A40 Westway: Innovative Bridging Solution

TfL Lane Rental Industry Publication

TRANSPORT FOR LONDON

Introduction

The A40 Westway forms part of the strategic road network to/from central London from the West. Carrying 96,000 vehicles a day, it is ranked London's second busiest corridor and is critical for the operation of London. Built in the late 1960's and 1970's, the Westway comprises of 52 individual structures along 4.6km of largely elevated road between Wood Land Flyover to the west and Marylebone Flyover to the east. The structures are predominately of concrete construction with a mixture of pre-stressed and post tensioned decks.

It was identified that the elevated section of the A40 Westway was in need of urgent structural work to safeguard journeys on this major London corridor that facilitates the movement of public transport, essential goods, services, and critical commuter trips. This included the replacement of one of only three roller-shutter expansion joints in the UK as part of the wider project.

To avoid disruption while this work was carried out, It was proposed that an innovative bridging solution be used. Made up of removable steel plates and asphalt ramps, the system would be installed over the roller-shutter joint and carry traffic across the bridge until the new joint had been installed underneath

The Project

To protect the integrity of the structure, major safety related remediation works were needed to replace the roller-shutter expansion joints. The scope of this project included an innovative temporary bridging system of removable steel plates and asphalt ramps that were installed to bridge over the existing roller-shutter joints. The removable steel plates and asphalt ramps also carried traffic until the new joint was installed underneath. The benefit of using the temporary bridging system was that at peak times the steel bridging plates could be in place to carry traffic, and then at off-peak times the plates could be removed during temporary lane and road closures to carry out work on the joint underneath.

The implementation of the bridging system meant that two lanes of traffic were maintained in each direction, avoiding a full road closure of the A40 Westway throughout the duration of the project. However, some weekend and overnight closures were still required to allow access to all areas of the structure that were refurbished as part of Work Package I(WPI). The initial stage of the works was completed on the eastbound carriageway, then the westbound carriageway in order to complete the project.

These works will prevent further deterioration of the asset and extend the viability of the structure for a further 50 years, thus mitigating future road network disruption. The design was used as this method allowed traffic flow across the joint over the proprietary ramps for replacing movement joints. This is because steel ramps slow traffic down to speeds less than 30mph, they cannot cater for large movement ranges and cannot span the length of the rolled steel joist (RSJ); furthermore, the hinge joint restricts access to the joint from one side.

Outcomes

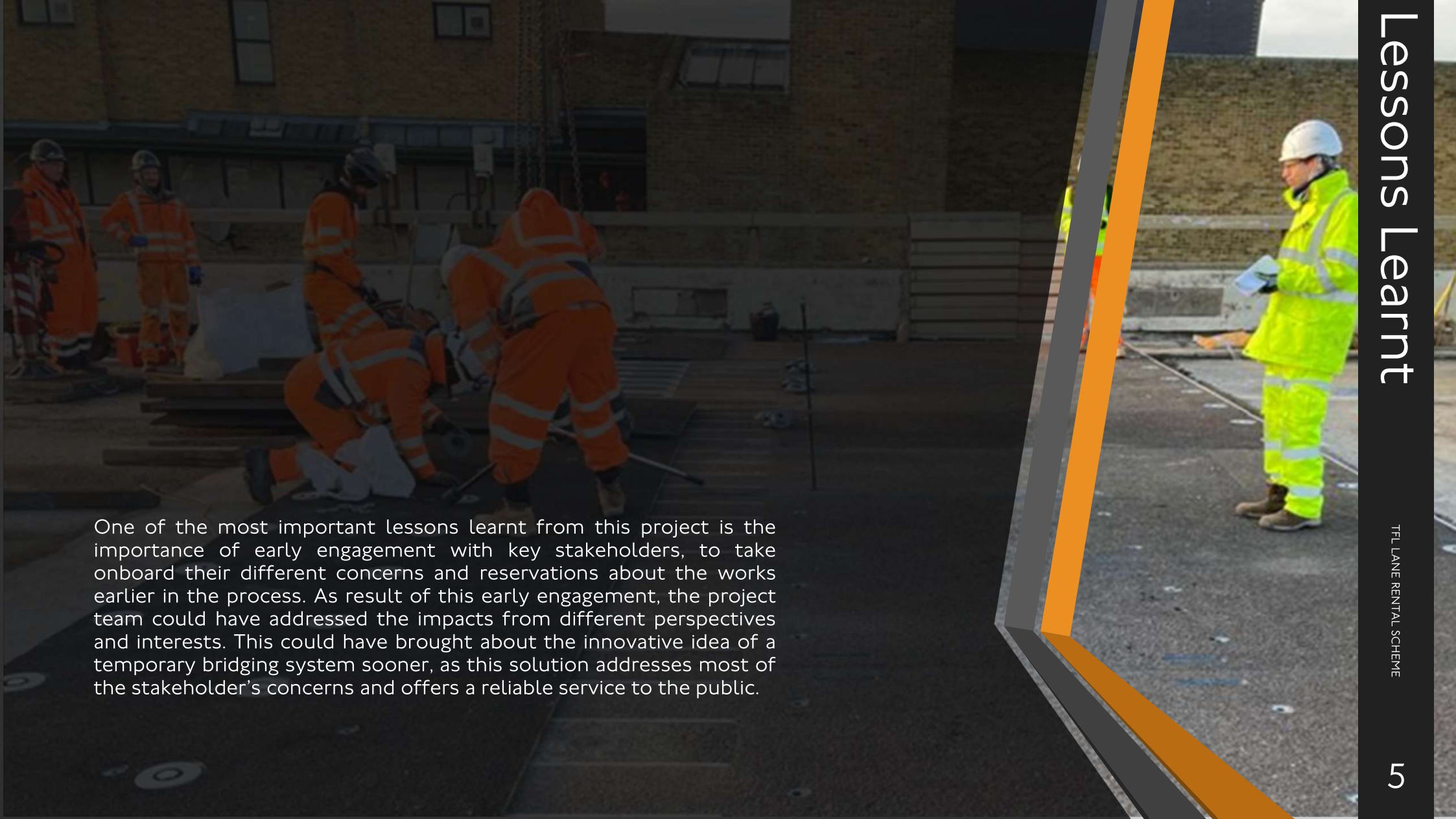
The main objective for the temporary bridging plate was to reduce disruption along the network and local boroughs during peak times on weekdays. A significant benefit was that traffic avoided the A40 Westway during the weekdays, the impact of having two lanes in operation meant that 60-65% fewer vehicles were reassigned to borough roads compared to a full road closure.

If the project went with the full road closure option, the financial impact to buses alone was forecast at £11.4m, which would also mean that 100% of all traffic would need to be reassigned to borough roads. In contrast, since the project maintained operating two lanes with some weekend and overnight closures, the financial impact has been assessed at £6m with 30-40% of traffic reassigning to adjacent roads over the 38 week works duration. The social cost of delay saved has been calculated at £3.7m.

After three weeks of implementing the bridging system the Networking Performance Team collected real data and issued a report. The map shows the bus performance in the area map between Monday-Friday. Green shows better bus performance against baseline data and red shows worse bus performance against baseline data.

Based on the map it can be concluded that from Monday to Friday the network is impacted less when two lanes are in operation, this is due to less reassignment of traffic. Therefore, it indicates that the methodology followed in delivering this replacement does not affect the surrounding network.

Lessons Learnt



One of the most important lessons learnt from this project is the importance of early engagement with key stakeholders, to take onboard their different concerns and reservations about the works earlier in the process. As result of this early engagement, the project team could have addressed the impacts from different perspectives and interests. This could have brought about the innovative idea of a temporary bridging system sooner, as this solution addresses most of the stakeholder's concerns and offers a reliable service to the public.

Conclusion

In conclusion the project has exceeded expectations. Approaching the replacement of the roller shutter joint with innovative temporary bridging solution has addressed the network impact and buses performance concerns raised.

The bridging plate system has potential across a range of sites, with some minor design changes needed on a case by case basis to accommodate the particular site arrangement over the carriageway and viability of fixings into the structure below.

It is recommended that the below adaptations be considered for future works:

- 5m system

This could utilise the plates already designed for the Westway roller shutter joint 5A. These plates could be supplemented with some additional plates of different widths (e.g. 924mm and 1540mm) in order to create a set of units that can be adapted to multiple carriageway widths.

- 3.5m system

This would be similar to the 'network ramps' system that was designed with Connect Plus. The plates are sized for smaller, more typical expansion joints and are therefore smaller and lighter than the 5m system.

By having a range of plates to includes several different widths (e.g. 1232, 924, 1540) would enable the system to be adaptable in a much broader variety of situations

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