

Project Info



01 / 10 / 19



CC8™ Batched Rolls



200m²



Transverse layers



Newburn, Newcastle upon Tyne, England



Colas Limited



Continuation of works within Newburn Culvert to provide scour protection to new section of old brick-built culvert



Completed CC installation within Newburn Culvert

Concrete Canvas® was specified as a scour protection solution for an old brick-built culvert in Newburn near Newcastle-upon-Tyne in early 2019, following on from initial works a few years prior for Newcastle City Council.

In May 2012, residents of a block of flats known as Spencer Court in Newburn, northern England, were evacuated when a 6-metre-wide sink hole appeared on the site following a period of heavy rainfall.

Emergency teams were deployed to uncover why the hole had appeared and carry out repair works to stabilise the ground and improve the general safety of the area for residents and visitors.

Spencer Court was constructed on land which was owned by the Duke of Northumbria sometime in the mid-1800s. During the initial investigations, a privately-owned masonry culvert was discovered below Spencer Court. The culvert was a traditional brick Victorian structure and showed signs of damage due to erosion and flood events. It was thought that the culvert's poor state was a major contributor to the appearance of the sink hole.

On the 17th May, a number of pumps were installed to reduce the water level in and around a small valley upstream known as 'The Winnings'. While emergency works began, the summer months saw extreme weather. On 28th June a severe storm occurred and in the following weeks, the pumps became overwhelmed by the rising water levels at The Winnings. As a result, Spencer Court, along with a number of other residential dwellings and even cars were flooded during the early hours of the 10th June.



The flats were again evacuated and the area was again hit by a storm just days later which was reported by the Environment Agency as the largest storm the Newcastle area had experienced since the 1900s. Further flooding was seen in Spencer Court, this time up to the second floor of the buildings. Further emergency works were carried out, with teams working 24 hours a day to pump out the flood water and put further precautions in place to prevent additional damage. However, in September 2012 Spencer Court was partially demolished after the discovery of a six-inch subsidence.

It wasn't until 2016 that internal works began to protect the culvert structure. The first of three phases began, with Concrete Canvas® (CC) GCCM* being brought in to provide a hard-armoured erosion protection solution to the damage culvert. In 2019, Concrete Canvas Ltd returned for phase three. On arrival at the site, the existing material installed in 2016 was found to be performing as expected, however there were several areas of the culvert structure that still required repair and remedial works.

Prior to works, each section requiring repair was dammed off in turn using sandbags and plastic sheeting. A 600mm diameter pipe was used to manage the flow of water around these areas to allow for easy access and installation and a safe working environment. Debris was then removed from the culvert, including silt, rubble and chunks of brickwork that had been damaged and dislodged during storm events.



First signs of sink hole



Extent of damage after significant storm events



Entrance of culvert



Inside of brick-built culvert

*Geosynthetic Cementitious Composite Mat

Following preparation, the first section of works began approximately 50m inside the culvert. Colas rigged a number of lights and the crew wore head torches to aid with installation. Grout filled sandbags were used to fill the scour holes that had been created in the invert over time. Depending on the size of the holes, up to 200 sandbags were used to fill the voids. The sandbags were pegged into position and CC secured in place on one wall of the culvert using shot fired nails and stainless-steel fixings.

The CC had been batched to required lengths prior to being transported into the culvert to allow for manual transportation and easier installation. The material was then unrolled along the floor of the culvert and up the adjacent culvert wall where it was secured in the same way. The same fixings were used to secure the material along the culvert floor. Grout was used to fill any gaps between the wall and material to prevent ingress in the even of high water levels. At the leading and trailing edges of CC, a stainless steel 5mm thick plate were installed and bolted into position and finished with a small fillet of grout.

This method was repeated for all further lengths of CC installed, with adjacent lengths overlapping the last in a hinged pattern in the direction of waterflow. The CC was then hydrated using water flowing through the culvert.



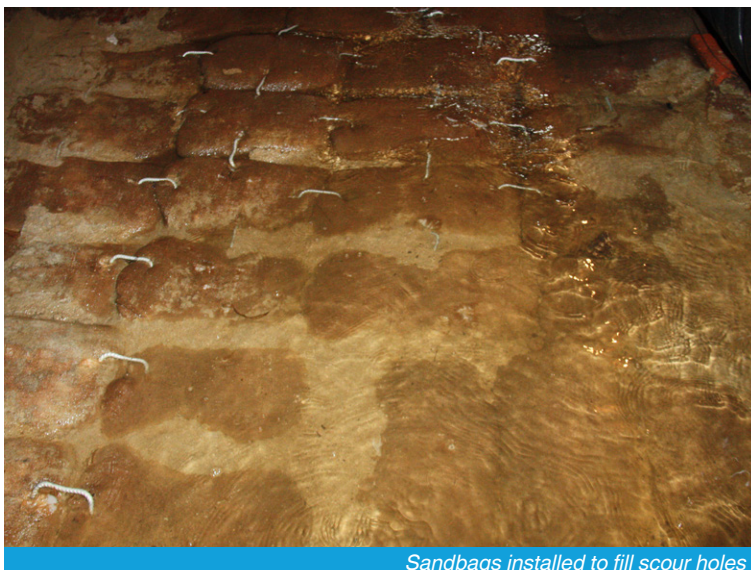
Entry point for workers and materials in 2019



Section of culvert requiring work in 2019



Pipe used to divert water through work sections



Sandbags installed to fill scour holes



Batched rolls of CC transported through culvert



Deploying CC batched roll



Securing leading edge of CC to culvert wall



CC edges were trimmed for neat finish



Securing CC to culvert floor



CC easily conformed to the culvert profile



Completed section of CC installation within the culvert below Spencer Court

The installation was very difficult for the construction teams due to the cramped conditions and limited light. However, the team of four completed the installation of a 200m² of CC8™ within approximately five working days.

The CC installed during phase three of the works is expected to provide effective erosion and scour protection, as well as impact protection from any further debris carried through the culvert in future storm events. CC's high levels of abrasion resistance, lack of requirement for plant and specialist equipment and ease of transportation and installation on such a challenging site made it the ideal solution for this project.

Since the disaster, the emergency works teams successfully stabilised the site and the remaining residents were permitted to move back into their homes. The Duke of Northumberland is reported to have provided more than £10 million to help with the repair of the culvert and support those who lived in the buildings on Spencer Court that were demolished in September 2012.