposals for both upgrading/maintenance works and capital works projects should be submitted to the Vetting Committee on Slope Appearance for endorsement :

- (a) First-time shotcreting of an existing or new slope; and
- (b) Renewal of existing old chunam or shotcrete cover (excluding emergency repairs after landslip, local repairs of defective areas and temporary slopes formed during construction activities).

(F) References

Works Branch Technical Circular No. 25/93 – Control of Visual Impact of Slopes

Works Bureau Technical Circular No. 17/2000 – Improvement to the Appearance of Slopes

GEO Publication No. 1/2009 – Prescriptive Measures for Man-made Slopes and Retaining Walls

Checklist for Proposed Surface Protection of Roadside Slopes

(* denotes Delete as appropriate)

1. New slope to be formed in capital works project (Yes/No)*.
If Yes, item nos. 2, 11 and 12 below are not applicable.
2. Cut/Fill Slope Registration No (GEO/HyD)* _____
3. Location _____
4. Slope within Country Park Area (Yes/No)* (Item A in Guidelines)
5. Consequence-to-Life Category (1 /2 /3) * (Item A in Guidelines)
6. Slope Height (H) from _____(m) to _____(m) (Case 1 of Item B in Guidelines)
7. Slope Angle (β) from _____(degree) to _____(degree) (Case 3 of Item B in Guidelines)
8. Road at slope toe (Yes/No)* (Case 2 of Item B in Guidelines)
 - (a) If Yes, road offset from slope toe (D1) by _____(m)
 - (i) Number of lanes on road _____
9. Buildings, Road or other Facilities at slope crest (Yes/No)* (Case 3 of Item B in Guidelines)
 - (a) If Yes, road offset from slope crest (D2) by _____(m)
10. Upslope angle (α) about (___degrees/ level/ falling back) * (Case 2 of Item B in Guidelines)
11. Condition of Existing Surface Protection
 - (a) Bare/ Grass/ Defective Chunam/ Defective Shotcrete *
12. Soil Nails already installed on slope (Yes/ No/ Don't know)*
13. Shotcreting recommended by Consultant (Yes/No) *

14. Slope can be cut back to 55 degrees if necessary

(Case 3 of Item B in
Guidelines)

- (a) Technically feasible (Yes/No) *
- (b) Traffic impact acceptable (Yes/No) *
- (c) Environmental impact acceptable (Yes/No) *
- (d) Land impact acceptable (Yes/No) *

15. Proposed Surface Protection on Soil Portion of Slope (circle from items below)

- (a) Vegetation with temporary degradable erosion control mat
- (b) Vegetation with long-term non-degradable erosion control mat
- (c) Vegetation with long-term non-degradable erosion control mat and wire mesh
- (d) Shotcrete
- (e) Other landscaping measures _____

16. Proposed Surface Protection on Rock Portion of Slope

(Item C in
Guidelines)

Joint spacing (> 60mm/ < 60 mm)*

(circle from items below)

- (a) Leave exposed
- (b) Rock Net
- (c) Shotcrete

Prepared by _____ **(Post** _____ **)**

Date : _____

Vetting Committee on Slope Appearance in HyD

Composition

- Chairman : RHE/U
- Members : Representatives from relevant slope maintenance and project offices
SGeoE from GAU for the relevant slope maintenance office
SLA from Landscape Unit for the relevant slope maintenance office
- Secretary : SE/Slopes, Urban Region

Terms of Reference

The Vetting Committee shall regularly review and endorse the following proposals for roadside slope upgrading/maintenance works and capital works projects in the relevant Offices (excluding emergency repairs after landslips , minor local repairs and temporary slopes formed during construction activities) :-

- (a) First time shotcreting of an existing or new slope; and
- (b) Renewal of an existing old chunam or shotcrete cover on a slope, excluding minor repairs of defective local areas (less than 30 m²).

Frequency of Meeting

As decided by the Chairman.

Submission

At least 10 working days before the meeting, the relevant Office shall circulate shotcreting proposals to members of the Vetting Committee. The proposals should include:

- (a) Slope location and layout plans;
- (b) Checklist on surface protection proposal (see Proforma at Appendix B above);
- (c) Colour photographs of concerned slope and surrounding area showing extent of proposed shotcreting and any landscaping measures (not for new slopes to be formed);
- (d) Consultant's recommendations (if any); and
- (e) Joint GAU/Region site inspection record (if any).

Urgent Cases

Subject to agreement by the Chairman, urgent shotcreting proposals in capital works projects may be endorsed by special circulation to Committee Members.