Case Study  

Mersey Tunnels Scheme

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<td>Merseytravel</td>
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<td>Principle Contractor</td>
<td>L&amp;R Roadlines Ltd, part of Hitex International Group</td>
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**Background**

**Queensway Tunnel, Birkenhead-Liverpool**

Completed in 1934, the Queensway tunnel is a major route linking Liverpool to the Wirral peninsula. It consists of a single 4 lane bore, and is 3.24km (2.01 mi) in length. Today, the average daily traffic through the Queensway tunnel currently stands at around 35,000 vehicles, which equates to just under 12.8m per year.

**Kingsway Tunnel, Wallasey-Liverpool**

The Kingsway Tunnel is the second major transport link running between Liverpool and Wallasey in the North West. It was commissioned after the original Queensway Tunnel became unable to cope with modern volumes of traffic and was completed in 1971. The Kingsway tunnel is 2.4 km (1.5 mi) long and consists of twin bores, each having two 3.7 m (12ft) wide lanes.

An average 38 million vehicles use the tunnels every year.
Case Study

Mersey Tunnels Scheme

L&R Roadlines began working with Merseytravel in November 2012 for works on the tunnel interiors, toll plazas and tunnel approach roads following resurfacing. The timing of the project was critical; the tunnels not only had to remain partially open during night time works, but also had to be fully operational each morning to allow full traffic flow in both directions.

Objectives

- **Formulate a durable, ‘low-tack’ thermoplastic marking solution**
  
  The thermoplastic grades used previously in the tunnel were not performing to standard. Without rainwater to wash the markings clean, dirt and debris from the tunnel traffic built up rapidly thus impairing the performance of the markings.

- **Deliver a cost-effective lining solution to visually reinforce lane segregation**
  
  Strict lane discipline is fundamental to the safe passage of traffic through the tunnel. The Queensway is far narrower than its modern-day equivalents, making the standard marking widths of 150/200mm unsuitable for use as centre and edge lines. Additionally, the curvature in the design of the older tunnel had made it necessary to introduce height restrictions for nearside and offside lanes to accommodate modern vehicle dimensions. Our client needed to find a cost-effective way of reinforcing this segregation the length of the tunnel.

- **Improve safety for drivers and pedestrians by designing a traffic calming scheme for the toll plaza. Reduce the number of lane contraventions on toll booth approach and prevent sudden speeding on exiting the tunnel**
  
  The plaza needs to be safe and accessible to tunnel staff, as well as being able to deal with very high volumes of traffic during rush hour periods. A traffic calming scheme was needed to reduce the incidence of vehicles suddenly changing lanes on the approach to the barriers, and increasing speed on exiting the tunnel. The materials used had to withstand heavy breaking and constant wear.

- **Source and install Cats Eye studs suitable for contraflow**
  
  During maintenance or in the event of an accident, lane direction inside the tunnels can be switched to contraflow. Our client specified Red/Red 2-way reflectors for this project. They also needed to be narrower in width than standard studs to sit within the double solid centre line.

- **Plan and work to a very tight schedule**
  
  Without lane markings, the tunnels are too dangerous and cannot be used. For such a vital travel link however, closing the tunnels during the day was not an option. Works needed to be efficiently planned and executed to a very tight night-time schedule to allow for the daily re-opening of the tunnels to commuters.

Initiative Outcome/ Results

Technical staff at Hitex Traffic Safety engineered a low ‘tack’ thermoplastic specifically for use on this project. The customised formulation was used on the centre and edge lines the length of the tunnel interiors and on the distance markings within the Queensway scheme.

The finished result was a clean, bright reflective finished markings that repelled dirt for longer periods of time, reducing the need for cleaning.

**Image 1: Tunnel interior, Queensway**

Different symbols were adopted as distance lane markers where vehicle height limits applied. This allowed drivers to clearly differentiate between near and offside restrictions while also encouraging safe distances between vehicles - vital in preventing vehicle collisions which are so dangerous in a confined space.

A 100mm wide application shoe was manufactured by our engineering company Somerford Equipment to allow the specified road marking widths to be installed inside the narrow Queensway tunnel.

**Image 2: Lane markers to reinforce lane segregation**
For the toll plaza and toll approach we used a combination of high performance thermoplastic and Hitex ColourTex high friction surfacing on staff/pedestrian crossings, ‘rumble’ strips, red slow pads and chevrons. The markings were designed to slow down traffic on approach, prevent lane crossing, provide shorter breaking distances, and allow staff to pass safely between booths.

Red bar markings were used at either end as a further traffic calming measure to reduce exit speeds (below).

The only 2 way reflectors available for standard use in the UK are White/White or Red/Amber, and so Red/Red studs of the correct width for the narrow centre line were imported from America.

The studs were bonded with Hitex StudTex; a product which incorporates recycled materials and produces no waste on site— a far greener alternative to traditional bitumen. The dry-mix formulation of the product allows for a longer application time per closure which reduced the overall project programme.

Through effective planning and working practices, we installed the specially modified double centre and edge markings in a single shift. Where time restrictions were enforced, our operatives installed temporary lines until each section was finished to ensure that the tunnel was still fully operational at the end of each night shift.

In order to successfully co-ordinate all disciplines to a very tight programme, we constantly monitored and adapted to changes to the programme schedule. This careful planning resulted in all works being completed on time and on budget, and with absolute minimal disruption to tunnel users.

Testimonial

“ The project objective given to Hitex International Group was to deliver on time, within budget and most importantly with minimal disruption to the customer. L&R Roadlines worked within the specified project programme, providing competent staff, sufficient labour, plant and material to enable them to fulfil their own objectives, and those of the overall project.

The company and staff always conduct themselves in a professional and safe manner while on site. I have found them to be friendly and reliable and always willing to provide technical advice over the many projects we have worked on together. The materials provided are both robust and fit for purpose.

Hitex International Group provided all resources needed to enable all works to be successfully completed within the required programme.”

John Merrill, Senior Officer (Civil & Marine), Merseytravel
Hitex International Group are a leading solution provider of:

- Road markings
- Road repair systems
- High friction surfacing
- Road marking vehicles and equipment
- Decorative surface treatments
- Operative training

Utilising the collective resources and shared expertise of our four divisions, we develop cohesive solutions for key areas such as road safety, efficient asset management and the future sustainability of the road network.

**Group divisions**

**Hitex Traffic Safety Limited**
Material development, manufacture and export

**L&R Roadlines Limited**
Contractors of road markings, high friction surfacing and road repair

**Somerford Equipment Limited**
Application vehicle design and build

**Textureprint Limited**
Contractors of decorative surfacing

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