

Reflection on Graduation Project



Reflection - Niels Oude Wolbers

Designing in relation to the social context

It was clear from the beginning that my project would be the construction of a school in the former leprosy-colony Westfort. Therefore I was highly interested in school-designs and I researched into several schools, as well as schools designed by Sytze Wierda, chief architect of the first stages of the Westfort plan.

In this research I found that education in South Africa is an urgent matter that must be addressed as soon as possible. South Africa has a relatively expensive and underachieving schooling-program. Compared to surrounding countries it shows a high inefficiency and a large percentage of dropouts. A major consequence of this low level of public education is the relatively high standard that is delivered at private (or independent) schools. These schools attract their own revenue streams with higher tuition fees and also with sponsored events and alumni.

What was clear however during this investigation was that the focus on the site and historical values was not elaborate. Therefore I discarded the research as a very valuable investigation for the continuation and strengthening of the design process. I took several notions out of it. First and foremost; the school was to become an independently run school. This had some consequences to the design. If the school was to become an independent secondary school, location was an issue.

The Westfort-site and surrounding neighbourhoods are not very affluent and this might be a big problem. However Westfort is a monumental and historical site with beautiful architectural expression and not everybody in and around Westfort can be seen as poor. There is also a rising affluent group. To, more efficiently, address this group the school will be rather small, up to 600 students. This is also because the site that I choose doesn't provide for a much bigger school. An independent school will only be feasible when it can compete with other independent schools. It must either be the best or differentiate, or both. This competitiveness is however hard to realize by the means of architecture. It can however provide a framework for a competitive program.

This program will be at the core of my design and it comes from a theme that I have been interested in for a long time, Sustainability.

Sustainability is something that I have been researching in my studies up to now and also during an internship in Granada. For me sustainability is the decreasing of the impact architecture has on the environment in every sense of the word.

-resources have to be treated as valuable relics that can be reutilized.

-the use of energy should not be seen as a patient connected to IV, but rather as a farmer creating its own food.

In my masterplan I put a great emphasis on sustainable design merely in the form of a focus on agricultural production. I see a future in which cities will be more self-providing, in energy, resources and food. Westfort has to be a frontrunner and not walk behind the masses that are soon to emerge. In addition the school will also have a curricular focus on agriculture and sustainable innovation and the buildings themselves are examples of this vision.

Rain is a major issue in Pretoria. In the hot summers (October-February) it is relatively wet with big showers and a rainfall of 100mm a month. This is comparable to the month of August in Delft. But in Pretoria the amount of rainy days is about 50% less. Besides the wet summers the weather in Pretoria is rather dry with almost no rain at all from May till September. Water management is thus an important topic in Pretoria. Water has to be accumulated in the wet season to become available in the dry winter. For this problem several instruments are often used in South Africa. One of these solutions is often used in South Africa and consists of a water reservoir or 'retention pond' and a network, guiding rainwater to this reservoir. This system often uses bio swales. A bio swale is an artificial rivulet with a rather natural appearance. It is characterised by a declivity in the landscape which channels the water runoff. The bio swale shows itself as a green place with lush vegetation.

As mentioned before the research on schools was lacking the context of heritage and thus I put my focus more on the objects that I found on site, the buildings designed by Wierda and staff of the DPW (department public works of the ZAR). These buildings, and other designed by the same team had a focus on sustainable ventilation principles. For Westfort this was quite obvious since health and clean air and a remote location were important aspects for leprosy asylums. But the fact that it was also the case for many other public buildings, amongst which schools, struck me and triggered a research into the works of Wierda and his focus on sustainable ventilation solutions.

Designing in relation to the research paper

My research resulted into a scientific paper:

Sytze Wierda - Ventilating the Republic: How did the architectural discourse of the nineteenth century on physical wellbeing influence Sytze Wierda in his work.

In this research I found that around the time Westfort was built health and hygiene were important topics for architects and many new insights came to live. In the works of Westfort the emphasis was placed primarily on ventilation since clean air was very important. One of the main consequences and strengths of this conception was the affect it had on cooling in the South African climate. A good proactive and 'passive' ventilation concept allowed for, when combined with air inlets that run the air through the ground to cool it down, a good cooling system in the hot summer days.

The system that Wierda used was highly sophisticated, as I found in my research on the Staats Model School in Pretoria, designed by Wierda and fellows between 1895 and 1896.

"The building plans show us many interesting features that show the wit of Wierda and his fellows. As many of the buildings in South Africa, it is built with saddle roofs that provide shelter from the summer heat. This roof has no use as a utilized space but has a very important function in the physical properties of the building. To prevent the rooms below from overheating the whole roof space is ventilated by air scoops, that somewhat resemble the dormer windows that were in fashion the eighteenth century in city houses in the Netherlands, and large circular air inlets in the gables, to provide extra ventilating above the larger spaces.

In front of and behind the main bay, verandas are situated that further shade the classrooms from direct

summer sunlight that is very much unwanted.

The floors of the rooms are ventilated from below by ventilation openings in the plinth that ventilate the floor cavity. Ventilation is a very important topic in the climate physics of the building, which has an ingenious system of ventilation to keep the classrooms comfortable. Air was let in through openings under the windows in the exterior of the building and would let in air through a canal in the wall entering the classrooms just under the windows. By leading the air through the walls it would be precooled or heated before entering the room, improving the interior comfort. Foul air that had to be removed was sucked out of the room by simple physics. The warmer used air would rise and push on the ceiling. Where an air outlet was situated which let the air out of the room through a pipe through the roof space exiting the building on the ridge. On the ridge the ventilation pipe was topped off by a ventilation tower which sucked out the air due to the venturi-effect. Added to this the foul air would increase slightly in temperature when traveling through the plenum which adds to the upward motion, making the system even more effective." (out of my research report)

Further analysing, this system primarily exists of several elements; the ventilation tube that runs through the roof space out of the building and discards foul air and the heat surplus. The ventilated roof space that protects the interior from the hot sun and it's stretched out to prevent sunlight to enter the building in the summer and allow the low angled sun in winter. Air inlets to the classrooms are integrated in the brick wall under the windows.

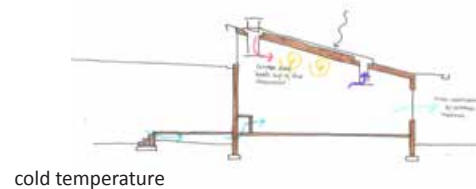
Besides these, the buildings, that are not insulated, provide a thermal guard that, due to the thermal mass, keep the building-interior cool in summer and warming it at night.

All these measures make the buildings that I researched, comfortable and relatively cool in summer without the use of air-conditioning but also quite cold on winter days, as I was told by one of the residents of Westfort. This is thus an issue that I have to deal with in my design.

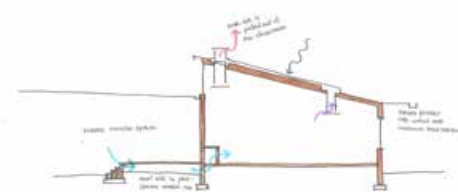
The research that I undertook provided me with an interesting and very sustainable (passive) concept of climatic design. This was to be the starting point for my climatic concept. More specifically, I want to use the power of the sun to cool the classrooms in summer and heat them in the winter.

In my design the roof will be the technical element of the building which provides cooling, heating and protection. To architecturally show this technical and climatic purpose, my roof will be made of corrugated steel sheets. This material is an often used material for roofing in South Africa and shows a technical complexity that will contrast with the otherwise more low-tech materials that I use for other elements. The roof can be seen as a reflection of the landscape on which Westfort lays, gradually sloping down to the east. The roof protects the classrooms from the sun and creates shaded outside spaces. It also provides technical innovation to suck out the air and maintain constant ventilation. This innovation is based on the trombe wall or solar chimneys, in which air is heated between a material with a high heat capacity and a layer of glass. This configuration will trap the suns energy and makes it warm the void. The warmed air in the void will rise and causes suction at the entrance of the void which is located in the ceiling of the classrooms and is the provision for the ventilation.

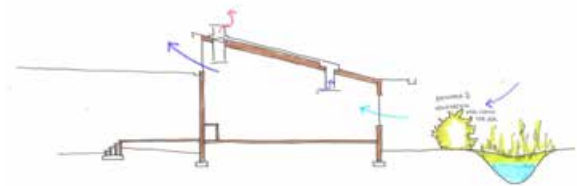
Pretoria has a warm climate with winter days with an average



cold temperature

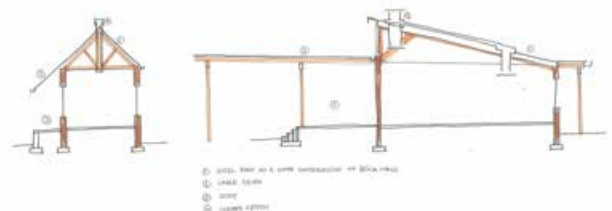


hot temperature

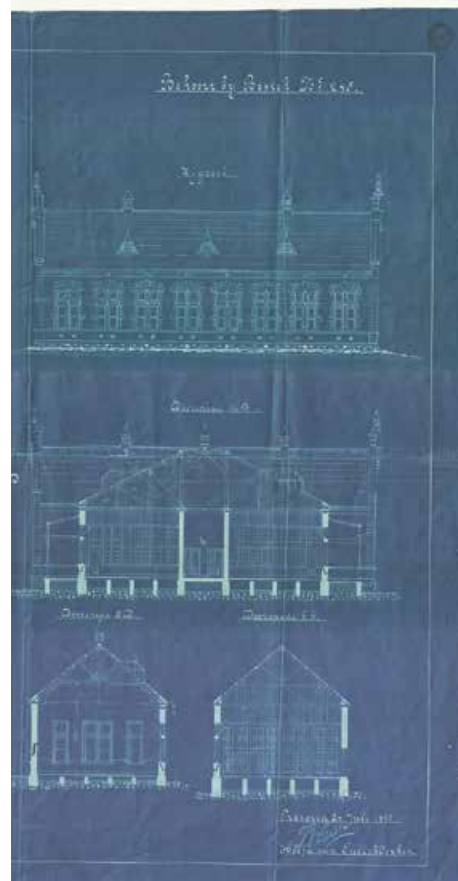


moderate temperature

Climate design



Material / typology design



Staats Model School (DPW)

maximum temperature of 21 degrees Celsius and hot summer days with an average maximum temperature of 30 degrees Celsius. This makes cooling a more important topic than heating. It also keeps my heating concept less elaborate. It makes use of the same system as the ventilation in summer but this time the system is reversed, it now works more as a trombe wall and less as a solar chimney. The exit ventilation tube, discarding the warmed air will be blocked off and instead redirect the air pushing it back into the classroom after it has been heated. Ventilation will occur this time by opening windows to allow for cross-ventilation, while the space below the ceiling will hold a warm layer of buoyant warmed air which will radiate down.

During days with moderate outside temperatures the ventilation will mainly be accommodated through cross-ventilation by opening the large sliding windows opening up to a green area and the south facing (away from the sun) roof windows that pierce through the roof.

Designing in relation to the Heritage

This graduation studio is a heritage studio. This has consequences to the way designing is done. The heritage-section and our teacher provided me with a conceptual vision of heritage architecture. They see heritage-architecture as a playing field on three levels: Design, Culture and Technology.

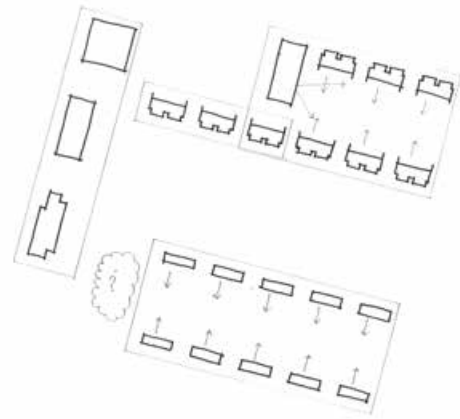
Heritage is the place where these subjects touch and overlap. As I mentioned previously the designs by Wierda in Westfort were designed on a highly technical and equipped with contemporary technology. My main heritage focus is also on this smart utilisation of climatic opportunities.

Besides this homage to the technical wit of Wierda's designs, I am also engaging a dialogue with the heritage site on a more historical level and in this way touching the Design and Culture levels.

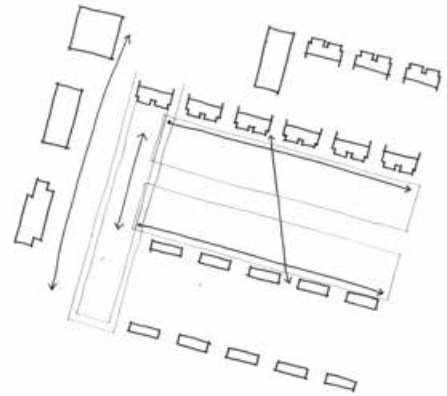
The community aspect of heritage will be discarded in my design. Upon arrival at the site I found that Westfort was highly neglected and a majority of the people didn't see the value of the site. In my masterplan I will free the site by offering the inhabitants houses to live in in the immediate surroundings and mainly using the historic buildings for other purposes.

Westfort is a valuable site in the historical architectural context of South Africa. It shows the ideals of a former coloniser. Westfort was originally built far away from the capital Pretoria to house lepers. The site was chosen because of its hygienic isolation from Pretoria. It was built in the shade of the Daspoortrant along the Skinnerspruit. This isolated location was ideal for housing lepers from all over the ZAR. The urban layout of Westfort is also an important memory from the past; it shows the hierarchical way patients were dealt with. Patients were clustered according to race and sex in wards. Each ward consists of a court with the patient houses facing it from two sides and a more formal staff building that was placed on the high end of the court and overlooked and controlled the patient area. In the middle of Westfort a large triangular plain was not built upon because of a softer soil on which it would be harder to build.

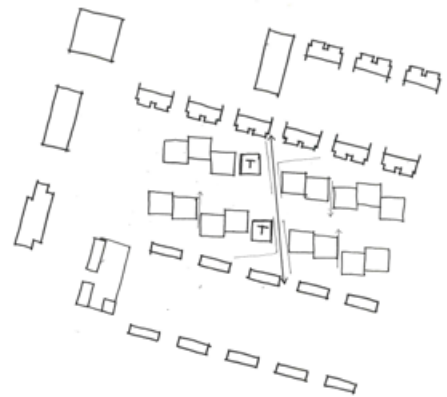
In my masterplan this green triangle will be the green agricultural and leisure area around which public functions are situated. One of them is my school. The site for the school consists of two wards with parallel orientation but with different architectural expression. On the higher end, away from the triangular plain there are three buildings perpendicular on the direction of the wards. In between these three buildings and the wards there is



Location of the wards and the three staff-buildings



Designated building areas and proposed organisation



Spatial layout Programme

an existing path which will be the main axis in my plan. Along this axis I will build a main building/auditorium that will provide as a 'staff building' for one of the wards for which this is now missing. It will complete the layout of the original urban plan; it will also fill a hole in the urban plan which will provide as a formal court for school activities and serves as an entrance area to the different wings and areas of the school.

The main focus of my graduation is on the classroom wings that are situated in between the two wards. This is a deliberate choice. The ward as a whole shows the history in one blink of an eye while the space in between is a neglected space, not used nor taken care off. The ward shows the inward nature of the leprosy asylum which was primarily isolated from the rest of the world and secondly isolated into different wards and thirdly into individual houses, all facing increasingly inward. Building in the courts would interrupt this notion and thus be harmful for the

historical contextualisation.

Another argument to build between the two wards is a philosophical. The space between and behind the wards was originally used as a space for labour, mainly agricultural activities, that were thought of as to be beneficial for the patients. Now this space will be again the core area of labour in the school, the classrooms.

The buildings themselves show a functional approach with a lot of repetition and only differences from one ward to another or in orientation. Materials were chosen for their availability and effectuality. The walls are built up of brick and the roofs are according to South African standard pitched and made of corrugated steel. Details and ornamentation are apparent mainly in the woodwork and window frames.

In my design I want to show the possibilities with these materials in respect to the patient houses by morphing the basic layout and section of the patient houses to make them usable as classrooms I reflect on the orientation and materialisation of the houses by repetition of typology and materialisation.

The classrooms are organised in two wings. These wings consist of a walkway and classrooms. In both wings the walkways walk behind the backsides of the old patient houses whereas the classrooms face each other with a green space in between the two wings, through which the bio swale is running. The classrooms are rotated 14degrees so they are orientated according to the sun. This makes large south-facing roof windows possible and frees the view to the lush green corridor that runs in between the two wings. Besides this, it also creates interesting spaces along the walkway that allow for platforms or 'stoepen' that can be used as a covered outside space for studying or recreating in between classes. By setting back several classrooms in a more irregular pattern these stoepen are even more emphasised and small routes are opened up from the walkways to the green corridor.

The two main courts that are situated in the two wards are connected by the formal covered arcade and a secondary diagonal. This diagonal cuts through the two wings and forms a hinge between the two. This hinge is emphasised by the placement of the toilets and a cut through the roof, following the diagonal and placing an accent on the more public and open character of the joint by making it less covered.

I will also make interventions in the old patient houses that will contain elegant and honourable functions as study houses, computer rooms and administration spaces. The houses will be more open to the back to allow them to showcase their function along the walkways. This opening is done by replacing the doors that now exist in the backside by large glass windows which will allow light to come in. This intervention is consistent with my values that highly value the front of the houses in their respectable context and do not value the backsides as an important aspect of the ensemble.

