

INSTALLATION GUIDELINE FOR HIGH ENERGY ABSORPTION PANEL (HEA) WITH PERIMETER WIRE ROPE

1.0 Important Note

The methodology of slope protection suggested herein applies to **Maccaferri MAC.RO. SYSTEM HEA PANELS**, as an active rock protection system. For simplicity the word “HEA” is used to describe **Maccaferri MAC.RO. SYSTEM HEA PANELS**. Maccaferri does not supply any equipment, clamps, rock bolts and accessories etc and these are to be sourced from approved suppliers.

In order to minimize wastage during overlap, it is recommended to carry out “mapping” of the site to determine the exact length of the HEA rolls required, in consultation with the manufacturer’s representative. This exercise should be carried out before placing the order.

All safety measures and installation procedures shall comply to local health, safety and environment standards, codes and laws that are in effect at time of execution of works. All necessary safety precautions shall be taken by the installers to ensure that any critical areas or structures that may be at risk of damage or that may pose physical harm shall be adequately protected during the installation of the rock fall protection system.

2.0 INSTALLATION METHODOLOGY

2.1 SLOPE SURFACE PREPARATION

Slope surface shall be prepared as per the designer’s specifications. Loose rock particles and unstable soil which could detach easily from the slope surface shall be removed.

2.2 PLACING OF HEA

Prior to the installation of the active rock protection nets, the rock anchors are to be installed to the Engineer’s specification.

Phase 1 – Drilling

Drilling can be done by either air-flushed percussion drilling, augering or rotary wash boring drilling depending on ground condition as specified by the Engineer. The size and the inclination of the drill shall be as per construction drawing. It is important to produce drilling equipment with sufficient power and rigid drill rod. The hole shall be flushed with air or water before insertion of nail to remove any possible collapse materials which can reduce the grout-ground interface resistance.

Phase 2 – Insertion of Nail & Grouting

The nail shall be prepared with adequate centralisers at appropriate spacing and for proper grout cover for first defense of corrosion protection. A grouting pipe is normally attached with the nail reinforcement during inserting the nail into the drilled hole. The grouting is done from bottom up until fresh grout return is observed from the hole. The normal range of water/cement ratio of the typical grout mix is from 0.45 to 0.5. Uninterrupted delivery of grout mix into the borehole is essential. The grout mix shall be as per Engineer’s specification. The nail shall be protruding outside the surface for a minimum length of 0.2m. The grout shall be allowed to develop adequate bond strength before the placing the HEA panels.

Phase 3 – Placing of Rock Fall Netting

Once the rock anchors are installed, the rock fall netting is placed (see Installation Guideline for Rock fall Netting), it is possible to commence with installation of HEA panels

Phase 4- Installation of HEA panels

The installation should be started from one of the top corners of the area to be protected.

Firstly, the top row of HEA panels are to be hung at every corner anchors.. The panels shall be laid side by side, starting from the row at the top corner of the area to be protected. Refer to Fig.1

After the 1st row of HEA panels have been placed, the 2nd row of HEA panels can be installed and the subsequent placing of panels are continued in this fashion until the area to be protected are totally covered as shown in Fig. 2.

Once this is complete, intermediate anchor to anchor cables are placed between the anchors and shall be pulled taut and clamped at the ends. This cables are to be equal or larger than the HEA mesh panel cable size (suggested 12mm – 16mm). The length of each intermediate anchor to anchor connecting cables shall be no more than 20m. The termination of the cables are shown in Detail C of Fig. 2.

Once all the anchor to anchor connection cables are installed, the lacing operation of the inner HEA panel edges can be commenced. The lacing cables shall be of equal or larger size than the HEA mesh cable size and maximum recommended length of this lacing rope is approximately 20m. Refer to Fig.3

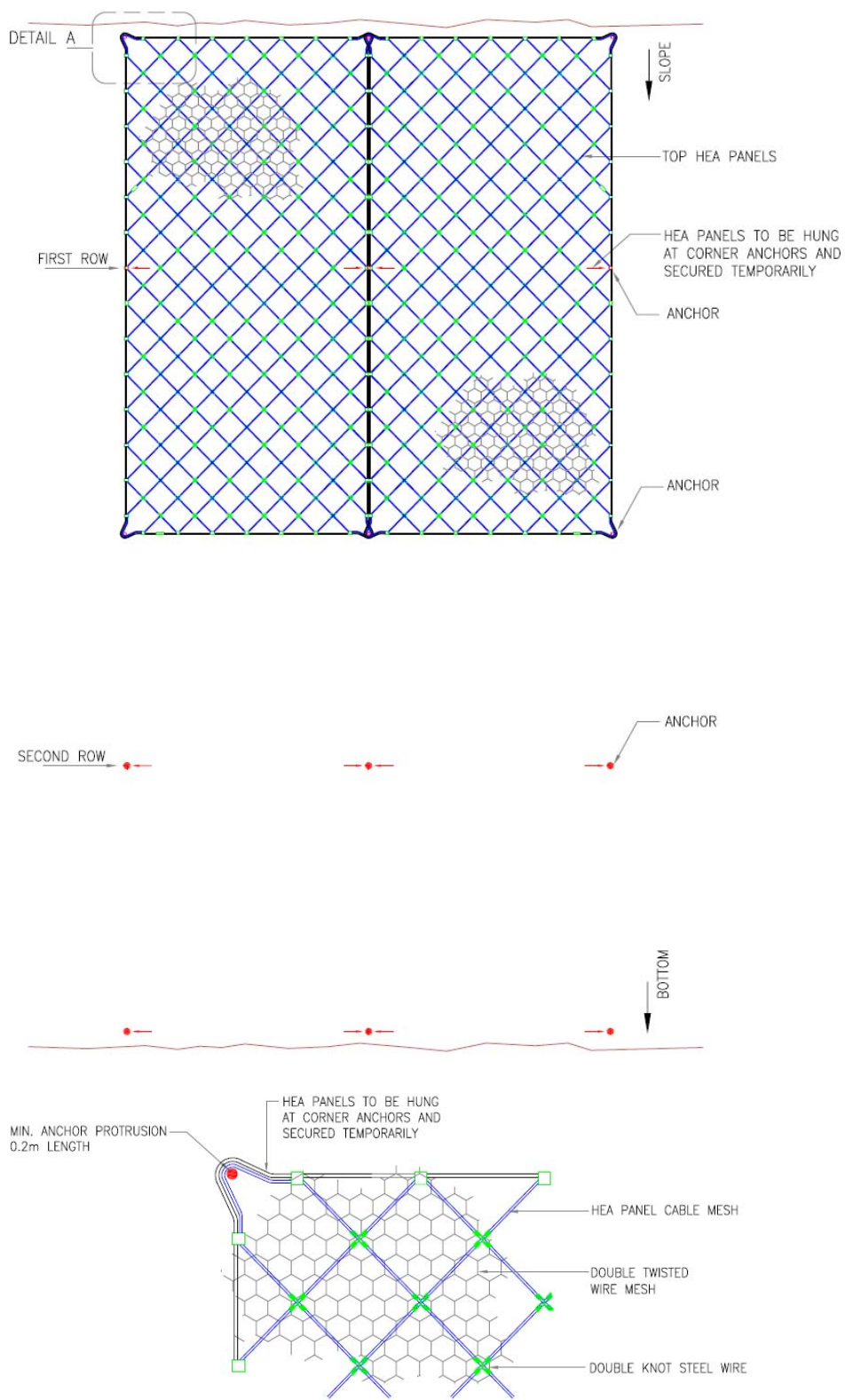
The lacing wire rope is weaved in a spiral manner around the HEA perimeter cables as shown in Fig 3 . After the lacing cables are in place, it must be pulled taut and both ends shall be clamped as shown in Fig 2– Detail C.

This operation is continued until all adjoining sides of the HEA panels are laced. Once this is completed, it is then possible to carry on with the installation of anchor plates and nuts. Refer to Fig. 4

Phase 5 – Rock Anchors

After completion of HEA panel installation, a heavy galvanised base plate with min. size 250 mm x 250 mm or as specified by the Engineer shall be tightened on the rock bolt using lock nut , taking care that the base plate maintains a firm contact against the HEA panel wire rope.

FIGURE 1



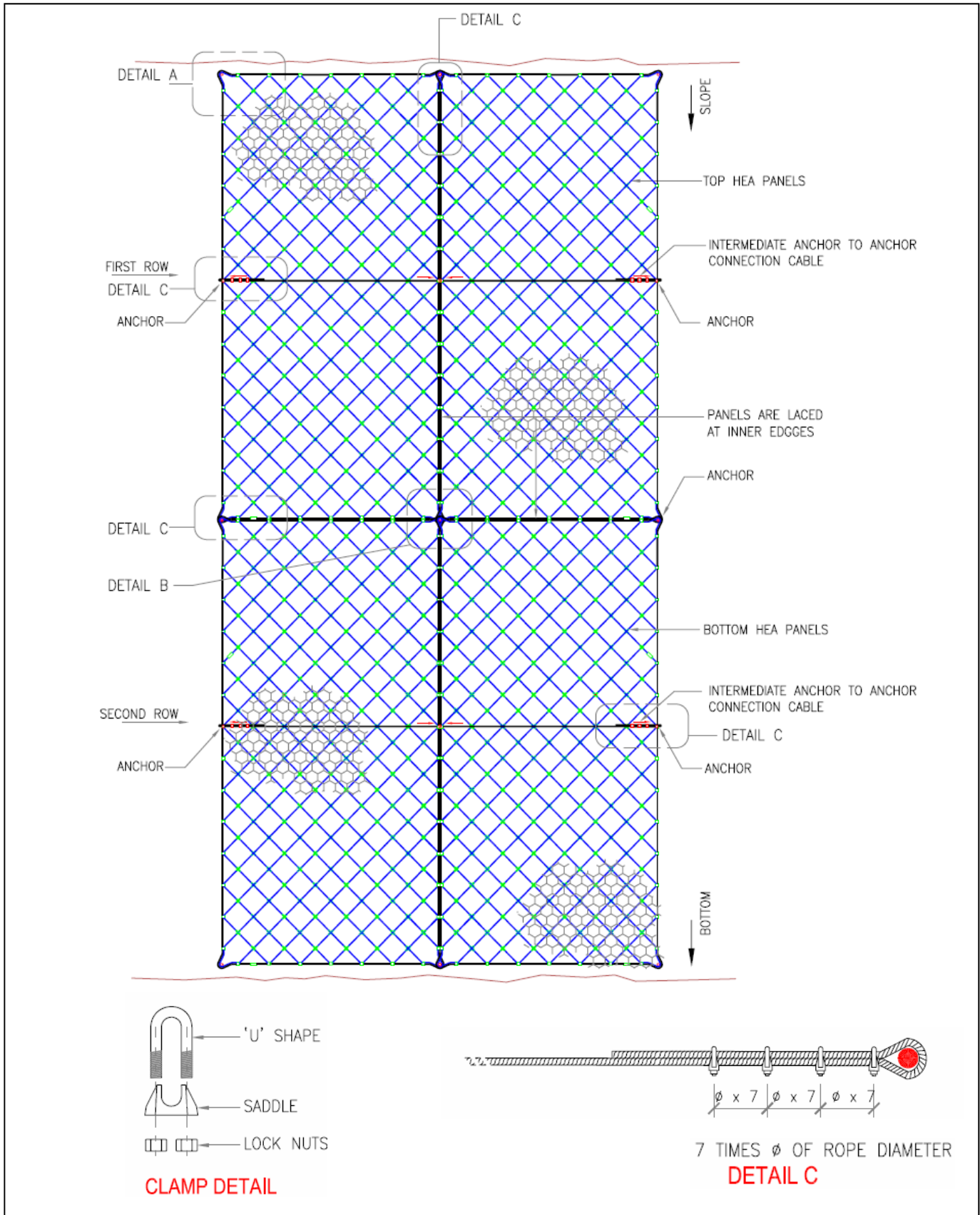
DETAIL A

MACCAFERRI ASIA

Regional Head Quarters
 Unit 3A-11, Block B, Phileo Damansara 1,
 46350 Petaling Jaya, Selangor, Malaysia
 Tel: (60-3) 7957 8330 Fax: (60-3) 7957 9080

BVQI Certified Quality System Company with
 UKAS's Accreditation

FIGURE 2

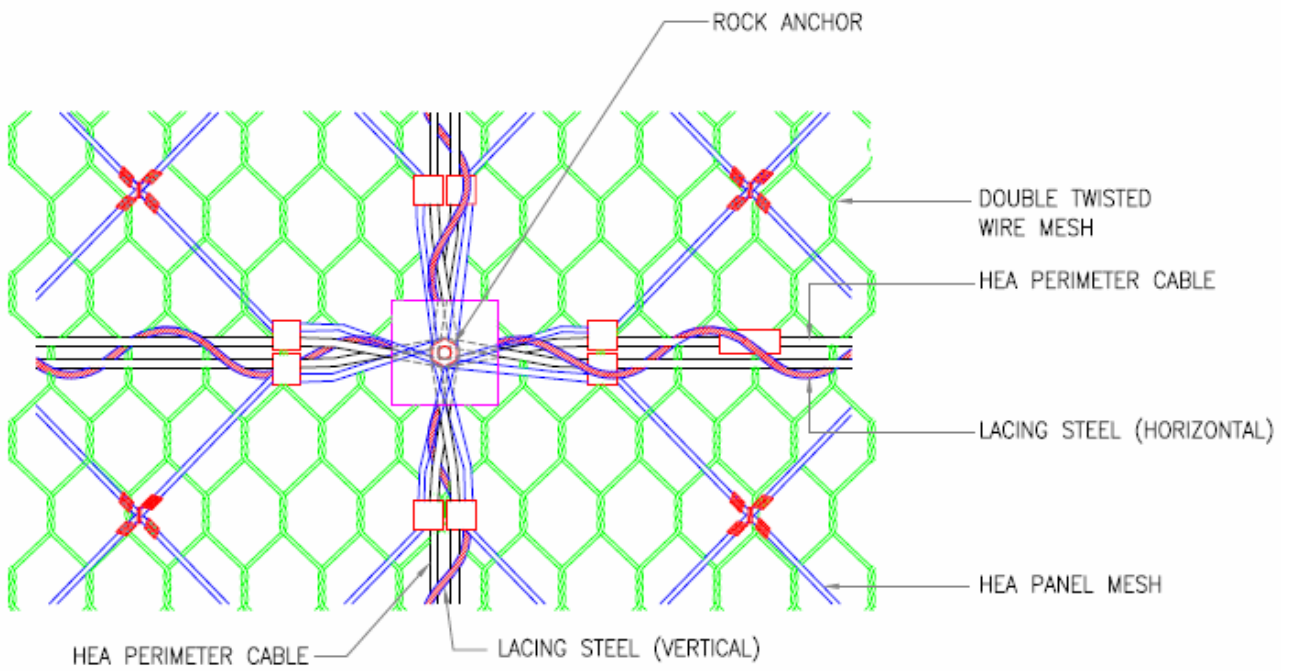


MACCAFERRI ASIA

Regional Head Quarters
Unit 3A-11, Block B, Phileo Damansara 1,
46350 Petaling Jaya, Selangor, Malaysia
Tel: (60-3) 7957 8330 Fax: (60-3) 7957 9080

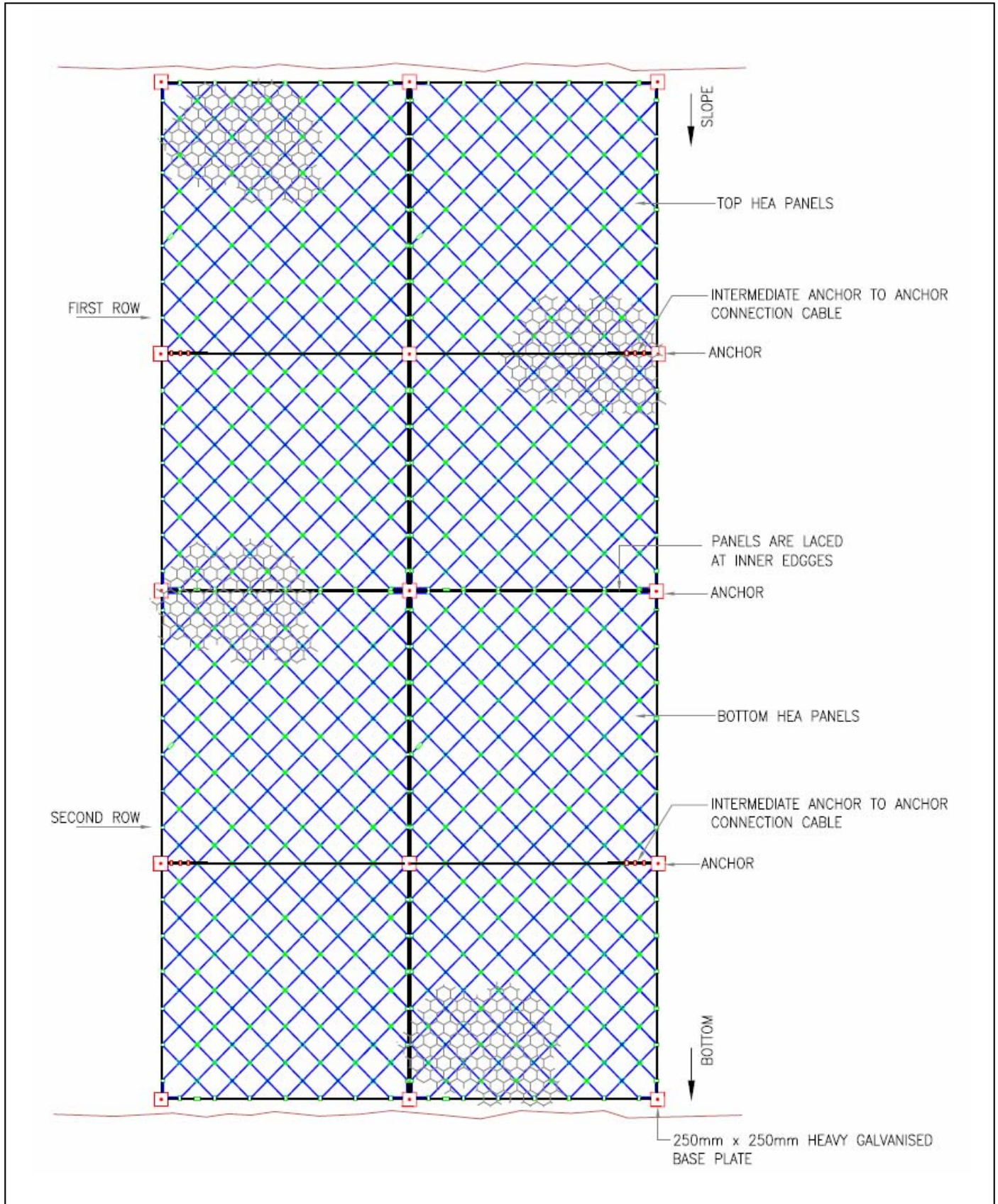
BVQI Certified Quality System Company with
UKAS's Accreditation

FIGURE 3



DETAIL B

FIGURE 4



MACCAFERRI ASIA

Regional Head Quarters
Unit 3A-11, Block B, Phileo Damansara 1,
46350 Petaling Jaya, Selangor, Malaysia
Tel: (60-3) 7957 8330 Fax: (60-3) 7957 9080

*BVQI Certified Quality System Company with
UKAS's Accreditation*