

Structures Maintenance Research, Development and Innovation

Saving Structures Through Research and Development

Hand built brick culverts and small arched bridge structures built mostly in the Victorian era were never designed to carry the loads modern transportation now requires of them. Regular inspections and monitoring show a large number are suffering from potential structural failure.

In the County of Essex Structures Maintenance have taken on the challenge through research, to try and extend the lifespan of these beautiful historic structures, using German technology in the installation of a structural liner made of glass reinforced plastic, which is inflated against the inside walls of the structure and cured using ultra violet light.

This process has successfully saved many structures to date with the added enhancement of using a trenchless solution which minimises timescale, localized disruption, environmental impact and is very cost-effective saving the Essex tax payer in excess of 1.7million pounds over traditional reconstruction costs in the past 18 months and most important to the drivers in the county keeping the road network open.

Essex gets a World's first.

Wash Farm Bridge at Sible Hedingham in north Essex is a brick built structure and dates from 1850, it carries the busy A1017 across a tributary of the river Colne. Increasingly frequent inspections of the Bridge revealed a growing radial crack which threatened to lead to the complete collapse of the structure. This particular structure has a unique historic provenance and needed to be saved.

However, calculations showed that due to particularities of the structure's double barrelled design, it would need a liner that was stronger and therefore thicker than anything used before.

Working with our supply chain partner's iLine and the German Engineers from Reline Europe a new concept chemical chain reaction was developed to cure the extra thick liner. The re-lining was successfully carried out across four and a half days and was confirmed as the thickest structural liner of its type in the world. An example of collaborative working pushing the boundaries.



Saving Structures Trough Research and Development and Innovation

River scour is a recognised threat to many bridge structures in the form of the undermining of structural foundations. The size and scale of the problem varies much like the hydrology and surrounding location of the structures.

Tried, tested and traditional methods of preventing scour are feasible at locations with available area and ease of access. Increasingly the sites are remote with restricted access possibilities, so the need to research and develop a process/ technique to combat and protect structures from scour at remote sites was there.

Research based on finding a viable scour solution incorporating durability, ease of handling, installation and following academic research brought to the fore the unique combination of Multilock recycled plastic sheet piling, with a hybrid kingpost system formed by the use of 100mm Dia. Guadua Bamboo.

The light weight (easier manual handling) recycled PVC plastic sheets are formed with two 120mm hexagonal tubes giving enhanced rigidity, can be driven manually or with small handheld machinery, into the river bed. Guadua Bamboo culms (light in weight but comparable in strength to traditional materials) are then driven through the hexagonal cells, to design depth, to provide structural anchorage of the retaining wall.

This combination of materials and process has proved not only to be a multi award winner, but also the ease of on-site construction negated the need for heavy piling plant for installation. The longevity and low maintenance requirements of the piling combination contributed to an overall reduction in construction and ongoing maintenance costs. Also, the materials used were 42% cheaper per square meter installed than traditional materials, plus the products used are renewable/sustainable and have a low carbon footprint.



Recycled plastic sheet piling



Guadua bamboo



Installation