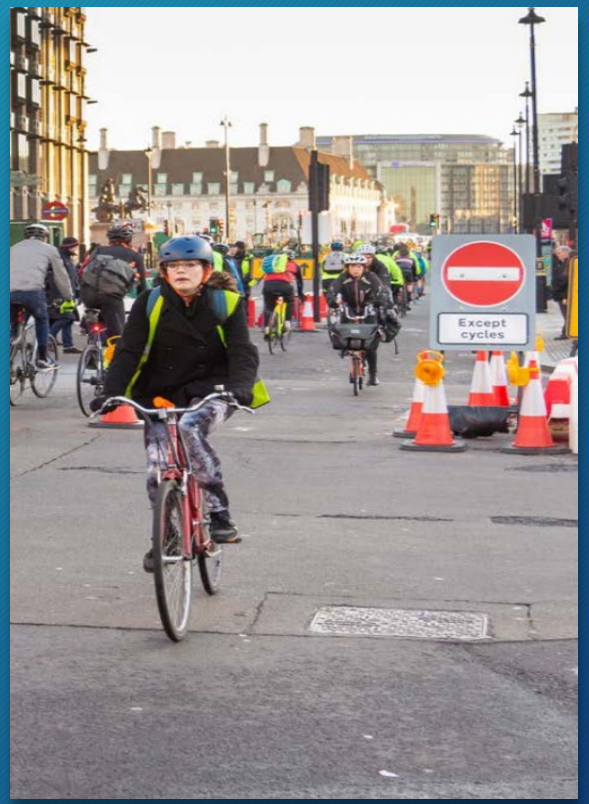
Preventing Ice Formation on Cycle Lanes

TfL Lane Rental Industry Publication

TRANSPORT FOR LONDON

Introduction



The number of people cycling within London has doubled since 2000, with approximately 700,000 daily journeys completed in 2017, and a direct correlation to cycling infrastructure investment over the past 20 years. With the need to improve air quality within London and the popularity of cycling likely to continue, a further 450km of cycle lanes are planned by 2024. More people travelling by bike, requires increased maintenance for safe conditions throughout the year.

Ice formation on cycle lanes is of particular concern, closures that divert these vulnerable road users into the carriageway, especially where road works are already present, leading to increased risk. Maintenance of cycle lanes over winter includes precautionary and reactive treatments. Anti-icing is the proactive application, before adverse weather sets in, to prevent formation or build-up. De-icing is the reactive application to melt snow and ice.

Applying anti/de-icing treatments presents issues, due to limited access and traditional highway methods not being the most effective. Salt crystal require vehicle traffic to break down the solid before the particles are distributed, creating additional hazards for bikes at bends and junctions in the process.

It was therefore proposed, that an investigative project be carried out, to review solutions, which would to prevent cycle lane closures.

The Trial

The feasibility study reviewed several systems used across the world to determine which, if any, were practical for potential use or adaptation to cycle lanes. The systems analysed varied from fixed automated spray technology, to thermal methods, through to modified pavement materials and evaluated based on their, readiness level, availability, scalability. The ability to develop small scale samples for laboratory testing was also evaluated, as well as practicality of installation and maintenance. Based on this, the following systems were tested :

I) Electric melting systems

2) Anti/de-icing asphalt additives.

The most common surfacing, AC6mm, was selected for the laboratory trial. Three batches were manufactured for test specimens, with a variety of tests undertaken to strict controlled standards. The batches were:

- AC6mm with 5% Winterpave
- AC6mm used as a Control
- AC6mm with an integrated Heating Element.

Outcomes

The Winterpave additive and heated elements both effectively prevented the formation of ice, however the most effective method was the embedded heating element. The skid pendulum test and ice prevention visual assessment both highlighting the heating element to be effective to -15° C, whereas the Winterpave was effect -7.5° C.

When comparing these two ice prevention methods, cost, effectiveness, buildability and maintenance requirements were carefully considered. The Winterpave additive showed no adverse effects to strength or age resistance and therefore, anticipated to have a similar life expectancy of usual methods. However, the surface may reduce over time and this was evident from reduced conductivity readings and water retained. Further research is required to monitor the longevity of effectiveness to understand potential maintenance costs and asset life. Therefore, it is recommended that a network trial is carried out and monitored over several years.

The heating element will continue to work as long as there is power, as there are no moving parts that will require replacing. Therefore, the whole life cost of operation and maintenance may outweigh the initial capital costs, particularly if a renewable energy source is installed. However, the additional space required for an energy capture unit, storage and control box may be an issue for locations where space is limited, and may need to be situated away from cycle lanes. It is recommended that the technology be trialled at a location particularly prone to colder temperatures and sufficient space.

Conclusion/ Recommendations

To determine which of the methods to take forward to network trials, a detailed cost analysis is needed to compare the whole life cost. This cannot be accurately quantified until a suitable location has been identified. However, depending on the location and budget, either product could be a cost effective alternative to traditional rock salt and/or liquid anti-icing agents.

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TfL Lane Rental Scheme

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