Amiblu®

Case Study

Bradford UK - Reinforcement of the Bradford Beck culvert

Bradford Metropolitan Council proposed plans to refurbish an existing building, located in Bradford City Centre. Beneath the building lies the culverted Bradford Beck which runs diagonally through the middle of the site.

During the refurbishment of the existing structure, it came to light that there were several cast iron beams located within the Bradford Beck culvert, directly under the site. Some of these beams were severely corroded and although some sections of the culvert had been replaced in previous works, there remained 22 m beneath the structure that had not been upgraded. The culvert in this section comprised masonry walls, with the building supported on heavily corroded iron beams which from a structural perspective meant that culvert had reached the end of its design life and therefore was in need of urgent refurbishment and maintenance.

Bradford Metropolitan Council engaged the services of JBA Bentley to design and build a suitable solution which included structural stability and installation works being carried out safely beneath an active site.

Fig 2: Courtesy of Peter Duffy Ltd

By choosing Amiblu's GRP NC Line, the design team were able to eliminate any works that may have had a negative impact on the fabric of the culvert and the building above. To complete the NC Line design Amiblu's engineers carried out a Finite Element Analysis to ensure the correct pipe strength and dimensions were specified for production. In addition to this and prior to production, principal contractor JN Bentley, working alongside contractor Peter Duffy Ltd designed a template to the recommended pipe dimensions to check and confirm suitability for access and maneuverability on site, with final measurements verified by 3D digital twin.

Fig 1: Courtesy of Amiblu

The complex design was governed by the extraordinary loadings and steel cross beams, as the culvert runs beneath the large city centre building. The challenge was to strengthen the existing 5 m wide x 22 m long culvert without removing the steel beams. The design team at JBA Bentley collaborated with Amiblu's application engineers and structural engineers to produce a design comprising two identical pipelines running parallel to one and other to accommodate the hydraulic design and achieve the crucial structural performance.

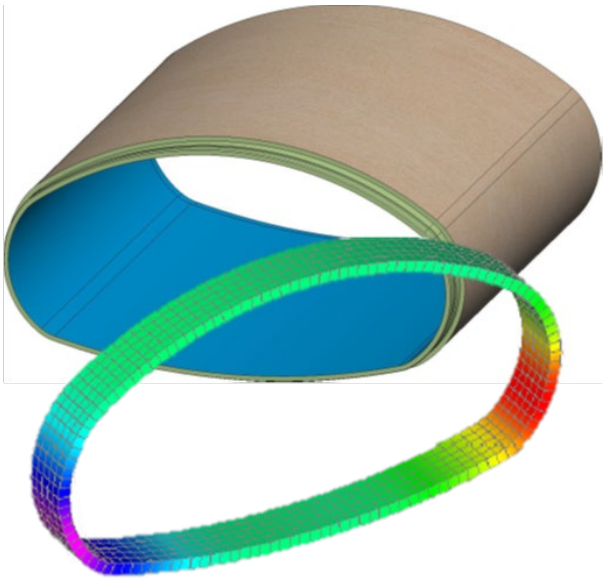

Fig 3. FEA extract & NC Line dwg courtesy of Amiblu

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PROJECT PARAMETERS

Country	UK
City	Bradford
Year of Construction	2022
Application	Culvert Strengthening
Installation	Trenchless
Technology	Amiblu NC Line
Total Length of Pipe	44 m
Nominal Diameter DN (mm)	2000 x 1000
Nominal Stiffness SN (N/mm²)	As designed
Client	City of Bradford Metropolitan District Council
Contractor	JBA Bentley/ Peter Duffy Ltd
Consulting Engineer	JBA Bentley
Principal Contractor	JN Bentley

"We have had a very positive experience working on this project with Amiblu. They were quick to reply to any technical queries and supplied us with all of the information that we needed to be confident in the installed solution.

Our client is very satisfied as the installation ensures the future of the culvert and the site." Dan Hotten, Chartered senior engineer, JBA Bentley

Due to the geometry of the culvert the twin pipeline was proposed by Amiblu's engineers, and was created by installing bespoke manufactured 'arch shaped' NC Line units; 2000 mm wide x 1000 mm high with a structural wall thickness of 47 mm.

Deliveries for the project were made to Peter Duffy Ltd's premises in Wakefield where they were stored and delivered to site as and when required.

"This was a complex project, with restricted access due to the active site. The partnership between Amiblu and Peter Duffy Ltd was seamless and included site investigations, designs, pipe delivery, project support throughout pipe installation including the annulus grouting to complete the required structural outcome. Peter Duffy Ltd provided professional and expert installation teams deployed to undertake the work the result was exceptional and long may this partnership continue in the future." Ben McCluskey, project manager, Peter Duffy Ltd.

Amiblu relining pipes are particularly suitable for pipe and culvert rehabilitation, as they are light in weight, corrosion resistant, quality assured, easy to install and engineered to significantly extend an assets' service life. Manufactured in Europe, they are available in a wide range of diameters up to DN 3600 mm in circular and shapes to DN 4000 mm in non-circular options and with varying strengths and lengths to cater for all locations and performance criteria.

Fig 4: Courtesy of Peter Duffy Ltd

Contact Amiblu in the UK:
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