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Particular Specification of Eco-Bag System

GENERAL

General Requirement 1.01 Eco-Bag System is vegetation treatment to the non-soil surface of slope. It shall 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 I – General Landscape – Group II
Landscaping Class II – Hydroseeding – Group II,

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

MATERIALS & EQUIPMENT

Existing Wire Mesh 2.01 It should be galvanized and PVC coated double twisted wire mesh with diameter 2.2 mm, 80 mm x 60 mm or Engineer approved type.

Binding Wire 2.02 It should be galvanized and PVC coated binding wire with diameter 2.2 mm or Engineer approved type.

Fiber Soil

- 2.03 (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 drought 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 m³)</u>
(a) High grade Peatmoss	600 Liter
(b) Wood chip compost	400 Liter
(c) Chemical fertilizer (N:P:K = 13:3:11)	0.36 Kg
(d) Chemical fertilizer (N:P:K = 4:17:4)	1.19 Kg
(e) Perlite powder	4.02 Kg
(f) Acrylic polymer granules	0.05 Kg
(g) Bonding agent	9.3 Kg
(h) Germination stimulator	1 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 ³ to 450 kg/m ³
(h) Saturated density	350 kg/m ³ to 400 kg/m ³

Vegetation

- 2.04 (1) Choice of vegetation should be of good and consistent quality. Only known cultivars with documented proven performance should be used.
- (2) Vetiver grass should use top quality of container-plants. Container-plants should meet the following specifications:

The size of the containers for the container-plants should be 150 mm

diameter and 75 mm long.

The container-plants should have active roots, which are regenerated in the container media. This root mass should be enmeshed in the potting media. Any plants with aged roots should be rejected.

The top should be cut to a height of 23-30 cm before deliver to the site.

The tops should have 5 or more actively growing tillers, which have been regenerated and produced in-situ in the container. Old tillers extracted from the ground nursery should not be included in the count.

- (3) The ground cover sprig should not be more than 150 mm long, but with more than 1 number of healthy nodes.
- (4) The climber should be grown and supplied in a container at least 75 mm diameter and 125 mm deep.

Eco-Bag 2.05 Eco-Bag, or other equivalent materials, should be supplied by Toyo Greenland Company Limited. It is a UV-resistant Polyethylene bag with texture opening approx. 2mm x 10mm and filled with Fiber Soil.

MATERIALS SUBMISSION

Submission 3.01 The following particulars of the proposed materials for Eco-Bag System and establishment works shall be submitted to the Engineer, not less than 14 days before the commencement of works.

Test Report of Fiber Soil 3.02 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:

- (1) pH value
- (2) Moisture content
- (3) Carbon/nitrogen ratio
- (4) Dry density
- (5) Saturated density

Particulars of Other Materials 3.03 The following particulars of the proposed materials and method statement of Eco-Bag System shall be submitted to the Engineer.

- (1) Species and rate of application of ground cover sprig
- (2) Type and rate of application of water retaining agent, fertilizer and bonding agent
- (3) Details of wire mesh, binding wire
- (4) Details of the company employed to carry out the works of Eco-Bag System

Samples of Materials 3.04 (1) Samples of the following proposed materials shall 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	10 litre
(b) Binding Wire	1 m
(c) Eco-Bag	1 no.

- (2) Samples of materials for Eco-Bag System and the program of establishment works should be inspected and checked by the Engineer on the site before the delivery of material.

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.

Slope Cleaning 4.02 Weeds, rubbish, litter, stones exceeding 50 mm diameter and all deleterious material shall be removed from the surface of the slope. Vegetation shall be cleared without using herbicide unless permitted by the Engineer. If permitted, the herbicide shall be a proprietary type approved by the Engineer and shall be applied in accordance with the manufacturer's recommendation.

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| Fixing of Eco- Bag | 4.03 | <ul style="list-style-type: none"> (1) Setting out the locations for placing Eco-Bag (vertical spacing 1 m x horizontal spacing 800 mm c/c). (2) Cut the rock mesh in the marked locations with cutter in horizontal line of width approximately 600 mm. (3) Place the Eco-Bag with vegetation to the opening and fixed in the rock mesh with at least 3 nylon cable ties. (4) Use diameter 2.2 mm galvanized and PVC coated binding wire or Engineer approved wire to lace the cut opening. |
| Planting of Vegetation | 4.04 | <ul style="list-style-type: none"> (1) Fiber Soil should be added to the Eco-Bag. (2) Then the Vetiver grass should be placed vertically in the pit and adjusted to the required depth. (3) 2 numbers of <i>Parthenocissus himalayanan</i> will be planted into the Eco-Bag. (4) 2 numbers of <i>Wedelia trilobata</i> sprig will be sprigged into the Eco-Bag. |

ESTABLISHMENT WORKS

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| Establishment Works | 5.01 | <ul style="list-style-type: none"> (1) Establishment works shall be carried out for the period stated in the Contract and in accordance with Clauses 5.04 to 5.05. (2) All necessary measures shall be taken to ensure that grass become well-established and to keep the area tidy and free from litter and rubbish. |
| Inspection of Establishment Works | 5.02 | An inspection of Eco-Bag System work and the establishment works shall be carried out jointly by the Contractor and the Engineer at monthly intervals when required. The Engineer shall 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 | The rate of survival of Vetiver grass should be 90% or better in 2 weeks after planting. All failures should be reinstated within the first month after planting. |

All slow growing clumps that do not recover from transplanting disturbance should be replaced within the third month after planting.

The vegetation shall be healthy and free from other weeds.

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| Control of Pests and Disease | 5.04 | Pesticide or fungicide shall be applied in accordance with the manufacturer's recommendations to control pests and disease if necessary. |
| Completion of Work | 5.05 | Immediately before the end of the establishment works period:
(1) All planted and grassed areas shall be free from litter;
(2) All replacement and patching up of vegetation shall be completed, |

TESTING OF VEGETATION COVERAGE

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| Testing of Vegetation Coverage | 6.01 | Tests shall be carried out to determine the vegetation coverage. The tests shall be carried out 90 days after planting. More than 99% of Vetiver grass should be actively grown and healthy. |
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The tests shall be carried out 180 days after planting. All clump of Vetiver grass should have 5 or more active growing tillers produced at the site.

The tests shall be carried out 365 days after planting. All clump of Vetiver grass should have 12 or more active growing tillers produced at the site.

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| Non-compliance of Vegetation Coverage | 6.02 | If the result of any test for vegetation coverage of works does not comply with the specified requirements for vegetation coverage, the plant shall be replaced in accordance with clauses 4.05 - 4.06 as instructed by the Engineer, depending upon the size of the defective area. |
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Particular Preambles for Standard Method of Measurement

Eco-Bag System

The units of measurement shall be:

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

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

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

Group	Feature
I.	Eco-Bag System
II	Establishment Work

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

- (a) Preparation of surface;
- (b) Supply and install Eco-Bag with fixing system in accordance with the Particular Specification and Drawing;
- (c) Supply and planting of vegetation.

The item for establishment work shall, in accordance with General Preambles paragraph 2, include:

- (a) Watering;
- (b) Fertilizing;
- (c) Insect and pest control;
- (d) Replanting where the vegetation fails to establish.