Abslope SM Reinforced Earth System

Installation Guide

General Advice

These instructions should be read in conjunction with the contract specification and drawings. They are intended to provide guidance in normal installation situations and are addressed to the installer on site. If there are any questions related to the design, unusual installation challenges, or any doubt, consult ABG Design Team for further advice. Please read all instructions before commencing construction work.

Description

Abslope SM is an economical and structurally flexible sustainable earth retaining slope system developed for road embankments, acoustic bunds, amenity slopes, land reclamation projects and housing developments to meet the demands of Engineers, Architects and Developers. The system consists of a proprietary steel mesh facing panel and retained earth reinforced with **ABG geogrids**. The slope can be constructed to a face angle of 60° to 70°. The reinforced fill and retained backfill will be as agreed and confirmed by the customer. The underside of the steel mesh facing is lined with a **vegetation liner** to assist establishment of a grassed slope face (Fig. 2). The contractor shall ensure that installations comply with CDM Regulations and refer to the designer's Risk Assessment and COSHH statements.

Material Supply (delivered palletised to site) (Fig. 3)

- **Abslope SM** - steel facing panels (2.4m length x 700mm height) delivered in bundles and supplied with steel brace bars (3 bars per panel). Can be stored outside
- **ABG geogrids** - delivered wrapped in polyethylene, and may be stored outside. The type & exact dimensions to be advised on site specific drawings
- **Abpin 400/8** - Steel 'J' pins (2 'J' pins per panel) - delivered in wooden boxes, 50 per box
- **Vegetation liner** - erosion control mat delivered in rolls, type & dimensions to be advised on site specific drawings (e.g. Erosamt Type 3/20Z, 2.5m width x 25m length, weight 32kg/roll). **Note:** the vegetation liner roll needs to be cut on site to 1.25m width by the contractor, using any suitable cutting tool

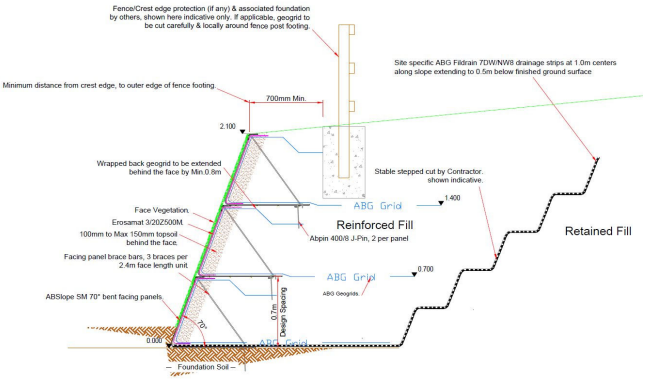

Fig. 1: Example project design

Fig. 2: Completed reinforced grassed slope

ABG geogrid

Abslope steel facing mesh

Brace bars

Abpin 400/8 J

Vegetation liner

Fildrain

Fig. 3: Abslope SM reinforced earth system materials

Steel wire

Rebar end caps

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- **Fildrain** drainage geocomposite specific to site (e.g. Fildrain 7DW NW8, 275mm width x 50m length). Delivered in roll format and may be stored outside
- **Plastic safety rebar caps** (delivered in boxes of 100) or a half round section of PVC pipe
- **Steel wire** & **cable ties** (contractor to supply)

Manual handling instructions

Lift geogrid rolls with a boom / spreader bar or by means of lifting straps around the roll. A minimum of two people required for handling during construction.

Equipment Required

- Excavator for site preparation & backfilling
- Wacker plater or single drum vibrating roller
- Angle grinder to cut steel panels to required length and shape
- Wire cutters for cutting geogrids and steel wire
- Other general tools & PPE as required (safety knife, tape measure, shovels, laser and spirit levels, lump hammer, safety gloves)

Site Preparation and Installation

Step 1

The construction drawing produced by ABG must be carefully read and made available on site.

Step 2

Prepare the formation to the level and line according to the project drawings (Fig. 4). Creating a stable bench in the existing ground is the responsibility of the contractor.

Step 3

Lift and position the steel facing panels in accordance with the SOPs along the intended alignment of the slope. Use the sacrificial 'J' pins (see Note 1) to anchor the panels in position (2 pins per panel, Fig. 5). Anchor at the back of the horizontal base of the facing panels. SOPs are not the responsibility of ABG.

Step 4

Overlap the panels by 100mm side by side longitudinally and fasten using metal tying wire. (Fig. 6)

Fig. 4: Cut site to shape with level base in preparation for reinforced slope construction

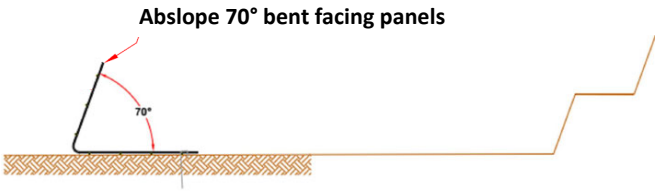

Fig. 5: Position steel panels and use 2 J pins to anchor

Fig. 6: Overlap adjoining panels by 100mm and fasten together using steel wire

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Site Preparation and Installation (cont.)

Step 5

Place **plastic rebar caps** (or half pipe section) on the exposed ends of the upstanding facing mesh. (Fig. 7)

Step 6

Where **Fildrain** is specified to provide drainage to the back of the reinforced fill, unroll into position from the top of the embankment and pin to the ground. Space the drains apart as specified on the construction drawings and position down the back of the excavated slope. Slide beneath and terminate to the front of the steel facing panels. (Fig. 8)

Step 7

Cut the **vegetation liner** (1.25m wide) and **geogrid** to the design length from the roll as mentioned in the construction drawings. Safety gloves should be worn and beware of any sharp edges on the cut geogrid. (Fig. 9)

Step 8

Place and fix the **vegetation liner** at the inner side of the facing mesh using cable ties. (Fig. 10a)

Step 9

Place and fix the **geogrid** over the **vegetation liner** and roll out behind the face, make sure that the **geogrids** are laid perpendicular to the facing panels and flat on the ground. (Fig. 10b)

Step 10

Extend the **vegetation liner** at the base and under the geogrid for a minimum of 200mm. Both **vegetation liner** and **geogrid** to be draped over the outside of the upstanding facing mesh by at least 200mm and 800mm respectively. (Fig. 11)

Step 11

The geogrid needs to be laid side by side, abutting each other (if parallel), no overlap is required. Converging or diverging of the geogrids may be required if the layout of the slope curves in or out.

Fig. 7: Use rebar safety caps on exposed ends. A half round section of PVC pipe could also be used

Fig. 8: Where specified, fix Fildrain to the top and down the back of the excavated slope

Fig. 9: Cut vegetation liner and geogrid from roll to design length using safety knife / wire cutters

Fig. 10a: Place and fix the vegetation liner at the inner side of the facing mesh using cable ties

Fig. 10b: Place geogrid over vegetation liner and roll out behind the face

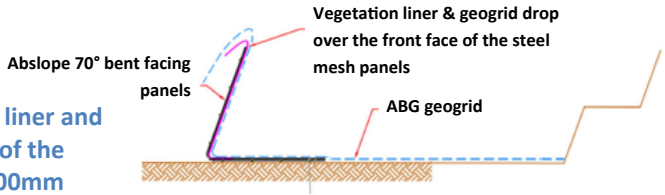

Fig. 11: Drape vegetation liner and geogrid over the outside of the facing mesh by at least 200mm and 800mm respectively

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Site Preparation and Installation (cont.)

Step 12

Place the topsoil at the inner corner of the facing panels to a defined lift height, and within 150mm behind the facing mesh. (Fig. 12)

Step 13

Fix the Brace bars, 3 bars per panel. Brace bars need to be hooked at the uppermost horizontal bar and the rear most horizontal bar on the base. (Fig. 12)

Step 14

To remove the slack, stretch the geogrid against the topsoil dead load. While maintaining tension, place a layer of fill to the back of the geogrid so that all slack is removed (Fig. 13). **Note:** A steel, round-toothed rake (not supplied) can also be used for stretching the geogrid.

Filling and compaction

Step 1

Place and compact the selected reinforced fill (see Note 2) which is approved and confirmed for the ABG design (Fig. 14). The fill needs to be placed using a plain toothless excavator bucket. A minimum post compaction thickness of 150mm needs to be placed in a single lift, and compacted in accordance with Manual of Contract Documents for Highway Works, Volume 1, Series 600, Clause 612.

Step 2

The topsoil (in accordance with BS 3882) of a maximum 150mm wide behind the face of the **vegetation liner**, to be infilled at the lift height compatible with that of the reinforced fill and successively to the full height of each panel. **Note:** Selection of seeds for vegetation and width of topsoil may vary according to the specific project. The topsoil should not be over compacted.

Step 3

Repeat the compaction process in layers of defined lift heights up to the next geogrid level as specified on the project drawings. **Note:** Compaction plant must neither hit the facing panel nor approach within a designated distance (**see Step 8 below**) so that the alignment of the facing panels is not damaged.

Fig. 12: Topsoil placed and brace bars fixed

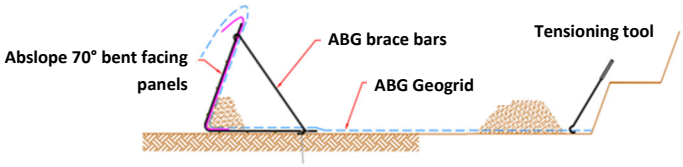

Fig. 13: Brace bars fixed, geogrids tensioned at the back of the slope against layer of fill load to remove slack

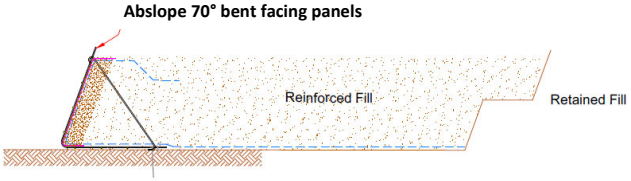

Fig. 14: Topsoil/Reinforced fill compacted and levelled to full height of facing panel

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Filling and compaction (cont.)

Step 4

The compaction machinery must travel along the slope, not perpendicular to the slope. Fig. 15

Step 5

If any project specific additional geogrid is required, cut to size and place at the height as detailed in the ABG design drawings, and abut to the back of the face.

Step 6

Repeat the process for successive courses of panels to complete the reinforced slope (Fig. 16). In case an overall face angle of less than 70° is required, panels are stepped back from the front face of the lower panel by an amount as shown on the design drawing.

Step 7

If successive panels are stepped back, the protruding vertical bars of the lower panels need to be bent to horizontal using a metal tube to prevent a safety hazard for operatives and the end users.

Step 8

All plant, including construction equipment, with a mass above 1,000 kg to be kept at least 2m away from the back of the facing. Plant to be used for compacting the fill within 2m of the back of the facing is restricted to a vibratory roller having a mass per metre width not exceeding 1,300kg or a plate compactor having a mass not exceeding 1,000kg (MCHW Vol 1, 600-SHW).

Step 9

For face vegetation, grass or other seeds as required on the project (see Note 3) hydroseeding is recommended (Fig. 17). Alternatively pre-mixed topsoil seed can be added to the inside of the steel mesh by hand.

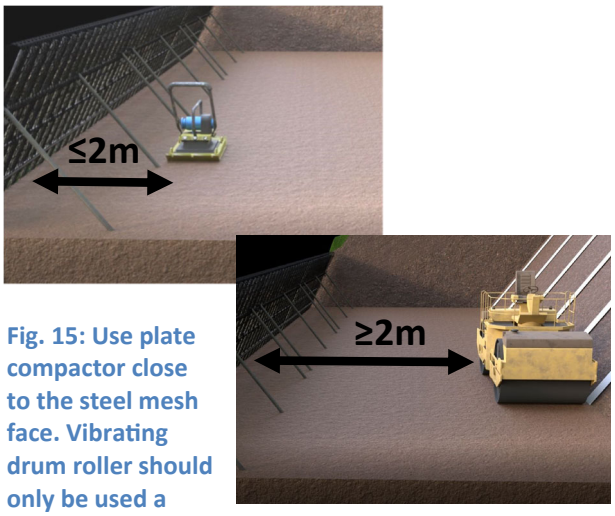

Fig. 15: Use plate compactor close to the steel mesh face. Vibrating drum roller should only be used a minimum of 2m away from the face to prevent displacement

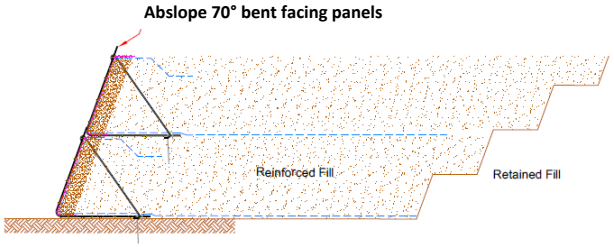

Fig. 16: Construction of slope repeated.

Fig. 17: Slope face after hydroseeding

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Notes

1. The “sacrificial” pins are not intended to provide any long term structural stability to the slope. The supplied 400mm “sacrificial” pins allow the facing panels to be placed at the intended alignment.
2. Contact the ABG Design department if the type of the reinforced fill, retained backfill and/or compaction method varies from that specified.
3. ABG will be pleased to advise on suitable species for vegetating the front face of the slope. The establishment of vegetation is important for prolonging the life of the exposed steel face. Construction in an area where sufficient sunlight is not available may require specific types of planting with monitoring and maintenance over time to ensure that adequate coverage can be established.

Terms and Conditions

- The ABG Design Document provided should be consulted to understand all project specific design notes/ caveats and exclusions.
- The construction must be in accordance with the design provided. Unless prior notice is given to ABG, any alteration will invalidate the PI insurance cover.
- The contractor must assess all the risks associated with working from height, both for machinery and the operatives. The operatives to follow all construction H&S rules as necessary.

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