Kanaän, or the suburb of the polycentric metropolis

Graduation reflection

Sunday, 7 May 2017

The chair of Architectural Engineering has allowed me to look at architecture as a means, a tool, to effect ways of living. To pose all things we create as a technical and architectural artefact. The studio allowed me to formulate my own design question within my own context. Believing architecture is largely a practice of organising information and identifying & deploying patterns in the built environment. A critical thinking that works all scales and requires an understanding that transcends linear roles such as planning, urban design and architecture.

MSc architecture, urbanism and building sciences
Chair of Architectural Engineering, Intecture studios

tutors:
Architecture | A. Snijders
Research | M. Stellingwerf
Technology | E. van der Zaag

Location
The Avantis European Science and Business Park
in Parkstad, Limburg, The Netherlands
between Heerlen, the Netherlands & Aachen, Germany

Problem statement
After decades of excessive growth the Parkstad area in Limburg, the Netherlands is currently in decline of population. Throughout the 1960s and 70s, the region was faced with problems caused by the decline of the coal and mining industries. From the start of the 1990s, the region turned itself towards new energy, tourism & recreation, healthcare, smart- and financial-administrative services. In an attempt to stabilise the population by means of reestablishing the purpose of the area there is need for an incentive.[1]
One proposition is the intercity rail connecting Maastricht to Aachen, running through Heerlen. This train line, dubbed the Avantisline, was supposed to run right through the Avantis business park. Unfortunately this plan is receiving insufficient political and financial support and has been postponed ever since 2011. Although Maastricht and Heerlen are connected, there is still infrastructure needed between Heerlen and Aachen. This has a negative effect on the development of the business park and will also affect the success of the internationale bauausstellung (IBA) set in 2020. The Avantis business park has neglected it's original masterplan (2001) and later redeveloped strategy (2012) and currently does not have a plan to fit this mode of general transport. Transport is one of the key aspects to our settlement patterns. In order to have transport serve the policies on decline, Parkstad is in need of:

- The choice for a clear interrelated region with the best possibilities for a comprehensive approach.
- The choice for an achievable strategy in transport modes that supports the regional development but is also adaptable and scalable to the continuous change in the region.
- The choice to kickstart progress from a coherent ambition set for the region.

Objective
Develop a mode of transport to improve the connection of the four core cities in the Meuse-Rhine region. This mode of transport should facilitate the Parkstad region in its four key ambitions: 1. the strengthening of the economic profile 2. intensifying connectivity 3. capitalising on the quality of life in the region and 4. facilitating a higher level of human capital and labor potential. This is done through connecting Heerlen to Aachen and positioning Parkstad in a clear hierarchical plan of transport ranging from local to international scale. The development anticipates a revolution in our way of transport and acknowledges a mode better suited for the network of four cities which will develop in the next 25 years. The regional scale needs a mode of transport similar to the characteristics of the Hyperloop but at lesser speed. This mode of transport should be used for the IBA in 2020 and will need a stop on the Avantis business park.

Design assignment
Envision the Avantis campus following the choices for a clear interrelated region, an agile strategy in transport and a way to kick-start progress. Design a Hypoloop station for Avantis that can also be used with a contemporary mode of transport.

[1] Parkstad Limburg (2012). Working towards a sustainably robust region. [online] available at: http://www.parkstad-limburg.nl/showdownload.cfm?objecttype=mark.hive.contentobjects.download.pdf&objectid=23CAEEFA-09D9-C57D-1189185068FF8293 [accessed 02 Jan. 2017].

Product

The cable car station requires additional programs to function. Besides rooms for machinery there is also space required for staff rooms and ticketing/info services among others. All of these spaces have been fitted underneath the gondola platform. On both sides of the gondola platform there is a two story volume with the station platforms in the upper part and the entrance at the ground level. The program here allows for an open space plan that counteracts 'body' underside of the gondola volume.

The research concluded with stating the design of a hypoloop station in the Avantis business park that can also be used with a contemporary mode of transport. This mode of transport will be in use at the IBA in 2020 and aims to adjust the business park to more of a campus style urban plan.

The contemporary mode of transport selected is the 3S gondola lift system. This transport has similar characteristics to a Hypoloop as it functions with cabins of up to 35 passengers able to move up to 5000 people per hour and direction. It has it's own dedicated infrastructure with minimal interference with ground level activity. Current downsides are that it moves at 30km/h, requires a station every 5 kilometers and needs special intermediary guidance rails in order to make turns along the line.

After selecting the center circle as location of the station following my study of the preceding masterplans I inserted the spacing needed for a gondola line in the direction of both Heerlen and Aachen. As primary point of acces I believe the station should double as a campus square and decided the design of the entire circle needs to be incorporated into the design of the station.

After discussion with Doppelmayr I understood the cable car station requires additional programs to function. Besides rooms for machinery there is also space required for staff rooms and ticketing/info services among others. All functions of the gondola can be fitted in the underneath spaces, apart from the gondola maintenance space, which should be right to the side of the gondola rails. Following the decision to make the station platforms and entrance enclosed by facades and a roof, a two story volume on each side of the gondola line is added. The program here allows for an open space plan that counteracts 'body' underside of the gondola volume. These volumes have a frameless glass facade allround and a 1.5 meter high concrete cassette flooring as architrave to the structures 4.5 meter high levels. The center of the top level is raised an extra 3 meters in order for the gondola maintenance rail to be an the same level as the gondola line and to be connected to the underside of the roof.

The all glass facade addresses the relation of the station to the campus square towards a borderless transition. The structural grid sizing is determined by the span required to cover the gondola system. 19.2m divided in 8 results in a square grid of 2.4m. In order to better address the human scale and understanding of aesthetics I have included the golden ratio in the design of the facades. As the ratio of 2.4m is 1.5m the facade height lines are multitudes of 1.5m. Considering the grid length span of 8 as a number in the Fibonacci Sequence the relation of the elements in the grid focusses on the proportions of 1, 2, 3, 5, or 8.

Process

The translation from research to design was quite difficult. This was mostly due to the grand scale of the research and lack of physical boundaries on the project location. This led me to struggle greatly with the size and proportions of the project, Trying to fit a structure that did not correlate with the program requirements and blowing up to disproportionate sizes. I set up rules of geometry to myself in order to be able to better direct the shape I was working on. These self determined rules actually backfired and I ended up with a building 3 times the size it needed to be. I found the solution when I looked into the volumes that were actually needed and placed these on the grid I had already established. By formulating the station platforms and entrances separate from the center gondola segment, but still sticking to the structural gridlines, I found a shape that both presents program and aesthetic harmony. From here on I took up the design of the square as a synthesis of the current condition and the station design I had come to so far.

As the project started at a cross-border scale I figured I would only zoom in more and more to come to the level of the structure. During the project however I found that stating the need of a cable car station at this

location opened up the possibility to work from the structure and detail level outward to the urban plan for the central square. As I was greatly struggling with the masterplan for the Avantis campus this new approach that I tried made me look at the project another way and gave me tools to continue the design. It also strengthened the seam of the structure to the location as I found they merge at this square level.

Planning
In all honesty I have not used the planning that I made in my graduation plan. Making the planning helped me understand what elements and steps I needed to get to the final design. However the timeline I executed the steps in was completely different from the planning. This was largely due to problems I faced translating the project from research to design. I got everything back on track about three weeks before the P4. Realising the period towards the P5 is only for nice renders and a good model, at the P4 the structure and design were mostly finished.

Did my approach work?
The Avantis business park is in need of a proper public transport. It has been since the first plans for a rail line in 2010. The developments in transport suggest good odds for the development of a new type of transport to replace/add to the train/metro/bus modes. However it is debatable wether the qualities of the current cable car system outweigh the downsides. A limited top speed at 30km/h, the necessity of a station every 5km and the need for intermediary guides in order to make turns make the gondola system a rather specific solution in urban design.
Adding a transit stop to a specific site impacts the relocation, behaviour and contact of it's users and it's surrounding. Often a temporary event, for example an IBA, is used as a kickstart the development of such a transit location. After the transit is in place and is being used for more everyday activities more permanent settlements follow in it's proximity. This way the cable is used to kickstart developments in the Avantis area. In return the parties settling in this location will later increase the importance and value of a new 'hypoloop' type transport as suggested to be developed between Heerlen, Aachen, Liege and Maastricht around the year 2040.
To determine wether the approach works is greatly dependent on financial and business factors outside the scope of the design. My doubt lies mostly wether the cable car is a sufficient solution or wether we simply do not have an adequate alternative mode of transport at this time. The cable car will at least be half of the cost of the rail line so if the travel time is less of importance I reckon it to be a more applicable solution than any current plans in the administrative office.

What next / different? looking beyond
The design of a mode of transport connecting Heerlen to Aachen via Avantis will increase economic activity in these area's. As this connection exemplifies the strength of connecting cities in the Meuse-Rhine region Liege and Maastricht will reevaluate their relation to this region. There is however need for a more sustainable mode of transport connecting cities 20/50km apart.

Relationship between research & design

The goal of working on mobility and accessibility is improving international connections, stimulating and facilitating the economic structure, growing employment and improving the liveability and attractiveness of a region. Yet it can also create new challenges. New ways of transport have always come as an invention in the quest of improving mobility and its accessibility. This sometimes had radical impacts on urban development. The research has stated the importance of a transit connection between de primary Meuse-Rhine region cities and the unique opportunity to start with the IBA. This gave me reason to design a transit station, currently functional with a cable car, for an anticipated 'Hypoloop'. Given this program and the chosen location the design unfolded from structure to an urban plan for the central square. This intervention in turn fits to the redeveloped strategy proposal from Royal Haskoning and projects towards a future Avantis New Energy Campus that could be established in the coming decades.

Image 1 - profile sketch from Heerlen to Aachen, over Avantis.

Relationship between the theme of the graduation lab and the subject/case study chosen by the student in his framework

At the start of the graduation there was a presentation on a number of possible project locations. The IBA Parkstad challenge related fully to the topic of my personal study.

Relationship between the methodical line of approach of the graduation lab and the method chosen by the student in his framework

The struggle I had selected to address in my graduation year is the design of an urban intervention that relates to a scale of national demographic trends and policies. This as a product from taking a multitude of urbanism courses, projects and internship in the first year of my masters. I was questioning how my new found love for urbanism could transcend through the scales of design to an architecture project, which of course I have to graduate on. At first there was a collide, as one might believe, with the approach a

graduation lab like architectural engineering takes. I was happily surprised to find one of the possible project locations, IBA Parkstad, to be presented as more of an urban case. It surprised me to see how much space and support I received for completing the graduation research with still no idea what my design intervention would look like. All I knew was that it would be a cable car station in the Avantis business park. In this sense the first half year of the lab's standard methodology did not provide me with any tools. I was quite happily drifting solo with good support of both my design and research mentor. The second half of gradation did not have a methodical approach from the studio. At this time I was confronted with the struggle I had selected for myself. Following the struggle I decided to lock myself up and figure it out for myself before calling out to my mentor for guidance. From the P2 to the P3 was a period difficult to find motivation. At the time of the P3 I had managed to produce a building., but it was very alienated and lacking of proportion and human scale. It did set me up with the reference projects: military museum Soesterberg(Utrecht), Penkelbahn (Mayrhofen) & Zuidasdok station (Amsterdam). These projects gave me grip on the scale of my design and measures for adjustment.

Relationship between the project and the wider social context

To establish the conceptual convex of Liege, Maastricht, Heerlen and Aachen as heart of the Meuse-Rhine Euroregion will benefit the greater region economy. Phasing helps to develop a mode of transport of this scale. We need general transport that is agile and more adaptable to changes in demographic trends. Parkstad is looking to stabilise it's population through it's four key ambitions. Prioritising the connection of Heerlen to Aachen and providing a more cost efficient solution will speed up the sought-after change. The technical research relates decline in population to the coming transport revolution. It shows how to adapt Howard's garden city methodology to assess regional strategies in the interest of the energy transition. The design anticipates these developments and distills the development of this region down to starting with a mode of transport connecting Heerlen to Aachen via Avantis, and thus the 2020 IBA. Following the vision to establish Avantis as the New Energy Campus of South Limburg the design of the station and square have been directed to establish an energy neutral mode of transport reaching out to the connection of these cities, crossing contemporary borders.

Image 2 - IBA 2020 proposition.