

Geodetic Infrastructure and Positioning for the Fehmarnbelt Fixed Link

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SUMMARY

The Fehmarnbelt Fixed Link is a tunnel which is being constructed between Germany and Denmark across the Fehmarnbelt, and it is one of the larger construction projects in Europe at the moment. For large construction projects a homogeneous and robust geodetic infrastructure is important and this paper describes the solutions and implementations chosen in establishing a geodetic basis, or geodetic infrastructure, for the construction work. The geodetic infrastructure consists of establishment of new permanent GNSS stations, selection of geodetic reference system, establishment of a geodetic reference frame, analyses of sea level change, determination of mean sea level in the area, definition of a new height system, determination of a geoid model, derivation of parameters for coordinate transformations to the national reference frames in Germany and Denmark, definition of a map projection, and development of a transformation software where all parts of the geodetic basis have been implemented. The paper describes how this work was carried out, and some of the considerations behind the chosen solutions. Also the sequence of the tasks is outlined in the paper since coordination of the work is important to avoid time delays in the project. When the geodetic tasks were completed a network based GNSS RTK service was established making use of the geodetic infrastructure. The GNSS RTK service is based on the new permanent GNSS stations along with some existing GNSS stations in the area. The paper describes the design and implementation of the RTK service as well as some testing carried out with the operational system. The geodetic infrastructure and positioning system is now operational, and the paper finally reviews the maintenance and monitoring activities carried out to make sure requirements for the system are continuously fulfilled.