NJUG CASE STUDY

CASE STUDY 16: Savings through trenchless techniques

The National Joint Utilities Group (NJUG) is the UK industry association representing utilities on street works issues. The thirty-eight companies[1] we represent work to deliver gas, electricity, water and telecommunications to both individual consumers and UK plc.

NJUG members need to continue to drive forward further improvements. We have therefore developed the NJUG Vision for Street Works, which revolves around six main principles:

1. Safety is the number one priority
2. Damage to underground assets is avoided
3. Utilities work together and in partnership with local authorities to minimise disruption
4. Utilities deliver consistent high quality
5. Utilities maximise the use of sustainable methods and materials
6. Street works in the UK are regarded as world class

This case study is an example of NJUG delivering on these principles and turning the Vision into a reality.

Overview:

Laing O'Rourke were contracted under the "Yorkshire Water 2007 Networks Contract" to investigate the current status of water mains in the eastern area of Yorkshire and to design a cost effective solution to rehabilitate the assets. Upgrades performed ranged from simple cleaning to refurbishment or replacement of assets.

Under current legislation and highway codes, material excavated from open-cut trenches in city centres, roads and verges cannot be used as backfill material. Accordingly, all excavated material from these areas is required to be sent as waste to landfill, incurring significant landfill and transportation costs and using valuable space within landfills. Additionally, suitable backfill has to in turn be imported from quarry, further adding to the cost of any operation.

The increased drive for companies to decrease their carbon footprint has led individual projects to look at ways to minimise their own waste production. The bulk of works performed by the Yorkshire Water Networks Rehabilitation team involved the renovation or renewal of existing underground pipes in the Yorkshire Water Network. The team therefore put considerable effort into reducing the amount of material sent to landfill through the use of trenchless technologies.

LAING O'ROURKE

[1] NJUG's current members are Energy Networks Association (representing electricity and gas), Water UK (representing all water and wastewater companies), National Grid, Openreach, Virgin Media and THUS, a Cable and Wireless Business. Our associate members are Clancy Docwra, Skanska McNicholas, Balfour Beatty, Morrison, Morgan Est, NACAP, PJ Keary, First Intervention, Carillion, Enterprise and Laing O'Rourke. Including members through trade associations, NJUG represents thirty-eight utility companies.

Case Study

At the outset, the team performed a survey on the pipeline to determine the residual structural strength of the pipe and its internal condition. Following this, a proposal was put to Yorkshire Water including a recommended rehabilitation procedure.

Where the pipe was structurally sound and the lining was in good condition, or where plastic piping was involved, a cleaning operation was recommended. Where the pipe was structurally sound but unlined, the team would recommend cleaning and lining. Where the pipe was not structurally sound or in cases where there had been 5 bursts between fittings or within a kilometre, or 3 bursts where there are water quality issues, Yorkshire Water requested that the main be either renewed or semi-structurally lined. Pipe renewal is the rehabilitation process that potentially results in high volumes of excavated materials deposited to landfill.

During the design phase, other renewal techniques were investigated to try and reduce the necessity for open cut trenches. Following the introduction of the methods above, the team bettered their goal by achieving 7.5% saving on energy costs and 15% reduction in the water resources used.

Pipe renewal techniques used under the Yorkshire Water 2007 Networks Contract included:

- ***Directional Drill:*** Best utilised on new pipelines where there are very few other services in the area. This technique involves excavating pits (2m x 1.5m) every 100 metres along the proposed route. From these pits the pipeline is drilled along the alignment, without the need to excavate a trench.
- ***Slip Lining:*** A slightly smaller diameter pipe is inserted inside the pipe being renewed. As with pipe bursting, this technique requires pits to be excavated every 100 metres. In some instances where the existing pipe is clean and clear of any obstruction, pits can be up to 300 metres apart along the route of the section being replaced.

The Yorkshire Water Networks Contract used trenchless renewal techniques on 356404m of pipeline. If a trench of 0.5m wide x 1.2m deep is assumed (typical trench dimension for a 150mm diameter pipeline) the use of trenchless techniques versus traditional open cut techniques equates to

- 356404m x 0.5m x 1.2m = **213 842m3** or **118 800 tonnes** of excavated material NOT sent to landfill, at an average cost saving of £5.52 per tonne.

This doesn't include the cost of transporting the material from the excavation site to landfill, nor the cost of importing suitable backfill material at £11 per tonne.

Further benefits realised through the use of trenchless pipe renewal techniques included:

- Increased operative and public safety due to limited excavations
- Decreased environmental impact on the project, through decrease in waste material sent to landfill and decreased importation of material from quarry
- Decreased road closures and disruption to the local community
- Decreased traffic management requirements
- Increased production – the team would not have been able to achieve the production rates of trenchless techniques if the open cut method were used

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Through the application of trenchless technologies, the Yorkshire Water 2007 Networks Contract reduced the amount of excavation waste produced. By employing trenchless renewal techniques, Laing O'Rourke were able to drastically decrease costs associated with landfill fees, transportation and import of backfill material. Other benefits included:

- Increased health and safety due to fewer excavations
- Decreased environmental impact
- Decreased impact on the local community
- Decrease in traffic management
- Increased production rates