

SECONDARY NODES

WITHIN THE INNER-CITY OF ROTTERDAM

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01

NODE BEURS



secondary mobility node

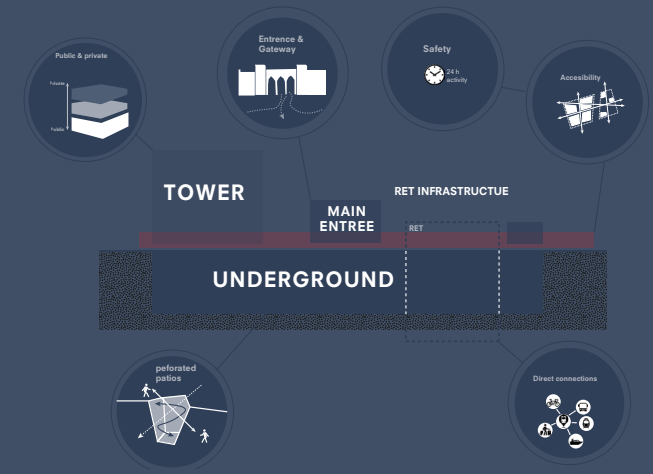


Nesselande

De Terp

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PROJECT BEURS



ROTTERDAM

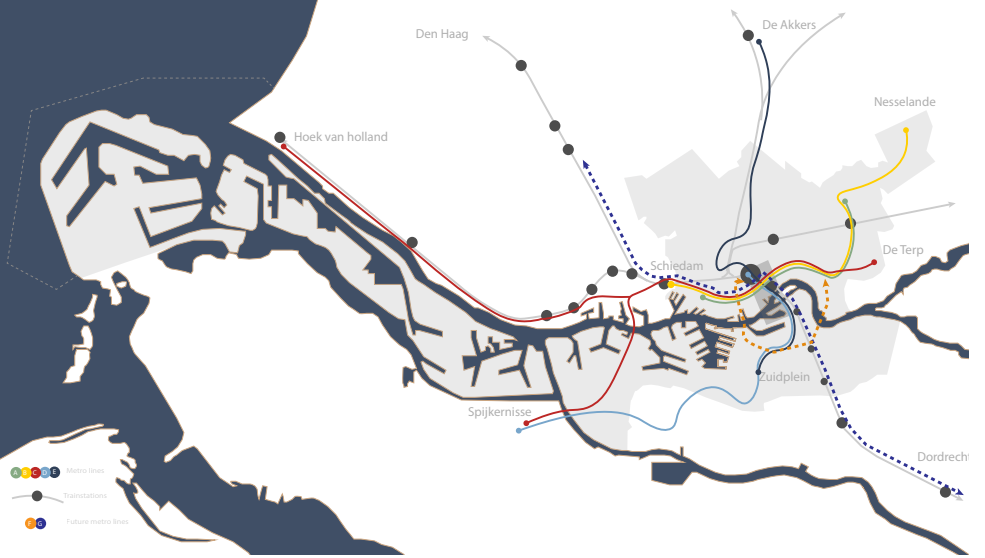




Image 1. Renders of the main entrance hall (level-2),
Entree from parking garage with daylight perforations(-2)

The New Inner City Entrance Beurs; A Regional Light-Rail Mobility Hub

1. Introduction

The idea of mobility nodes has been migrated and developed over time. A lot of research has been focused on those (inter)national nodes of a train station, this article is focused on the 'Secondary Nodes'. Those regional nodes, of multiple transportation flows, are situated in densifying metropolitan cities. In Rotterdam, the Node Beurs is situated in the inner-city and contains a junction of traffic flows of the metro, tram, bus, ferry, car, pedestrian and bike. Prospects indicate that the rising densification, leads to almost double amount of people using the metro at Beurs. At the moment Beurs is already an overloaded and fragmented node that forms a barrier within the urban tissue. While the Node Beurs has the potential to be a clear entrance to the inner-city and guide the traffic flows that cope with the capacity increase. The Node also has the potential to be part of the patchwork of public spaces, adding to the public floor-line of Rotterdam. Generating a multiple leveled open space and place to stay, with leisure, shops and other facilities. The project is establishing new urban connections, as well as strengthen the existing once by interweaving the hard infrastructure with the soft program and public space by making it pedestrian-oriented. The main goal of this architectural project is creating a new entrance that functions as a gateway to the inner-city, connecting the surrounded neighbourhoods, unravel the flows and directly connect the different types of transport. As well as it is an area that gives breathing space to the densifying city. The multiple leveled square function as a social place where people meet and are invited to explore the daylight perforated underground world. The recognizable entrances adding to the human scale and add to the local and regional character. As well as the pillars influence the local climate, by giving shelter for the rain and heat, function as a sounding board translating the weather to

the underground area. The flexibility of the transport hub is key for future developments, as the underground is already quite full, there is still some room to extend the entrance or bike facility or add an extra metro line possibly. Interweaving, perforating and breaking the underground open, increase the accessibility and mobility of the secondary node Beurs and the inner-city itself.

2. Research

2.1 Migration of the station

Migrating from the UK in 1863, the idea of the metro arose from the existing train networks. It traveled towards the big growing metropolitan areas like Istanbul, Budapest, Paris and New York. The metro in 1960 traveled towards the Netherlands and developed the first metro network in Rotterdam. Train stations developed important national and international nodes first on the edge of the city and later within the city. Through growth and densification within the city, the urge arose to develop and create a mobile and fast underground network within the city. As multiple cities in the metropole are growing, the connections between the cities become important. The metro network facilitates this fast connection with its big capacity, filling up the gap between the fast-moving trains and the local stopping tram. The metro intersecting with other transportation, like the tram bus, ferry, bike and car form a secondary and regional node. Those nodes become the driving motor for the flow in densifying city arteries, as well as for city growth and a place of kickstarting the development in the city.

The idea of big stations has developed over time and became to work like a running engine and gateway. The station has become more than a transfer point, combining all different elements related to multiple transport options; the basic station facilities; the public space; shopping facilities and leisure facilities; various routes and entrance functions towards the city. The trend is that the metropolitan nodes are developing a commercially focused program, taking

advantage of the big continuous flows of people, as well as it provides a base for funding those big architectural and infrastructural projects. Besides the commercialisation, the urban nodes have become multifunctional in their program, have increased in public space and function as a place to be.

2.2 The arriving metro in Rotterdam

In 1950 Rotterdam is blooming again after the destroying WWII. As the harbour of Rotterdam city is flourishing, the work and living mobility flows from South to North Rotterdam is enormous increased. The Maas had become an enormous junction of work and living flows and the economic driving harbour. Traffic jams are cluttering the traffic arteries, overloading the Maastunnel and bridges over the Maas, create a bottleneck in the heart of the city. The urge was big to declutter the junction and improve connections with new tunnels, bridges and ferry connections. Still, the capacity towards the inner city gave problems crossing the Maas river. By introducing, in 1960, the first metro line in the Netherlands of 5,8km connected the working and living centers of North and South of Rotterdam, the connection increased the capacity and speed. Instead of the 30 minutes crossing, it took only 2 minutes. In the '90 the Erasmusbridge and the Willemstunnel strengthen the connection even further. The metro line opened in 1968 and grew fast in its popularity, and still is expanding its network till today future. Creating a durable decentralized public system for future growth, as mobility is affecting the liveability and use of the city. Reaching the satellite cities and connecting everything to the bigger cities to one metropole. Beurs is one of the stations of this first metro line, and the only point now where you can transfer to all other regional lines, as well as entering the inner city of Rotterdam. Beurs is a node that is centrally located in the new Highrise strategy of the municipality, as well as its located on the education and culture axis. Connect to cities like Den Haag, Dordrecht, Rotterdam, and Hoek van Holland along with other smaller cities.

2.3. Location Node Beurs - Transport hub & Entrance

The busiest and biggest secondary node, within the densifying inner city of Rotterdam, is Node Beurs. Positioned at the intersection of the Coolingsingel, (West) Blaak, Churchillplein and the Schiedamsedijk. The node intermediate between the four different neighbourhoods, characterized by the harbour Leuvenhaven; the dwelling neighbourhood and nightlife of the Witte de Withstraat; as well as the two neighbourhoods known for their shopping streets, offices and pedestrian-friendly public domain. Beurs profit from the close by located museum park, the education axis, the activity of the waterfront around Leuvenhaven, the shopping center area. Koopgoot is one of the side entrances of the metro.

Beurs is fundamental within the regional network and functions as a heart to pump different traffic flows through the arteries of the growing and densifying city. Through increasing flows and aging of the metro station, the node is constrained towards the upcoming future. At the moment, the node is busy, chaotic, forms a barrier between neighbourhoods and is a hidden entrance in the inner city. While this node has the potential to connect, increase capacity, to create a mobile and connected inner-city. As well as it has the potential to be part of the public space patchwork, allowing to enter the floor-line of Rotterdam city, that function as the base to the changing and developing sky-line.

The area of Beurs is quite complex. It contains a complex infrastructural node with multiple traffic flows above ground and underground. Interweaving the urban tissue with intersecting metro lines of the Rotterdam network, as well as crossing traffic flows of the cars, tram, bus, bikes and pedestrian. Also, the space to build is limited, and need to cope and take into account the groundwater and a close-by metro line building condition. The site requires building not lower than 3 levels underground, build without too much vibration and build not too high next to the metro line. Along with taking into account the Highrise Strategy of Rotterdam, creating a lively plinth and rooftop landscape.

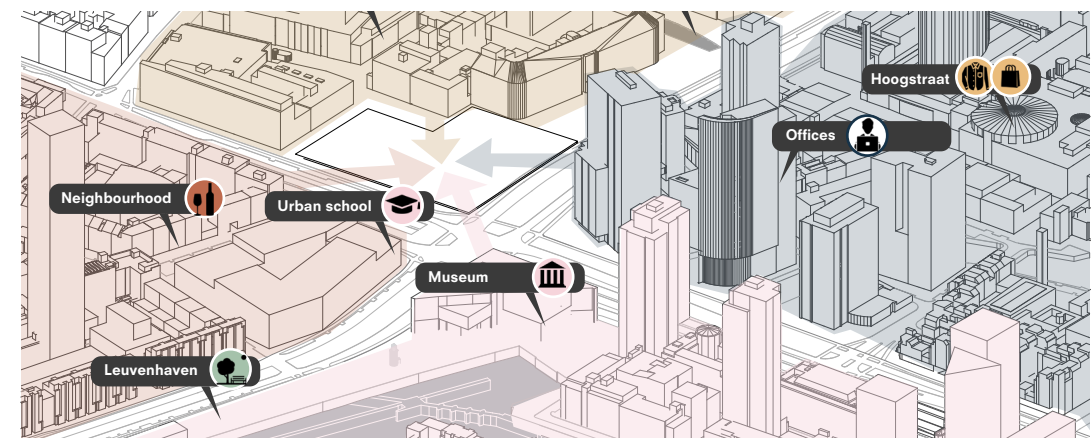
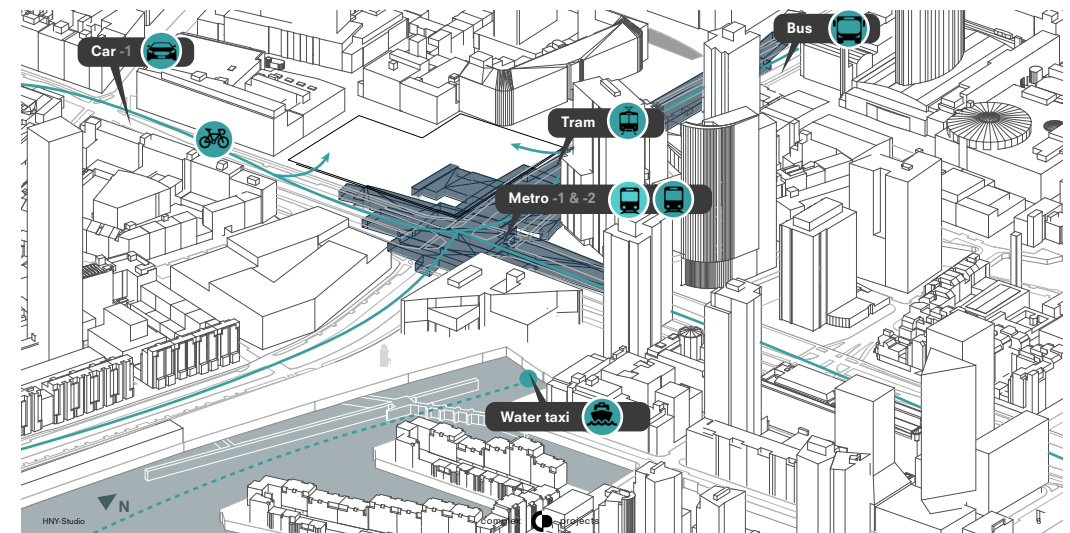
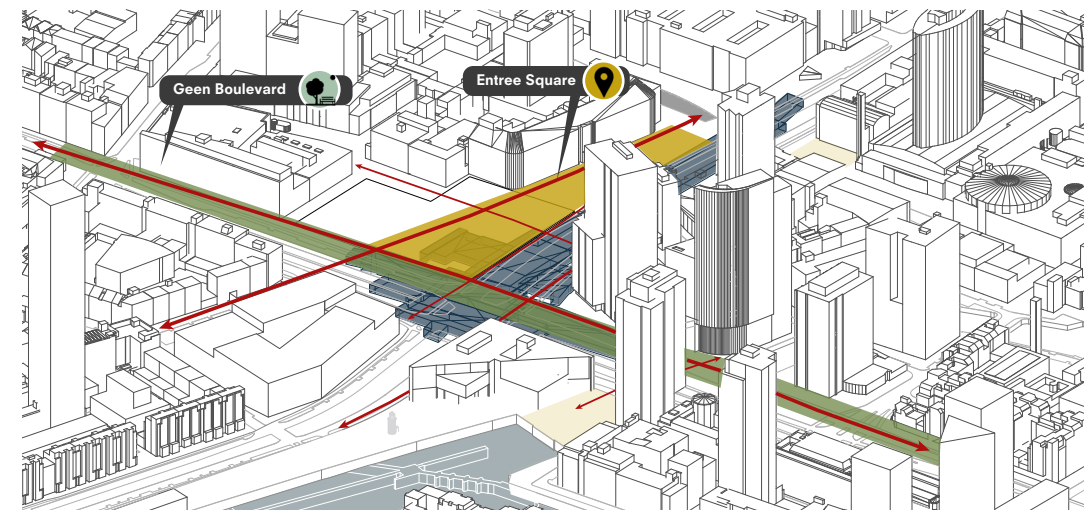


Image 2. Urban vision: Gateway and Entrance, Circulation and Connecting neighbourhoods

2.4. Densification

The municipality of Rotterdam is adding 50.000 dwellers in 2040, of which many will be on the high-rise axis. Through the increasing densification in the inner city the capacity of those regional secondary nodes, as Beurs, reaches limits. The metro station already reaches performance and capacity limits today, in 2020, as they expect it will almost double by then. This increasing amount of people, directly affecting how the secondary nodes and the city functions, as this regional network, is the root for future urban growth and development. The Infrastructure affects the quality of the public space on a local and regional scale. The densification sharpens the resistance to disruptive urban infrastructural interventions when space is scarce. It creates a need for a better interwoven and merged urban landscape with infrastructure that can cope with the future capacity needs.

2.5. Potential of the site

Although the area is highly accessible by public transport, the area of Beurs is also facing several challenges. The area is infrastructure dominated and no pleasant place to stay or enter the city. Some of the neighbourhoods are disconnected or more difficult to reach because the infrastructure is forming a barrier. Hidden entrances, difficult and overloaded paths, and small narrow streets creating a need of improvement for circulation and people flows. Also, the connection between the different types of transportation asks attention. Bicycles everywhere on unintended places are a sign of an opportunity to create a direct transit of flows and traffic, together with proper bike storage. The hidden entrances of the metro, narrow streets, and lack of activity around make the area unsafe at night. Important is to get back the sightlines, create 24h activity, and a more clear identity of the public space. Beurs has a lot of potentials to become a pleasant place to stay and to connect to the public space patchwork within the urban fabric. Beurs, as the heart of the secondary network, has the opportunity to function as a new gateway to the inner city. As passenger,

you can enter the inner-city by a new public square that is well connected to its pedestrian-friendly surrounding neighbourhoods. As well as attracting the people within the surrounding neighbourhood to the new plaza. The new entrance and newly added facilities of the metro station will function as a kickstart for development and amenities to arise around the area. The increasing capacity and extending the metro's network create a bigger reach to use public transport and stimulating a more sustainable and accessible inner city.

3. The Project

3.1. Project scope & Interweaving the urban tissue

The project scope of Beurs exists out of three components to establish together this underground regional light rail mobility hub, interwoven and merged in the urban landscape. The three components exist out of the renewed casco of the tower, the existing metro station and the newly build main entrance. The program of the scope is divided into soft and hard infrastructural program. Exiting out of a metro platform, two levels of bike storage, a new entrance hall with commercial facilities, and a 24 h active hotel and catering facilities. To create a more safe environment the entrance need to include a 24 active program and open sightlines.

The first component is the tower, were we keeping the existing casco of the Coolse Poort and renovate it. Adding a new program of a hotel, with the flexibility to turn it into dwellings, renew the façade and open up the underground of the tower towards the entrance hall. Creating an atrium next to the tower and create a new open urban corner block. As well as creating an active and open plinth providing safety and place for the local economy. Using an arcade as an architectural expression to create a smooth transition between the public square and the building. As well as adding balconies to the tower to create more of a human scale and flexibility to the program. Although the tower is important the project scope will be more

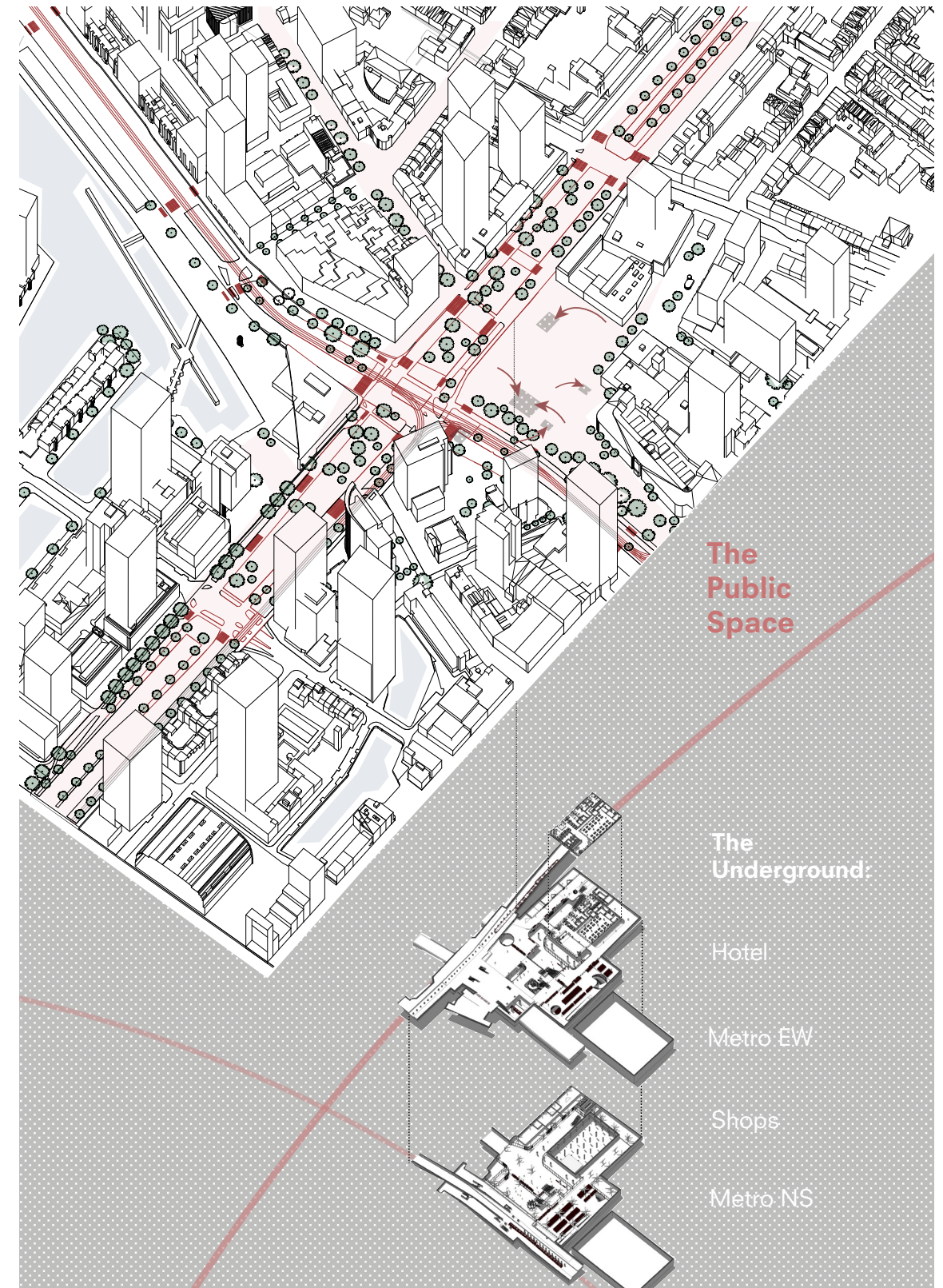


Image 3. Underground Lightrailhub Beurs axonometric & Public Transportation

focused on the other two components.

The second component is the underground metro that will be extended with a new entrance and embrace the tower building. The circulation is important, guiding the increased flows. Putting a new main entrance and its program mostly underground, create the opportunity to create a public space square on ground level within the densifying city. As well as it gives the opportunity to design direct connections and transits. Opening up the metro underlining the infrastructural identity of the area and connect the metro visually. The underground concept of perforation creates possibilities of adding daylight, as well as it makes the underground metro visible, creates a sense of the weather underground and create a connection between people within the different levels of public space.

The third component is the main entrance. This entrance invite the people through the gesture of the canopy into the underground. The pillar with its arching canopy function as sculptural recognizable building function as billboard and branding of the place. Create a smooth transition by interweaving the landscape together with the underground. The main entrance should be highly accessible from different sides, the side entrances should add and strengthen the accessibility and distribution of flows even future. The café in the main entrance pillar gives a 360 view of the inner city of Rotterdam. The entrances towards the infrastructure are highlighted by the pillars, the routing of the whole project is arranged into an L-shape activating the backstreet as well as the main entrance. As it also give long sightlines for overview to the travellers and visitors of Beurs.

3.2. Architectural Concept – an integral approach

The architectural concept of pillars and bows is based on a few different inspirations, influenced by the location, the underground world, the existing architectural characteristic columns and form language of gateways. In the research of the existing metro, it became clear that the exiting columns express the

identity of the historical metro network. Along with that, the tower is also expressing its main entrance by special and expressive columns. From here on the idea of the integral column started to grow.

The Coolingsingel parallel to the project site is currently developed into a green boulevard, at the site the pillars highlighting the underground entrances blending into the language of the trees. Also the new development of the group strategy, at the car artery at Churchillplein and (West)Blaak, is being transformed into a pedestrian-friendly green boulevard. The pillar entrance with their canopy inviting people, and function as meeting space, outdoor shelter and guidance to the people flows towards the underground. The pillars function as a gate towards the inner-city and branding the area.

The underground columns with beam arches function as construction elements inspired on the gates of for example the old city main station, as well as they function as routing elements, daylight element and climate element. The column is multifunctional in its being. The beams are a triangular structure and in the composition of a hexagon its referring to the history of the place of Churchillplein, were the Bijenkorf in Rotterdam has been located before WOII.

The whole construction exists out of the two adjusted existing construction of the tower and metro lines together with the embracing new construction of the new entrance. The new construction of the columns and beams is made out of concrete prefab elements. The columns are hollow inside as they function as ventilation canals. The columns are placed in a grid of 14,4 meters, as the existing nearby tower has a grid of 7,2m. Important is to give enough space for the people flows to meander through the underground entrance.

The beam construction exists out of triangles, creating a stiff formation, that also functions as spring imposition dividing the load better. The bow construction of the beams helps with dividing the load of the floors towards the columns. Those beams holding the semi-transparent glass walkable floors or hollow-core slabs. To prevent the new underground construction to float above, the bottom

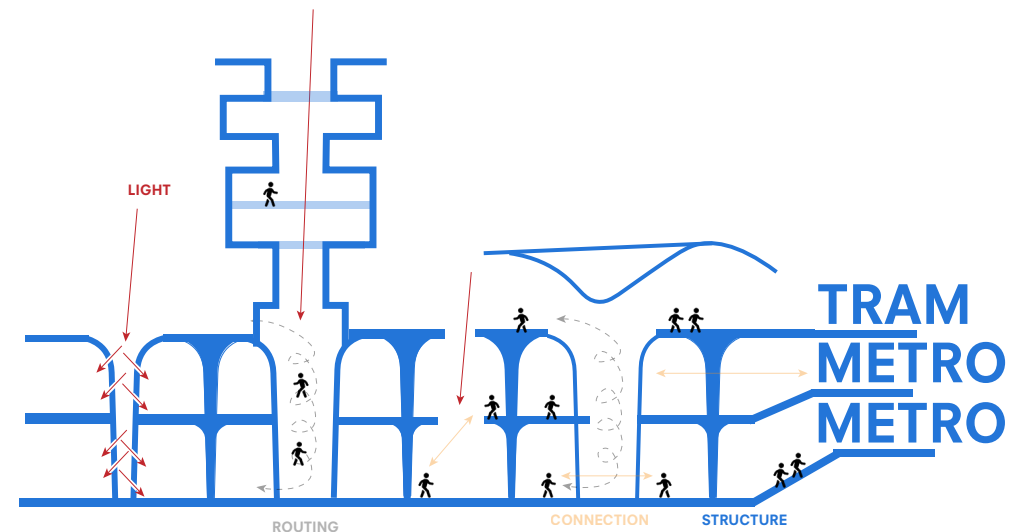


Image 4. Integral concept columns: routing, construction, connection, daylight & transport

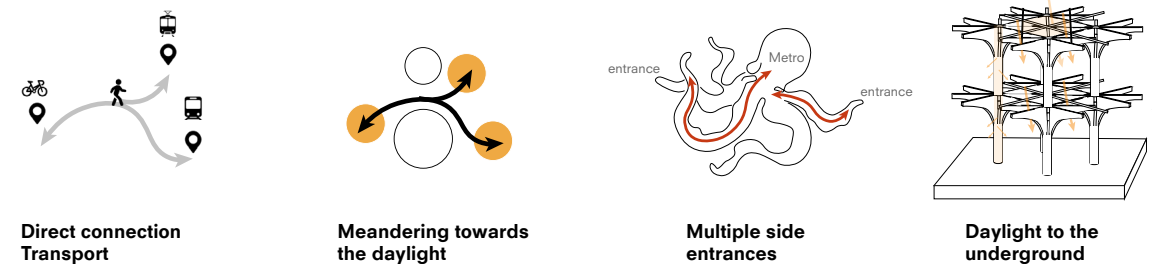


Image 5. Render of the atrium and second entrance (-2)

becomes weighted down, as well as it will be pushed outwards by grout anchors.

3.3. Mix of climate zones

Through the different building components and mixed program, the project contains three different Climate zones. As the roof of the underground entrance is a public square, the technical space is located in the underground on the lowest floor. From here the ventilation is regulated and guided through the columns, water drainage is transported towards the water storage and other installations like the WKO are placed here.

The first zone is the semi-outdoor climate of the metro and bike parking underground. The underground is connected with the outdoor air but also protected. Because of the increasing amount of people, the underground will be extra mechanically ventilated. The acoustics are regulated by transparent panels on the glass and wall panels.

The second climate zone is the semi-climatized area of around 15 degrees, including the program of the entrance hall. The program exists out of a mix of shops, catering and routing. This area needs to be climatized more, although it's also located in the stable thermal condition of the underground. In the winter heating it by core activation connected to a WKO system. Siding doors should keep in the warmth in. The mechanical ventilation underground needs to be carefully regulated, the extraction of ventilation is mainly organized through the columns, released at the public square by ornaments. The connected atrium is used as overflow, as well as it is full with transparent solar panels producing energy for the building. The acoustics have been regulated by wall panels keeping the ceiling construction open.

The third climate zone is fully climatized and around 20 degrees. It is including the area of the tower with the hotel program and the shops. The thermal heating is regulated by floor heating in floating screeds and using a WTW for the ventilated air. The acoustics is regulated through the ceiling panels. Important for the acoustics in the hotel is that its place as far as possible from the metro lines, as well as the metro noise, is blocked through multiple

facades. The shop's facilities separately need to regulate their own temperature by radiation panels and ventilate with separate air handling units.

3.4. Main Entrance climate concept & Routing

The main entrance pillars with their canopy function as their own system inviting people to the underground, and influencing the microclimate of the urban square. The main entrance pillar is made out of a coated steel construction bearing the public, 360-degree view, cafe floors. The canopy is protected by the semi-transparent Teflon and fiberglass membrane giving shelter and shade to the square. The entrance pillars function almost like a flower, collecting rainwater, getting energy from the transparent solar panels and function as a sound drum addressing the outside weather towards its surrounding. In the pillar is also the routing situated, the transparent core of elevators towards the café as well as the metro. The rest of the main entrance is made accessible by different escalators and stairs reaching different directions of the square. The main entrance is supported by the different new side entrances.

3.5. The roof as public square & daylight

Through perforations and openings in the roof of the underground, lots of daylight comes down. Implementing daylight adds to the durability of the project as well as influence the material choices. The underground materialisation is mainly focused on resilience, durability, light and reflective materials, like the white recycled concrete, glass materials and white terrazzo floor. As its underground, it is important to keep it as light as possible. The furniture and smaller elements are accentuated by warm wooden material to present a more living room of the city feel. In the evening the light works in the reverse direction, the lighted underground, lighten up the public square through the perforations and ventilated ornaments. Addressing the roof, we coping with water drainage. The water will be collected just under the square, where it partly will evaporate as well as the

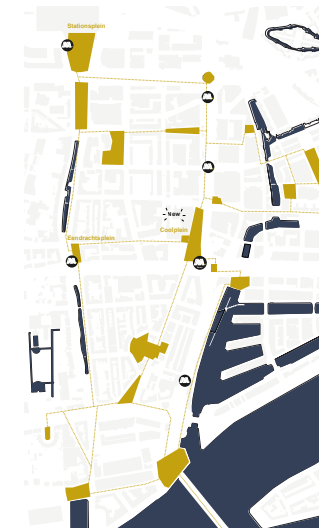
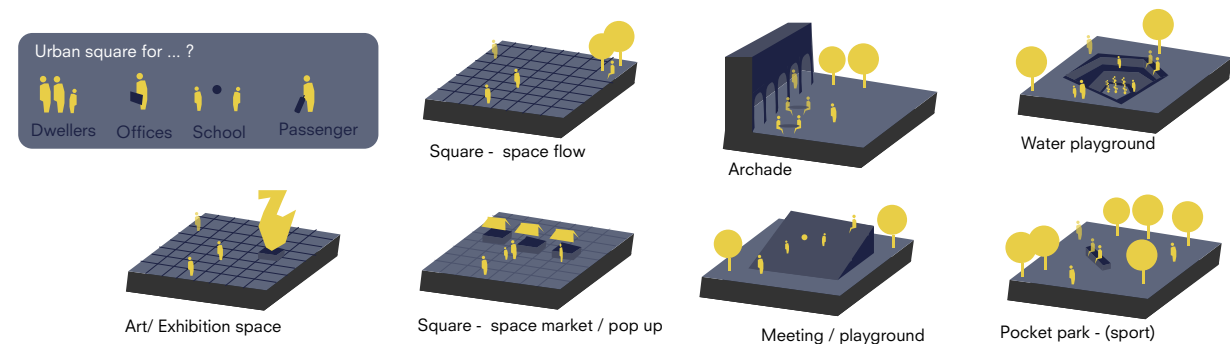


Image 6. Public Entrance Square of the Inner-City Rotterdam



excess will be transported towards the water storage, which can be used for other facilities in the building.

3.6. Future development

Developing a transport hub takes years to build, so it's important that it will be flexible for changes and adaptation. This transport hub project, divided into different elements, exists out of different phases wherein it is important to keeping the maximal accessibility to the infrastructural network.

The first phases of this project contain the car tunnel extension and connected parking garage, so the area above is suited as a work area for material and equipment storage. The cars should be guided along with this development. As well as the 2 existing pavilions and building should be demolished, so there is room for the underground and aboveground development. Important is to keep open the entrance of the metro. The Coolse Poort tower can be stripped, to rebuild from the casco.

The second phase exists out of making the underground container for the new entrance and the water storage. The tower can be renewed, adding a durable new façade and adding a new interior layout for the hotel. The new program layout of the hotel should also be flexible for transformation to housing, adding outdoor balconies and easily adjustable rooms. The entrance of the metro should stay open as long as possible while connecting the left metro entrance to the new main entrance, still, two exiting entrances are open.

The third phase after connecting the new underground entrance to the metro is to continue the renovation of the metro itself in parts, renewing the materials. Finishing the development by completing the public space of the square and the urban park above the car tunnel.

For future phasing, it is possible to adjust an add an extra North-South metro line, together with renewing the right side entrance. The hotel should be flexible to transform into dwellings and the water storage space can be adjusted to an extension of the bike parking area if needed. Through the

flexibility of the construction in the entrance hall, it's also possible to develop it differently when this is needed in the far future.

4. Conclusie

The aim of this graduation project was to get a grip on secondary nodes in densifying cities. The research on the people and traffic flows, infrastructure, and migrated stations resulted in a spatial design project that reacts to the rising urban environment and the prediction of increasing people and traffic flows in the future. Proposing a new underground entrance at the infrastructural node and metro junction Beurs, is focused on improving the neighbourhood connections; creating a visible gateway to the inner-city; create and interweaving the urban public space, and creating a direct relationship between the different durable traffic flow networks. This design project is part of the spatial urban strategy, create a more pedestrian suitable area by splitting mobility flows for more efficiency and generating public space; utilize the underground, and accomplishing the public floor-line of Rotterdam. The multiple entrances to the underground and open plinth increase the accessibility of the area. The proposal of the Transport Hub Entrance presents a transition of the densifying inner city toward the underground by implementing an integrated approach. Using the architectural expression of columns, arches, and canopies to propagate an invitation to social coherence, urban and infrastructural connection, guided people flow and create a visible light and inviting underground. Existing structures will be renovated and embraced by a new commercial characterized entrance, activating it as a place to be. This hub interweaves the hard infrastructural program together with the soft program of the urban public space and commercial facilities. Interweaving, perforating and breaking open the underground, increase the accessibility and mobility of the secondary node Beurs and the inner-city itself affecting the local as well as the regional scale network.

Different facets and linkage opportunities shown and gave understanding

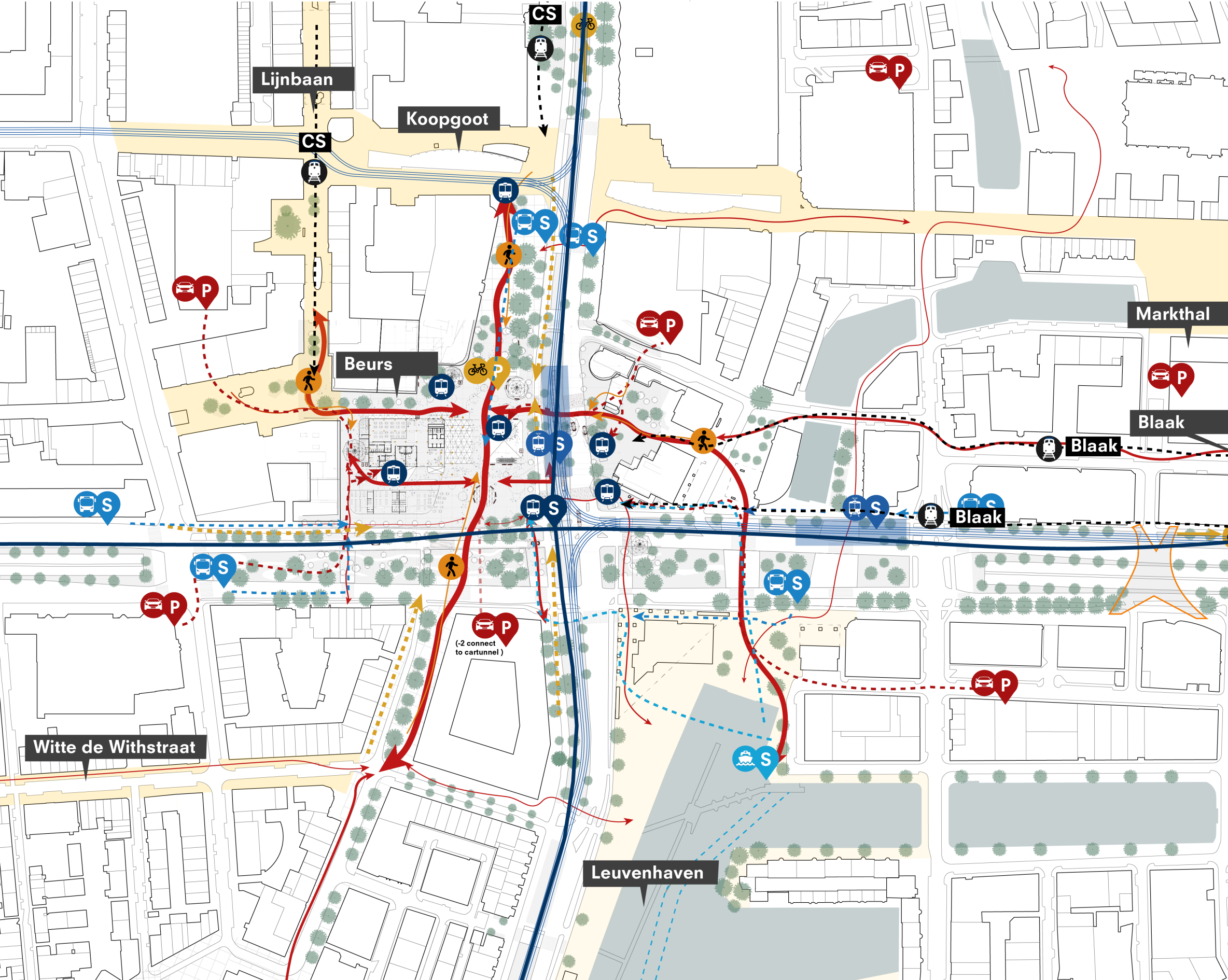
to secondary nodes require a holistic view of architecture, urbanism, and infrastructure. Especially when the space is costly and scarce within these densifying cities. Creating a contractional response towards the high-rise, actually can stimulate surrounding growth and add value by creating quality multiple levelled and open public space, it benefits the whole (inner-)city and compliments the city public space patchwork. Stimulate the use of public transport will improve and provide more future-proof mobility and durable roots for the flourishing high-rise (inner-)city.



Image 7. Hotel room(-1), Shopping street (-1), Platform metro underground added daylight (-1)

THE SECONDARY NODE BEURS

Image 8. Different people and traffic flows going from public transport and public spaces to connect to the new entrance square of the Node Beurs



- Legenda**
- Route Trainstation
 - Metro entrances
 - Car Parking
 - Stop Bus
 - Stop Tram
 - Stop Ferry
 - Bike Parking
 - Pedestrian routing

