Lanes Group Case Study

Blind shot reline under world's widest bridge

Project:
Blind shot reline under world's widest bridge

Client:
Manchester Metrolink

Sector:
Public transport

Location:
Greater Manchester

Challenges and achievements

- Successfully carrying out what is thought to have been the UK's largest no dig blind shot reline project.
- Completing trenchless reline of complex surface water sewer, including negotiating of two blind chambers.
- Managing heightened pollution risk for this complex reline project under the world's widest bridge, despite...
- Completing the reline project on budget – avoiding the need for an excavation that would have been hugely costly and risked seriously delaying the tram extension programme.

Overview

Lanes Group was commissioned to reline surface water sewers along the route of new track being built to extend the Metrolink tram network in Greater Manchester at a cost of £1.5 billion. One 54 metre section of the line ran across the world's widest bridge, in Rochdale town centre.

For this section, while there was access to the sewer pipe, there was no exit manhole, only an outfall directly into the River Roch.

Carrying out an excavation would have been disastrous for the budget and project schedule. Lanes had to find a way to line the 600mm diameter vitreous clay pipe and negotiate two blind chambers along the way, without allowing water, contaminated with styrene during the reline process, to reach the river.

The solution proposed by Lanes was to carry out what was thought to be the UK's biggest 'blind shot' reline project.

It was the only feasible way to carry out the work within a reasonable budget, within a timeframe that would keep the overall tram network expansion programme on track.

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Client's view

A client spokesperson said: "There's no doubt that it was a challenging project. Without an exit chamber we were facing a hugely expensive undertaking. Fortunately, the Lanes reline specialists came up with a solution which allowed us not only to complete this section, but to avoid any knock-on delay to the wider project too."

The project

The Metrolink expansion scheme would see the network triple in size after 60km of construction, 57 new tram stops and 240km of new rail track. Underground services, including sewers, had to be reinforced to withstand the 39.7 tonne trams. Lanes Group was commissioned to carry out the relining work required to strengthen the surface water sewers, where required.

The problem

In Rochdale, Lanes encountered a particular problem with the reline programme. There was a 54 metre long section of the 600mm diameter sewer that could only be accessed at one end.

The pipe's outfall into the river was inaccessible to men and machinery. There was a risk of contaminated water from the reline process getting into the river. Also, the sewer went through two blind chambers, increasing the risk of a liner snagging, or veering off course during installation.

The site

The sewer in the town centre runs under the widest bridge in the world, created when seven bridges were joined together to culvert the river in the 1920s.

Four attempts by the contractor to find the exit manhole failed, due to bridge struts blocking access. The team had to find a way to reinforce the sewer without excavating it. The previous time the bridge had been excavated and the river uncovered, in the 1990s, the bill had been £3.5 million.

The solution

Lanes' reline team suggested a 'blind shot' technique.

Lanes Reline Division Operations Manager Lee Bow:

"Usually we line from manhole to manhole and trim off the liner's sealed end at the exit manhole. With a blind shot, you launch an open-ended liner (specially tied) at the upstream manhole and use water pressure and volume to 'blow' the end open, because there is no exit access. The technique is usually only attempted on pipes up to 12" diameter. At 600mm diameter, this would be, to our knowledge, the biggest blind shot attempted."

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The project continued

Other challenges included:

- Blind chambers: The liner had to be guided through two blind chambers where the liner could snag or crash.
- Risk of river contamination: water used to cure – harden – the liner becomes contaminated with styrene (0.008 parts per million). This could not be allowed to get into the river.
- Changing diameter: After 54 metres the sewer suddenly decreased to 400mm. If the liner hit the smaller opening it could bunch up and block the pipe.

Risks associated with blind shot reline

Once the liner went into the sewer passed a half way, there would be no way to retrieve it without carrying out an excavation. There would be no second chance. The Lanes team had to get it right first time.

The blind shot plan

Lanes' plan incorporated carefully designed measures and contingencies to manage these challenges:

1. Access only

The open-ended liner would deal with the issue of having no downstream access.

2. Getting through safely

To negotiate the drain and blind chambers, the team inverted a triple-stitched, heat-welded plastic pre-liner carrier through first. This gave the liner a guide to inflate to, helped it negotiate the open chambers and was also an indicator of how the wet-out liner would travel.

3. Adequate water pressure

The liner was inverted in the conventional away with water under pressure delivered via an inversion tower constructed with scaffold. This was supplied with four jet vac tankers delivering water at 80-gallons per minute, per unit.

Pressure and volume were critical to ensure an adequate head of water to invert the liner through and to blow open the 'blind' end. Get it wrong and the liner could stall in the sewer. If this had happened, the only way to retrieve it would be to excavate.

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The blind shot plan continued

4. Double protection

A second calibration hose inside the liner forced it to inflate against the pre-liner, ensuring that it cured in shape. Doubling up with this second plastic, triple-stitched, heat-welded hose also guarded against rupturing and process water entering the river.

5. Control of inversion water

Once the liner had cured, the 8-metre head of water was removed by tanker, and the calibration hose pulled back to the inversion manhole, bringing residual water with it. All water was removed to a registered waste plant. The sewer was CCTV-surveyed and, as is standard on this type of contract, a sample was sent for independent testing to ensure that it met or exceeded specifications.

3. Adequate water pressure

The liner was inverted in the conventional away with water under pressure delivered via an inversion tower constructed with scaffold. This was supplied with four jet vac tankers delivering water at 80-gallons per minute, per unit.

The result

Lanes' expertise and planning paid off and what is thought to have been a record-breaking blind shot reline project was a success. The budget was intact, and the Metrolink extension was still on track.

Metrolink site - Rochdale

Excavation on the widest bridge in the world in the 1990s cost £3.5m.

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Blind shot preparation
Liner ready for wet-out process in Lanes' production facility.

No going back
Liner goes in at launch manhole on Smith Street.

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