

street upgrade



water use

The most significant upgrade for the inhabitants is in the street tissue and the backyards, which is why we have focused on solving these challenges with realistic and technical solutions. We have chosen a typical street in order to exemplify the specific measures and their impact on the residents' daily life. The solutions we present are transferrable to the rest of Aba Shawl and similar areas in Asmara.

identity



the characteristic street tissue tells a different part of Asmara's history, and is worth preserving

sustainability



preservation is a sustainable approach to upgrading
local materials are used as far as possible
adapting for infiltration
growing own food

technical features



adding distribution pipes requires special materials and knowledge
ecological sanitation toilets are low-tech, but learning how to use it is essential to avoid failure



functions

water distribution system
storm water handling
ecological sanitation toilet
waste handling
accessibility
functions
public space

top-down



water distribution
accessibility upgrade
creating and maintaining public spaces
adding municipal functions
waste collection services



bottom-up

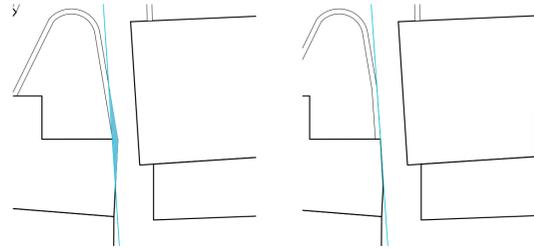
adding commercial functions
sanitary system
waste segregation and recycling
water collection on roofs
growing food in vertical gardens



expanding streets

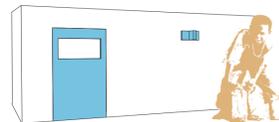
At this point the street is less than 1,50 meter, over a stretch of 5,5 meters. On the east side there is a building along the entire stretch, while it on the west side is a mix of building and fence. Building a new fence is not as big a convenience as building a new part of the house, which is the reason for choosing to move the building and fence to the west. This operation steals 0,9 m2 of the plot, which will be given back in the allotment garden. The work should be financed by the government or if not, by the profit from the operation station's services.

If relocation of a family is necessary, a possible site is an open plot in the outskirts of Aba Shawl. It is about 1 600 sqm and could house several families. The plot could also be used for a public function, but it is important to give some of the families affected by the upgrade the possibility of getting new plots in the same neighbourhood.



tap station

Adding a water distribution system for all the inhabitants in Aba Shawl is a long process. When implementing water in a street, water taps should therefore be spread throughout the structure. It will be a step up from being dependent on a truck that comes once a week, and will function good as a starting point.



pump station

There should be a minimum slope of 1 % in order for the water to run through the pipes and be distributed to the different households. The greywater contains more particles, and further pressure is required in order for the water to flow properly. In some parts of Aba Shawl, the slope conditions are not sufficient to provide the necessary pressure. In these situations it will be necessary to install booster pumps. In some cases, an installation inside a house or backyard of an affected area can be necessary.

The pumps will require some sort of energy source. Since batteries are expensive in Eritrea, pumps run on solar- or wind energy can be used. Rechargeable batteries are also an alternative. The pumps should be placed inside pumping stations to be protected against rain and flooding.

Booster pumps might be an expensive solution, but it is important to find a solution for the areas with low pressure, in order for the system to function properly. However, in some of the affected areas, an advisable solution might be to excavate more land and put the pipes further down in the ground to create the needed slope.

street section

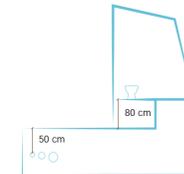
When implementing water it is easiest to put the pipes in the existing streets. As this is quite a big operation, it is natural to do the rest of the upgrade at the same time. This means lighting, making it possible to put all technical wires underground, adjusting the street height according to the backyards, making storm waterways and making the street cover even and stable.

The pipes should be of PVC-plastic, as they require little maintenance and are possible to import. We visited a construction site during our stay in Massawa, where they had very good experiences with using this type of pipes. As there will not be heavy traffic in the streets, it is sufficient to put the pipes 50 centimetres under ground level. The different pipes should not be collected in one small culvert, but put down separately.

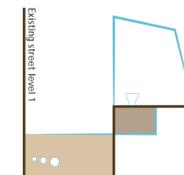
The street cover should be upgraded to a more solid one than dirt roads, as they tend to be washed out during the rainy season. Granite cobblestones are a good option, as is both cheaper and aesthetic better than asphalt and similar options. The small size of the stones (10 cm x 10 cm x 10 cm) also suits the small scale of the area. The water groove should be put in the middle of the street, so that the storm water is led away from the houses. To avoid dangerous situations with road users, the groove should be covered. We suggest a thick granite slab, perforated with small holes.

The area has bad or no lighting today. This makes it more dangerous at night, in terms of both crime and the difficulty to walk on the uneven street without stumbling. When implementing lighting it is important to keep the light source under the backyard walls, as the light then isn't disturbing for the residents close by. The lighting can be made at Medeber market, and attached to the top of the backyard walls.

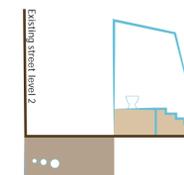
Most backyards lie today higher than the street level, probably to avoid the storm water coming into their backyard. This is also the preferred situation in the new street section, where the toilet tank should be on street level, while the toilet itself is raised 80 centimetres above street level. The height difference between the backyard and toilet can be adjusted with stairs. This means that in total, the height difference between the pipes and the toilet should be 1,30 meters. Some places this is already the situation, in which digging isn't necessary. Other places one needs to dig the pipes down and add stairs to the toilet.



Wanted situation: Height difference between the street level and toilet height is 1,30 meters.

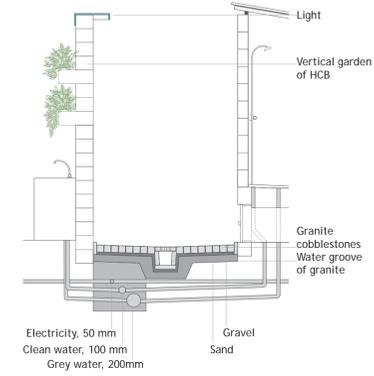


Existing situation: the difference between the street level and backyard is 1,30 meters or over.

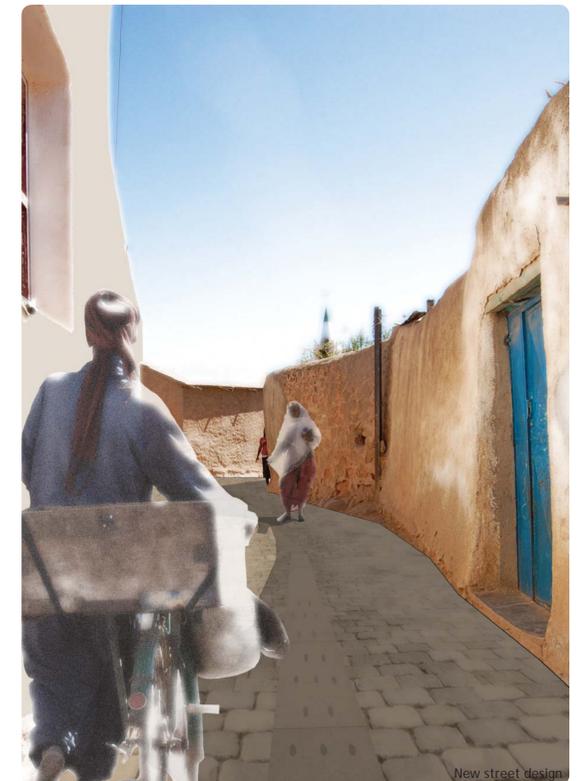
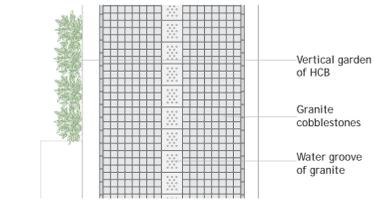


Existing situation: the street level and backyard is on the same level.

Street_section, 1:50



Street_plan, 1:50



backyard

To illustrate what an upgrade of a backyard means, we have looked at what should be proposed as minimum requirements, and how a design could be shaped around them. In order to be more specific, we have chosen one backyard along our street as an impact area. The main issue is the implementation of a new building, the toilet, but finding solutions for rainwater harvesting and waste also affects the backyards.

toilet description

The ecological sanitation toilet type we have chosen is the LASF (letrina Abonera Seca Familiar) dehydrating toilet often used in Central America and Mexico. This type is successfully tested in many similar areas, and meets our strategy requirements. It consists of two vaults, where each has a volume of 0.6 - 0.9 cubic metres, depending on how many people are sharing the toilet. After using the toilet a dry material is sprinkled over. When the first vault is full, you seal it and start using the other. When this is also full, you need to switch back. The time this takes, depends on how many users it has. A household of 5-6 persons will change toilet once a year. Turning the faeces into ready-to-use fertilizer takes about six months. If there are more users and the vaults get full before it is fully sanitized, it must get collected and go through a secondary treatment before it is used in the allotment gardens. This is also the case for backyards where there is not enough room for a double vault system. Here we propose a single vault of 0.5 cubic metre that has to be emptied every 4 months. This is also depending on how many users it has.

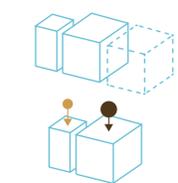
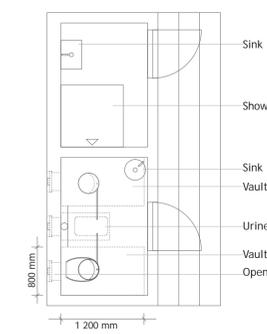
The urine is separated from the faeces, into its own tank. This needs to be collected every week. The urine contains as much as 90% of the fertilizer value in human excreta, and is also the easiest to use as fertilizer by the inhabitants themselves. The excess urine, and the urine from the inhabitants not wanting to use it on-site, is collected weekly. This urine is stored in the storages on the hilltop, and then sold to farmers or used in the parks of Aba Shawl or in the allotment gardens.

The street section is important in the design of the toilets. The waste should be easily accessible from the street so that it can be collected without the workers having to enter the backyards. In most situations, there is also quite a big height difference (from 0.2 m up to 1 m) between the road outside and the ground level of the backyards. This can be exploited to minimize the height difference between the floor of the toilet and the ground level in the backyards. If it is not a possibility to build a toilet along the street walls, it is still possible to build it inside the backyard elsewhere. This does however mean that you instead of a vault have a transportable tank that can be rolled out for collection.

Toilet solution in selected backyard, 1:50

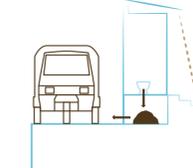
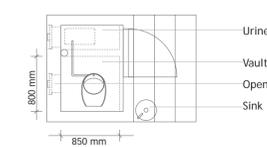


Proposal_large, 1:50



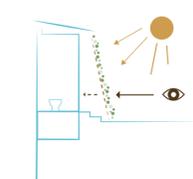
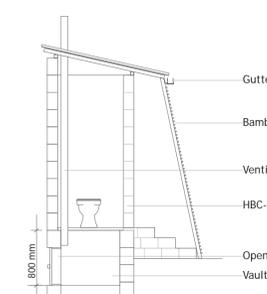
Proposed regulation: Each toilet vault must be between 0,5 - 0,9 m³, with an urine tank next to it. Faeces and urine must be separated.

Proposal_small, 1:50

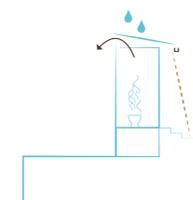


Proposed regulation: Toilet waste must be accessible from the street. This is to avoid the workers having to go into the backyard, and to ease the work for them.

Proposal_section_small, 1:50



Proposed toilet design: A light wall is put up in front of the entrance of the toilet. This provides shading, but also privacy by shielding the entrance. The screen is made of bamboo and can be used for climbing plants and be a green wall inside the backyard.



Proposed toilet design: The roof has a tilt towards the backyard so that the water in the rainy season can be collected in the backyard instead of flooding the streets.

There is also an opening between the walls and the roof so that the toilet is easily ventilated.

public space

We have developed a design for one of the open spaces along the chosen street of study.

- _upgrade cover
- _add function
- _create meeting places, place to linger
- _handling surface water

On the site there is already a mosque. This function attracts people, but we propose to also add a new function because of a large undeveloped site available at the neighbour plot. Many functions of a municipal character are missing in the area, such as health station and tap station, and these would be suitable programmes to add here.

A former sanitary station on the site has been transformed into a residential house. This we choose to relocate, as Aba Shawl then gains a bigger square inside the street tissue. Procedures for this relocation is mentioned in "extended streets".

Granite cobblestones are chosen as ground cover as in the rest of the streets. Benches of granite are arranged at different levels shaped by the terrain.

A green zone is added to the space. This increases the esthetical value in addition to give shade from the sun and being an infiltration basin for surface water. An infiltration basin consists of gravel, bushes and trees. The gravel infiltrates the surface water while the trees make the soil porous. (For more information about infiltration basins: Edaga Hamus, Public space)

In Asmara, planning by creating conditions for activity to take place is essential. Making sure a space has a central location and some type of furnishing can be enough to make a space an important meeting place for the inhabitants. A design with focus on simple solutions is fundamental.

