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## INTRODUCTION OF ECO-GREEN SYSTEM

Shotcrete is a commonly found slope surface erosion control treatment in Hong Kong. In recent years, with the increasing concern over environment, greening the shotcrete for the improvement of the environment in respect of scenery and quality of air becomes a hot topic. Not only improve of the visual appearance of a shotcrete slope, vegetation covers also help: (1) provide suitable habitats for birds and other small animals, (2) cool the city by reducing the urban heat island effect, (3) improve the air quality by reducing the rate of ground-level ozone formation, (4) reduce drainage system loads by assimilating large amounts of rainwater, and (5) absorb air pollution, collecting airborne particulates and storing carbon.

Nevertheless, it is impossible to establish a full vegetation cover on a shotcrete slope without providing a plant-growing medium. For the past few years, many slope greening techniques have been invented. Eco-Green System is the most convenient and cost-effective technique to provide a layer of a planting medium on the steep non-soil surface. By integrating the concepts of Bio-engineering, Geo-synthetic and Horticulture, this technique ensure the medium to be self-sustained on the steep slope; therefore, small shrub, creeper, and grass species can grow, reproduce and be fully established.



Yam O Tuk Fresh Water Service Reservoir. Eco-Green System was completed on 2004-04-21

## OBJECTIVES OF ECO-GREEN SYSTEM

### Supporting Diverse Vegetation Species

By spraying a layer of 50-mm thick Fiber Soil on the concrete slope, shallow root species (i.e. grass and creeper species) will be well established. In addition, the installation of Eco-Bags, which are durable synthetic perforated bags filled with Fiber Soil with the 300 mm thickness, will provide the adequate depth for most of the woody tree and shrub species to anchor. Successful establishment of the following Hong Kong native shrubs has been proved on the Eco-Green System applied on non-soil slopes.

Available species of native trees:



*Lagerstroemia indica*  
紫薇



*Mallotus paniculatus*  
白楸

Available species of native shrubs:



*Catharanthus roseus*  
長春花



*Gordonia axillaries*  
大頭茶



*Hibiscus rosa-sinensis*  
大紅花



*Mallotus paniculatus*  
白楸



*Melastoma sanguineum*  
毛稔



*Mussaenda pubescens*  
玉葉金花



*Phyllanthus emblica*  
油甘子



*Rhapsiolepi indica*  
車輪梅



*Rhododendron simsii*  
紅杜鵑



*Rhodomyrtus tomentosa*  
桃金娘

Available species of native herbs:



*Spathiphyllum kochii*  
白掌



*Hymenocallis americana*  
蜘蛛蘭

Available species of native climbers:



*Lonicera japonica*  
忍冬



*Parthenocissus himalayana*  
爬牆虎

Available species of native creepers:



*Wedelia trilobata*  
三裂葉蟛蜞菊



*Desmodium styracifolium*  
假花生

Available species of native ferns:



*Nephrolepis exaltata*  
劍蕨



*Selaginella uncinata*  
翠雲草(綠絨草)

### **Self-Sustainable Ecosystem**

The key objective of the Eco-Green System is mainly to establish a self-sustainable ecosystem on the concrete or rock slope. In the Eco-Green System, grass, climbers and native shrubs on the slope serve as the primary producers to generate new biomass using solar energy and inorganic nutrients. On one hand, they provide food and habitats for insects, birds, or other animals. On the other hand, their detritus (i.e. fallen leaves) supports decomposers (micro-organisms), which recycle inorganic nutrients for the vegetation in the next growing season.

### **Surface Erosion Control on Soil Slopes**

With the installation of high strength galvanized PVC coated wire mesh, which is fixed by an individual anchor at about 1,000 mm c/c and acting as the turf reinforcement mat, the sprayed layer of the Organic Fiber Soil will be reinforced and self-sustained on any slope surface. Therefore, the underneath in-situ earth materials can be protected from thermal weathering and surface erosion by the permanent vegetation cover.

## ADVANTAGES OF ECO-GREEN SYSTEM

### Long Durability of Engineering Materials

The Eco-Green System is designed to be fixed with numerous small units of individual anchors; therefore, the bulging effect and stress failure can be eliminated. The layer of the organic Fiber Soil is made up of the natural vegetation fiber, and is very light in weight, i.e.  $350 \text{ kg/m}^3$ . High porosity of the Fiber Soil can enhance the growth of rooting system and further reinforce the Fiber Soil to prevent erosion.

For the past six years, there have been 4 times of Black Rainstorm Warning Signal (with over 100mm rainfall per day) and 11 times of Storm of Gale Signals with No. 8 or above in Hong Kong. Even after these adverse weather conditions, the Fiber Soil of the Eco-Green System could still sustain on steep non-soil slopes.

### Long Lasting Nutrient Availability in Fiber Soil

The layer of Fiber Soil consists of more than 50% of organic matter, which is an enriched vegetation for the establishment. In the mature stage of the vegetation system, the dead tissue of the mature plant will be decomposed into the soil layer and become part of the nutrient cycle in the system itself. Total concentrations of Nitrogen Phosphorus and Potassium in Fiber Soil were fairly stable thru out six years after completion. This can save up the annual application of fertilizer.

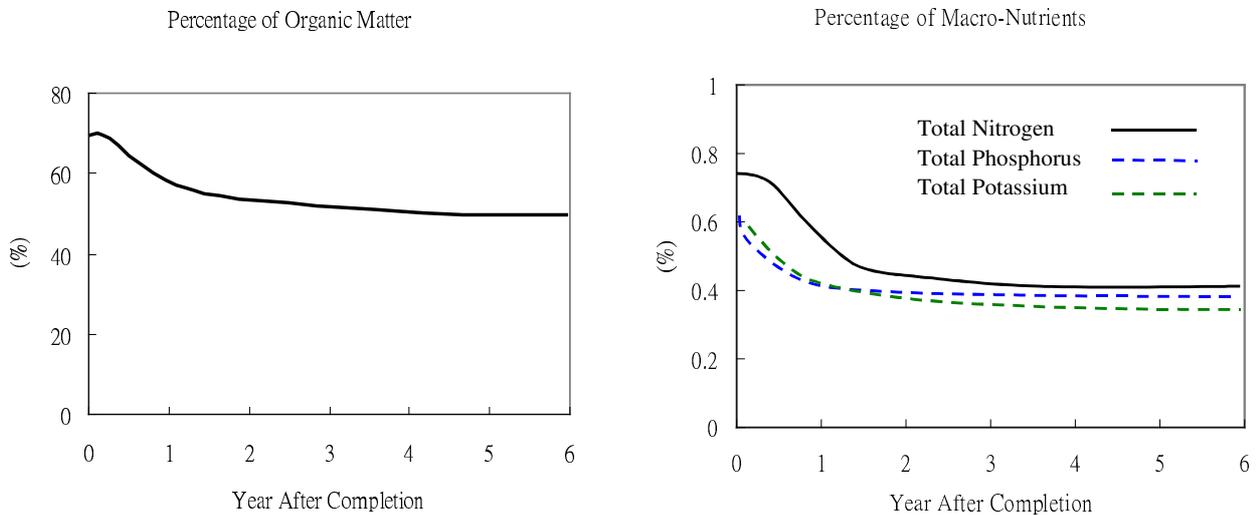


Figure 1a&b. Percentages of organic matter and macro-nutrients in Fiber Soil over time.

## **Low Maintenance with Evergreen Performance**

The Fiber Soil contains more than 95% of natural organic fiber, which is a good moisture-retaining agent. The moisture can be kept inside the system to support the growth of vegetation even during dry seasons. The layer of Fiber Soil consists of various types of organic and inorganic moisture retaining agents for the establishment of broad leaf plants. Once the vegetation system is established, the soil surface will be fully protected from intensive evaporation due to sunlight and strong wind. Watering is usually not necessary in summer seasons; however, monthly watering is suggested to maintain evergreen performance, especially during dry winters when there is no rainfall for more than 30 consecutive days.

Eco-Green System on two slopes near Yam O Tuk Freshwater Service Reservoir

Slope 3



2004-09-22

Slope 4



2004-09-22



2005-03-10



2005-03-10

## **High Flexibility of the Materials**

The Eco-Green System can be applied on steep slopes with almost any surface conditions. The turf reinforcement mat is flexible that can be applied on the uneven slope surface or the slope with high density of existing trees.



Eco-Green System was applied slope with the gradient about 75° near Penny's Bay Gas Turbine Power Station.



The Fiber Soil, after being mixed with water, fertilizers and seeds, was sprayed by using a high-powered air compressor to as far as 100 meters horizontally and 50 meters vertically. The flexibility of this technique not only makes the Eco-Green System applicable onto remote and elevated locations, but also minimizes the disturbance to the surrounding residents.



*Energy Generator*



*Mixing Yield*

### **Reduced “Heat Island Effect” \***

Eco-Green System is an effective vegetation system that can reduce “Heat Island Effect”. Since Eco-Green System is allowed to plant different kinds of shrubs and whips species, which can increase the rate of photosynthesis to the atmosphere.

#### **\* What is the Heat Island Effect?**

On hot summer days, urban air can be up to 10°F hotter than the surrounding countryside. Not to be confused with global climate change, scientists call this phenomenon the "heat island effect." Heat islands form as cities replace natural land cover with pavement, buildings, and other infrastructure.

## Particular Preambles for Standard Method of Measurement

### Eco-Green System

The units of measurement should be:

- (i) Eco-Green System.....square meter
- (ii) Establishment Work.....square meter

The measurement of Eco-Green System should be the surface area of the slope vegetated. No allowance should be made for surface irregularities or other local peculiarities. No deduction should be made for opening of size one square meter or less.

Separate items should be provided for works in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I.	Eco-Green System
II	Establishment Work.

The items for Eco-Green System should, in accordance with General Preambles paragraph 2, include :

- (a) preparation of surface;
- (b) supply and install Eco-Bag;
- (c) supply and install 3-dimensional turf reinforcement mat;
- (d) supply and install fertilizer strip;
- (e) installation of root hole with planter tube for climber sprig;
- (f) supply and spray the fiber soil with grass seed mix;
- (g) supply and plant creeper by plug planting;
- (h) supply and plant shrubs;
- (i) supply and install erosion control mat with iron staple.

The items for establishment work should, in accordance with General Preambles paragraph 2, include :

- (a) watering;
- (b) fertilizing;
- (c) insect and pest control;
- (d) grass cutting;
- (e) Pruning
- (f) reseeding where the grass fails to establish.

# Particular Specification of Eco-Green System

## GENERAL

General Requirement 1.01 Eco-Green System is a vegetation treatment to the non-soil surface of slope such as shotcrete, no fine concrete, concrete buttress, bed rock or chunam with slope gradient not more than 75°. It should be carried out at locations as shown on the drawings or as directed by the Engineer.

The Hong Kong sole agent for this method is Toyo Greenland Company Limited at No. 58, South Section, Wah Shan Village, Sheung Shui, N.T.  
(Tel. No.: 2639 9312 Fax. No. 2377 2150)

List of Approved Suppliers of Materials and Specialist Contractors 1.02 If the Contractor is not included in the “ List of Approved Suppliers of Materials and Specialist Contractors for Public Works” maintained by the Employer for :-  
Landscaping Class II – Hydroseeding – Group II

Then he should enter into written sub-contractors with approved listed contractors, in the relevant Group, for the execution of respective part of the Works.

## MATERIALS & EQUIPMENT

Turf Reinforcement Mat 2.01 It should be pvc coated rhombus galvanized wire mesh with diameter 2.5 mm, 50 mm/50 mm rhombus opening and 30 mm thickness when it is spread.

Auxiliary Anchor 2.02 It should be galvanized mild steel with 16 mm diameter and 400 mm length.

Subanchor 2.03 It should be galvanized mild steel with 8 mm diameter and 200 mm length.

Seeds 2.04 Grass seeds are imported in terms of species, varieties and purity. The origin of seed and the name of the supplier should be stated on the container or packing.

(1) The quality of grass seed should be gauged by purity, germination percentage and freedom from weeds. The total weed seed content should not exceed 0.5% by total mass and the total content of other crop seeds should not exceed 1% by total mass.

(2) The application rate for the Eco-Green work should be as follows :

<u>Species</u>	<u>Application Rate</u>
Bermuda grass ( <i>Cynodon dactylon</i> )	15 gram/m <sup>2</sup>
Bahia grass ( <i>Paspalum notatum</i> )	10 gram/m <sup>2</sup>
Other seed may be selectively added as requested	

Fiber Soil 2.05 (1) The fiber soil should be the Soil-Factor, or equivalent material, supplied by Toyo Greenland Company Limited. It should be excellent in gas permeability and water-retaining capacity, and can maintain fertilizer for a long period of time. Besides, it should be strong resistance to drying and rain erosion. High alkaline content material should not be used as bonding agent. The fiber soil consists of the following ingredients:

<u>Ingredients</u>	<u>Application Rate (per m<sup>3</sup>)</u>
(a) High grade Peatmoss	600 litre
(b) Wood chip compost	400 litre
(c) Chemical fertilizer (N:P:K = 13:3:11)	0.4 kg
(d) Chemical fertilizer (N:P:K = 4:17:4)	1.2 kg
(e) Perlite powder	4.0 kg
(f) Acrylic polymer granules	0.1 kg
(g) Bonding agent	9.0 kg
(h) Germination stimulator	1.0 kg

(2) The properties of the fiber soil are:

(a) pH value	6.0 to 7.5
(b) Moisture content	30 % to 35 %
(c) Organic matter content (dry weight)	50 % to 90 %
(d) Organic Carbon content (dry weight)	40 % to 60 %
(e) Total Nitrogen content (dry weight)	0.1 % to 1.5 %
(f) Carbon : Nitrogen ratio	35:1 to 50:1
(g) Dry density	400 kg/m <sup>3</sup> to 450 kg/m <sup>3</sup>
(h) Saturated density	350 kg/m <sup>3</sup> to 400 kg/m <sup>3</sup>

Eco-Bag 2.06 The Eco-Bag is supplied by Toyo Greenland Company Limited or others of equivalent materials. It is a uv-light resistance pvc netting bag and filled with fiber soil.

Erosion Control Mat 2.07 Erosion Control Mat should be made with approved coir mesh or equivalent materials. It should be natural coir fiber product and should not be degraded within 5 years after application or until the specified grass cover has been established.

Fertilizer Strip 2.08 Fertilizer strip or equivalent material is supplied by Toyo Greenland Company Limited. It should be a double-layer non-woven strip, which filled with approved slow-released fertilizer and water retaining agent.

Creeper Sprig 2.09 The creeper sprig should not be more than 150 mm long, but with more than 1 number of healthy nodes.

Planter Tube 2.10 It should be perforated pvc tube with 170 mm long and approx. 32 mm in diameter which filled with topsoil, post-planting fertilizer, moisture retaining crystal and 2 numbers of creeper sprig.

Spraying Machinery 2.11 The spraying machinery should be a wet spraying machinery which should be verified by the material supplier in order to facilitate the spraying of fiber soil.

Water and fiber soil ingredients should be readily mixed before loading into the spraying machine.

## MATERIALS SUBMISSION

- |                                |      |   |
|--------------------------------|------|---|
| Submission                     | 3.01 | The following particulars of the proposed materials for Eco-Green System and establishment works should be submitted to the Engineer, not less than 14 days before the commencement of works.   |
| Particulars of Seed Mixture    | 3.02 | <p>A certificate or a numbered seed analysis report for each seed mixture issued within 6 months before the date of use of the seed showing the species and variety of the seed, the date of testing and including results of tests :</p> <ul style="list-style-type: none"> <li>(a) Percentage of germination of pure seed in a fixed period of time under standard laboratory conditions</li> <li>(b) Percentage of composition by weight, including details of impurities</li> </ul>   |
| Test Report of Fiber Soil      | 3.03 | <p>A test report of fiber soil issued within 6 months before the date of use should include details of the composition and results of test for :</p> <ul style="list-style-type: none"> <li>(a) pH value</li> <li>(b) Total organic matter</li> <li>(c) Moisture content</li> <li>(d) Carbon/Nitrogen ratio</li> <li>(e) Dry density</li> <li>(f) Saturated density</li> </ul>  |
| Particulars of Other Materials | 3.04 | <p>The following particulars of the proposed materials and method statement of Eco-Green System should be submitted to the Engineer :</p> <ul style="list-style-type: none"> <li>(a) Species and rate of application of grass seed and creeper sprig</li> <li>(b) Type and rate of application of water retaining agent, fertilizer and bonding agent</li> <li>(c) Detail of turf reinforcement mat, fertilizer stripe, Eco-bag anchor and subanchor</li> <li>(d) Type and detail of erosion control mat</li> <li>(e) Details of the company employed to carry out the hydromulching System. The company should provide at least 3-year local job reference of projects, which proved to be successful with all year round self-sustained vegetation.</li> <li>(f) Details of the equipment to be used</li> <li>(g) Details of the mixing yard</li> </ul> |
| Samples of Materials           | 3.05 | (1) Samples of the following proposed materials should be submitted to the Engineer at the same time as particulars of the material are submitted:  |

<u>Samples</u>	<u>Quantity</u>
(a) Fiber Soil	100 litre
(b) Fertilizer Strip	500 mm
(c) Turf Reinforcement Mat	1 sq. feet
(d) Eco-Bag	1 no.
(e) Auxiliary Anchor	1 no.
(f) Subanchor	1 no.
(g) Erosion Control Mat	1 sq. feet

- (2) Samples of materials for Eco-Green System and the program of establishment works should be inspected and approved by the Engineer before the delivery of material to the site

## METHOD STATEMENT

Preliminary	4.01	The method statement and procedure of work should be read in conjunction with the detail of the drawing or as requested by the Engineer. All provisional works should be scheduled according to the different gradients and surface conditions of slopes according to the instruction of Engineer.
Ground Cleaning	4.02	Weeds, rubbish, litter, stones exceeding 50 mm diameter and all deleterious material should be removed from the surface of the ground. Vegetation should be cleared without using herbicide unless permitted by the Engineer. If permitted, the herbicide should be a proprietary type approved by the Engineer and should be applied in accordance with the manufacturer's recommendation.
Fixing of Eco- Bag	4.03	The Eco-Bag filled with fiber soil will be fixed in row or stagger type by using pvc coated galvanized wire string and subanchors.
Fixing of Turf Reinforcement Mat	4.04	<ol style="list-style-type: none"><li>(1) Fixing of turf reinforcement mat, anchor and subanchor.</li><li>(2) The auxiliary anchor should be fixed at a minimum of 1,000 mm c/c along the crest of the slope.</li><li>(3) Minimum 50 numbers of subanchors should be fixed in every 100 m<sup>2</sup> of area.</li></ol>
Installation of Fertilizer Strip	4.05	<ol style="list-style-type: none"><li>(1) The double layer non-woven fertilizer strip filled with slow-released fertilizer and water retaining agent.</li><li>(2) The fertilizer strip should be inserted horizontally into wire mesh at approximate 500 mm c/c.</li></ol>
Extension of Weep Hole	4.06	If there is weep hole and ranking drain on the slope, it should be extended 100 mm further with similar material in order to avoid blocking of outlet after hydromulching.
Installation of Root Hole	4.07	The root hole should be drilled at approximate 32 mm diameter and 200 mm depth by mechanical or electricity drill. The pvc perforate planter tube will then be inserted into the root hole after the completion of spraying work.
Hydromulching	4.08	<ol style="list-style-type: none"><li>(1) The fiber soil should be mixed with seed and water in an appropriate proportion.</li><li>(2) The mixture will be sprayed by wet spraying machinery onto the surface until reaching thickness of at least 50 mm or covering the thickness of turf reinforcement mat.</li><li>(3) Walking on the area that have been hydromulched should be restricted to access unless the fixing protective fabric or the work of patching</li></ol>

Installation of Erosion Control Mat	4.09	<p>The Erosion Control Mat should be laid and fixed with iron staple on the surface of fiber soil layer with anchor at approximate 1,000 mm c/c.</p> <p>The overlapping of the mat should not more than 50 mm in order to prevent the interruption of the growth of vegetation under the mats.</p>
Pit planting on Eco-Bag	4.10	Excavate a planting pit on the Eco-Bag. Pre-planting fertilizer and water retaining agent should be added to the planting pit. Then the plant should be placed vertically in the pit and adjusted to the required depth and orientation of the crown.
Planting of Creeper Sprig	4.11	<p>(1) Creeper sprig will be planted by hand plugging at 500 mm c/c if no planter tubes are installed.</p> <p>(2) 1 number of well established planter tube will installed into the root hole for the work applied on the shotcreted slope.</p>

### **ESTABLISHMENT WORKS**

Establishment Works	5.01	<p>(1) Establishment works should be carried out for the period stated in the Contract and in accordance with Clauses 5.04 to 5.06.</p> <p>(2) All necessary measures should be taken to ensure that grass and ground cover become well-established and to keep the area tidy and free from litter and rubbish.</p>
Inspection of Establishment Works	5.02	An inspection of Eco-Green work and the establishment works should be carried out jointly by the Contractor and the Engineer at monthly intervals when required. The Engineer should instruct the Contractor to carry out establishment works when necessary; the work instructed should be completed within 14 days after the date of the Engineer's instruction.
Replacement of Vegetation	5.03	Vegetation coverage of 90% of the area should be achieved at the end of the period for establishment works. The vegetation should be healthy and free from weeds. Areas which are considered unsatisfactory by the Engineer should be reseeded by hydroseeding as stated in General Specification.
Watering	5.04	<p>(1) Fresh water should be used for watering for Eco-Green System. Water should be applied using a hose or any type of sprinkler agreed by the Engineer and in such a manner that compaction, washout of loosening material will not be caused; any damage caused should be made good immediately.</p> <p>(2) After spraying, watering should be carried out every 7 days. The minimum requirement for watering should be 10 litres/m<sup>2</sup>. The Contractor may apply for the Engineer's agreement for relaxation of the requirements in the event of heavy rainfall.</p> <p>(3) Watering should be conducted until the vegetation is satisfactorily established.</p>
Grass Cutting	5.05	(1) The inspection of grass cutting should be carried out twice a year at 5th month and 11th month after completion of work.

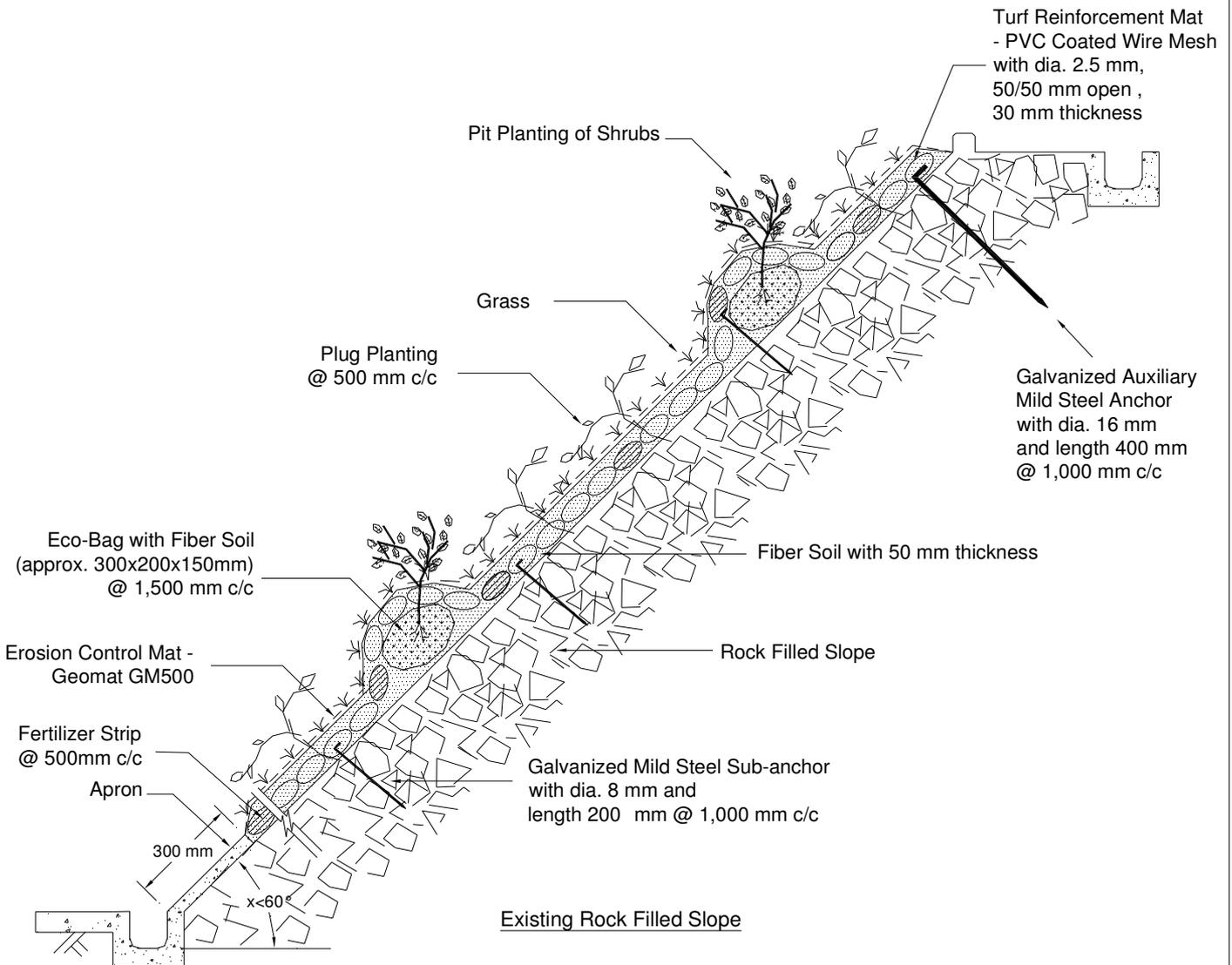
- (2) Grass should be trimmed along the boundary of hydromulched area, if the climber spread outside the hydromulched area more than 500 mm.
  - (3) Grass shall be reduced by cutting to a height of 100mm when it reaches 300 mm height.
- Control of Pests and Fungi    5.06    Pesticide or fungicide should be applied in accordance with the manufacturer's recommendations to control pests and disease.
- Completion of Work    5.07    Immediately before the end of the period for establishment works :
- (a) all planted and grassed areas should be free from litter;
  - (b) all replacement and patching up of vegetation should be completed;
  - (c) all vegetation edges trimmed..

## **TESTING OF VEGETATION COVERAGE**

- Testing of Vegetation Coverage    6.01    (1) Tests should be carried out to determine the vegetation coverage. The tests should be carried out 100 days after grassing and at the end of the period for establishment works. The vegetation should be cut to a height of 300 mm if necessary over the parts of the area to be tested.
- (2) The number of tests should be instructed by the Engineer
  - (3) Tests should be carried out at location which is chosen by the Engineer to represent the grassed area as a whole. At each test location an approximate area of 10 m<sup>2</sup> should be marked.
- Compliance Criteria of Vegetation Coverage    6.02    At least 90% of each test area should be covered with vegetation unless the existing gradient of the slope is greater than that from design, or it is a shaded area which is not suitable for vegetation growth.
- Non-compliance of Vegetation Coverage    6.03    If the result of any test for vegetation coverage of Eco-Green System works does not comply with the specified requirements for vegetation coverage, the area should be rehydroseeded or reseeded as stated in General Specification, depending upon the size of the defective area, as instructed by the Engineer.

## Summary of Job Reference - Eco-Green System

<u>Project</u>	<u>Description of Work</u>	<u>Main Contractor / Subcontractor</u>	<u>Client</u>	<u>Consultant / Landscape Architect / Architect</u>	<u>Completion Date</u>
Contract No.: DC/99/01 Drainage Maintenance and Construction in Mainland South Districts (2000-2002) Jordan Valley Nullah	Toyo-Mulching System on Sprayed Concrete Slope - 1,800 sq m Geomat - 1,800 sq m Eco-Bag	Hung Mau Realty & Construction Ltd.	Drainage Services Department	Drainage Services Department	December 2002
Contract No.: GE/2002/17 LPM Project, Phase 2, Package G	Hydroseeding - 21,392 sq m Planting Planter Tube Eco-Green on Rock Slope - 200 sq m Toyo-Mulching on Concrete Slope - 300 sq m	Hsin Chong Construction Co., Ltd.	Geotechnical Engineering Office	Halcrow China Ltd. Urbis Ltd.	October 2004
Contract No.: EP/SP/28/95 Upgrading Works for the Shortcrete Surfacing Slope at Sai Tso Wan Landfill	Toyo-Mulching System on Sprayed Concrete Slope - 2,459 sq m Eco-Green System on Concrete Slope - 1,000 sq m	Hong Kong Landfill Restoration Group Ltd.	Environmental Protection Department	Maunsell Environmental Management Consultants Ltd.	August 2003
Contract No.: GE/2002/05 10-Year Extended Landslip Preventive Measures Project, Phase 2, Package D	Hydroseeding - 55,000 sq m Planter Tube Eco-Green on Shotcreted Slope	Yick Hing Construction Co., Ltd.	Geotechnical Engineering Office	Binnie Black & Veatch Hong Kong Ltd.	December 2004
Contract No.: 33/WSD/00 Construction of Yam O Tuk Fresh Water Services Reservoir and Associated Works	Eco-Green System on Rockfill Slope - 1,070 m <sup>2</sup>	Chun Wo Construction & Engineering Co., Ltd.	Water Supplies Department	N.A.	May 2004
Contract No. HC068-02132 HKU - Flora Ho Sports Centre	Toyo-Mulching System - 742 sq m Eco-Bag	Hanison Construction Co., Ltd.	Hong Kong University	ADI Ltd.	June 2005
Contract No. GE/2003/23 10-Year Extended LPM Project Phase 3 - Package E LPM for slopes in Central & Western and Wanchai	Eco-Green System 694 sq m	Barbican Construction Co., Ltd.	Geotechnical Engineering Office	C. M. Wong & Associates Ltd.	January 2005
Contract No. TK60/30 Tseung Kwan O Development	Hydromulching System 2,747sq m Supply and Installation of Eco-Bag	Barbican Construction Co., Ltd.	Civil Engineering and Development Department	Maunsell Consultants Asia Ltd.	April 2006
Contract No.: 1/WSD/03/(H) Aberdeen Catchwater Slope Feature No. 11SW-D/F448	Eco-Green System 80 sq m Geo-Net	Chun Wo Construction and Engineering Ltd.	Water Services Department	Maunsell Consultants Asia Ltd.	December 2006



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Project:



Toyo Greenland Co., Ltd.

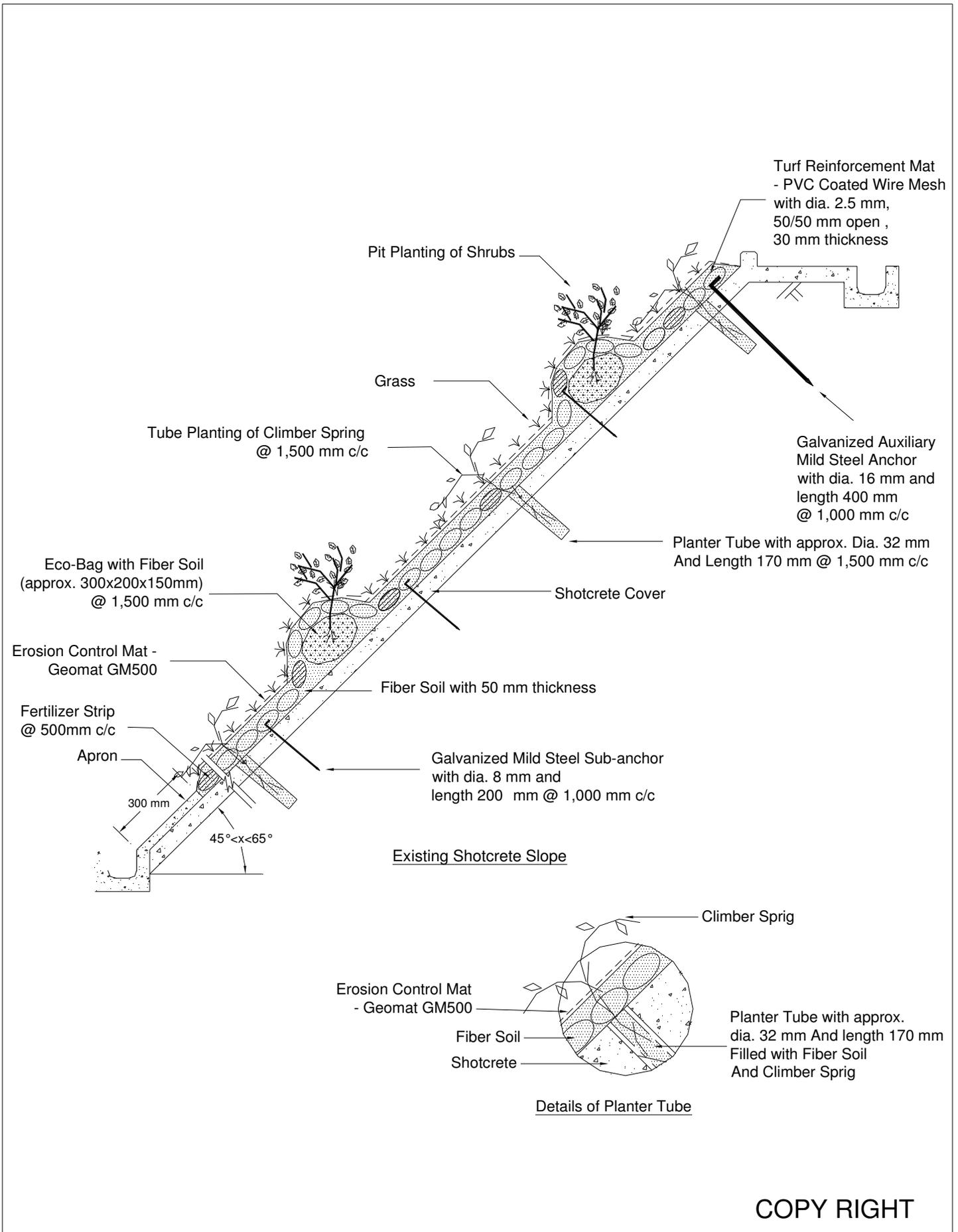
Drawing Title: Typical Section Details of Eco-Green System on Rock Filled Slope

Check : Ho Tat Pui, Daniel

Scale : N.T.S.

Ref.:

Date: 20 January 2005



Typical Section Details of Eco-Green System on Shotcrete Slope	 <b>Toyo Greenland Co., Ltd.</b>	
	Check : Ho Tat Pui, Daniel	Scale : N.T.S.
	Ref.:	Date: 18 January 2005