



## Vertical Microtunnelling technology developed for retaining wall Amsterdam

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### Summary

The municipality of Amsterdam is currently constructing the new metro line, the North/South-line. This metro line passes through Amsterdam's Central Station. The contractor must therefore construct an immersed tunnel under the station platforms, the 15 tracks and the historical station building. It must be avoided that the historical building that consists of brickwork from 1890 is damaged. Rail traffic and rail passengers cannot be inconvenienced during construction and safety must be guaranteed.

The realization of the retaining wall under Amsterdam Central Station is achieved by a newly developed innovative method for installing watertight interlocked tubular steel piles to a depth of -66 metres NAP.

**Keywords:** Vertical Boring, TBM (Tunnel Boring Machine), Microtunnelling, Retaining Wall, Bore-front Stability.

### 1. Introduction

The Microtunnelling system has been developed within a joint elaboration by the Client and the main contractor in order to limit and control the construction risks. The Client is represented by "Adviesbureau" North/South-line a partnership between Royal Haskoning, Witteveen+Bos and Ingenieursbureau Amsterdam (IBA). The station manager, ProRail, has awarded the design contract to VOF SE, a partnership between Movares Nederland B.V. and Arcadis Infra B.V. The contract for the crossing of Amsterdam Central Station was awarded to the JV CSO (Combinatie Strukton Betonbouw Van Oord ACZ) on 7<sup>th</sup> of November 2002.

The new metro line, the North/South Line (in Dutch Noord/Zuidlijn), will increase the accessibility of the city centre of Amsterdam. The line will ensure there is a fast link between Amsterdam-North, the city centre and Amsterdam-South.

The Stationseiland (i.e. the Station Island) where Amsterdam Central Station is situated, is regarded by experts as one of the most complex parts of the North/South Line. It consists of a brickwork station building and a station platform. The Stationseiland is the busiest public transport junction of the Netherlands with more than 250,000 passengers a day.

The design includes a construction pit under Amsterdam Central Station in which a tunnel element will be immersed (see Figure 1). Special technologies have been developed using an innovative approach that have been tested at full-scale and applied in the works. One of the significant examples has been the development of a vertical Microtunnelling technology to construct a tubular steel pile retaining wall under the station platform.