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Development in culvert repair technology: Strengthening using UHPFC shotcrete

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1 Abstract

There are currently no standardization regarding the production, design, and operational execution of Ultra-High Performance Fibre-Reinforced Shotcrete structures. Based on the recent practical feedback and understanding of the standard UHPFC cast in place, Freyssinet has developed an innovative technology, which is particularly suitable in repair solution to improve the competitiveness of strengthening design both technically and economically.

This attractive alternative repair solution is implemented on a specific shaped structure like a culvert pipe composed of a corrugated tin steel plate, and used for secondary human or hydraulic path under highway embankments surroundings rural and urban areas.

Despite their general simple appearance, pipe structures provide key issues involved in the design, implementation and maintenance when their sizes are reaching their limits. The combined use of the blast technology and the UHPFC material performance have allowed to develop a new sustainable repair solution.

The design solution provides a thin UHPFC shotcrete shell adapting to the roughness of the existing steel plate, and keeps similar flexible behavior relevant to the soil/structure stiffness interaction. In terms of strengthening and robustness, the solution develops the full load capacity for extending the structure design life.

Keywords: UHPFRC; shotcrete; sustainable technology; innovative strengthening solution; nozzle structure; soil/structure interaction.

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