

**ACCESS ROAD SUPPORT IN IRON ORE MINE  
LUMUT, PERAK, MALAYSIA**

**RETAINING WALLS & SOIL REINFORCEMENT**

**Product:** Gabion, MacGrid<sup>®</sup>, MacTex<sup>®</sup>

**Problem**

Vale Malaysia Minerals Sdn. Bhd. is a pioneering Brazilian mining company that provides raw materials for many industrial uses. Due to their expansion, Vale set up a new regional iron ore distribution centre and pellet plant located in Lumut, Perak. This centre was scheduled to open in 2014. It is designed to handle 90 MTPA (Million Tons Per Annum) of Brazilian iron ore and will include port facilities to load and unload ore and pellets, stockyards and a pelletizing complex.

An access road was needed to transport materials between the stockyard areas. The pellet plant in Teluk Rubiah is located in hilly terrain and is adjacent to the coast of the Straits of Malacca. Due to its geological conditions, it was very difficult to achieve the required road finished level through cutting and filling of the existing slopes. Therefore, a separate retaining structure on which the road would be built was determined to be the best solution, thereby controlling the finished level of the access road.



Filling gabion fascia units with stone fill

**Solution**

A number of retaining solutions were considered, before a reinforced soil solution was selected as offering the most cost effective and flexible structure for these conditions.

Project designer, Essar Engineering Services Division designed the reinforced earth wall in consultation with Maccaferri. The maximum retained height of the wall is 13m and it is 360m long. The access road will be exposed to the constant pounding from haul trucks transporting the heavy iron ore loads between the facilities at the site. Therefore, the reinforced soil wall will not only have to be functional, but strong enough to withstand heavy loading. The design used a combination of gabions with MacGrid<sup>®</sup> geogrid for reinforcement of the soil backfill to the gabion wall. The geogrid tensile strength used were 200kN/m and 300kN/m and was placed with a vertical spacing of 0.5m.



Placing MacGrid<sup>®</sup> soil reinforcement geogrids

**Client:**

VALE MALAYSIA MINERALS SDN. BHD.

**Main contractor:**

WCT BERHAD

**Designer:**

ESSAR ENGINEERING SERVICES DIVISION

**Products used:**

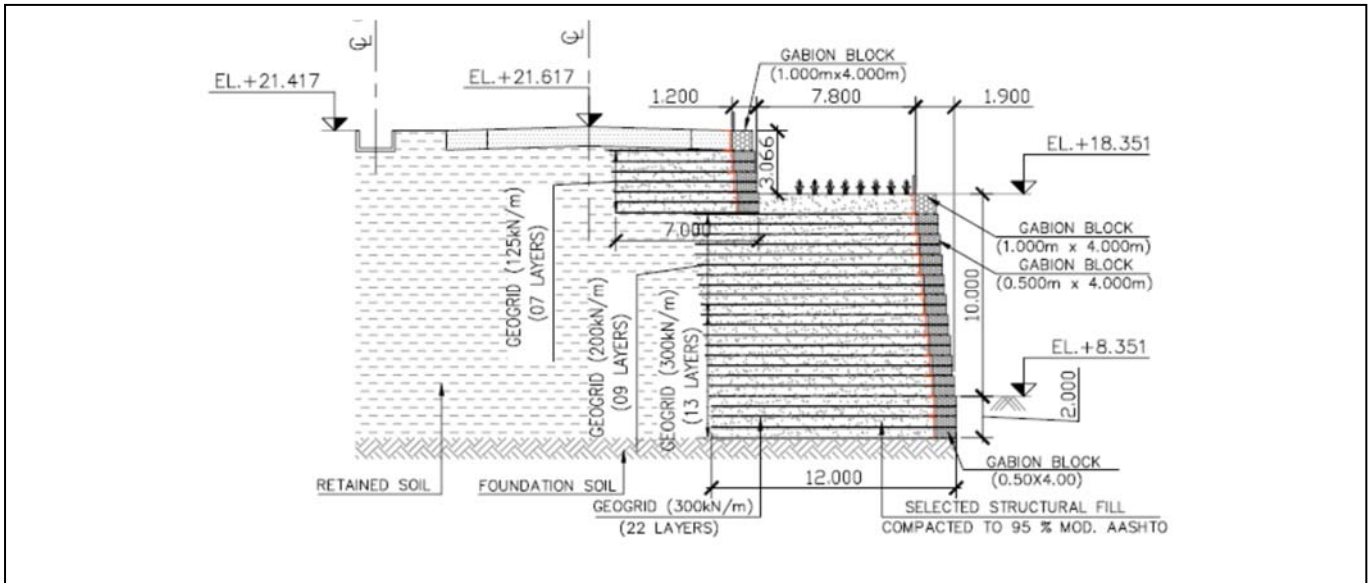
GABION, MACGRID<sup>®</sup>, MACTEX<sup>®</sup>

**Date of construction**

October 2012 - May 2013



Placing and compacting backfill on the MacGrid<sup>®</sup> geogrid



Typical cross section

The gabion units provided the fascia to the reinforced soil wall. The gabions are delivered to the project site flat-packed. They are opened out, assembled and placed into the correct position in the works. Then they are filled with hard, durable rock fill, placed so as to minimise the voids within the basket.

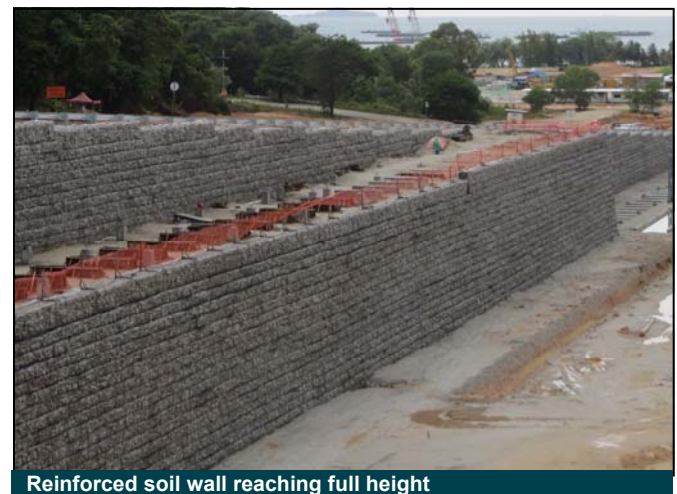
The MacGrid® geogrids were sandwiched between the gabion layers and unrolled horizontally. Structural backfill was then placed and compacted onto the geogrids, reinforcing the soil and enabling it to accommodate greater loads than an unreinforced soil.

Compaction of the structural backfill was to achieve a minimum of 95% of the dry density at optimum moisture content. Compaction effort adjacent to the gabion fascia is reduced and lighter equipment is used. This reduces the potential for the compaction to disturb the gabion fascia, pushing it out of alignment.

During construction, Maccaferri provided site and technical assistance to the consultant and contractor, to ensure proper installation.



Nearing completion of reinforced soil wall



Reinforced soil wall reaching full height

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