



Early Trafficking On-Street Trials

TfL Lane Rental Industry
Publication

Introduction

With approximately 400,000 works taking place in London each year, it's important for the reinstatement of excavations to be expedited. All reinstatements must adhere to the requirements set out in the Specification for the Reinstatements of Openings in Highways (SROH), with the 3rd edition being produced in 2010.

The SROH requires concrete to be cured for seven days before road works reinstatements can be trafficked again, which results in considerable delays, especially in sensitive areas of the road network.

In circumstances where the reopening of roads is needed earlier, Highway Authorities can request that rapid curing materials be used however, as this is not within the SROH, there is often debate about who is liable for future maintenance and defects.

It has long been believed that concrete reinstatements can be trafficked earlier than the required seven days, so Transport for London (TfL) requested, that the Transport Research Laboratory (TRL) test this theory with off-street trials.

The results of these trials showed that the curing period could be as little as 48 hours, before being trafficked, using standard strength, readily available concrete. Lane Rental funding was therefore requested to carry out monitoring and intrusive testing of on-street trials on the Transport for London Road Network (TLRN) to support these findings.

Considerations

It should be noted that the trials were based on the 3rd edition of the SROH, however 4th edition has recently been introduced which has different requirements for overlaying and trafficking composite reinstatements, including a new definition of 'composite'.

It is believed that the trials carried out are still valid, as the thinner asphalt layer used will represent a 'worst case' in terms of reinstatement performance. If these reinstatements perform adequately with a 70mm asphalt overlay, their performance will not be adversely affected if overlaid with 100mm asphalt surfacing.

The 4th edition has also introduced the ability to overlay and traffic composite reinstatement after 24hs, provided that a minimum strength is achieved, supporting the aim of the trials. Based on this information, the trials were concluded earlier than initially planned, as it was determined that no negative impacts would result. This is in addition to the following:

- Insufficient curing is related to heat damage caused by the asphalt temperature. This type of failure results in early cracking of the concrete base and is reflected by cracks appearing in the asphalt surface. After a year and a half of monitoring, no cracking has been detected and therefore, damage is not expected.
- The concrete material used in these trials is C20 and above; therefore, the new requirement of achieving a C3/4 strength before overlaying will be complied with, without the need to complete the Appendix 9 route.
- The LoHAC contract that this study was carried out under ended in March 2021. The four batches were monitored up to the proposed 12-month surveys.

After careful consideration, it is proposed that sharing the trial findings will support the new SROH requirements.





The Trials

The trial reinstatements were completed as four batches of three trial holes and a control site for comparison, as part of the Cycle Superhighway (CS10) works on the A40 in London.

The most crucial monitoring period of the trial was the initial 28 days. During this period the concrete is still curing and strengthening. Usually, the main challenge faced during this time is from early life concrete shrinkage and the impact on asphalt materials installed directly onto the concrete. If shrinkage of the concrete occurs, this can result in voiding beneath the asphalt, this can also cause the asphalt to be damaged under loading. If this had occurred, it would have been identified as cracking in the asphalt surfacing during the first visual inspection at seven days.

Only minor fretting and hairline cracks were visible during monitoring, which is not cognisant with the failures noted above. The subsequent cores showed no signs of concrete shrinkage or asphalt surfacing being cracked or damaged.

The laboratory test data showed concrete compressive strengths at the time of testing to be as expected for the concrete grade for the majority of concrete cube and core samples. This laboratory test data suggested that the concrete had not experienced any damage due to early asphalt application or trafficking.

These trials were designed so that upon completion of the works the SROH could be updated with sufficient information to outline that the minimum required highway reinstatement curing time, prior to reopening to traffic, using conventional (as opposed to rapid curing) concrete, could be two days.



Outcomes

Based on the surveys and testing undertaken, there was no evidence to suggest that the early (48 hours) trafficked reinstatements performed any differently to the later (seven day) trafficked reinstatements. With the curing time, the SROH 4th Edition allows reinstatements to be overlaid and trafficked after 24 hours, provided that a minimum strength is achieved. This supported the aim of these trials.

It is concluded that, based on the results from these trials, concrete reinstatements can be overlaid with asphalt and opened to traffic after 48 hours following concrete installation.

The trials determined that even a very low strength backfill concrete can be trafficked in 48 hours negating the need for super-strength concretes to be used for quick road reopening.

Traffic delays and congestion associated with up to seven-day lane restrictions (while waiting for concrete to cure) can be avoided. The trials demonstrated that restrictions can be removed after two days reducing potential traffic disruption by five days. This also has positive impacts on air quality as there is reduced air pollution from congestion.





Lessons Learnt

In addition to the updates to the SROH, these trials faced some issues that caused disruption to the proposed program, these included initial difficulty in setting up the trials with a willing utility company and restrictions caused by the pandemic. Also, to prevent unnecessary traffic delays the trial sites were placed into live major highway construction project areas rather than as standalone work. Combining the strict timing requirements for the trials with potentially flexible major works programmes provided limited opportunities in which to conduct the project. This also delayed trial commencement date.

Conclusion

These trials evidence that use of readily available standard backfill concrete does not require lengthy curing periods before it is overlain with the surface course and reopened to traffic.

Depending on circumstances, and the urgency of reopening the highway after intrusive works have been completed, there is no need for the concrete to contain rapid-hardening agents. The use of these agents, while may be beneficial at the time, ultimately results in more protracted re-excavation times in the future which leads to increased cost to the works promotor and, by association, potentially their customers. This also causes lengthier lane and road closures for the highway authority and greater delays for road users effecting both the economy and air quality.



TfL Lane Rental Scheme

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



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