

CASE STUDY NUMBER 80: Southern Water/Clancy Docwra/Atkins – Digging Deep for Safety

WINNER OF THE NJUG SAFETY AWARD 2015

The National Joint Utilities Group (NJUG) is the UK industry association representing utilities solely on street works issues. The 42 Utilities and 16 Associates we represent are major contributors to economic growth and 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 seven main principles:

- Safety
- High Quality
- Minimise Disruption
- Keep the Public Fully Informed
- Sustainable Methods and Materials
- Avoid Damage to Underground Assets
- Innovation

This case study is an example of the street works sector delivering on these principles and turning the vision into reality.

Overview - Digging Deep for Safety

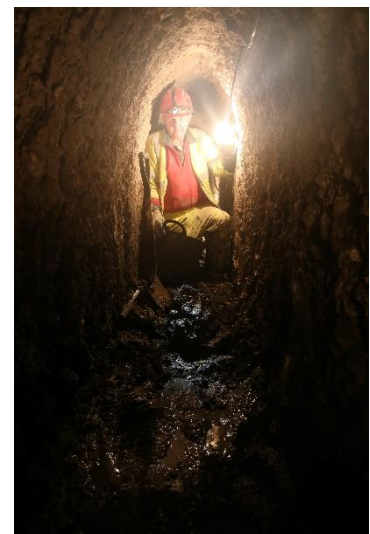
When repairs were required to Ramsgate's unique sewer system – a network of deep tunnels - staff were faced with working in the most inhospitable conditions imaginable to clear by hand sewer sludge and debris up to 300mm deep, leading to a 'world first' use of technology to reduce disruption to road users and the public, and a string of safety measures to protect the large workforce, resulting in an exemplary record of zero reportable accidents, zero lost time incidents and zero RIDDOR incidents during the 249 days of the project.

Case Study

A century ago a unique sewer network was created beneath Ramsgate by building tunnels rather than trenches to house sewer pipes. Nowhere else in the UK can a sewer system like this be found – but it poses a huge problem today when it comes to carrying out repairs.

Repairs are essential as sewage is coming into contact with the chalk tunnel walls and potentially permeating through fissures in the bedrock threatening the water in the aquifer serving the Thanet region. In this exclusive and potentially dangerous network of crumbling chalk tunnels, Southern Water brought together a specialist team comprising itself, its main contractor Clancy Docwra which undertook the construction work and Atkins which carried out hydraulic modelling and design. They brought in seven specialist sub-contracting companies.

Over the years there have been numerous surcharges of the network, plus fractures in the clay pipes, resulting in spoil – in places 300mm deep - piling around the original pipes, all of which had to be cleared. More than 7,000 tonnes of debris, including human excrement and rag, had to be removed from the tunnels. They devised and implemented a system of sewer rehabilitation never before seen in the UK – or indeed the world – to repair 20km of sewers and 96 manholes.



The challenge: Miners had dug the original underground tunnels up to 10m deep – but to carry out repairs safe access could not be gained using deep open trenches in a residential area. The team had to utilise the tunnels to gain access to repair and replace the sewer pipes using modern

techniques. However, a century ago the workforce did not have to contend with the build-up of escaping sewage and other debris.

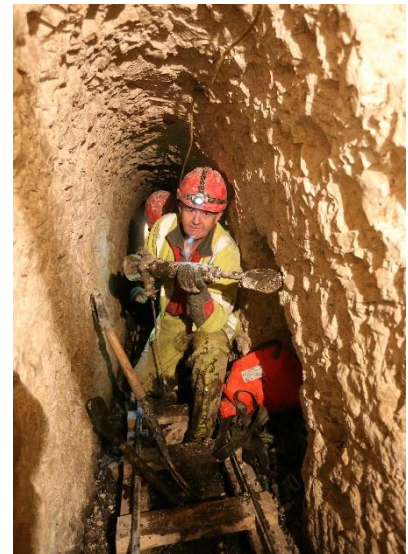
In some of the most inhospitable conditions imaginable, this had to be cleared by hand, scooping it into mini skips and lifting it from the tunnels. Not only was the workforce performing this unwelcome task in confined spaces deep beneath the ground, they often did so wearing full breathing apparatus when noxious gases were detected. Once the tunnels had been cleared, new pipes could be laid but this, too, presented an exceptional challenge.

The Solution: Initially, they considered spraying the tunnel walls with concrete to seal them but this was quickly discounted because this would not be safe if an operator was standing just 150mm from the wall. Aggregate could spray back at him.

An innovative solution was found when adapting the Cured In Place Pipe System, a technology introduced in 1974, which allows a flexible composite liner (polyester felt with glass reinforcement and an ultra violet sensitive resin) to be pulled through a tunnel. This system has been used widely to repair existing pipes but the team adapted it, designing the liner to become the pipe itself. Consultations were held with liner manufacturer Impreg to make a specially reinforced liner structurally capable of acting as a stand-alone pipe – a ‘world first’ – to enhance safety and minimise disruption.

Work within the cramped tunnel environment posed a serious health and safety risk. Robust working procedures were required:

- A full time Health and Safety Advisor with substantial experience in mining and confined spaces was appointed who worked with the team to conduct risk assessments and develop safe working practices.
- Specialist tunnelling company M A Durbin was appointed to ensure that only experienced personnel were employed, engaging teams of miners from all regions of the UK.
- A further specialist company Mines Rescue provided rescue teams who monitored all safety aspects.
- The tunnel atmosphere was monitored for dangerous gases and each worker wore a personal gas detector.
- A forced ventilation system was also introduced to blow air through the tunnels.
- Simulated training exercises were conducted regularly to replicate the rescue of workers, e.g. broken limb, gas inhalation.



Quite apart from the potentially hazardous working environment, further safety problems were encountered when accessing the tunnels for the first time. Large voids were discovered where the roofs of the tunnels had eroded and collapsed. On two occasions roads had to be quickly closed when it was discovered that the road surface was being supported only by water pipes and gas mains!

The success of the precautions taken to ensure health and safety for a workforce of more than 100 at peak times is measured by an exemplary record of zero reportable accidents, zero lost time incidents and zero RIDDOR incidents during the 249 days of the project. Not even a strain or a stumble – a remarkable period in the life of a major utility project and a fantastic achievement for working in confined spaces.