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"Titel – T-Sofia"
"Title – T-Sofia"
Metrostation in Stockholm

BACKGROUND

During the autumn of 2013 the Swedish government announced that they intend to invest in expanding the metro system in Stockholm. With Stockholm's population expansion and the fact that no new metro being built since 1994 it is now again time to invest in the metro network.

The expansion includes one new line from Odenplan to Arenastaden, the blue line is extended in the north from Akalla to Barkarby.

The largest part of the project is the extension of the blue line from Kungsträdgården to the southeast municipality of Nacka. The Nocka extension will also be connected with Gullmarsplan, in the south. Plans for a metro extension to Nacka have existed since the 70ies but the political will to realize the project have not existed until now.

Totally there will be nine new stations and plans for 78,000 new dwellings. The construction is planned to start in 2016 and the project will be totally completed in 2025 at a cost of 25,7 billion Swedish crowns.

My thesis project is about the design of one of these new stations: Sofia on Södermalm in the southeast parts of the inner city, a station on the new line that is going to connect Nacka with the Metro.

I chose to work with this particular station due to the existing city structure, the surrounding water and challenging topography that are important conditions for the project. Sofia will play a key role among the new stations and have importance as a transfer hub in the Stockholm region, linking the inner-city, with Nacka and the southern areas.

The bedrock of Stockholm consists of solid rock, about 1800-2800 million years old which is a good and stable material for building tunnels. Several alternatives have been investigated for the Nacka extension; the most complicated aspect of the project is how to cross Saltholm.

The two alternatives for this crossing were either to make a concrete tunnel in the water or to drill and blast a rock tunnel beneath the water.

Due to technical complications it was decided in the end of January this year (2014), to go for the rock tunnel alternative. A consequence of this decision is a dramatic section, where the tunnel dives under the sea and then rises upwards. Sofia is going to have an extraordinary deep position underground, about 100 meters below street level. This makes the station to one of the deepest in the world.

Stockholm has a largely perforated underground, with the metro as well as shelters from the cold war days, parking garages, underground passages and tunnels for water and electricity. An important feature of Stockholm is the three-dimensionality of the street network, layer by layer, where it is possible to move long distances underground.

This is also true when it comes to the Sofia site, which is surrounded by large scale underground infrastructure and shelters.

HISTORICAL BACKGROUND

The excavated space can be said to be one of the earliest forms of architecture, when humans settled in naturally generated caves for shelter, also in terms of culture and art the cave have an important position, one of the world’s oldest known art pieces can be seen in the Lascaux Cave in south western France. The excavated space plays an important role in human development. The metro can be seen as part of this development, representing the civilization and the modern city.

The Stockholm Metro is called the world’s longest art exhibition. Over 90 of the 100 metro stations in Stockholm feature art, created by more than 150 artists. The artistic and architectural design helps to create contextual identity, and sensual qualities in a subterranean environment that easily could be tough, stressful and anonymous. The artists Vera Nilsson and Siri Derkert played an important role in the 1950s in providing the metro with art. Vera Nilsson courted the Social Democrat politician Hjalmar Meir, Mayor of Stockholm at the time, with several letters. In a letter to him in March 1955, which received a positive response, she argued for art in the metro and to create “Cathedrals underground”.

Vi vill ha fest, glädje och färgrakt i tunnelbanan. Det är de enkla människornas, de billösas dagliga trafikled...Låt oss få det i underjorden, katedraler under jorden! Varje hållplats ett sagaoslött!

Vera Nilsson in a letter to Hjalmar Meir, Mayor of Stockholm, 18 March 1955

The high design ambitions for the Stockholm Metro have created a broad spectrum of artistic and architectonic expressions. The “grotto stations” built in the 1970s have to be especially mentioned as they are unique of its kind in the world. Instead of coating the blasted rock with concrete as was done in the 1960s, it was decided to spray the rock with a layer of 7-8 cm of shotcrete. This technique was much cheaper than the previous methods and meant money left over to design artistic concepts for entire stations. The cave-like stations caused debate in the beginning, as they could be seen as frightening and give associations to hell and the dark underworld. For this reasons painted metal grids were placed on ceilings and walls on the first stations constructed with this method to hide the rock face.

When the blue line was built in the 1970s it was decided to show the sprayed concrete as it really was. The typical stations of this time were stations designed as a coherent whole. Artists collaborated together with architects and engineers to create complete environments rather than individual artworks. Sl. (Greater Stockholm Public Transport) had at the time its own architecture office working with the metro.

Among the grotto stations Kungsträdgården, opened 1977 is one of the most famous and elaborated. The art on the station draws associations to the history of the site as well as to political movements and happenings of the time. It was planned that Kungsträdgården would be one of the major stations in Stockholm, close to several cultural institutions and with a central position in the city. Since the planned line to Nacka that was intended from the beginning, never was realized the station today is a calm end station, something that will change with the Nacka extension.

Some parts of the rock at Kungsträdgården have not been covered with shotcrete leaving it exposed. The naked rock can be seen as a living material that is both constructed and natural. The bare rock walls at Kungsträdgården, have created an ecosystem of minerals, water, moss, fungus, bacteria and insects. A for Sweden new type of spider was discovered here 1980.

The architectonic and artistic features of Kungsträdgården as well as its importance as a hub travelling between Nacka and other parts of the Stockholm region makes it an important station in relation to Sofia.
NEW STATION

Because of the depth travelling with escalators would be too time-consuming; instead a solution with elevators is suggested. In the pre studies done by the traffic department Stockholms läns landsting, 8-10 elevators are suggested: elevators that each can accommodate 30 persons, traveling at a speed of 3 m per second you reach the -100 level in about 30 seconds.

The safety demand is that two fully loaded trains (2400 people) should be able to be evacuated via the elevators and emergency stairs. During rush hour 1000 boarding passengers are calculated. Two ventilation systems are needed for one for smoke evacuation in case of fire and one for general ventilation. The platform should be 180 meters long and platform space 330 technical and ventilation spaces included.

T-SOFIA, THE PROPOSAL

I have suggested two elevator shafts to the station, one smaller with 4 elevators in the crossing of Rensniernas gata and Skånegatan bringing people to Nytorget and Sofia Kyrka. The main entrance with a shaft for 6 elevators is located along Folkungagatan, below the height Stigberget.

Stigbergsparken where the main entrance to the station is located is today a nice park but quite deserted and forgotten. There are several stairs that connects the park with Stigberget. These existing stairs are important for the project as they contribute into creating a journey from the heights of Stigberget down to -100 meters on the underground train platform level. Stigberget is like a big wall that separates Saltsjön and Folkungagatan. A natural height that in great extend have been modified by humans and adjusted to the needs of the city, like Stadsgärden and a harbour area, where today big cruise ships anchor

My main concept for the station is to make use of the spectacular depth with a shaft that connects the underground platform space with the ground level at Stigbergsparken. The technical functions: emergency stairs, ventilation and elevators are placed in a separate shaft. The other shaft is open and exposed to weather, climate and airflows.

Instead of only seeing the depth as a problem to work away and hide, it can be used to provide the passengers with an everyday experience of space, light, void and geology in combination with logistics and infrastructure. To make it possible to sense and feel the depth might also have a pedagogical value, a feeling of control that counters claustrophobia, stressful elevator rides and confinement.

The shaft is reinforced by rock bolts and a protective net to prevent rock fall. The slightly conical shape of the shaft is possible to sense and feel the depth might also have a pedagogical value, a feeling of control that counters claustrophobia, stressful elevator rides and confinement.

The first model I made was paper and MDF model in the scale of 1:100. My initial idea was to create an open shaft to work with two shafts, one built in with ventilation, technical systems and elevators, and one void shaft. Instead I started to work with excavated space, mass and void have demanded a bit different methods then a regular above ground experience.

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In a segregated city like Stockholm, the metro is one of the spaces where different kinds of people really meet and are visible to each other. This proposal wants to create a public space in several levels where people can meet and experience a spectacular void in a weekday context that the metro represents.

ARGUMENTATION

The metro extension is financed with tax money, but will lead to big private profit as real estate values rise. The shaft will contribute into giving something back to the tax payers. It might also lead to even higher increase in real estate prices. Using an architectonic landmark and economic argumentation, the shaft will put Stockholm and the specific site on the map and give more visitors and tourists.

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Process

To work with excavated space, mass and void have demanded a bit different methods then a regular above ground project. Also trying to visualize the project and get an understanding of the space and the scale has been demanding. Experimentation with models was a good way to deal with these aspects during the process.

The first model I made was paper and MDF model in the scale of 1:100. My initial idea was to create an open shaft with elevators inside it. But I soon discovered working with the model that the idea of the void and light not was possible to combine with the amount of space that the elevators and technical systems demanded. Instead I started to work with two shafts, one built in with ventilation, technical systems and elevators, and one void shaft.

In the process plaster castings was a good way to get a feeling for the mass/void relationship. To be able to work more in detail I started a 1:100 model with foam covered in plaster. This helped me to study the roof and elevator platform.

To investigate the light I built a 1:50 model in paper covered with graphite to express the rock. I covered the openings at the bottom to only get light in at the top and used a camera under different weather conditions.

The design process has been about adding as little as possible and the transition from initial conceptual idea to concrete proposal. The simple idea of an open shaft is followed by many questions of safety and construction methods to make it realizable and refined. To keep the character of the void as simple as possible as it in the same time meets the demands of safety, function and logistics without losing light or the raw character of blasted rock.

You move into one of the elevators and travels down, a 30 seconds trip with the suggested elevators. When you exit the elevator you are 95 meters below street level. As you move towards the escalators that brings you to the train platform, you move under the void, and a roof with a circular hole. This roof leads away the water that is exuded from the rock walls, frames the void and contrast with its perfect circular geometry against the organic character of blasted rock. After the elevator ride you are -100 meters below street level and can catch the train.

The train platform space is a typical Stockholm grotto station with applied shotcrete and with a future design by artists. Also the void could be a space that is being used for artists; works with light or sound are two possible artistic mediums for this space. Also the ground level with park and square could be further developed by landscape architects and architects. This initial proposal could and should be further developed by other architects as well as other professions.
78,000 new dwellings

The expanded metro system, new stations marked with yellow, Sofia marked with red circle.

New Metro line towards Nacka, rock tunnel beneath Saltsjön and the topography of the site makes the station Sofia extraordinarily deep.

Background

Geological context, the bedrock of Stockholm consists of solid rock, formed for about 1880-2850 million years ago, a good material for building tunnels.

Rock types
- Monzonit
- Granodiorit
- Monzonit
- Gnejs

78,000 new dwellings
1. Skeppsholmens bergrum
   Built in the 1940s as headquarters for the naval command in event of war.

2. Saltsjötunneln
   Built in the 1980s to lead purified wastewater to Saltjön.

3. Katarinaberget
   Built in the 1950s, at the time the largest shelter in the world.

4. Pionen
   Former military commando central, now server space for internet service provider Bahnhof.

5. Henriksdals reningsverk
   The largest treatment plant in Stockholm.

6. Atlas Copco provgruva
   Built in 1930s as test site for rock drills and mining equipment.

Kungsträdgården-Nacka section
Application of shot concrete in the 1970s, the material stabilizes the rock and drains water.

Artist Vera Nilsson to the right, working with pillar at T-centralen 1957, the first station where art were incorporated.

Bare rock wall Kungsträdgården, constructed and nature, ecosystem of minerals, water, moss, fungus, bacteria and insects.

New species in the metro

View from Stigberget towards Stadsgårdskaian.

View from Stigberget towards Folkungagatan, site for shaft, park and main entrance to Sofia metro station.

Bergsprängtrappan, street intersection Renstiernas gata.
Skånegatan, site for the other of the two entrances to Sofia station.

Stigbergsparken view towards west.

Stigbergsparken not very used and a bit forgotten.

Stairs connecting Stigbergsparken and Stigberget.

Ersta trappor.

Stockholms execution site was located on Stigberget during the 1500 and 1600 centuries. Visible to the right on painting from 1535.

Blasting for Renstiernas gata at Vitabergen 1932.

Mina drömmars stad (1960) by Per Anders Fogelström is a novel set from 1860 to 1880 in Stockholm. It portrays the life and everyday life among Stockholm workers in the area around Sofia.

Bergsprängträdgård 1885, this area was home to large families in simple wooden houses the area was one of the poorest and most miserable on Södermalm, today an area with cultural heritage value.

Ersta diakoni, hospital and care for the old, children and poor located on Stigberget 1861.

Ersta diakoni hospital interior.
Process

Pencil sketches

Model 1:100, paper and MDF

References

Reference 1: “Ringen” Stockholm central station, meeting point and visual contact

Reference 2: Mariatorget Södermalm fountain, park and metro station
Cloudy  Sunny

Model 1:50, paper and graphite, lit study
Model 1:100, foam and plaster
Model 1:200, plaster casting and cardboard
Main entrance, sloping square
Park at night
Lower level elevators, over shaft
Lower level
Elevators above train platform, below shaft
Towards the escalators, under the void
To the train
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