Smart Roads

TfL Lane Rental Industry Publication

TRANSPORT FOR LONDON

Introduction

With a population of 8.7 million, London is now larger than it has ever been and is forecast to grow to 10.5 million over the next 25 years. This growth is expected to generate more than 5 million additional journeys each day by 2041.

Against a backdrop of increasing congestion in the Central London area, the Smart Roads programme explores the concepts used by the national motorway network to investigate the capability to manage strategic traffic movements within the city. TfL wanted to understand the capability of smart roads technologies in mitigating pressure on London's roads, including reduced impact from planned and unplanned works, spreading the peak periods, managing unplanned events, and whether it could improve road reliability.

During 2015/16 concepts such as ramp metering, mandatory variable speed limits, dynamic priority lanes, tidal flows and all lane running were investigated. A series of credible operational structures were then developed and built by a third party for trial to test their effectiveness on a pilot corridor on the A2 from the M25 to the A102 Blackwall Tunnel.

The Study

Over the past five years, TfL has developed a pan-London approach to controlling traffic within London. This has been achieved through actively managing traffic signals in order to regulate traffic flow away from congested or over saturated parts of the network, particularly in central and inner London, where there are planned or unplanned works and events in order to minimise overall delay.

These traffic signal strategies have been a success, enabling the delivery of major events including the Tour de France and the London 2012 Games, along with the works undertaken to facilitate them. However, these existing strategies do have their limitations, and improved data and analysis tools have shown there is a limited ability to control traffic on the major strategic arterial routes into central London such as the A12, A13 and A40.

Outcome Definition work undertaken in 2015/16 identified a toolkit of measures including Ramp Metering, Variable Mandatory Speed Limits (VMSL) and a Dynamic Priority Lane as being most suited and of value for use on London's high speed corridors.

This feasibility assessment sought to determine the viability of these measures and develop and assess a design and operational strategy.

Considerations

The key considerations were:

- The requirement to build on initial work and develop a greater depth of understanding of requirements, impacts, legal considerations and gather potential stakeholder engagement issues
- Production of feasibility design for signage layout and traffic signal controlled facilities
- Investigation of UK signage limitations and development path of VMSL and MS4 signage capability
- Feasibility development of structural and foundation engineering, land, access, utility and operational systems
- Development and testing of staged scenarios ranging from ramp metering in isolation to increased application of multiple measures to a complete application of all measures – 9 tests in total
- Development of a draft operational structure for the day by day application for incident management, corridor performance, tactical and strategic requirements, including those associated to road works.
- Consider projects of influence including SITS and the A2 Connected Corridor

The A2 corridor was to be used as a Pilot study, and eleven priority sites for the introduction of ramp metering measures were identified

Objectives

The project set out several objectives:

- **Deliver Reliable Roads:** The introduction of Ramp Metering (RM) and Variable Mandatory Speed Limits (VMSL) was shown to improve the efficiency of the corridor. Including a Dynamic Priority Lane (DPL) highlighting slower but more reliable journey times.

- **Deliver a Quality Bus Network:** The strategic modelling work undertaken showed little to no impact on local bus services on the corridor assessed. The introduction of a DPL showed a flow suppression at the inner most point, which would create a reduction of vehicle movement in the Inner London area that could be managed strategically to aid bus performance.

- **Deliver a sustainable freight movement:** The introduction of RM and VMSL was shown to improve the efficiency of vehicle movements along a corridor, and aid in the recovery time following an unplanned incident. These measures could also be strategically applied to manage short term increases in construction traffic, such as on the A40 associated with HS2 growth sites.

- **Reduce Causalities:** The findings concluded that there would be areas of benefit to improved speed management on the corridor. The reduction of peak time vehicle flow reaching the Central area would also assist in the delivery of safety improvement schemes in Inner and Central London.

- **Support planned and unplanned works:** The measures installed resulted in the ability to alleviate congestion hotspots, removing additional pressure resulting from and moving around works.

Outcomes

The feasibility stage of the Smart Roads programme has successfully delivered an assessment of the design and operational viability of implementing Smart Roads toolkit measures on an urban high speed corridor. It has demonstrated that through a targeted approach it would be possible to improve the performance of the corridor dependent on operational need, including the movement around planned and unplanned works.

Draft layouts for all permutations have been produced to identify the range of required MS4 signs, in readiness for formal discussions with DFT and Highways England. Additionally, urban interface guidance was produced, with which to share and develop with Highways England, as this could well form the inter-urban position for other UK cities.

For the A2 corridor, priority road users would initially be freight, but there would be benefits for the coach industry (e.g. none local buses). However other TLRN corridors priority vehicle classes could be other road users and these should be taken into consideration during DfT discussions.

In terms of the engineering, the assessment has demonstrated that the Smart Roads measures are deliverable, that the design principals can be extended to match the requirements of other corridors, and that an operational strategy can be developed and managed by TfL.

Benefit analysis was carried out by TfL for the Tranche 1 Ramp Metering sites, and shows that implementation of tranche 1 site on the A12 and A13 delivers over £500,000 benefits per year to journey times in Central London. The addition of additional tranche 1 site on the A40 slightly reduces these benefits, which supports the view that these measures should be implemented with other Smart Road measures such as Variable Mandatory speed limits. The analysis also shows this benefit increases to just over £4,000,000 when all tranche 2 and Highways England sites are added as a strategic tool.

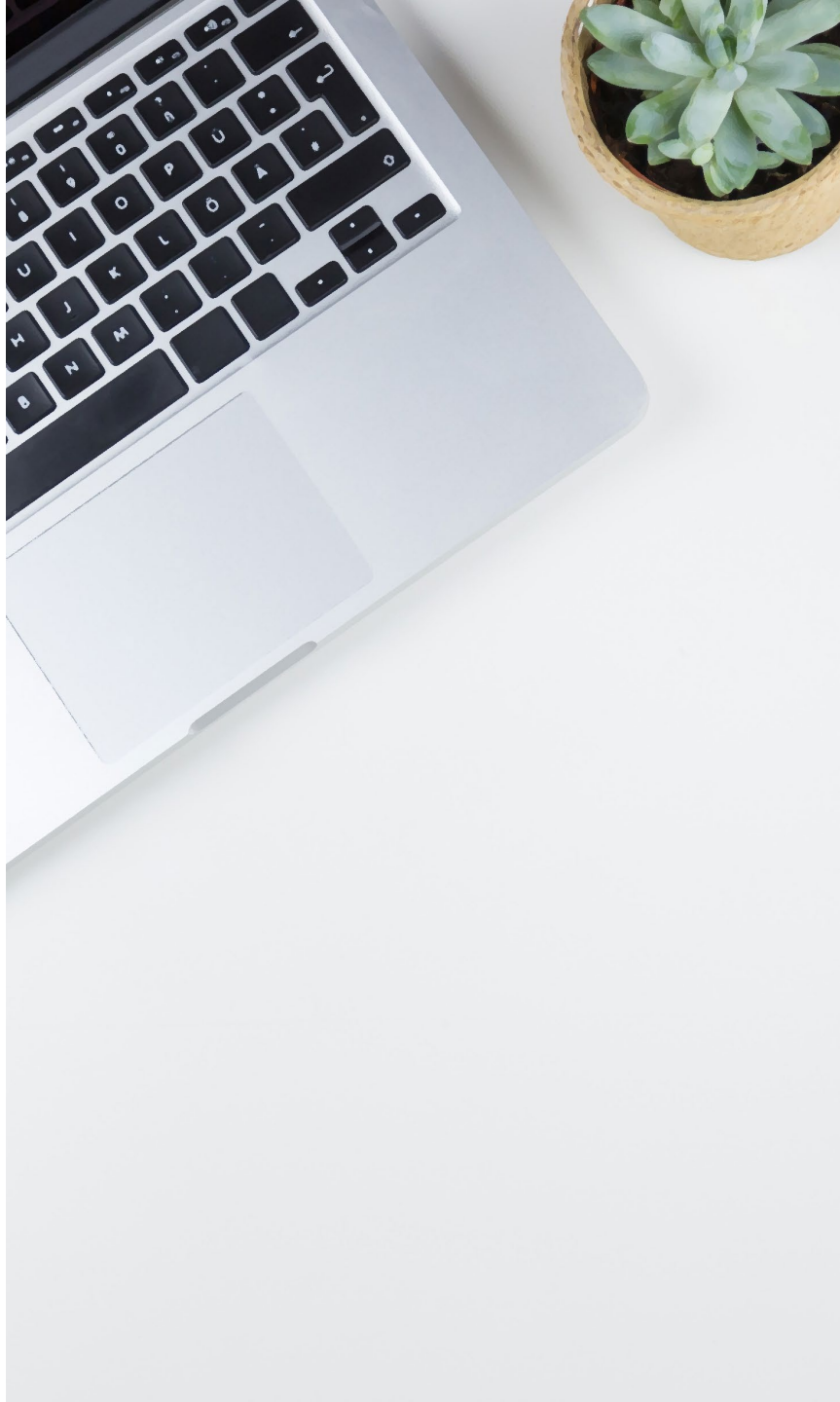
Despite the projected benefit within Central London, the implementation of ramp metering on ramp traffic itself has a negative benefit due to the increases in journey time to these vehicles, so a strategic decision would need to be made as to how to best employ these measures against operational requirements.

The introduction in ramp metering is also likely to result in other secondary benefits. This includes having greater control of the network during a major network incident. Recent data shows there are between 10-20 serious and severe incidents on the each of the tranche 1 corridors per period. If it is assume that ramp metering is required for 1 incident a week on all tranche 1 sites with potential network benefits of £20,000 per time, this would result in a £5,000,000 saving per annum.

Lessons Learnt

The project successfully delivered a feasibility assessment into the viability of introducing Smart Roads toolkit measures to the high speed corridors of an urban network. The project was challenged through external commissioning and management to provide technical expertise on the application of Motorway Best Practice. Alongside timely delivery, the contract had minimal change requirements, and a deliberate focus on technical input rather than an over bearing governance structure.

The change in the TfL Business Plan, and the subsequent reduction in scope, was managed through regular board meetings. It should also be noted that the engagement of a highly skilled and proactive internal team was to the benefit of the Smart Roads programme.



Conclusion/ Recommendations

The findings of the feasibility study show that it would be possible to transfer the application of Highways England Smart Motorway principles to an urban network, in this case, the TLRN. Doing so would enable benefits to be realised for the operation of the corridor, for wider network resilience and in the delivery of planned and unplanned works within Inner and Central London.

Smart Roads can be considered a dynamic enabler for the Mayor's Healthy Streets approach, and the areas of the Mayors Transport Strategy (MTS) that the Smart Roads programme delivers against include reducing traffic and encouraging active travel and public transport use, ensuring efficient use of road space, improving air quality and mitigating construction impacts.

At this time, the TfL Business Plan does not include a financial allocation against the continuation of the Smart Roads programme. However, in order to maintain wider industry involvement, TfL will continue to engage with Highways England and their Expressway aspirations, as well as with other Highway Authorities that would benefit from our industry leading understanding following this study.

TfL Lane Rental Scheme

Optimising customer journeys through the delivery of safer, innovative and sustainable roadworks

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