

A1 MOTORWAY - BOLOGNA TO FLORENCE SECTION
LOTTO 12, VARIANTE DI VALICO

SOIL REINFORCEMENT - TUNNEL PORTALS

Product: Green Terramesh®

Problem

The A1 Autostrada, known as Autostrada del Sole (Motorway of the sun), runs for 750km from Milan to Naples, via Bologna, Florence and Rome. Not only is it the longest motorway in Italy, it is considered to be the key corridor in the country's highway network.

To improve safety, reduce congestion and consequent environmental pollution, a new section of the A1 was proposed in 2001 through the Apennines between Bologna and Florence, known as the Variante Di Valico. This 58km 'New A1' would feature 23 viaducts and 22 tunnels. Towards the southern end of this extension was 'Lot 12' between Poggiolino to Aglio. The 4.5km route was characterised by complex geological and topographical terrain and included 3 viaducts and 5 tunnels.

Some of the tunnel portals emerged into complex Apennine clay formations, exacerbated by the presence of active or dormant landslides. The tunnel portals had to be carefully designed and constructed to stabilise, retain and consolidate the ground and required monitoring inside and outside the tunnels.

The Buttoli tunnel typified these ground conditions. Buttoli features two parallel tunnels of 490m (North) and 546m (South) with an excavated area of 190m². Each carriageway has a width of 11.95m per tube, thereby achieving three lanes (two running and 1 emergency) of 3.75 m wide each.

Lot 12, Variante di Valico required considerable technical and organisational commitment to stabilise and retain the portals, maintaining the land-value and cultural area of Mugello.

Solution

Maccaferri proposed the use of Green Terramesh® soil reinforcement at the mouth of the tunnel. This system is designed to vegetate, reducing the visual impact of the structure, and enabling it to blend back into nature. Green Terramesh® forms flexible soil reinforcement structures that can accommodate differential settlement without compromising the structure, ideal under these complex geological conditions.

Green Terramesh® consists of pre-fabricated soil reinforcement units of steel double twisted wire mesh, lined with an erosion control blanket and the face stiffened with a welded wire mesh panel. Steel struts hold the face at the correct angle during installation.



Assembling Green Terramesh unit



Placing backfill in zone between two tunnel portals



Placing and compacting backfill to Green Terramesh®

Client:

AUTOSTRADe PER ITALIA

Main contractor:

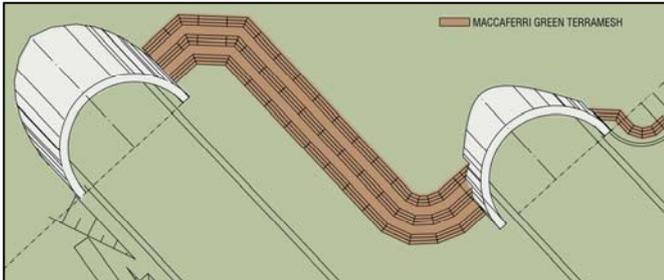
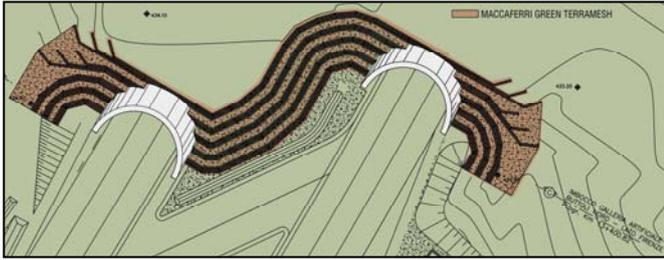
ATI BALDASSINI TOGNOZZI PONTELLO

Products used:

GREEN TERRAMESH, GABIONS

Date of construction

2008—2013



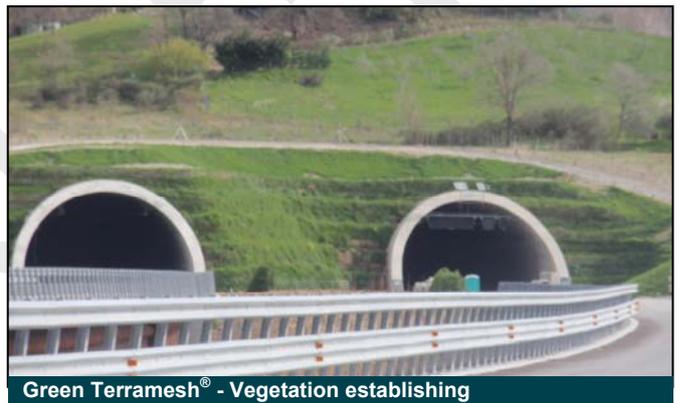
Schematic plan views of reinforced soil between portals



Detail of Green Terramesh® fascia as vegetation starts



Green Terramesh® - Construction complete



Green Terramesh® - Vegetation establishing



Green Terramesh® - Vegetation establishing



Green Terramesh® - Vegetation establishing

As all components are factory fitted, Green Terramesh® is more rapid to install than other reinforced soil systems. No external shuttering or formwork is needed. The unit is erected, positioned and structural backfill is placed upon the integral geogrid tails, before compaction. Good quality topsoil is placed immediately behind the front face to enable vegetation of the system.

To ensure a long design life, the steel wire mesh is heavily galvanised and has a robust polymer coating; essential in soil reinforcement structures.

The Green Terramesh® solution was also used in Lot 12 at the Lagnano tunnel in conjunction with gabions.

This new section of the A1 was officially opened by Italian Prime Minister, Matteo Renzi in December 2015.

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