



THE PROJECT

SHARNBROOK EMBANKMENT

LOCATION

SHARNBROOK, BEDFORDSHIRE

APPLICATION

MASS GRAVITY GABION WALL

DATE

JUNE 2007

CLIENT

NETWORK RAIL

CONSULTANT

CORUS RAIL CONSULTANCY

CONTRACTOR

MAY GURNEY LIMITED

SERVICES PROVIDED BY ENVIROMESH

- Design advice and detailed construction layouts taking account of jumbo gabion units
- Material supply
- On-site technical support during the construction programme

PROJECT BUILD COMPONENTS, SUPPLIED BY ENVIROMESH

- Gabion 39 System: bi-axial welded mesh jumbo gabions
- Gabion carcasses manufactured from 76.2mm × 76.2mm mesh
- Gabion carcasses manufactured from 3.00mm diameter galvanised wire, with plastic coated green to 3.50mm diameter overall
- Gabion face panels manufactured from 76.2mm × 76.2mm mesh, with 3.80mm diameter wire, galvanised and plastic coated green to 4.30mm overall

PROJECT BACKGROUND

The Midland Main Line passes through some relatively hilly areas of which Sharnbrook in Bedfordshire is one. Within this region there is a 1 in 119 gradient from the south taking the line to 100 metres (340 feet) above sea level.

Following a number of embankment slips along a particular stretch of the line, a need was identified for a series of three retaining walls ranging along a total stretch of some 262 linear metres.



THE CHALLENGE

As the lead design consultant for the project, Corus Rail Consultancy reviewed the options available and designed and specified a series of mass gravity gabion walls as the preferred retention element. The key challenge was to construct aesthetically pleasing structures in this environmentally sensitive rural location and to ensure that these would withstand the dynamic forces from the imposed loadings – from above and behind.

Commercially, the investment in the gabion wall construction needed to fall within a pre-determined budget and be manufactured to suit the timings of the site construction programme for the main contractor, May Gurney Limited.

THE SOLUTION

1. GABION WALLS

The walls ranged from 1 to 4 metres in height and the founding baskets were up to 3.5m in width. In all instances a non-woven needle punched geotextile membrane was placed between the rear of the gabions and the 6F2 compacted granular backfill to ensure that fines did not wash through the permeable gabions leading to settlement.

2. GABION FILL (MATERIAL)

This was typical of a 6G gabion graded stone, 100 to 150mm in diameter, with the key properties being hard, durable and irregular in shape to ensure good interlock thus reducing the potential for movement and settlement within the wall. The total quantity of imported 6G stone to fill the 1800m³ of gabions was some 3,250 Tonnes.

3. MESH CONSTRUCTION & SPECIFICATION

The gabions were constructed from the 'preferable' dimensionally-stable, welded-steel, wire mesh as opposed to a flexible double-twist, woven, hexagonal wire mesh. Enviromesh introduced the benefit of composite wire gabions such that the face panels were produced from a heavier wire diameter than the unit carcasses.

- **Fabric type**
Bi-axial welded mesh
- **BS EN 10218-2**
Steel wire and wire products
(general wire dimensions and tolerances)
- **Tensile strength (wire)**
540 to 770 N/mm²
- **BS EN 10244-2 (Class A)**
Zinc and zinc alloy coatings on steel wire
- **BS EN 10245-1**
Steel wire and wire products
(organic coatings, general rule)
- **BS EN 10245-2**
Steel wire and wire products
(organic coatings on steel wire, PVC finished wire)
- **BBA certification**
Design lifespan up to
120 years in a mild environment



Completed works at the Sharnbrook rail embankment project, Bedfordshire

The lid, base, back, ends and internal panels were fabricated from 3.00mm diameter wire mesh and plastic coated to 3.50mm overall diameter. The front facing panels were manufactured using 3.80mm wire diameter wire mesh and similarly plastic coated to 4.30mm overall diameter. Although this increased the cost, the enhanced benefits in terms of construction time subsequently outweighed the unit cost.

All wire products supplied conformed to international industry standards ranging from BS EN 10218 for the steel wire to BS EN 10244-2 (Class A) for the zinc and zinc alloy coatings on the steel wire.

4. COST SAVINGS

With every installation, Enviromesh will always objectively appraise third party construction proposals at the planning stage before submitting final costs for consideration.

With the Sharnbrook embankment project, the site contractor had planned to use standard sized gabions which are synonymous to the industry, utilising both 1m and 2m modules. However following intervention from Enviromesh, it soon became apparent that in the interests of a more economical installation, there was a more cost-effective approach to the project. By providing costs for bespoke configured jumbo units alongside a reduction in labour intensive conventional lacing requirements – the result was more technically appropriate and commercially viable.