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Building and Environment Assessment of

Dr. H. Mezger School Melela

Content

1 Assessment of existing buildings

1.1 General remarks on quality of existing buildings

Although the buildings at Dr. Mezger school are quite young there are some damages. The buildings are not to compare with an European standard. Estimated lifetimes are in general smaller, climate conditions are completely different and construction staff is trained in another way. Also the building costs are far lower. Considering these arguments the buildings are to our estimation not in a bad condition. But there are some points which could be improved to get a better quality without rising the costs to much and saving money on unnecessary repair costs.

- Improve the mixture for concrete and plaster. Because there was to less cement used and the local sand has to much small particles there are now some parts (compare 1.4 Boys' dormitory) which have to be overworked. Adding paintings or tiles afterwards is far more expensive then using a better mixture at first.
- Protecting steel parts which are exposed to the weather. For example proper paintings of steel props outside of girls' dormitory.

1.2 Student's toilets

There are cracks in the bricklayer wall of the student's toilet building (see Figure 1 and Figure 2). Furthermore the floor sunk down in some parts.

These problems are obviously caused by improper constructed foundations at the north-east corner of the building (compare Figure 3)

Figure 1: Cracks in girls' toilet building

Figure 2: Crack at girls' entry

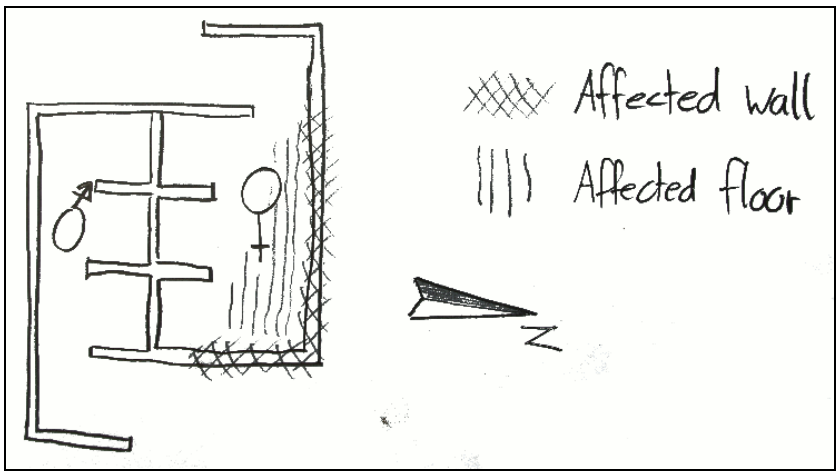

Figure 3: Ground view of student's toilet building

The building parts which are not signed as affected in Figure 3 are still in a good general condition. Therefore it is recommendable to repair the occurred effects instead of rebuilding the complete building (unless the toilet building should be lifted on a higher standard or have to be bigger because of the increasing number of students). For the repair works the affected walls must be disassembled and the foundations must be reinforced or completely changed in the affected area.

Furthermore it is important to complete the building with an appropriate roof. This work should be completed before the common raining season starts. Otherwise there are further damages on the walls and the floor likely.

1.3 Teacher's toilet

Figure 4: Damage at vertical timber member

Figure 4 shows the damaged lower part of the vertical timber member. This damage occurred because the timber was exposed to the weathering and to insects and fungus (mushrooms). As general building rule to prevent such faults at further buildings it is important to locate vertical timber members at least at a hight of 30cm. This can easily be achieved by using concrete sockets with this height. Neither splashing water nor soaking water will then affect the timber member.

1.4 Boys' dormitory

Figure 5: Washing room at boys' dormitory

Figure 6: Floor at washing room

The floor and the walls at the boys' washing room are partial damaged. This damage is caused by water exposure and by mechanical effects (dropping of things etc.). The damages are worse at the walls and limited at the floor although the water remains for longer time on the floor during usage. Obviously the used material for the floor is a higher quality. To prevent further damages the walls must be protected from the water influence. Appropriate paintings are a good and economic way to protect the walls.

For the floor paintings are not recommended because the floors are more likely exposed to mechanical damages. Paintings could crack or split off. As the floors are in an acceptable condition there are no urgent steps to be done. Tiles would be a good and high quality solution if an improvement should be done anyway.

2 Assessment on planned buildings

2.1 Rain water collection and supply

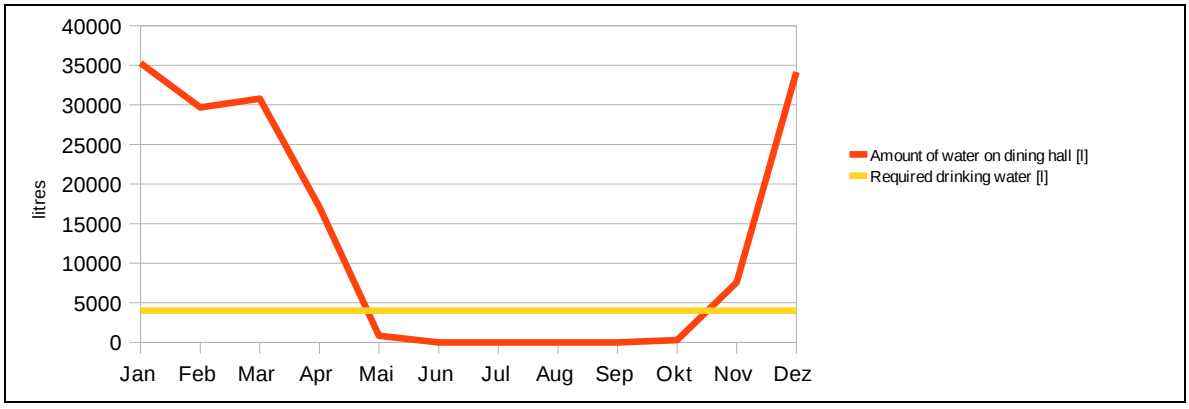

Figure 7: Rain water and drinking water

Getting exact data of the weather and rain in Melela is not very easy. Figure 7 is based on the climate data of Dodoma. The red curve shows the possible rainfall on an area with a size of 280m². This is equal to the roof area of the dining hall.

The yellow line shows the current consumption of drinking water (1000 litres per week).

The amount of rain falling on the dining hall is 3 times bigger than the consumption per year. During almost 6 months the rainfall is smaller then the consumption.

To store water for full year usage there would be a need of approximately 24 000 litres capacity of water storage. Please remember that such a big amount of water must be conserved adequately. This is probably only with chemical additives possible because the water is getting quite hot in black polytanks.

To buffer water as drink water supply during the rain season a capacity of 2 000 litres would be sufficient if there is a strong rain event once in two weeks time or one midrange rain once in a week. According own experiences this should be very likely.

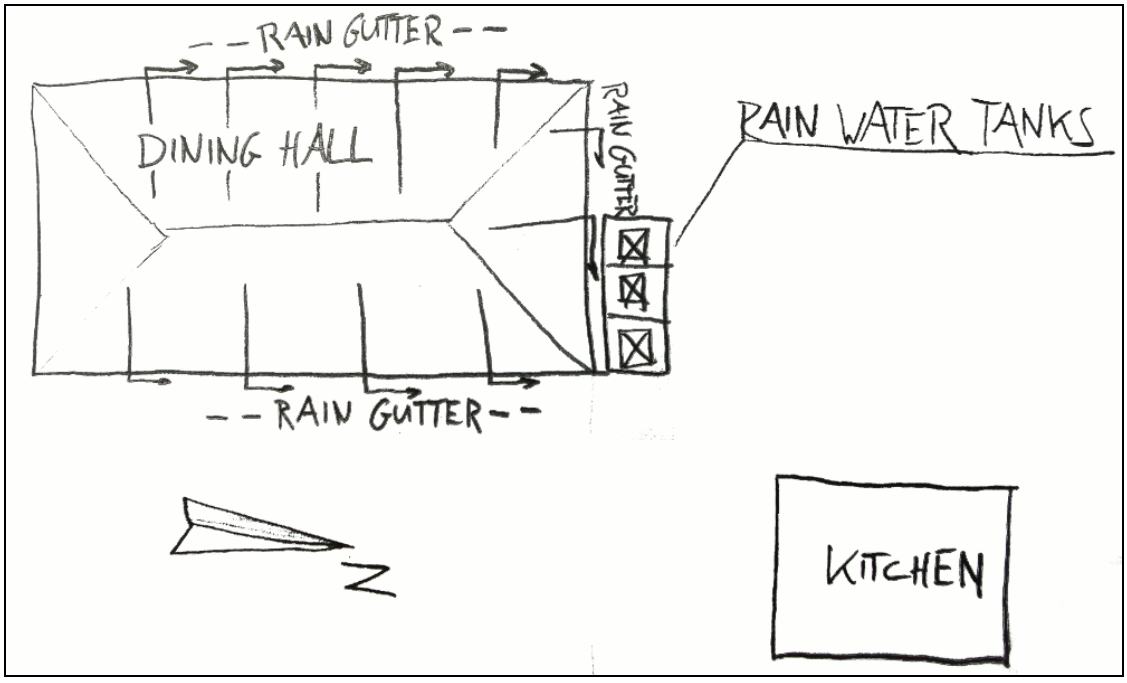

Figure 8: Ground view of possible rain water supply

Figure 8 shows a possible location for the polytanks for the rain water storage.

Below in Figure 9 one can see a possible elevation. The chosen place is so far not occupied by other building parts and furthermore the filling a well as the emptying can be achieved without using any pumps.

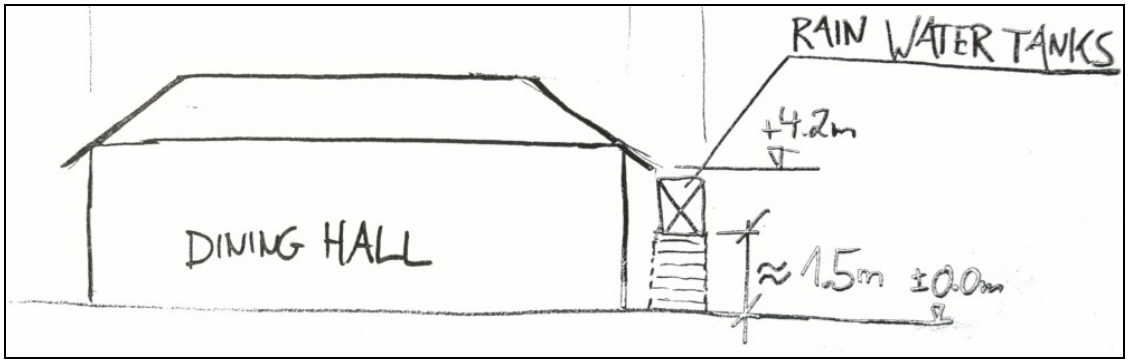

Figure 9: Side view (East) of possible rain water tanks

2.2 Guest house

Setting up a guest house for possible visitors which are volunteering for the school are an good idea. One of the first questions to discuss is which standard in terms of quality and luxury should be achieved. If "only" volunteers should be accommodated there may simple houses be the right choice. If also tourists of the National Park should be accommodated there may be a request for a higher standard comparably with the one of lodges or hotels. Is it worth to upgrade it to this level?

The Figure 10 shows a possible arrangement of guest houses. The idea is that there is one shared bathroom for two double bed rooms. In this case the houses can either used by one family each or even by two independent parties. Furthermore we assumed to have a third building which accommodates a kitchen and living room in one. According own experiences people meet were there is food ;-)

The advantage of this solution is the fact that there is space for privacy as well as for the commune. Because of the limited size of the houses it may be built by using simple construction methods. We recommend to use bricklayer walls with open windows without glass and a timber roof structure with metal decking. These are common methods of construction in the area and are comparably cheap and good.

For water supply a polytank on the top of the kitchen building is considerable and the electricity could be produced by using a PV system.

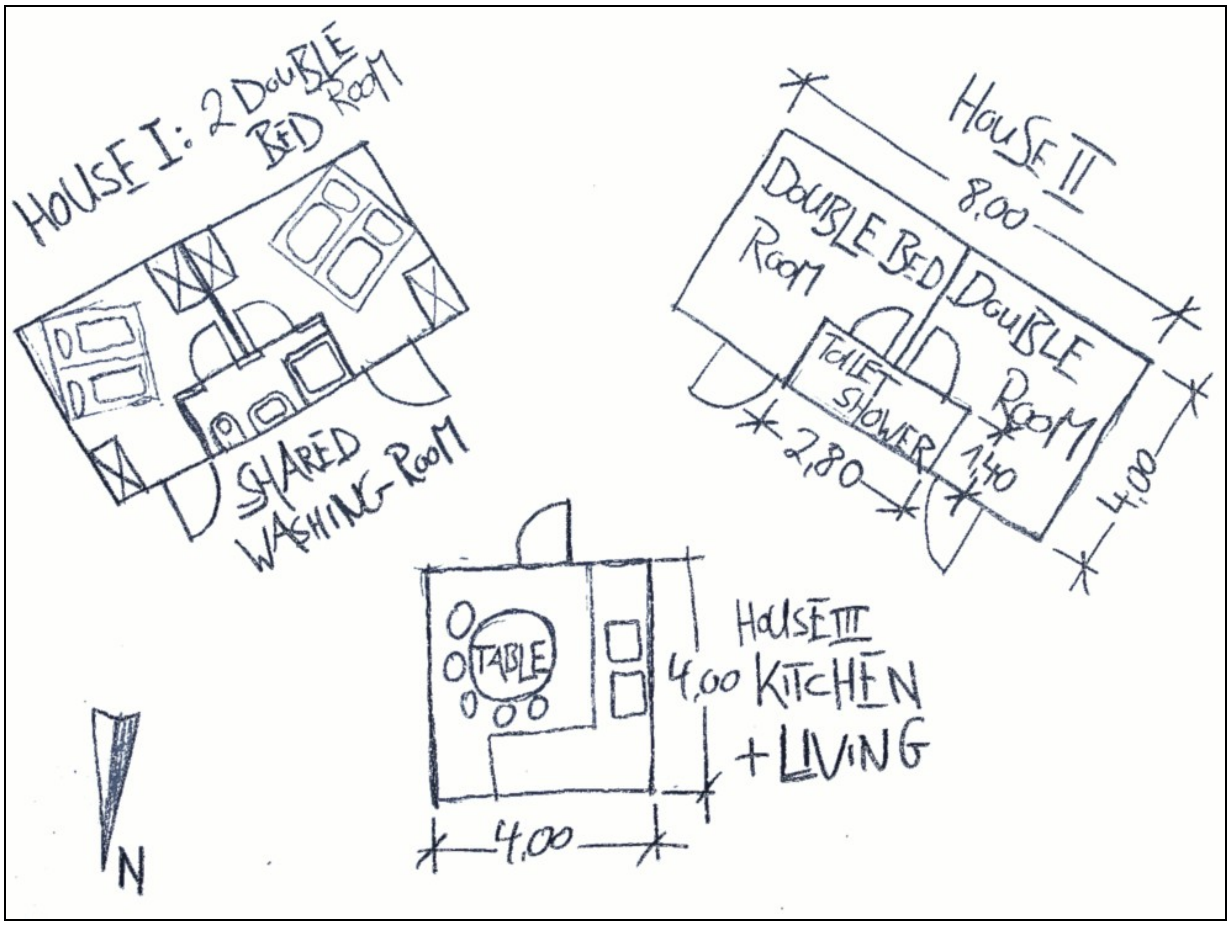

Figure 10: Possible arrangement of the guest house buildings

2.3 Physics and Chemistry Laboratory Block

The drawings published by the ministry of education and vocational training show a simple but highly functional building which seems to be adequate for the given circumstances. Some remarks:

- The roof overhang of 1,8m is very important to protect the construction from the bad influence of weathering and supplies pleasant shadow in addition. At the existing classroom building and at the administration building the roof overhang is far to small!
- Gutters are recommendable to prevent washing out of the ground underneath the roof edge but they are not the first priority. The big roof overhang is far more important.
- Chosen building materials are adequate. It's the quality control which is important to guarantee high quality and economic buildings (compare 1.1 General remarks on quality of existing buildings).

3 Other suggestions

3.1 Recycling and garbage system

One of our first impressions of the Dr. Mezger school was the rubbish and garbage which overspread all the areal. We are aware of the fact that the way like it is handled at this school is not very unusual in African countries. Therefore it's still our European perspective which let us see such things. Anyway, shaving blades lying in the sand are an obviously danger for example.

The introduction of a recycling and garbage system at the boarding school would be a big step towards a “Green school”. In our point of view this is a perfect opportunity to change the way of how people are thinking about the environment.

Up to now there are only some early ideas. Separating organic products and get them back into the organic circle by setting up a compost would be a first step. Another idea would be to make pieces of art out of unused items. This could be done in the children's afternoon spare time.

3.2 Improvement of existing water tank

The water pressure at the girls' dormitory is to low. The easiest way to solve this problem is probably to put the existing water tank on a higher level. An additional 2 metres should be sufficient. There are several ways to adjust the existing support construction.

One possibility is to put a steel or timber structure on top of the bricklayer construction. In this case there are workers with experiences in those constructions required.

The other possibility is to add another “floor” of bricklayer construction on top of the existing one. In this case works can be outset by already introduced companies which know how to do this sort of constructions.

3.3 Furniture

To fit the need of a multi-usable main building (dinner hall) folding tables are obligatory. The

most simple and established system may be “picnic tables” (German Biertischgarnitur). They are around 60 Euro and include one table and seat for 10 people. Furthermore they can stored in tiny space and are one of the strongest and most stable pieces of furniture which are available.

Other local produced furniture are obviously available in good quality and are all customized. This option shouldn't be underestimated. To get good products of local joineries it seems to be important to give them the exact ideas of what functions must be matched. There are a couple of workshops in Morogoro town.

3.4 “Colour the school”

To give the school a more friendly face there could be some improvements done:

- Painting of storage container by students
- Painting the Tanzania or the Africa map on the wall of the classrooms as part of the geology lessons

4 Report of other jobs

4.1 Fixing of sewing machines

Figure 11: Repair work

Figure 12: Fixed sewing machines

After about 5 days of work on the sewing machines we managed to fix 10 out of 11 machines. They are now ready for usage.

The problems of the machines occurred out of two reasons:

- Exposure to the weather; parts of the machines were oxidised (rusted), moving parts didn't work any more.
- The small and easy to remove parts were missing. Got they stolen? The persons working on the machines should be responsible for them and make sure that nothing is missing. It took us a lot of time to get all the parts in the shops, at the end we spent the money worth half of a brand new machine only for missing parts!

4.2 Fixing of water taps

Both water taps worked when we arrived to the school. One of them was very new, the other one was in a bad condition because of chalk exposure. We changed the sealing of a spare tap and replaced it with the worse of the two. Now they are both in perfect condition.

We couldn't detect any improper usage by the staff.

4.3 Check of Photovoltaic system at administration building

We carried out several tests on the PV system at the administration building. In the following the results:

- Connection of controller unit to battery and to solar panel. → Battery gets charged
- Connecting 12V fluorescent lamps (inside of administration building) → lamps are all broken.
- Connecting 12V lamp (outside of headmaster's office) to controller unit → lamp works proper at day time.
- Charging of battery for several hours → works good, charging slows down when battery is full.
- Discharging of battery during night-time → Voltage goes down very fast, connected lamp burns only for a few minutes.

Considering these affects it looks like solar panel and charging controller are working good. The battery is not able to store power. Changing the battery and the 12V fluorescent lamps should solve the problem.

There is one 100 Ah battery required for the administration building.

4.4 Check of Photovoltaic system at girls' dormitory

The solar system at the girls' dormitory shows the same effects then the one at the administration building. Charging works properly, solar panel delivers obviously enough power but the battery is flat after short time of using the lights at night time.

There are two 100 Ah batteries required for the girls' dormitory.

Melela, 21 July 2009

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