



GÖTEBORG CABLE CAR VISION

As a new mode of transportation, the Cable Car will literally propel Gothenburg forward as an inclusive, sustainable and dynamic city and become a true signaller of the modern compact City. Within this setting we have developed a design concept that builds a new reference framework from the logistical harbour towards a new prosperous future focused on the concept of transportation within the era of the knowledge-based economy. A design concept that will literally link the high-tech clusters in Västra Ramberget, Lindholmen and Järntorget, but will also be the social instrument that through media, arts and technology mediates between neighbourhoods, generations and people.

View from Järntorget | Terminal station | +65m tower

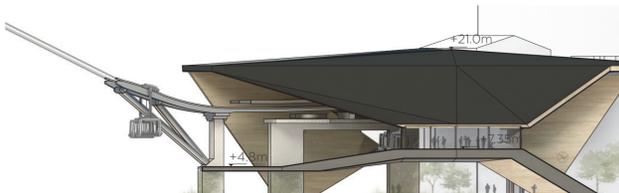
STATION DESIGN

The stations are not only designed around principles of natural wayfinding and social safety, but also with a strong branding strategy in mind that will make the stations clearly recognisable and positively perceived destination points within the city fabric. In their formal representation with the subtle faceting roof, a family is built with the tower structures to from a strong line wide identity as the optimal green link. Similar to the towers day and night beacon concept at dusk a slow transition comes forward: the geometric wood clad ceilings of the station bring a warm glow to the stations, making them the inviting access beacons of green transportation.

Large slanted oak clad walls that elegantly fold in to a distinguished matt black faceted roof form the stations main branding components. Functioning as a strong station signifier and unfolding welcoming gestures, the wood clad walls and ceilings guide the people up towards the platform level where the 'floating' roof structures provides an unobstructed panoramic view on the surrounding city and the arrival and departure platform.

The geometry of the stations, like the towers, is designed to work both aesthetically and constructively. The roof is a self-supporting structure with cross-reinforcements in the form of frames. Within the roof, large skylights that flood the platform with day light further enhance the experience on this level and provide for a comfortable and socially safe experience. All vertical transportation routes are carefully positioned to allow for shortest routes and different speeds of travels, securing ample run-off space at escalators for safety in more crowded conditions and clear navigation on the transfer areas.

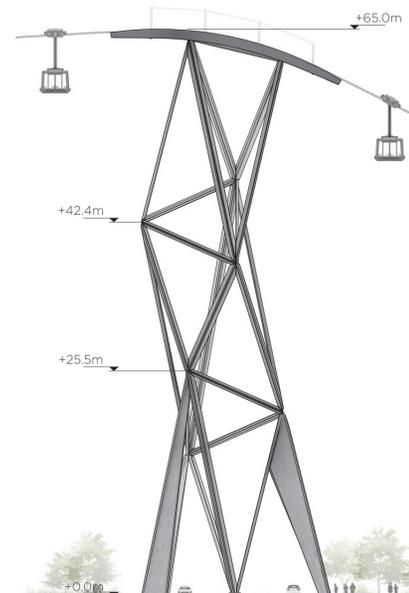
The stations are in their basic geometry designed to be adaptive to different urban conditions. For the mid-stations, a conceptual hinging mechanism around the stations 'centre point' allows the stations main geometry to 'kink' towards different needed directions and allowing it to blend into its surrounding. Furthermore, the geometry of the roof can be easily adapted without losing its recognisability; also, the position of the lifts and stairs can be angled in different ways without the design of the platforms needing to change. For example at the Järntorget station half of the main roof shape together with the slanted wall elegantly folds around the adjacent buildings, while still providing a recognisable architectural branding.



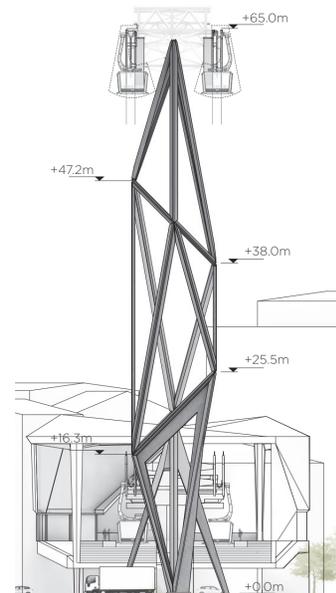
TERMINAL STATION | ELEVATION SIDE
Scale 1:500



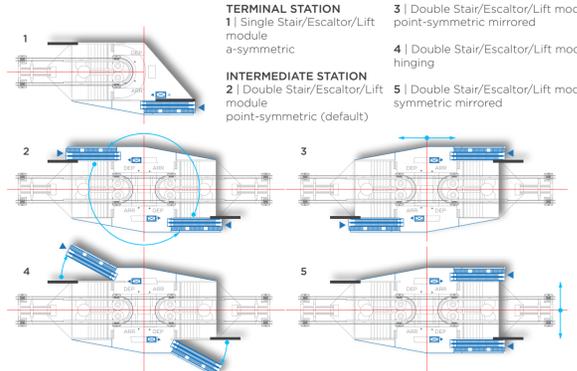
TERMINAL STATION | ELEVATION FRONT
Scale 1:500



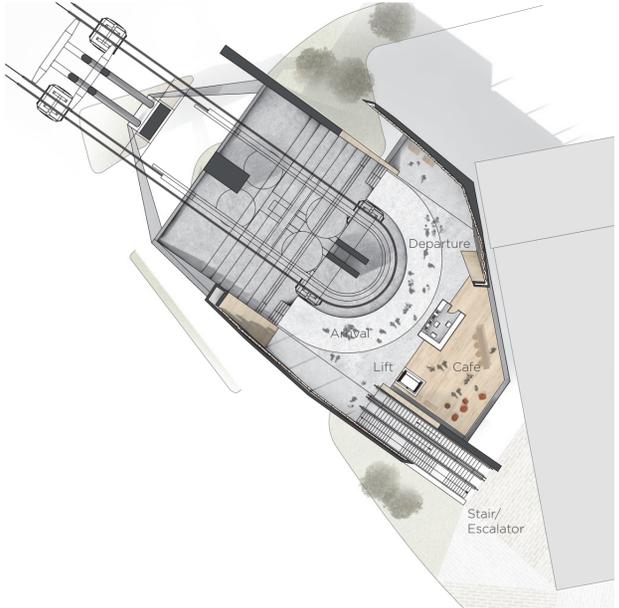
65M TOWER | ELEVATION SIDE
Scale 1:400



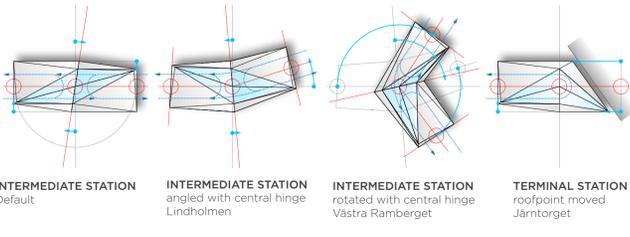
65 TOWER | ELEVATION FRONT
Scale 1:400



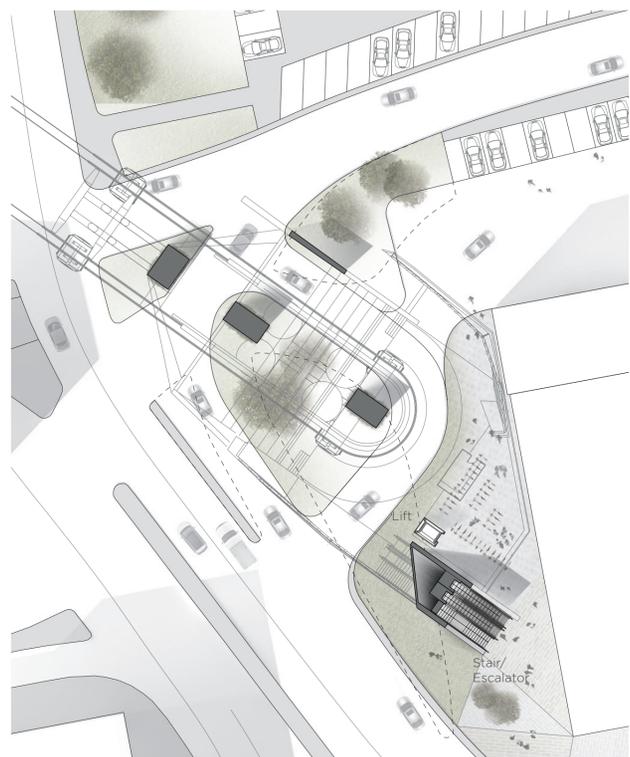
PLATFORM FLEXIBILITY



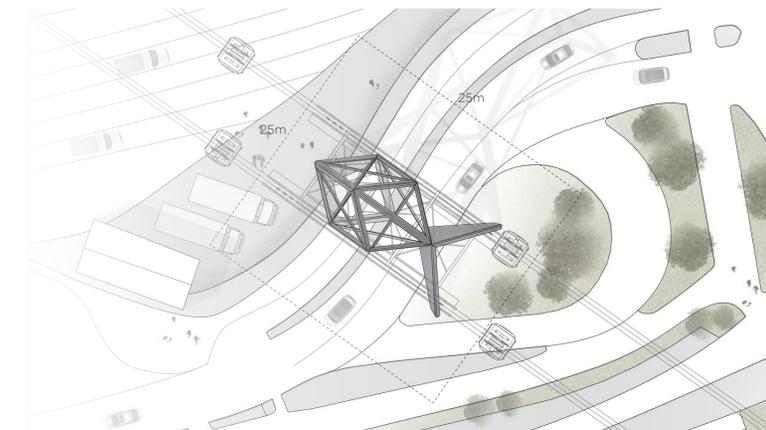
TERMINAL STATION | PLATFORM LEVEL PLAN
Scale 1:400



STATION | HINGING SYSTEM

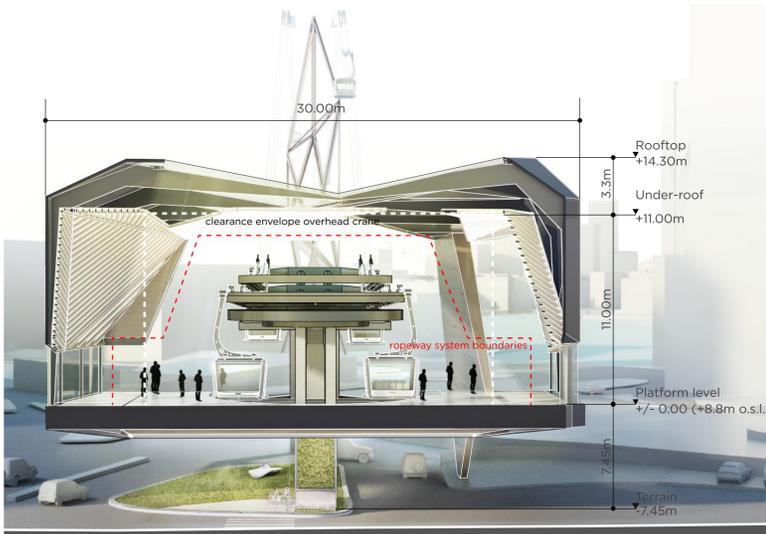


TERMINAL STATION | GROUND FLOOR PLAN
Scale 1:400



65M TOWER | TOP VIEW

Scale 1:400



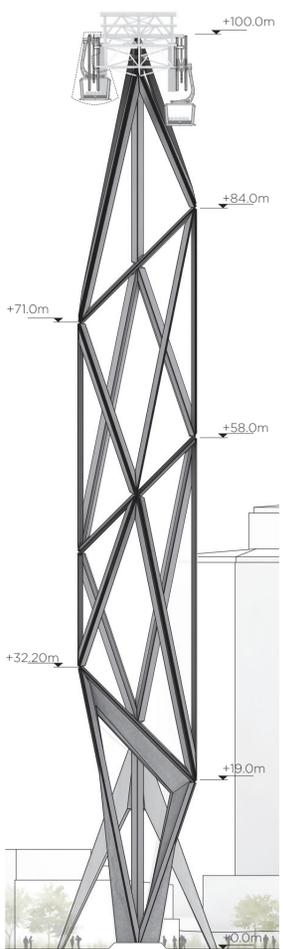
TERMINAL STATION | CROSS SECTION
Scale 1:200



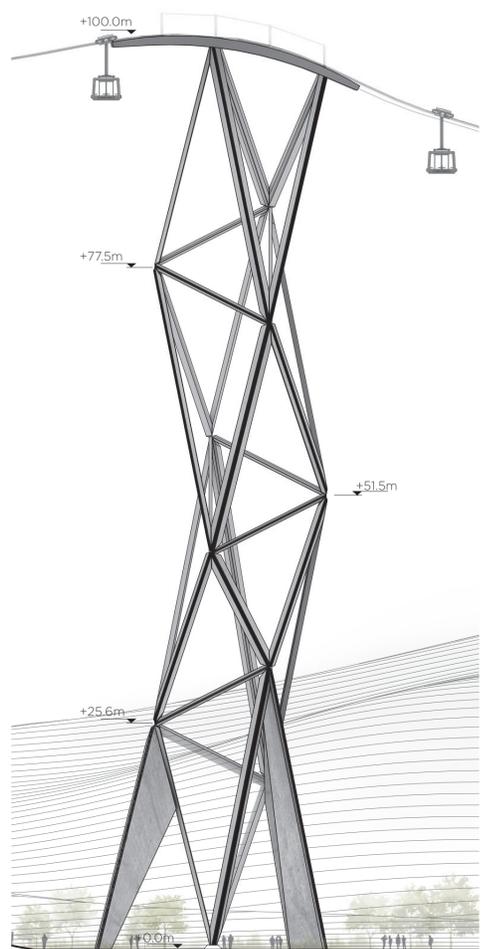
View over Göta älv | Lindholmen Tower +131m

THE NEW BEACONS

The most apparent elements of the cable car will of course be the towers that as highly visible landmarks will define a new skyline. It is from this great responsibility that we want to move beyond a basic design fetish, but make a true referential bridge between from history of the harbour city towards its new prosperous future.



TOWER ELEVATION FRONT scale 1:400



100M TOWER ELEVATION SIDE scale 1:400

AN INTRIGUING STRUCTURAL CONCEPT WILL BRING A MULTI-FACETED AND UNIQUE EXPERIENCE

Similar to the harbour cranes that in their working life, through their ever-changing constellations and positions bring a poetic notion of dynamic sculptures in the city skyline, our tower designs are born from the same context. An intriguing structural concept will bring a similar multi-faceted and unique experience: like dancers of the Göteborg's Danskompani pushing the boundaries of space, these new towers will become the intriguing sculptures that will give a different experience from every different vantage point in the city. Like in Vinga lighthouse and its båk, were the latter works as a sign during daytime and where the lighthouse guides the ships at night, the towers will become similar contrasting day- and night beacons allowing for different readings.

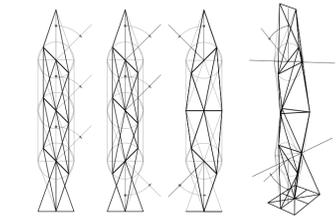
At daytime the subtly twisting and turning towers with their light structure bring an airiness that allow for adjustment of the beholders visual focal point: the tower takes place...but at the same could shift out of focus. On one moment, one will see intriguing sculptures as symbols of a new city, an image further refined by the carefully designed sharp connection joints. While on the other hand, its permeability also allows for focussing on the backdrop with the new city, the mountains and the water. In contrast to the daytime perception at dusk a new image slowly emerges, like in the referred Vinga Lighthouse at night the towers structure become

dynamically lit lanterns showing the newly established city links with its new focal points in the ultimate compact city.

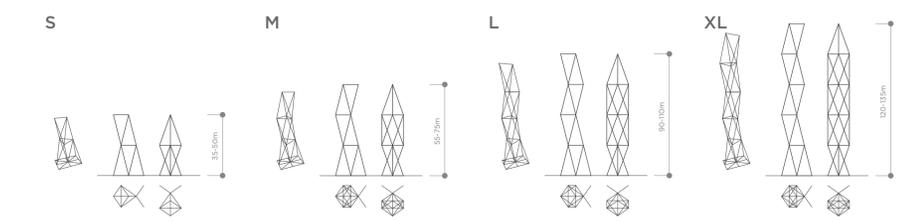
URBAN INTEGRATION: THE INTERCONNECTED KNOTS

Where the towers touch the ground, the permeability extends in such a way that the structure can be easily positioned and adapted to blend into the various needed urban situations. Facilitating urban paths, streets and green spaces to pass through the towers base become not only an integral obstruction less part of the city fabric, but they also prevent dark socially unsafe conditions. Furthermore, the open structure will not cast heavy shadows onto the surroundings and the irregular pen tower shape will cater for a pleasant wind climate at the towers base. On the position of the highest tower at the Lindholmen quay, the tower in our vision could become a city balcony on the water: a new positive urban focal point that makes the water accessible and defines a new place for social gatherings and leisure for everyone, regardless of age and background.

Like past inaugurations; from the historic ship launches, via the car borne city of Älvsborgsbron, in our vision the construction of the towers could be serve as a dramaturgic event within the 400th anniversary of the City of Göteborg that would propel the city forward as the new knowledge city based on collective transportation.



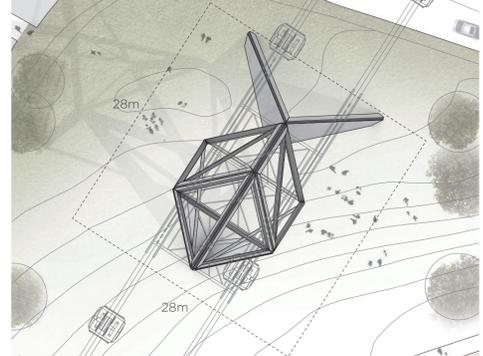
TOWER SYSTEM



TOWER SCALING



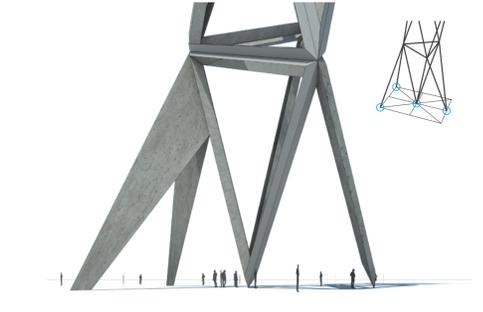
PASSING THE TOWER TOP



TOWER TOP VIEW scale 1:400



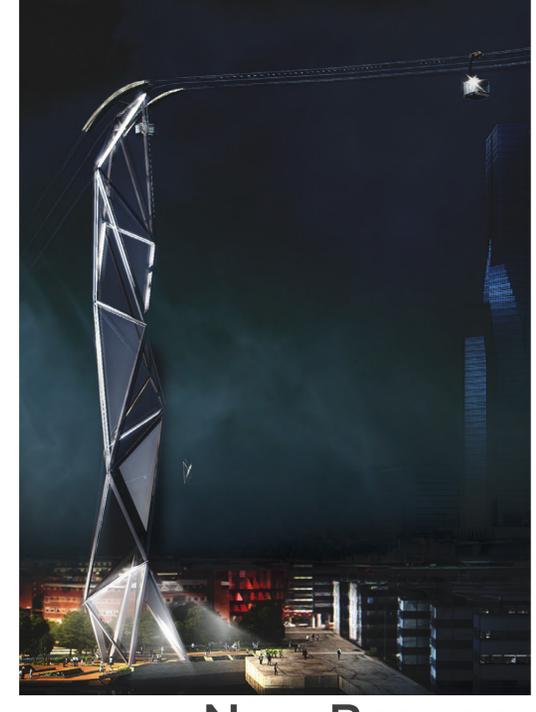
VIEW TOWARDS TOWER TOP



TOWER FOOT PRINCIPLE

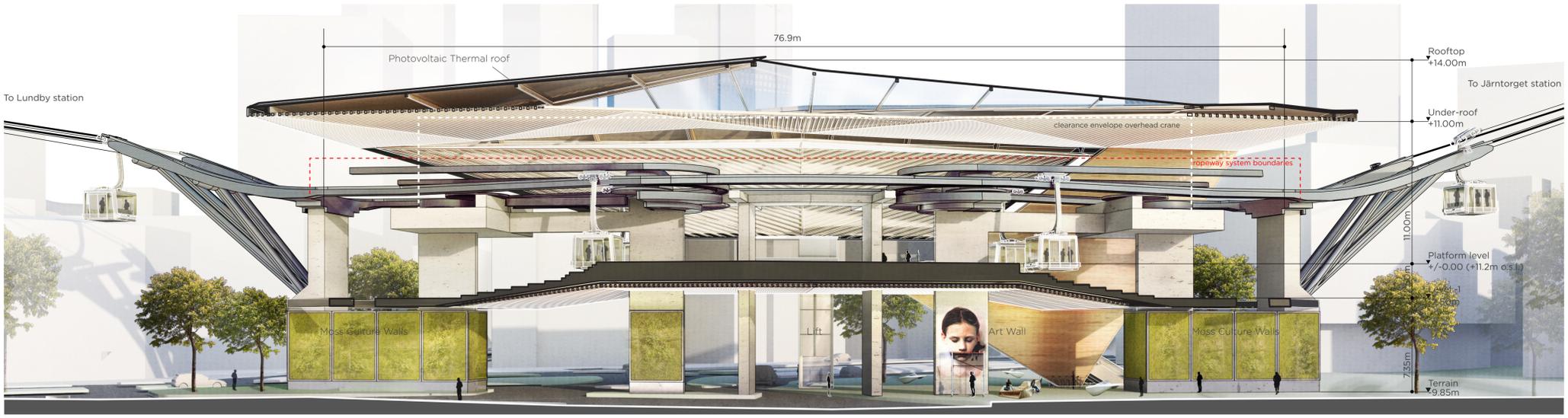


LINDHOLMEN | CITY BALCONY



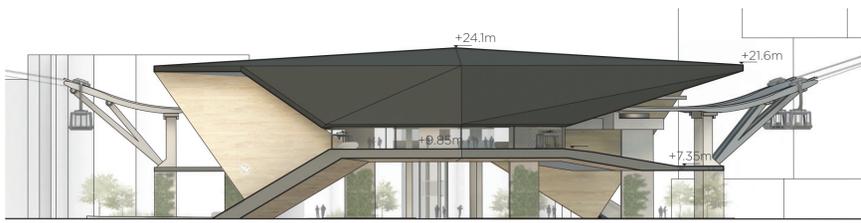


Lindholmen | Intermediate station

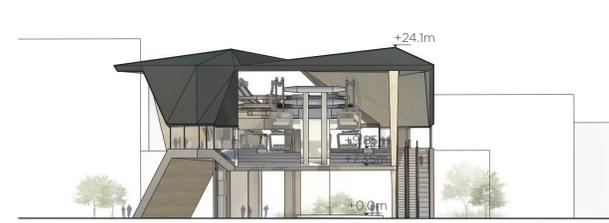


INTERMEDIATE STATION | 3D LONGITUDINAL SECTION

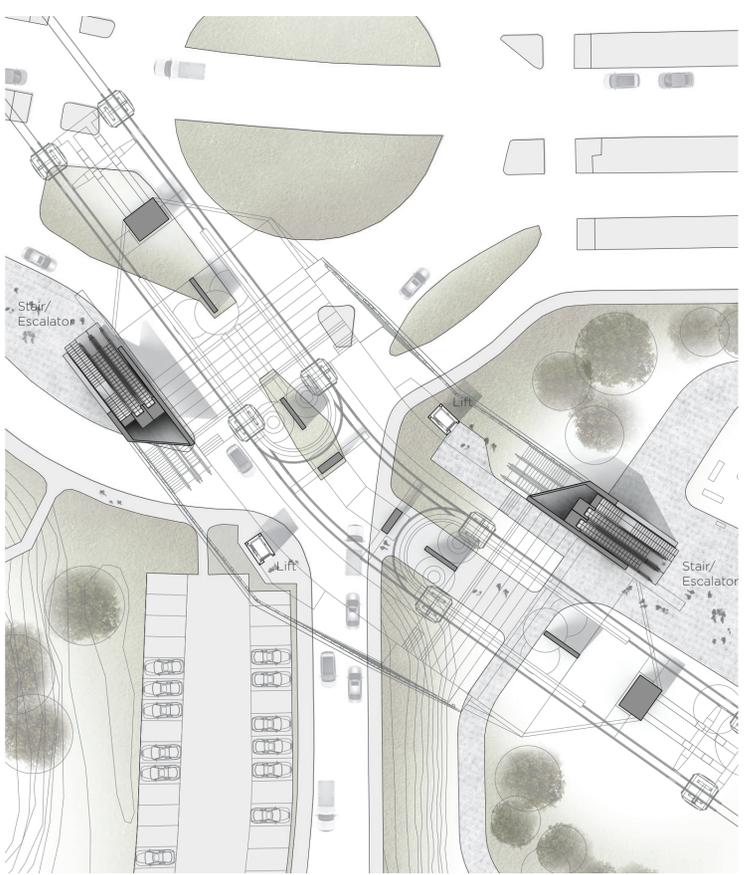
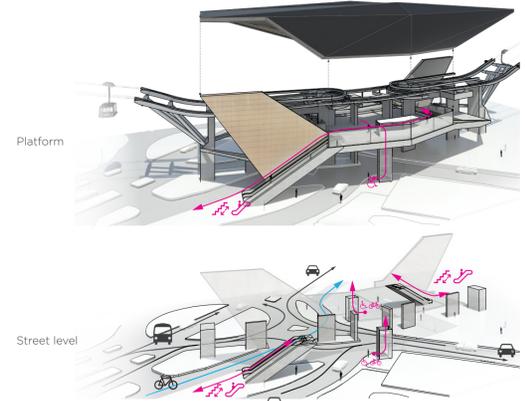
STATION DESIGN
 At ground floor level the stations permeability allows for an easy overview of station and surrounding, and allows for urban flows to unobstructed pass around and through the stations structures. Where urban space allows we envision presenting the space under and around the station as a 'modular canvas'. A fabric allowing not only for connectivity to the different entrances, but also by allowing for different plugin concepts of for example bike storage facilities, artistic interventions, food & beverage facilities, Urban Green and social meeting spaces, all function that contribute to a positive experience of the 'city on eye level'.



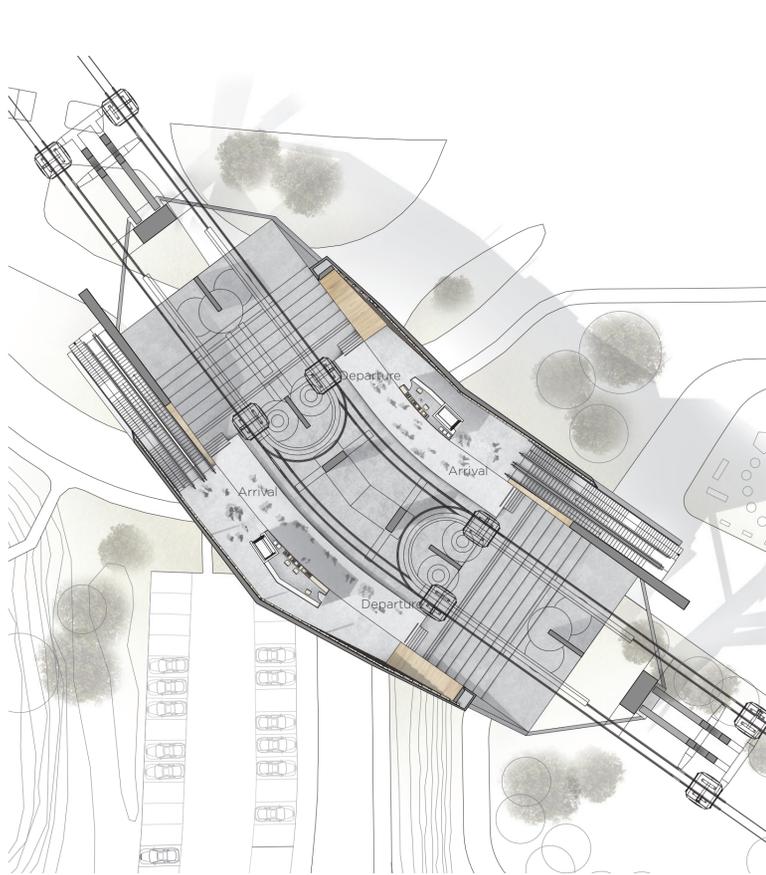
INTERMEDIATE STATION | ELEVATION SIDE
 scale 1:500



INTERMEDIATE STATION | ELEVATION FRONT
 scale 1:500



INTERMEDIATE STATION | GROUND FLOOR PLAN
 Scale 1:400



INTERMEDIATE STATION | PLATFORM PLAN
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Wieselgrensplatsen | Terminal Station | 82m and +101m Tower

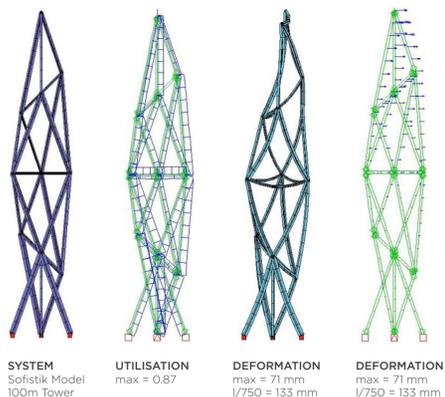
STRUCTURAL APPROACH, COST FEASIBILITY AND OPTIMAL LIFE CYCLE

TOWERS
The tower's structural system in its base principle is simplistic in its approach: loads are transferred directly to the foundations through efficient load paths. In order to minimize material consumption and allow a filigree appearance the tower is designed to act as a cantilevering trussed girder.

The individual elements are designed in prefabricated fibre reinforced spun concrete, in this production method common in for example Germany, concrete is injected into a rotating steel mould and hardens as it is pressured to the moulds inside of the centrifugal force. Diameter, wall thickness, reinforcement and level of pre-stress of each hollow element can easily be adjusted to suit the loads, allowing a highly efficient structural solution with minimal material use, and thus an economically and sustainable construction.

Each element of the tower is designed as a twin column of different profiles with a trapezoidal butterfly cross section to prevent transverse vibration and galloping effects by producing slightly differing own frequencies. The use of concrete profiles also helps to reduce resonance behaviour and structure borne noise. It also provides sufficient mass to resist uplift, and therefore eliminates tension forces under governing load cases.

The systemic approach provides excellent adaptability to local requirements while keeping the overall shape scalable and logic. The iconic appearance aside, a minimum impact to the surrounding neighbourhood is one of the major design targets for the structure. The prefabricated members are quickly assembled into triangular sections on site and hoisted on top of each other. Thus ensuring minimal local impact through short erecting periods and reduced noise and waste. The lower section of the tower to be constructed from massive concrete to provide resistance to potential terrorist attacks and vehicle impact as on many locations traffic will need to be allowed to pass through.



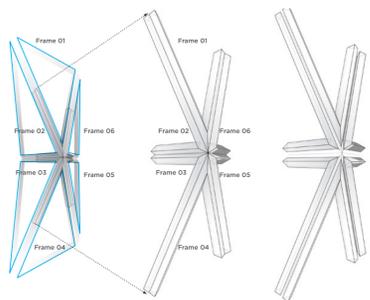
TOWER | STRUCTURAL ANALYSIS

STATIONS STRUCTURE

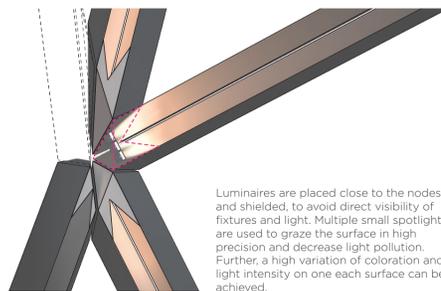
The stations structure is based on the design principles given with the brief. Only crossbeams have been added to carry the platforms on both sides supported off longitudinal walls. Prefabricated three-pinned frames carrying the secondary roof substructure support the roof. These frames also provide sufficient lateral stiffness to the station.

COST FEASIBILITY ANALYSIS AND LIFE CYCLE PERFORMANCE

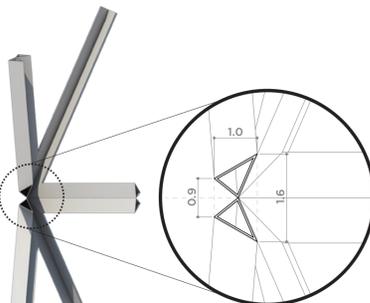
The design proposal in spun concrete has been assessed to be cost-neutral in comparison to a steel structure on the level of investment cost and fitting the construction budget stated in the competition brief. On a level of environmental impact the prefabricated spun concrete, with in its minimal material use, prefabrication and material performance will however outperform steel. For example it would not needed costly on site extensive labour and expensive scaffolding structures. On the level of its full life cycle it will even more so outperform traditional concrete structures or steel structures coming from its minimal maintenance requirements.



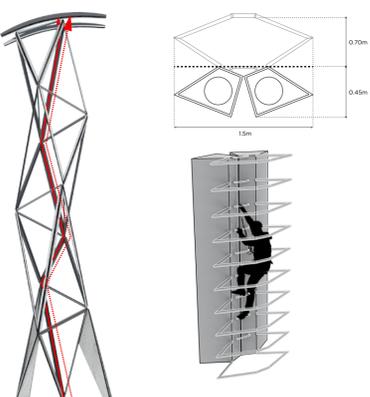
TOWER | MEMBER AND FRAME ASSEMBLY



TOWER | LIGHTING PRINCIPLE



TOWER | FRAME SECTION



TOWER | SADDLE ACCESS

SUSTAINABILITY

Both the design of tower and station follow strong sustainable principles: passive measures, active technology and most important social sustainability will be optimally facilitated.

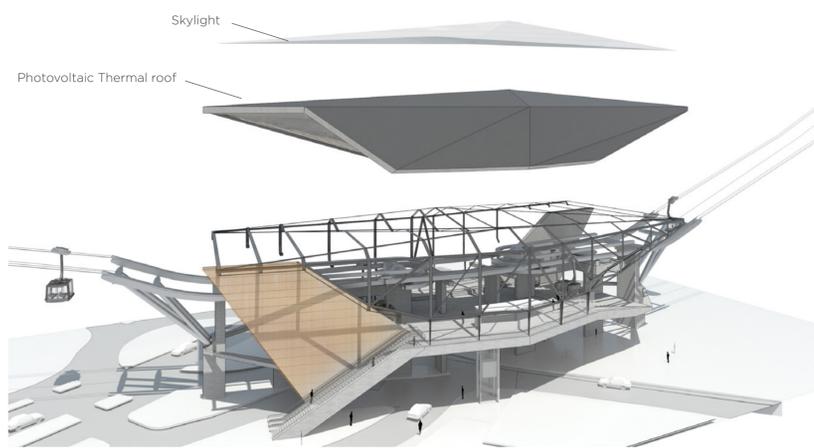
For the towers, as already described on the structural system the spun concrete has a low material use, minimal maintenance requirements and the short construction time will strongly minimize environmental impact. The towers structure will of course be lit by low energy lighting systems with energy sustainably generation by the stations.

Also the station designs are designed in robust materials that will age gracefully: oiled oak, granite stairs and floors and matt black coil coated steel.

Energy use is limited by the use of large skylights that flood daylight inside the stations. And to provide for a sustainable energy source photovoltaic thermal panels providing both electrical energy and hot water are integrated within the same roof structures. This efficient system provides for heating floors and stairs to provide safety and comfort. The PVT panels integrated in the roof structures also provide for the energy requirements of the low energy lighting fixtures at both station and towers. Rainwater running of these roofs is stored and slowly released through the green features and open pavement.

The large structural elements underneath the station are intended to be clad with an innovative moss culture cladding; every m2 provides air purification on the level of 15 trees. The surfaces of moss remove fine dust, nitrogen dioxide and ozone gases from the air and reduces the urban heat island effect by its evaporation. The installation is by use of IOT autonomous and requires very little maintenance: the solar panels provide electricity, while the collected rainwater is pumped into the soil. Another advantage are the noise absorbing qualities that in the busy traffic situating add to a more stress free urban fabric.

On the level of social sustainability, the stations will of course reinforce the social city fabric on a system level. However, more importantly the carefully designed surrounding of the stations with its public seating and leisure zones will allow for a social integration on a neighbourhood level.



STATION ROOF | STRUCTURAL PRINCIPLE

TOWER LIGHTING

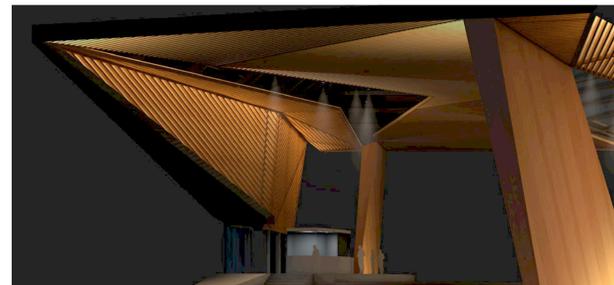
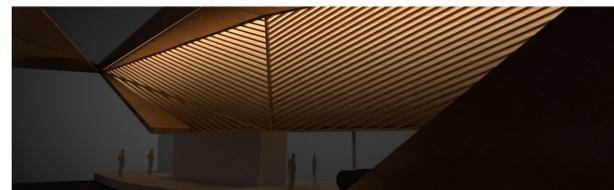
The towers illumination is achieved by implemented spotlights that graze along the inside of the beams' surface from two directions. Due to the gap between each structural member, light is able to cut among the open surfaces and create a thin and sharp line to the exterior and emphasize the image at night. The spotlights are individually controllable in their color and brightness, which gives the chance to animated the towers in multiple ways. An everyday scheme will make use of white tones between cold and warm, in a decent combination of brightness control, to perfectly fit the surrounding, color and brightness sensors are able to track the given light condition to adjust the illumination to an optimal level. For events or special occasions the appearance of the towers is able to drastically change by high saturated colors and stronger dynamics.

STATION LIGHTING

For the stations we carefully considered the use of daylight and artificial illumination to the stations' design and materialization. Gothenburg's geographical position and its resulting accessibility to daylight, made us incorporate spacious skylights for an extensive access to natural light. Passengers and employees of the ropeway can enjoy the incoming sky and sunlight during daytime - the little during darker winter periods, as well as the long-lasting light in the summertime.



For the station's artificial lighting we created a design that reverses the interior daylight condition to achieve a vivid spatial experience during different times of the day. Lighting fixtures hidden behind the timber beams, gently wash the interiors wooden surfaces. The illumination, mainly focused on vertical surfaces of the interior walls, visually extends the spatial borders. A resulting glare-free, indirect light, produces a high quality of vision for safety, visual comfort, efficiency, as well as renders the plasticity of the surfaces. The embracing facade opening allows the interior illumination to be seen from all around the building, while the facades exterior gladding subtly reflects its urban environment. Users, entering the station by cabin or from street-level, will perceive a feeling of protection and shelter. While the stations with their distinguish characteristics are well noticeable, no electric light is directly sent towards the night sky.



KISSING GONDOLAS

In addition to the both artistic and functional lighting design of the stations, we have developed a poetic concept for the gondolas: every time a gondola passes one from the other direction, a subtle light glow will signify a 'kissing moment', becoming a dynamic light sculpture that should inspire social interaction between the connected city areas. Dynamic coloured lighting within the interior for the gondolas that will adapt to environmental circumstances and time of day to give passengers a stress-free and relaxing trip.