



Rehabilitation of the sewage system in Baneasa using a Carbofix® concrete protection

The north part of Bucharest is an important business location due to its near location to the airports Henry Coanda and Baneasa and is therefore very good developed in its infrastructure, e.g. with the DN1 national road that connects to the central area of Romania. As the old infrastructure was obsolete and unsuitable for the further development of the area, the authorities decided to encourage the development of internationally funded projects to improve the road, the sewer and the water supply networks.

Also, private investments were supported for the building of three super markets and a brand new residential area. All these raised the demand for a larger sewer. After an international tender, the consortium J&P Avax - C. Psallidas from Greece was awarded the contract for the rehabilitation of the sewage system, with INOCSA from Spain as the consultant. The requirements for the main sewer were concrete pipes with a diameter of 1,200 mm and lined at the inside either with a coating or with an HDPE membrane. After detailed discussions and clarifications it was decided and accepted by the contractor and the consultant to use Carbofix®-10 406, 2.00 mm concrete protection liner from NAUE GmbH & Co. KG. The concept was based on manufacturing Carbofix® cylinders with 3 metres height, then introducing them into the vertical steel shutterings, where the concrete was poured and vibrated.

The Carbofix® studs were this way firmly incorporated in the concrete of the pipes. The decision to use Carbofix® was based on the overall liner performance, robustness, quality control, ease of installation and the cost effectiveness. The manufacturing of one pipe took 8 hours in summer and one team of welders could produce 10 Carbofix® cylinders per day. Due to handling issues only longitudinal hot wedge weldings were used. The installation was done according to the "pipe -jacking" technology by excavating 7 m diameter holes and pushing the pipes into each other. The horizontal digging process is controlled by a laser positioning device that ensures the correct level. One section is typically 150 m long, with one jacking shaft and two ventilation shafts. In the airport area, the length of the tunnel between two shafts increased to 300 m. Once two pipes were connected the joints between the pipes were sealed. In the particular case a 2.00 mm Carbofol® HDPE smooth geomembrane collar, 300 - 500 mm wide was applied over the joint and extrusion welded.

All the welds had a copper wire incorporated and were tested with a spark tester. In some sections the water table was so high that water penetrated the pipes and made welding impossible. In this case a special cement mix was injected into the soil in the area of the joints, so that water infiltration was reduced and welding was possible. Up to now 1.2 km of 2.8 km of the main sewer with Carbofix® were successfully installed and final completion is expected by the end of the year.



Carbofix® sealed pipes

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Secugrid® reinforced "soil pressure absorber" in front of the cellar wall