

## **COST Action TU1208 – Working Group 2 – GPR surveying of pavements, bridges, tunnels and buildings; underground utility and void sensing**

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This work aims at presenting the main results achieved by Working Group (WG) 2 “GPR surveying of pavements, bridges, tunnels and buildings; underground utility and void sensing” of the COST (European COoperation in Science and Technology) Action TU1208 “Civil Engineering Applications of Ground Penetrating Radar” ([www.GPRadar.eu](http://www.GPRadar.eu), [www.cost.eu](http://www.cost.eu)). The principal goal of the Action, started in April 2013 and ending in October 2017, is to exchange and increase scientific-technical knowledge and experience of Ground Penetrating Radar (GPR) techniques in civil engineering, whilst promoting throughout Europe the effective use of this safe non-destructive technique. The Action involves more than 300 Members from 28 COST Countries, a Cooperating State, 6 Near Neighbour Countries and 6 International Partner Countries.

The most interesting achievements of WG2 include:

1. The state of the art on the use of GPR in civil engineering was composed and open issues were identified. The few existing international/national guidelines/protocols for GPR inspection in civil engineering were reviewed and discussed. Academic end-users, private companies and stakeholders presented their point of view and needs.
2. Guidelines for investigating flexible pavement by using GPR were prepared, with particular regard to layer-thickness assessment, moisture-content sensing, pavement-damage detection and classification, and other main GPR-based investigations in pavement engineering.
3. Guidelines for GPR sensing and mapping of underground utilities and voids were prepared, with a main focus on urban areas.
4. Guidelines for GPR assessment of concrete structures, with particular regard to inspections in bridges and tunnels, were prepared.
5. A report was composed, including a series of practical suggestions and very useful information to guide GPR users during building inspection.
6. WG2 Members carried out a plethora of case studies where GPR was used to survey roads, highways, airport runways, car parkings, road tunnels, underground concrete tunnels, bridges, railways, buildings. GPR was also employed to detect cables and pipes, as well as to inspect road construction materials, joints, concrete and wood. A selection of the most interesting results will be presented during the 2017 EGU GA.
7. WG2 contributed to the TU1208 Education Pack, an open-access educational package conceived to teach GPR in University courses.

8. In cooperation with the other Working Groups, WG2 organized Tutorials on Ground Penetrating Radar (Brussels, Belgium, July 2014, and London, United Kingdom, March 2015), as well as Training Schools on “Civil engineering applications of Ground Penetrating Radar” (Pisa, Italy, September 2014), “Applications of Ground Penetrating Radar in urban areas: the sensitive case of historical cities” (Cracow, Poland, May 2015), “Ground Penetrating Radar for road pavement assessment and detection of buried utilities” (London, United Kingdom, October 2015), “Applications of GPR to civil engineering and archaeology” (Valletta, Malta, January 2016), “Non-destructive testing techniques for civil engineering” (Barcelona, Spain, March 2016), and finally “Ground Penetrating Radar for the assessment of transport infrastructure” (Osijek, Croatia, March 2017).

9. In cooperation with the other Working Groups, WG2 organized a series of national events devoted to fostering the interaction with stakeholders, new potential GPR end-users, and interested citizens. During such events, participants could discover what is GPR and how this technique can be effectively used in civil engineering works as well as in different fields (“TU1208 GPR Road Show”).

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