

VÄSTLÄNKEN E02-CENTRALEN BUILDING DIAPHRAGM WALLS - A SMART SOLUTION

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Abstract

The WestLink is a railway tunnel under construction below central Gothenburg, consisting of five construction lots including three underground stations. The purpose of the *Centralen* lot is to connect the commuter traffic to Nils Ericson terminal and to Gothenburg Central Station by a new four-track underground station with two platforms. Designed as an underground structure, the new station is built by NCC Infrastructure (NCC) as a cut and cover tunnel using the bottom-up method. As the ground consists mainly of very soft clay, the design and construction of the underground station is particularly challenging.

Trafikverket (TrV) chose Early Contractor Involment (ECI-Contract) for this challenging lot. In the first phase, the project team developed the design and set a target price. Wayss & Freytag Ingenieurbau AG (W&F) was appointed as a subcontractor for special foundation works. The team developed the design for Sweden's fifth diaphragm wall (D-Wall) project in history in a very creative and cooperative atmosphere. To verify the design parameters and to convince TrV from the technical solution, a D-Wall test field was successfully carried out in 2017.

The first part of the D-Wall production at *Centralen* started in April 2019 and was finished according to schedule until end of April 2021. During this period of time, a 500 m long construction pit with a maximum width of 50 m and a total number of 134 longitudinal and 466 cross wall panels were constructed. Therefore, 7.0 m long and 1.2 m wide trenches, which are stabilized by a special supporting slurry, were excavated to a depth of -24.0 m. After installing reinforcement cages with a maximum weight of 40 tons, the trenches are poured with concrete using the tremie method.

Based on the very good cooperation between NCC and W&F, both companies are also building the second approximately 200 m long part of Centralen's diaphragm

wall construction pit together. These works started in Summer 2022 and shall be finished until spring 2023.

Due to the weak strength parameters of the Gothenburg clay, it is not possible to activate sufficient passive earth pressure at the toe of the retaining wall. For this reason, cross walls of up to 50.0 m in length, which act as "low" struts, are constructed using the D-Wall technique. The top of the pit is braced with tubular steel struts. The free height between the steel struts and the cross walls is 14,0 m and allows the tunnel box to be constructed without without obstructions and need of horizontal joints (see Fig. 1).



Figure 1. View into the already excavated construction pit shows the D-Walls and and the enormous free space to construct the cut and cover tunnel.

Grundläggningdagen is the perfect occasion to share our experiences and to report about the actual status of the ongoing works, but also about the specialties and the challenges after three years of operation.