



TensorTech TW3 reinforced soil abutments support the fully integral bank seats



Walls & Slopes Nº 492

M42 Improvements New Junction 5A Overbridge (BR02)

📍 West Midlands, UK

CONSTRUCTED IN 2022

Benefits

Optimised design from Tensor provided the most economical solution for this complex, time-critical structure

Lower carbon solution using TensorTech reinforced soil abutments compared to the reinforced concrete alternative, which aligns with National Highways carbon cutting objectives

Reliable Partner From previous collaborations, Skanska knew they could trust Tensor's design service and delivery for a series of structures on this important project

The longest fully integral bridge on Tensor reinforced soil abutments in the UK

To relieve congestion around Junction 6 of the M42, National Highways proposed a new dual carriageway link road, accessing Birmingham Airport and Birmingham International train station. This would connect to a new Junction 5a on the M42. As part of this new junction layout, a 49.7m single span bridge was required to carry the dual 2-lane carriageway link road over the M42. The deck is supported on fully integral bankseats bearing on Tensor reinforced soil abutments. Vertical and horizontal deck loading are transferred directly to the reinforced soil structures.

CLIENT'S CHALLENGE

The bridge design comprises a single-span multi-girder steel/concrete composite deck, supported on fully integral bankseats transferring vertical and horizontal loads onto the abutments. An abutment design offering minimal construction carbon cost was desirable to align with the clients aims. The abutment solution needed a certified 120-year life with an attractive concrete facing.

TENSAR SOLUTION

Skanska engaged Tensor following successful collaboration on similar schemes. Tensor proposed the BBA/HAPAS Certified Tensartech TW3 reinforced soil wall system with modular block facing for the abutments and wing walls. This system offered a lower construction carbon footprint, lower cost, and faster construction time than RC alternatives. Working closely with Skanska's design partner, Mott McDonald, Tensor took responsibility for the design of the reinforced soil structures. TensorTech System components were then supplied by Tensor.



All 3 lanes on the M42 stayed open whilst the walls were built

PROJECT BACKGROUND

As part of the M42 Junction 6 improvement scheme, National Highways proposed a new junction 5a, with a dual carriageway link road joining the M42 to Birmingham Airport and Birmingham International train station. A new 49.7 single span bridge was required to carry the link road over the M42.

The engineers opted for a fully integral bank seat design that transfers both vertical and lateral loading onto the abutments. This eliminates the need for deck expansion joints, offering reduced future maintenance disruption and cost. Asphaltic plug joints are used between the end screen wall and the structural backfill behind the wall. Skanska engineers decided to use reinforced soil abutments and wingwalls to support the integral bankseats. The decision was based on cost and speed of construction, as well as the lower carbon footprint of this type of construction, when compared to RC retaining walls. This aligned with the carbon cutting targets of the client, National Highways.

Skanska appointed Tensar for design of the reinforced soil abutments and wing walls following successful collaboration on similar integral bridge structures. Tensar worked closely with the contractors' design consultant, Mott MacDonald, who had overall design responsibility for the bridge works.

Tensar proposed their BBA/HAPAS Certified Tensartech TW3 wall system with a precast concrete block facing, combined with Tensar uniaxial soil reinforcement geogrids.

Fully integral bridge design imparts both vertical and lateral loading to the supporting abutments. Lateral loads are primarily generated from expansion/contraction forces due to daily and seasonal temperature variation. Braking forces are minor and assumed to be transferred to the backfill behind the deck end screen wall.

Construction of the Tensartech TW3 structures was completed by PC Construction

Bridge Details:

TensarTech System	Abutment Loading		Bridge bankseat type			Bridge function		Spans	Total deck length
	Non-load bearing	Load bearing	Simply supported	Semi-integral	Integral	Over Structure	Under structure		
TensarTech TW3		X			X	Dual 2-lane carriageway	M42 motorway	1	49.7m

Client

National Highways

Contractor

Skanska

Contractor Design Consultant

Mott MacDonald

Sub-Contractor for TensarTech TW3 Wall Construction

PC Construction

“The key thing from our perspective is the carbon reduction we get from a TensarTech abutment system compared to a RC wall solution.”

“The construction went really well. We used PC Construction for the installation. They have installed TensarTech systems many times before and know exactly how to do it”

“We have used the same TensarTech system on a number of bridges on this project. To date we are happy with the way things went.”

Sam Linley

Engineering Manager
Skanska