CONCEPT REVIEW

MANAVTA

CONCEPT REVIEW FOR AN ALTERNATIVE LATRINE

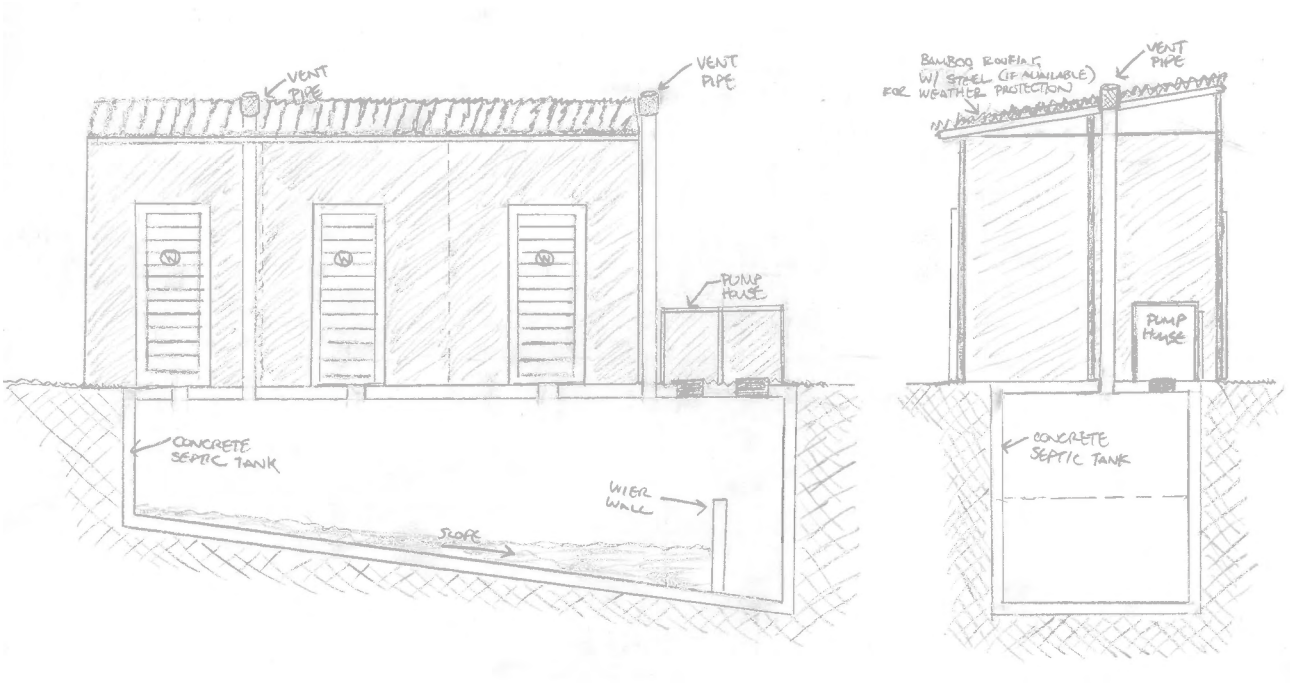


FIGURE 1 - PROPOSED LATRINE DESIGN - SECTION VIEW

INTRODUCTION

Our strategy is based on providing adequate technology and education to change open defecation behaviour, reclaim the environment and empower children and their families. While looking at cost effective solutions for sanitation needs, Manavta is proposing the following concept for our upcoming project in Surkhet, Nepal. For each school there shall be three separate toilet blocks; two separate blocks for male and female students and a third block for staff. Each block may have its own rainwater harvesting system that will provide water for hygiene and maintenance of the facilities.

IMPROVING SANITATION

Defecation and sanitation practices are a result of many factors including:

- Tradition
- Habit
- Cultural norms
- Local norms
- Economics
- Knowledge

Traditional sanitation practices may no longer work due to population increase, lack of space and changing environmental conditions. The risk of disease transmission rises as the number of people defecating, living and working in the same area increases. People are often unaware that their defecation and hygiene practices are making them sick. Achieving basic sanitation in a community relies on introducing new technology such as Latrines and changing people's behavior.

It can be very difficult to get people to talk about their behavior and it may take months or years to change habits that have been rooted in tradition or that have taboos and superstitious beliefs attached to them. Consistent use, proper operation and maintenance and good hygiene practices are critical to achieving long lasting benefits from improved sanitation. Awareness and education within the community is essential to ensuring that sanitation improvements are accepted, adopted, correctly practiced and consistently used.[1]

ECOLOGICAL SANITATION

The strategy for this concept is to provide a design that allows recovering nutrients from sanitation residues, while keeping water consumption as low as possible. Also, we aim to reduce overall costs for the project by providing an alternative design to the structure compared to the commonly used concrete. By definition, ecological sanitation is a type of dry sanitation; it does not require any flushing water and, by using a toilet that separates faeces from urine, makes it easier to use both of these materials as agricultural fertilizer and soil conditioner. Each of these toilets has two chambers that are used alternately, for faeces dry storage and dehydration, as seen in Figure. Urine, collected by urinals or urine diversion toilets, is collected and stored in a drum, outside the toilet block.

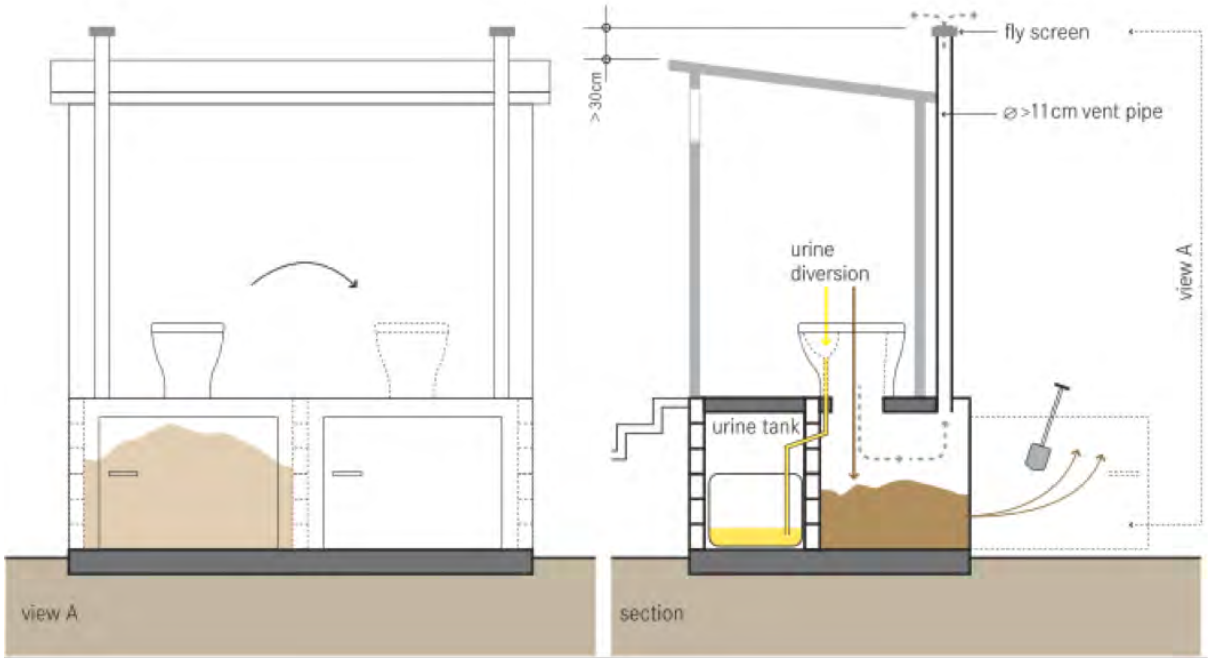
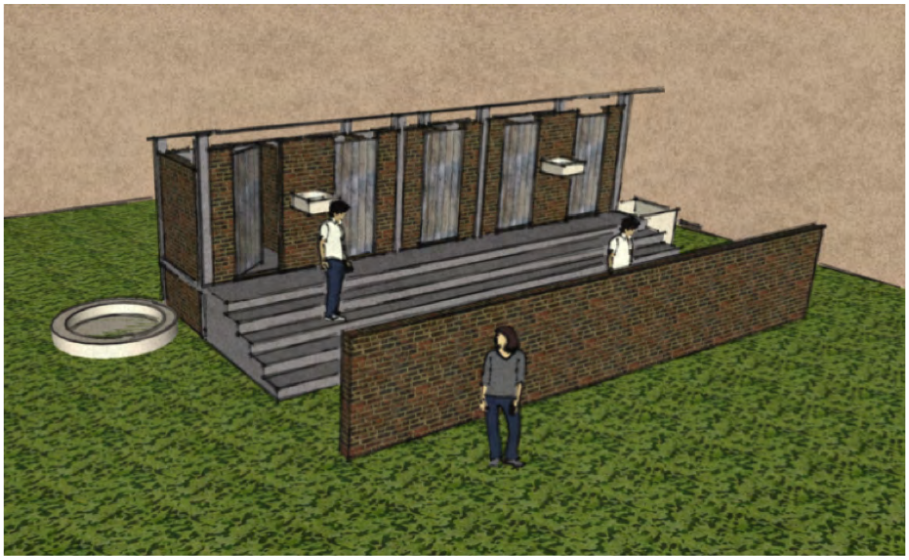


FIGURE 2: SCHEME OF THE FUNCTIONING OF AN ECOLOGICAL SANITATION TOILET, WITH URINE DIVERSION. SOURCE: TILLEY ET AL, 2014.

1. http://resources.cawst.org/asset/introduction-environmental-sanitation-technical-brief_es

Due to its structural importance, the chambers and the floor of the toilet block shall be built using bricks and concrete. The rest of the toilet block structure may be built using efficient, sustainable and low cost materials such as adobe bricks, wood or plastic bottles. The choice of the main building material will depend on local conditions and availability. The roof may be built using bound bamboo, overlaid with metal sheeting (based on availability) to limit water seepage.



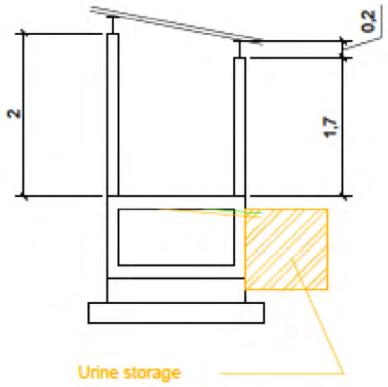


FIGURE 3: SIDE VIEW OF TOILET AND URINAL SYSTEM

SEPTIC TANK SYSTEM

From the information gathered, some schools may have septic tanks already built. This fact justifies the design of a water-based toilet. In fact, there is information about this type of sanitation facilities being built in other schools in Nepal. The exterior of the toilet blocks is similar to the one presented on figure 3. Instead of urine diversion toilets, in this case, regular flushing squatting toilets shall be used. For this case, urine collection is also feasible but it will rely mostly on urinals.[2]

MATERIALS:

The materials needed to create the Latrine Structure are as follows:

- Plastic bottles or clay;
- Filling material: sand, clay, straw;
- Concrete;
- Reinforcement steel;
- Bamboo (along with anything we can obtain locally to bind the bamboo)
- Metal sheeting (need to discuss other potential ways to “waterproof” the roof)
- Wood

2. http://resources.cawst.org/asset/solid-waste-management-technical-brief_en

MANUFACTURING

LATRINE FLOOR: The latrine floor is constructed using concrete. A wooden frame will be created to form the shape of the latrine floor, and the reinforcement steel shall be placed in position. Concrete will be then be poured into the wooden frame, smoothed over, and allowed to cure. The wooden frame is then removed, leaving us with the perfectly formed concrete floor slab.

ROOF: The roof is constructed using bamboo and metal sheeting. Binding the bamboo into large flat panels creates the base of the roof. As the sidewalls are curing the large panels are laid onto the roof and tied down. The curing process of the sidewall concrete along with the tying down of the roof will secure the roof to the structure. Lastly, metal sheeting is laid and tied down over top of the bamboo.

FIGURE 3 - SIDEWALL BOTTLE DESIGN

SEPTIC TANK: Similar to the latrine floor, the septic tank is constructed using wood and concrete. A wooden frame will be created to form the shape of the tank. Concrete will be then be poured into the wooden frame, smoothed over, and allowed to cure. The wooden frame is then removed, leaving us with the perfectly formed concrete septic tank. The tank will contain a weir wall/ separation baffle to allow liquid effluent to separate from the solid effluent, as both can be used for agriculture processes after appropriate treatment. A maintenance plan will be developed for the use of effluent for agriculture process.

FIGURE 4 - SEPTIC TANK CONSTRUCTION

SIDE WALLS: The sidewalls are constructed using plastic bottles, organic matter, and concrete. The plastic bottles are filled and packed tight with the organic matter. They are then left to dry to ensure a mold free environment. Concurrently, a wooden frame is created alongside the edges of the floor slab to form the base for the sidewalls. When the bottles are dry and ready for use concrete is poured into the wooden frames. The bottles are then laid onto the wet concrete. The gaps in between the bottles are filled with more concrete, followed by the subsequent laying of the next bottle layer. This process is repeated until all sidewalls are complete.

3. http://www.ecobricks.org/download/

BLUEPRINT AND FINANCIALS FOR 2015 PROJECTS

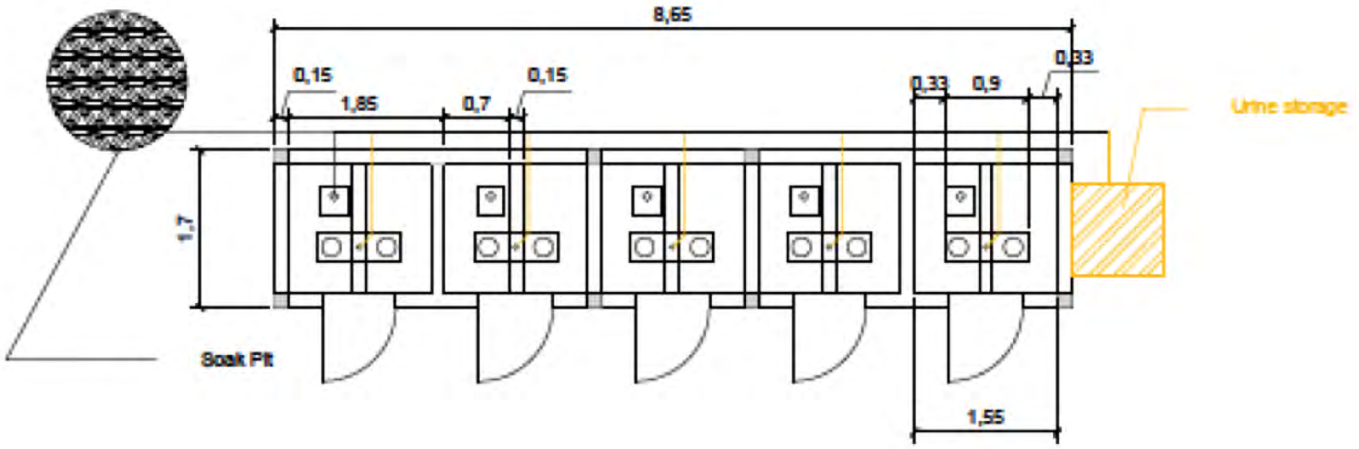


FIGURE 4: CROSS SECTION OF URINAL USED IN THE URINE DIVERSION PROCESS

PROJECT DATE: SEPTEMBER 2015

Shree Hastabir Prathamik School:
Student Population 400

Shree Xabi Primary School:
Student population 332

TENTATIVE BUDGET

Toilet Complex/Structure	$800
Transportation	$200
Education/Training/Programs	$200

When designing toilets for schools, the first thing that it's important to take into consideration is the **toilet to student ratio.** For our next project we are considering a **1:50** ratio for both, boys and girls (recommended ratio from Ministry of Health, Education and Water and Energy / UNICEF, 2010). For later phases of our projects we can turn to a 1:25 ratio when we have considerable success in our current phase. There will be two bathrooms for each gender for students and two for teachers an d staff, for women, another for men.

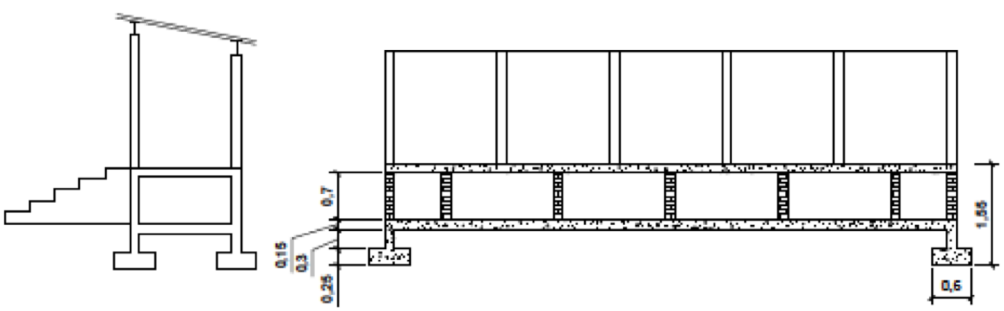


FIGURE 5: BLUEPRINT OF PROPOSED LATRINE COMPLEX

PILOT PROJECT BLUEPRINT AND FINANCIALS

Location: Lauke, Nuwakot

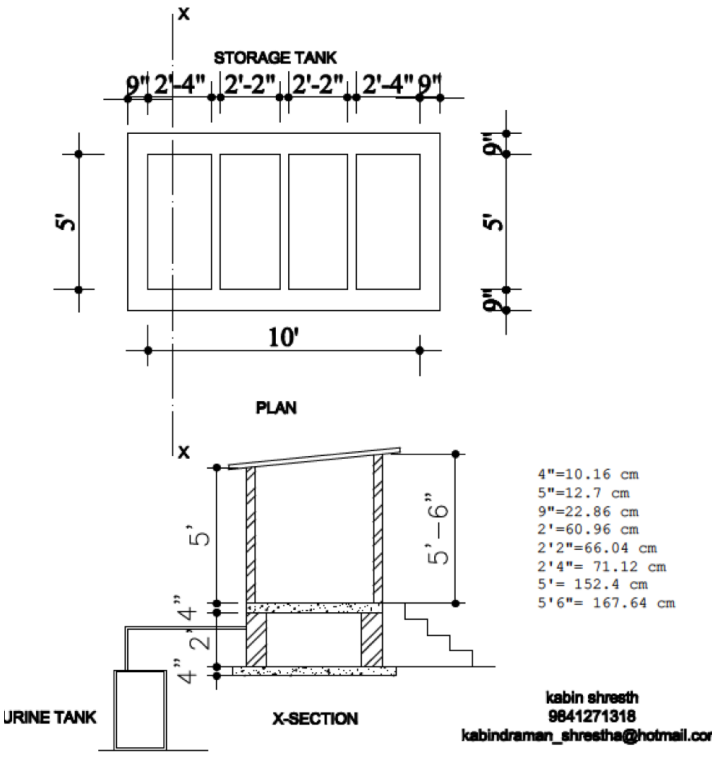
Donor: Silver Heritage Group (covered cost of the entire project)

Project completed: March 2013

Project Lead: Krishna Silwal

School: Shree Ram Janaki Primary School
Population: 75 students

ECO TOILET



SUMMARY OF COSTS FROM LAUKE, NEPAL

BRICKS	400
CEMENT	250
SAND (50 cubic ft.)	120
PIPES	60
PANS	40
IRON RODS	25
TOOLS	30
ROOF	60
TRANSPORTATION	100
DRUMS /Aluminum Sheets	50
TOTAL	$1135