GeoBIM for full underground BIM design

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Abstract

The GeoBIM concept has been developed since 2012 and is now a well tested tool in the infrastructure planning industry in Sweden. GeoBIM has been used in a number of large infrastructure projects i.e. Varberg railway tunnel, Norrbotniabanan railway, Ostlänken high speed railway. Within the concept the whole geo-related process from planning at early stages via field work to interpreted geo-model of the undergrround space, including both geometry and parameters, is now a completey closed digital chain. The core of the GeoBIM concept is a database capable of handling ALL geo-related data types that are used in large infrastructure projects (> 100).

Essentially, the database stores point information with location and eventual relation to other points. The point carries a value and this value is related to a measurement (information of measurement method etc.) as well as an unlimited number of dimensions. This approach ensures that information from new methods may easily be added, and large amounts of data can be handled rationally since data are handled as a point cloud. The database model is implemented in a PostgreSQL database located in the Cloud.

To access the information, a database viewer and a web map has been connected, which are accessible through a GeoBIM Portal (www.geobim.se) where project members can login to their projects. This enables the project member to get an overview, as well as a detailed view, of the data and related documents (e.g. seismic profiles, borehole information, etc.).

The easy access to data and geo models and the direct compatibility with the CAD design tools has made communication of both data and models to all project members very efficient and appreciated.

Ongoing work

The next generation of the infrastructure design process focuses on full BIM and LCC (Life Cycle Costs) as the governing decision tool. This means that the maintenance phase is gaining a lot more interest than before, resulting in a need for systems where the facility and the accompanying data and information need to be accessible for 120 years or so. However, if this is to become reality, more standardized data formats and exchange formats need to be developed and widely accepted.
In a recently started project the CoClass system is under development for underground objects, aiming at giving all geo-related underground objects – points, lines, areas, volumes – a certain code, which will give all systems in the infrastructure process a possibility to identify that certain object (Table 1). The CoClass system is a Swedish initiative built on the international standard ISO 12006-2. The system (version 1.0) is already set for structures above ground and is now introduced and supported by the Building Smart organization (https://coclass.byggtjanst.se).