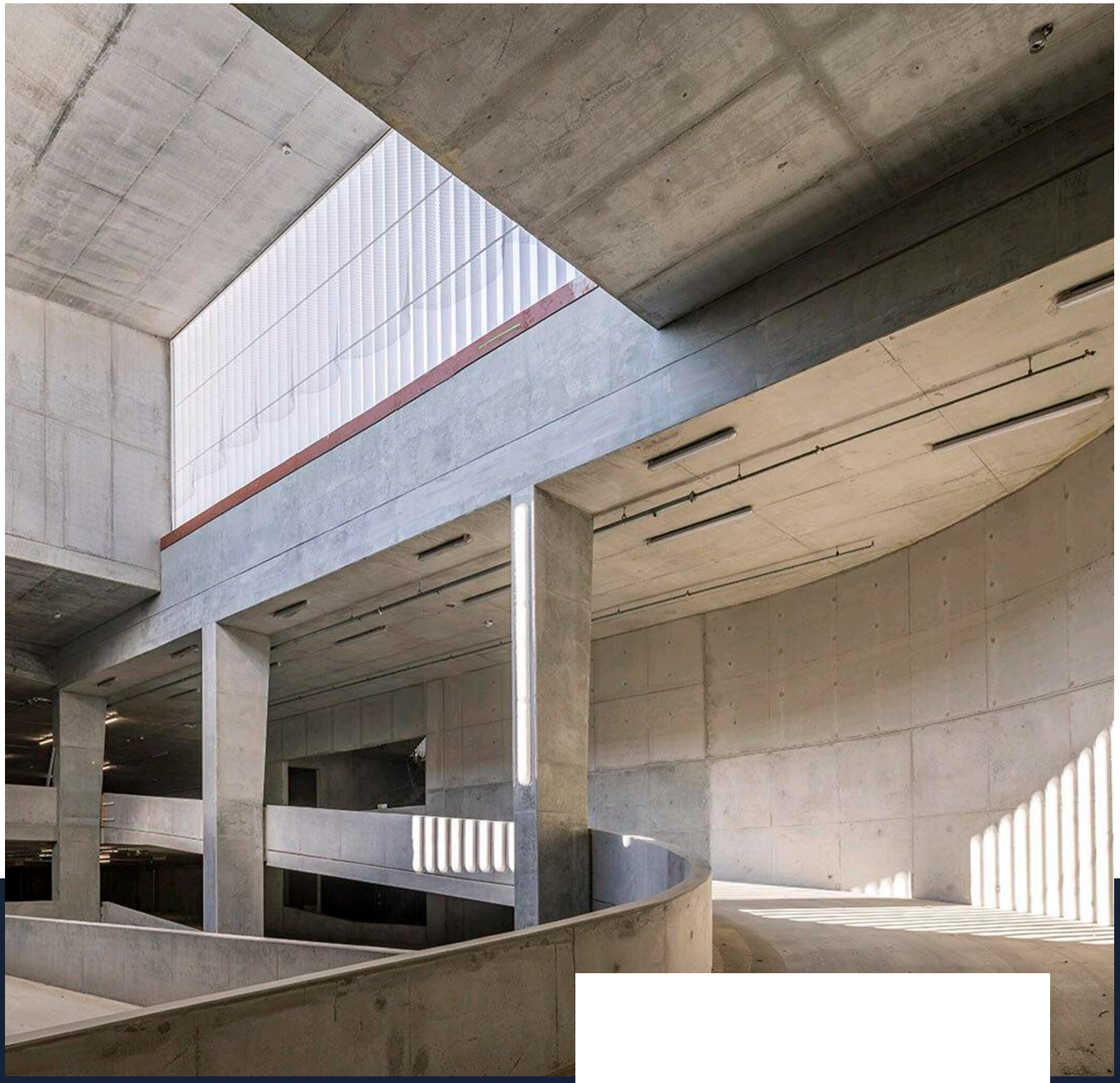


STATIONSPARKING KORTRIJK

Kortrijk
Station parking Kortrijk

Status
2019 - 2023

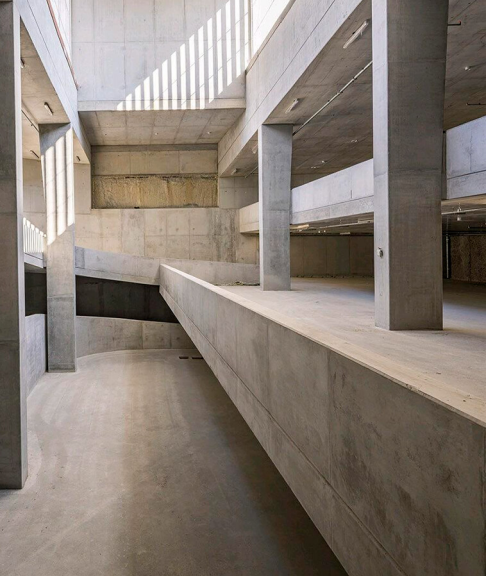
Services:
Civil Engineering, Structural

Sectors:
Civil works: tunnels

Client:
Stad Kortrijk

Architect:
Eurostation

BM ENGINEERING GROUP



The station area in Kortrijk will look completely different in a few years. Mobility will be optimized, with more attention to vulnerable road users and public transport. Key elements are the new underground parking garage and tunnels under the tracks for cars, buses, and bicycles. The numerous organic shapes in the design and the 'top-down' construction method put our structural engineers on their toes.

Various parties are involved in the project: NMBS, the City of Kortrijk, the Agency for Roads & Traffic, and Parko. TVH-Eiffage Flanders (Antwerpse Bouwwerken – Vuylsteke) was appointed as contractor for the underground parking garage, Besix for the car tunnel. They commissioned BM Engineering to convert the NMBS design plans into execution plans for the construction phase, specifically for the columns, walls, slabs, and diaphragm walls.

Stross method – top-down 'con'struction of the parking garage

In a conventional construction pit, sheet pile walls are first installed, after which the pit is fully excavated. After pouring the foundation slab, construction can proceed from bottom to top. However, for this underground parking garage, the process is reversed, using the stross method. After placing the diaphragm walls, foundation piles are first cast underground, in which vertical steel columns are anchored shortly after pouring. Then – still on solid ground – the roof slab is cast at ground level. Once it is sufficiently strong, the soil underneath is excavated. For each underground level, the floor slab is then cast, and then the soil underneath is removed. The construction pit is thus executed in steps downward. The advantage of this construction method is that no anchoring of the diaphragm wall is needed to create the construction pit. Moreover, placing anchors below the groundwater level is not straightforward. With the stross method, it is the underground concrete slabs themselves that each time provide the bracing of the diaphragm wall when excavating deeper.

Complex reinforcement in 3D

That the reinforcement of the underground parking garage was drawn in 3D was evident in a complex design where, among other things, the roof slab has various level differences. This quickly made clear how everything fits together, and any conflicts between reinforcement bars could be detected and resolved in advance, to ensure smooth execution on site. The existing car tunnel on Zandstraat will be extended to the former turnaround roundabout De Appel. The entire above-ground zone will then become a low-traffic green square. We also prepared the execution plans for the contractor for this project component. The stross method is again used. However, the design of the tunnel extension contains few straight lines, due to the permanent curvature of the road. The variety in reinforcement bars – both lengths and diameters – is therefore large. With concrete roof slabs 1.20 meters thick and diaphragm walls that are 20 meters long and 1 meter thick per section, it was also necessary here to make the complexity of the reinforcement transparent in a 3D model. To guarantee accessibility to the city center, the works are divided into different phases. The reinforcement and formwork plan also takes this into account.

Construction partners:

- NMBS – Stations Directorate (Brussels) – building owner
- NMBS – Division Study (Brussels) – design
- THV Eiffage Flanders (Antwerpse Bouwwerken – Vuylsteke) (Antwerp) – main contractor parking garage
- Besix (Brussels) – main contractor tunnel
- BM Engineering (Kortrijk) – execution plans for the structure and diaphragm walls

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