



TensorTech® GreenSlope was used to create natural vegetated slopes alongside rugby pitches at Murrayfield Stadium tram stop.

Winning combination

Using Tensor's reinforced soil systems with both traditional and none traditional lightweight fills enabled an innovative approach for construction of elevated sections of Edinburgh's tramway which was on compressible, weak ground in places.

CLIENT'S CHALLENGE

Graham Construction needed a technically robust and cost-effective way of building the reinforced soil structures and none load bearing bridge abutments carrying Edinburgh's tramway at many locations including Murrayfield. A primary aim was to minimise the amount of ground treatment or 'excavate and replace' the underlying weak soils over some parts of the route.

TENSAR SOLUTION

Tensor's TensorTech® reinforced earth solutions enabled lightweight expanded clay aggregate fill to be used to build the reinforced soil structures between bridges that carry the tram route over roads and a river. TensorTech TW3 block walls formed near-vertical walls alongside a railway, as well as none load bearing abutments for the bridge crossings. TensorTech GreenSlope and TensorTech NaturalGreen systems created vegetated slopes up to 70° alongside rugby pitches next to the Murrayfield stadium.

Edinburgh Tram Link

Reinforced soil walls and slopes

📍 Edinburgh, UK

BENEFITS

Faster construction

without the need for specialist plant and labour

Use of lightweight fill

was enabled

Attractive range

of architectural finishes

Intrusive ground treatment avoided



TensorTech® TW3 modular block retaining walls form complex structures at the Murrayfield Stadium tram stop.

PROJECT BACKGROUND

Edinburgh's tram system, which opened in 2014, is a 14km long link between Edinburgh Airport and the city's St Andrew's Square.

At Murrayfield Stadium the line runs on an elevated section alongside the mainline railway, crossing over local roads and the famous Water of Leith.

Tensor was involved at an early stage, providing application suggestions at pre-tender stage for construction of the up to 7m high reinforced soil structures between the bridges. The aim was, where possible, to minimise the amount of ground treatment, or excavation and replacement, of the underlying weak ground, which did not have sufficient capacity to take the load from the new structures.

Over 5,600m² of TensorTech TW3 modular block retaining wall system was proposed for the bridge abutments, the Murrayfield Stadium tram stop and vertical walls where space was restricted next to a mainline railway and buildings. Plus over 5,000m² of Tensor's TensorTech GreenSlope and TensorTech NaturalGreen systems were used for vegetated slopes including the section alongside Murrayfield's rugby pitches.

All three systems incorporate layers of uniaxial geogrid to reinforce soil behind the system face and can be used with lightweight fill (in this case a fired glacial clay). The resulting lighter loads allowed construction directly on the weak ground, minimising the need for treatment.

Final design was carried out by contractor Graham Construction's consultant Parsons Brinckerhoff, with Tensor providing advice throughout construction.

The precast concrete blocks of the TensorTech TW3 retaining walls are mechanically connected to the uniaxial geogrid layers to form load bearing walls and none load bearing abutments. TensorTech GreenSlope is designed for up to 70° slopes, with the geogrid connected to durable steel mesh units and an erosion protection layer that can be hydroseeded to encourage vegetation growth. TensorTech NaturalGreen is suitable for slopes up to 45°, with no geogrid connection required, just erosion protection on the slope face.

Main contractor:

Graham Construction

Subcontractor:

Expanded

Consultant:

Parsons Brinckerhoff

Client:

**Transport Initiatives
Edinburgh**

"The TensorTech systems enabled the use of lightweight fill in some areas, which meant structural loads were lighter and reduced the need for ground treatment, saving time and money on the project."

Craig Roberts

Product and Technology
Manager, Tensor

Tensor International Limited

Units 2-4 Cunningham Court Shadsworth Business Park
Blackburn. United Kingdom BB1 2QX

T. +44(0)1254 262431 | Visit: tensorinternational.com

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