

CASE STUDY

M4 CHISWICK FLYOVER, LONDON

Heavy duty repairs to bridge deck expansion joints



Chiswick Flyover is situated at the end of the M4, joining the motorway to the A4, a main arterial route carrying thousands of vehicles into Central London each day.

Similar to other arterial routes into major cities the A4 is prone to heavy traffic congestion causing queues of traffic to stand on top of the bridge. This places immense pressure on the expansion joints in the structure. The 'T' shape of the structure meant that two traditional asphaltic plug joints had been installed each at widths of 500mm with a gap between them of 750mm.

Owing to their inherently soft material properties the asphaltic plug joints had prematurely failed displaying severe rutting because of the prevailing traffic conditions. Rainwater collecting on the road surface was therefore allowed to leak through the failed joints, eroding the flyover supports. This essential repair work was required to extend the life of the road and reduce future maintenance.

As part of a total refurbishment of the flyover Permatrack Heavy Duty Expansion Joints were chosen by Consultants Mouchel Parkman to replace the existing Asphaltic Plug joints. The jointing

Sector: Highways

Client: Birse Civils Ltd on behalf of The Highways Agency

Consultants: Mouchel Parkman

System: IKO Permatrack High Modulus Bridge Deck Expansion Joint System

Products Used: IKO Permatrack H
IKO Permatrack PSB

Contact: Wayne Perrin

system was installed by Laser Special Projects a subsidiary of the Volker group of Companies.

The high modulus joints incorporate Permatrack PSB, a highly polymerised elastic bituminous membrane in preformed strips to provide the movement properties of the joint which is bonded to Permatrack H a high modulus matrix consisting of SBS modified bitumen and Trinidad Lake Asphalt. Permatrack H is compatible with virtually all common surfacing products (bituminous, resins etc), and no special primers or bonding agents are required in order to achieve full bond to the Permatrack top surface.



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Permatrack was chosen for this project due to its suitability for use on joints of any size and depth joint, whilst still offering exceptional resistance to rutting and load/sheer/deflection stresses. This meant that two 'failed' Asphaltic Plug Joints (Fig. 1) could be replaced by a single wide Permatrack joint (Fig. 2), thus offering a cost-effective and time saving solution.

The Permatrack surface is finished with pre-coated chippings to give the same skid resistance performance as the surrounding carriageway. Another benefit of the Permatrack system is that at a later stage the entire carriageway surfacing, including new Permatrack joints can be planed off and a thin surfacing system applied without the need to replace the expansion joints. The overlaid Permatrack joint is put back into full operation by cutting 50mm x 25mm rebates corresponding with the underlying joints and infilling with Permatrack PSB. This gives superior ride quality and noise reduction (benefiting local residents), whilst still maintaining the system's strength and movement properties.

Road closure times for the motorway were kept strictly to schedule (9pm until 6am), and on every occasion it was opened on time. The use of Permatrack therefore meant that fast open programmes could be achieved and no additional traffic management costs incurred.



Figure 1

In total, 2250 tonnes of Permatrack H was used on this prestigious project. 412 existing Asphaltic Plug Joints were converted into 206 Permatrack Expansion Joints on this stretch of the M4 (103 joints in each carriageway direction). The majority of this material was delivered 'hot charged' in tankers carrying up to 18 tonnes of material direct to site. This increases safety for the teams handling the material as they do not have to prepare it on site and allows for greater speed of application.

The size of each Permatrack joint was approximately 2.5m wide 7.3m long, with an average depth of 250mm.

The Permatrack High Modulus Bridge Expansion Joint System offers a highly effective solution which minimises future joint maintenance costs. It delivers high performance and versatility, is quick to apply and has the ability to take standing traffic within 90 minutes after installation (subject to weather conditions).

The combination of exceptional product properties, effective project management and efficient operations meant that this project was a resounding success, delivering an excellent solution with completion ahead of schedule.¹



Figure 2

