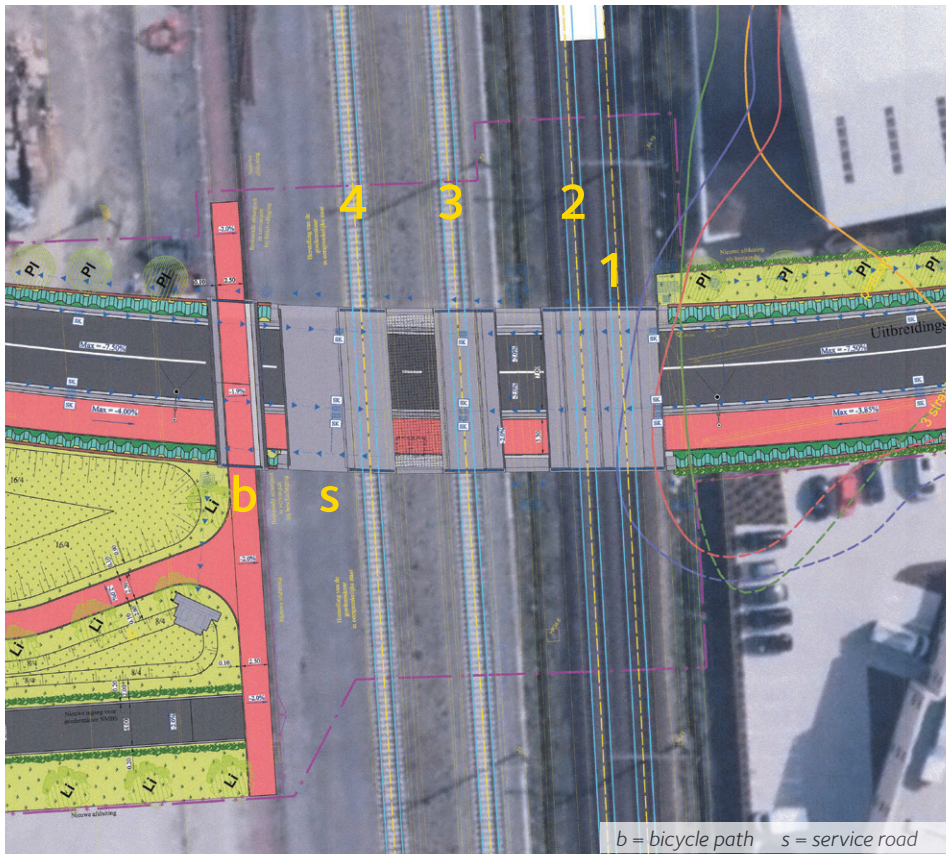
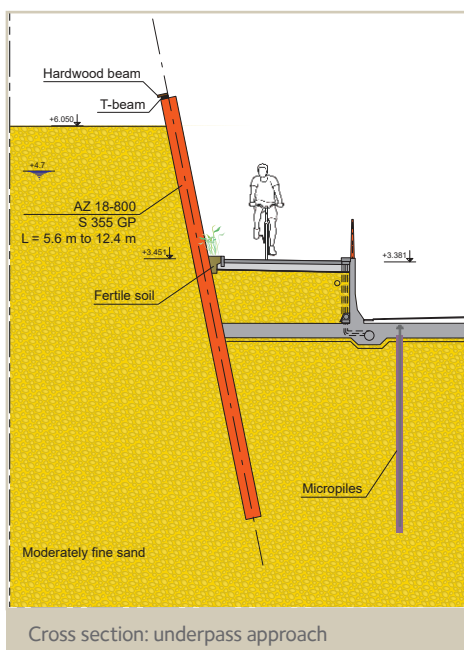




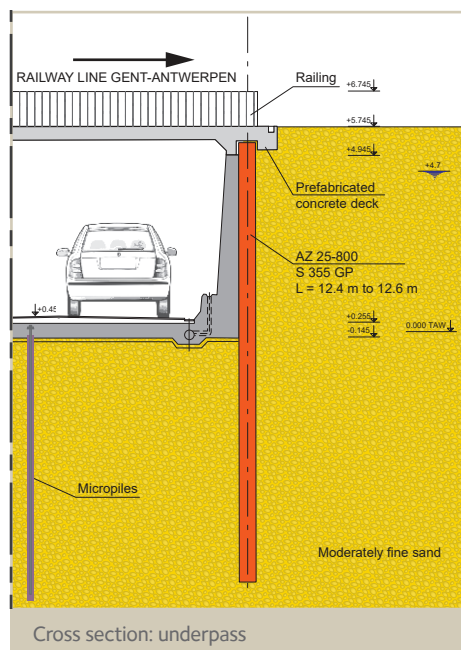
Railway Underpass Lokeren | Belgium



Railway underpass in Lokeren, Belgium - Overview



Cross section: underpass approach



Cross section: underpass

Lokeren is a Flemish town of 41,000 inhabitants located between the cities of Ghent and Antwerp. The busy railroad line Ghent - Antwerp passes right through Lokeren. To improve the safety of the railroad net in the North-East part of the city, the authorities decided to replace an existing railroad crossing by an underpass.

The planned structure undercuts four railroad tracks, a service road and a bicycle path. Two railroad tracks (n° 1 and n° 2) are for transit traffic, the other two (n° 3 and n° 4) are siding tracks. The underpass has two lanes for cars and trucks, and an elevated bicycle and foot path.

During construction of the underpass, tracks n° 1 and n° 2 could only be interrupted on two days in the weekend of 5 and 6 May 2018. To stay within this narrow time frame, a special solution was designed, using the top down method in combination with sheet piles.

The underpass decks are supported by 46 vertical AZ 25-800 sheet piles with lengths of 12.4 m to 12.6 m.

The underpass entrances consist of 165 AZ 18-800 sections in lengths between 5.6 m and 12.4 m. As special features, the piles have an inclination of 11° (1/5) and follow a curve with radius of 400 m. The vertical piles are connected by 4 prefabricated special transition piles to the inclined piles.

In addition, 18 AZ 18-800 sections of 3.4 m length were used to create a pumping pit at the bottom of the underpass.



Railroad underpass Lokeren | Belgium

End client	Infrabel, Brussels (Belgium)
Design	TUC RAIL nv, Brussels (Belgium)
Main contractor	BESIX nv, Brussels (Belgium)
Piling works	Kandt bv, Nieuwerkerk a/d IJssel (the Netherlands)
Steel sheet piles	AZ 18-800 S 355 GP 3.4 m - 12.4 m 272 t AZ 25-800 S 355 GP 12.4 m - 12.6 m 118 t
Total	390 tonnes of steel sheet piles

The underpass deck for railroad tracks n° 1, n° 2 and n° 3 was prefabricated next to the railroad and 14 AZ 25-800 sections were installed between the decks and track n° 2. On Saturday 5 May at 2:00 AM, the railroad traffic was interrupted and tracks n° 1 and n° 2 were removed. 18 AZ 25-800 sections, 2 transition piles and 4 inclined AZ 18-800 piles were installed in time. On the next day, the prefabricated 400 tonnes underpass deck for the 3 tracks was pushed on rails over the sheet piles to its final position. After the connection of the deck with the sheet piles, the tracks n° 1 and n° 2 were reinstalled. On Monday morning, 7 May, both tracks could be opened for traffic again.

The sheet piles were installed with two 70 tonnes hydraulic rigs equipped with PVE 24VM vibratory hammers with double clamps, fitting the AZ 800® profiles. In the next phase, the AZ 18-800 piles of the underpass entrances and the AZ 25-800 sections underneath track n° 4 were installed.

Once the sheet piles for the underpass entrance were installed, the excavation started underneath the prefabricated underpass decks. In parallel, the decks for track n° 4, the service road and the bicycle track were constructed in situ. After excavation to final level was finished, the interlocks of the AZ 18-800 piles were seal-welded to obtain a completely watertight wall. The use of ArcelorMittal's extra wide AZ-800 series allowed to minimize the total amount of welds to be done. After the pouring of the concrete

floor slab, the vertical AZ 25-800 piles were covered with an inclined concrete wall (1/15).

Due to the tight planning and the limited space on the job site, all sheet piles, 390 tonnes in total, were delivered just-in-time by ArcelorMittal. The works started in November 2017. The underpass opened on 22 May, 2019 and the entire project was completed in early July 2019, two months earlier than originally planned.



Pushing of the prefabricated bridge deck over sheet pile abutments



Installation by vibratory hammers with double clamping systems mounted on hydraulic rigs

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