MACCAFERRI

CASE HISTORY

Ref: CH/INT/IN/RWSR002 - Rev03 Sept16

MUMBAI-PUNE EXPRESSWAY UPGRADING

MAHARASHTRA, INDIA

RETAINING WALLS
Product: Gabions

Problem

The Mumbai Pune Expressway Project involved the construction of a new high speed highway connecting Mumbai to Pune. A series of retaining walls were required in the Ghat portion of NH-4 between Adoshi and Lonavala. This 2km hilly stretch is prone to heavy rains during the monsoons. Underground waterflows needed large drainage areas. The hill cutting and tunneling works generated of a lot of waste material which required disposal. This included rock debris created from blasting works. On the valley side, the main problem was the global stability.

In other locations, rockfalls were a hazard from the existing and newly cut slopes

Solution

Any retaining wall measures had to accommodate the volumes of water both above and in-ground. Gabions were deemed to be an ideal solution as they are free-draining and also offer speed and simplicity of construction. A further advantage was that the rock waste from the tunnel and cutting blasting works was found to be re-usable as gabion stone fill; a sustainability benefit compared to alternative solutions.

Due to the overall stability being the critical design condition, the gabion walls in these locations were detailed with wide bases to push potential slip-circles back into the slope. Compacted crushed rock was used to provide the foundation to the retaining walls on the valley side.

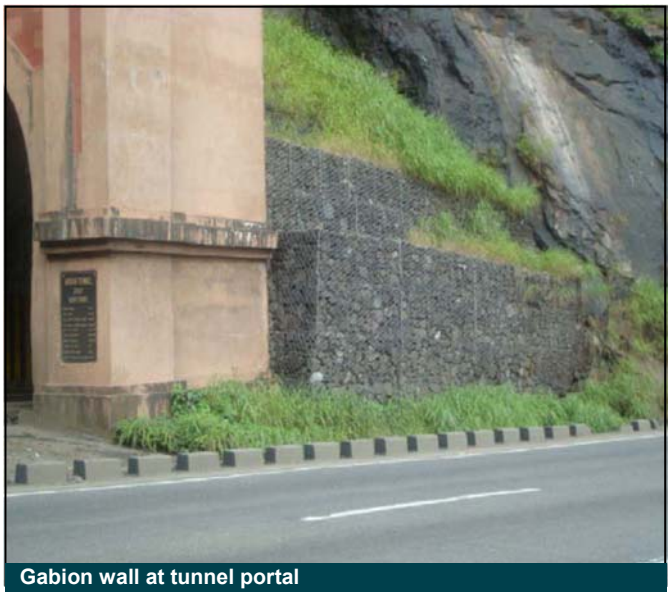
In some stretches along the hill side, since the rock surface was undulating, it was difficult to excavate the foundation. It was levelled using concrete, with dowels into the rock beneath to provide suitable shear resistance against sliding failures.

The gabions were made from steel wire double twist hexagonal mesh. The wire was heavily galvanized with an additional polymer coating to achieve the required design life in these demanding and wet conditions. Unlike welded mesh architectural style gabions, the double twist mesh engineered gabions can accommodate differential settlement and the seismic activity in the area without detriment.

Maccaferri also provided rockfall mitigation measures to prevent rock debris falling from the cut slopes onto the new highway.

Gabion wall under construction

Gabion wall, awaiting backfilling



Gabion wall at tunnel portal

Client:

MSRDC

Main contractor:

SHAPOORJI PALLONJI &CO, L&T

Designer:

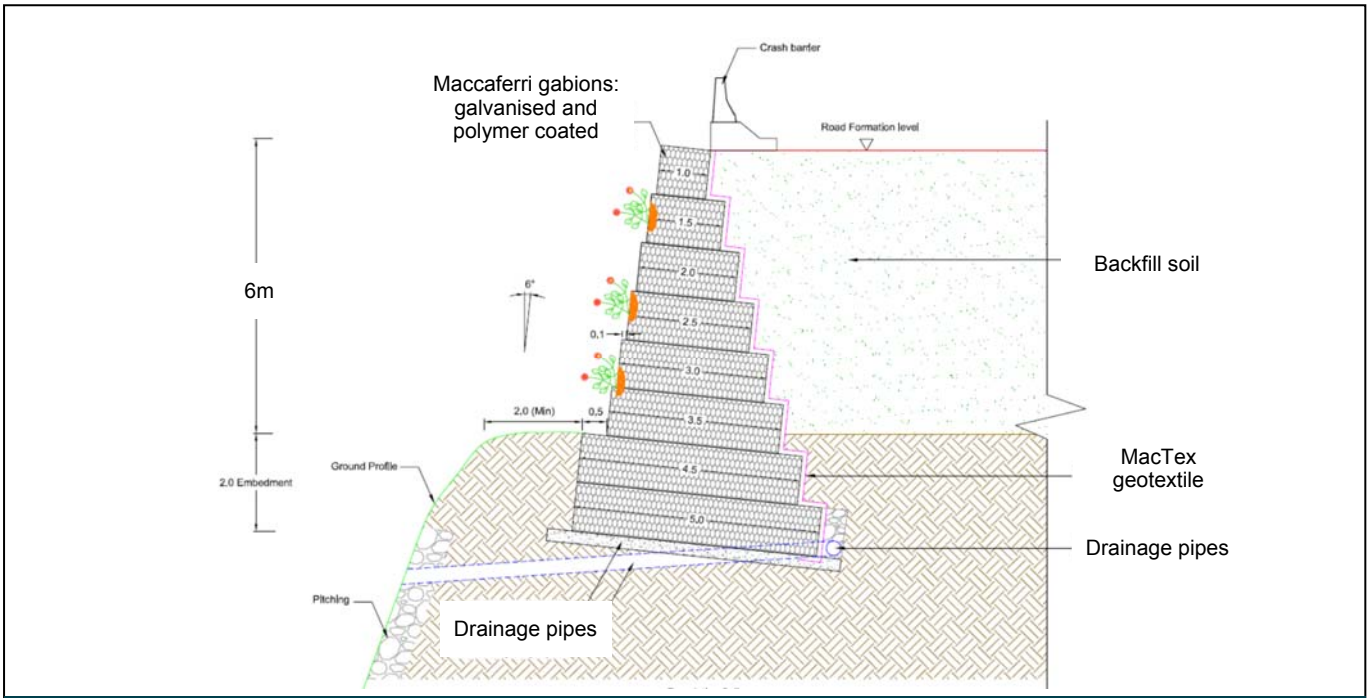
CONSULTING ENGINEERING SERVICES

Products used:

35,000M^3 GABIONS

Date of construction

2000



Typical cross section through 6m high wall

The rockfall drapery netting was anchored at the top and foot of the slopes. Any rocks falling from the slope would be contained behind the drapery preventing it from hitting the road.

To prevent the build up of hydrostatic pressure behind the gabion walls and to control the movement of water through the wall, drainage was incorporated. This consisted of larger size backfill material at the lower level of the fill and drains for collecting the water. At regular intervals along the gabion walls, transverse drains were made of heavy duty PVC at a slope of 1:15 to carry away water from the foundation.

The flexibility of gabions has been a key factor in the success of the retaining walls to this day; they can accommodate differential settlement and the high volumes of water expected. A further advantage is their ability to revegetate and re-integrate back into the local nature.

Typical view of gabion wall supporting the expressway

Gabion wall on the valley side where global stability was key

Typical view of gabions, 4 years after completion

Officine Maccaferri S.p.A. Global Headquarters
Via JF Kennedy 10, 40069 Zola Predosa (BO) - Italy
T: (+39) 051 6436000 F: (+39) 051 643 6201
E: info@hq.maccaferri.com
www.maccaferri.com