Applications of Non-destructive methods (GPR and 3D Laser Scanner) in Historic Masonry Arch Bridge Assessment

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Abstract – There exist approximately 70,000 masonry arch bridge spans (brick and stone) in the UK with tens of thousands more throughout Europe. A significant number of these bridges are still in operation and form part of the road and rail network systems in many countries. A great majority of these bridges are in desperate need of repair and maintenance. Applications of non-destructive testing methods such as ground penetrating radar (GPR), 3D laser scanning, accelerometer sensors and vibration detecting sensors amongst many others have been used to assess and monitor such structures in the past few years. This presentation provides results of the applications of a 2GHz GPR antenna system and a 3D laser scanner on a historic masonry arch bridge (the Old Bridge, Aylesford) located in Kent, in the south east of England. The older part of the bridge (the mid-span) is 860 years old. The bridge was the subject of a major alteration in 1811. This presentation forms part of a larger ongoing study which is using the two above mentioned non-destructive methods for long-term monitoring of the bridge. The adopted survey planning strategy and technique, data acquisition and processing as well as challenges encountered during actual survey and fieldworks have been discussed in this presentation. As a result of this study the position of different layers of the deck structure has been established with the identification of the original stone base of the bridge. This information in addition to the location of a number of structural ties (anchors – remedial work carried out previously) in the absence of reliable and accurate design details proved to be extremely useful for the modelling of the bridge using the finite element method. Results of the 3D laser scanning of the bridge have also been presented which have provided invaluable data essential for the accurate modelling of the bridge as well as the long term monitoring of the bridge.

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