

Composting Toilet Overview

Composting toilets are an excreta disposal system that effectively contain, process (remove pathogens) and reuse human feces. Experiences throughout the world have shown that if used correctly composting toilets are an efficient means of reducing diarrheal diseases in an environmentally responsible manner. All Hands composting toilet facilities are designed to be permanent, user-friendly and simple to use. Through a raised double vaulted structure, which physically separates solids and liquids, reusable natural humus (fertilizer) is produced.

Advantages:

- Ideal for areas with a high water table
- Environmentally friendly
- Beneficial for crop production and food security

Challenges:

- Requires commitment and responsibility from users
- Training on operation and maintenance is extremely important
- Removing end-product is an undesirable job

Design

The dimensions of the toilet stalls, access platform and stairway meet or exceed those presented in Haiti's *Direction National de L'Eau Potable et de l'Assainissement (DINEPA) Emergency Excreta Standards and Options* document dated April 2010. Further research and analysis was undertaken to determine the necessary volume for the waste vaults considering the frequency of use and the nine-month time period required for the composting process to complete. Throughout the design process, the following factors were prioritized:

- Minimizing the system's physical footprint
- Using locally obtainable materials
- Creating a modular design that is adaptable for larger schools
- Providing a permanent structure

Further analysis will be undertaken and design standards applied to ensure the design's ability to weather seismic and wind events typical to the area.

The waste storage system is a double vault design. Each toilet stall has two toilet pedestal locations, each leading to a different storage vault. For the four stall system, there are three whole vaults and two half vaults. For the initial twelve months, waste is deposited in two whole vaults then the pedestals are switched to their alternate locations, filling one whole vault and two half vaults.

The foundation, vaults and three of the four upper walls are cast-in-place concrete. The floors are made of pre-cast concrete panels. The stall separating walls, front wall and roof are of timber-



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framed and tin-sheeted construction. The hand washing station is of masonry block construction, with the cistern sized to hold adequate water for hand washing for two days worth of users. The stairs are cast in place concrete, resting on a rubble-filled masonry block enclosure.

Construction

There are three main phases to construction..

The first phase is prefabrication of various system components (concrete forms, precast panels, toilet pedestals, hole covers, and doors) at the All Hands operations base. While prefabrication is taking place, the second phase, construction of the foundation, can commence.

The second phase is the foundation layout and grading, and placement of the concrete for the foundation, vault and walls. For the typical facility size of five to eight toilet stalls, this construction stage will last nine days and involve two carpenters and four labourers. At the completion of this phase, the crew will jump to the next facility and a second crew will start the next phase.

The final phase is the finishing, which includes removal of the concrete forms, installation of the precast panels, construction of the interior walls and roof, construction of the stairs and hand washing station, and installation of remaining components. For the typical facility size of five to eight toilet stalls, this construction stage will last seven days and involve two carpenters, two masons and three labourers.

Maintenance

There will be certain tasks required on daily, weekly, monthly and annual bases for the use of these facilities. A maintenance manual will be developed to detail these tasks and it will be reviewed with the beneficiaries upon completion of construction. These tasks include emptying the wastebaskets, cleaning and disinfection stalls, stirring the composting pile, and emptying compost.

Costs

The cost of construction of All Hands' compost toilets depend on the quantity produced, as process requires forms for precast. For the production of 20 facilities (each with 4-plus stalls) the cost per facility is around is around US\$ 15,000. This includes the toilet and hand-washing system as well as all the hygiene promotion and training necessary. In a school setting this ends up being between US \$50 and 75, per user. The cost of materials alone for one of these facilities is around US\$ 5,500.

Figures

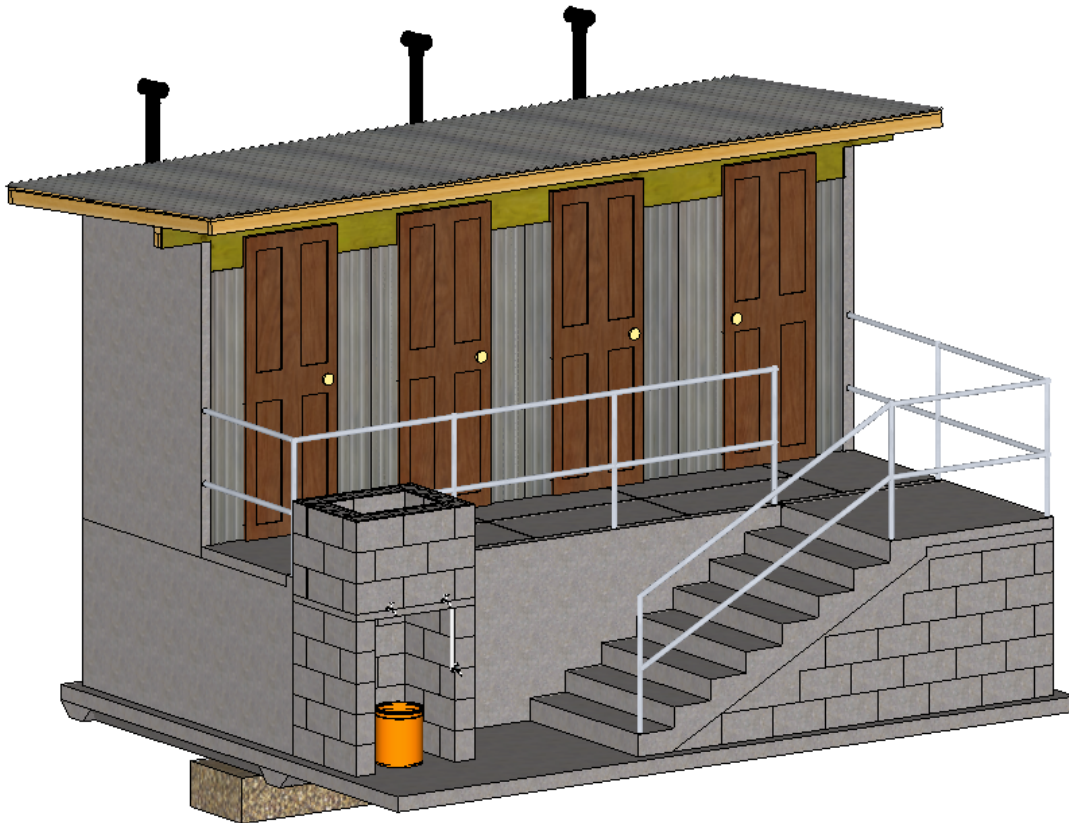


Figure 1 - Isometric view

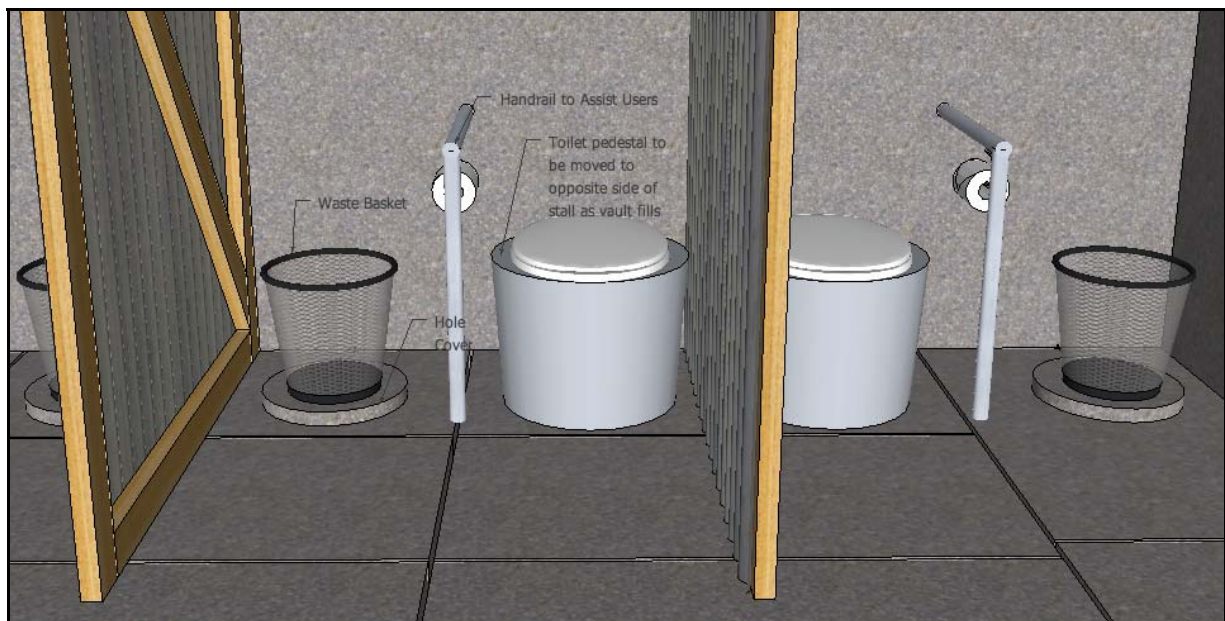


Figure 2 – Close up of toilet stalls (stall doors not shown for clarity)

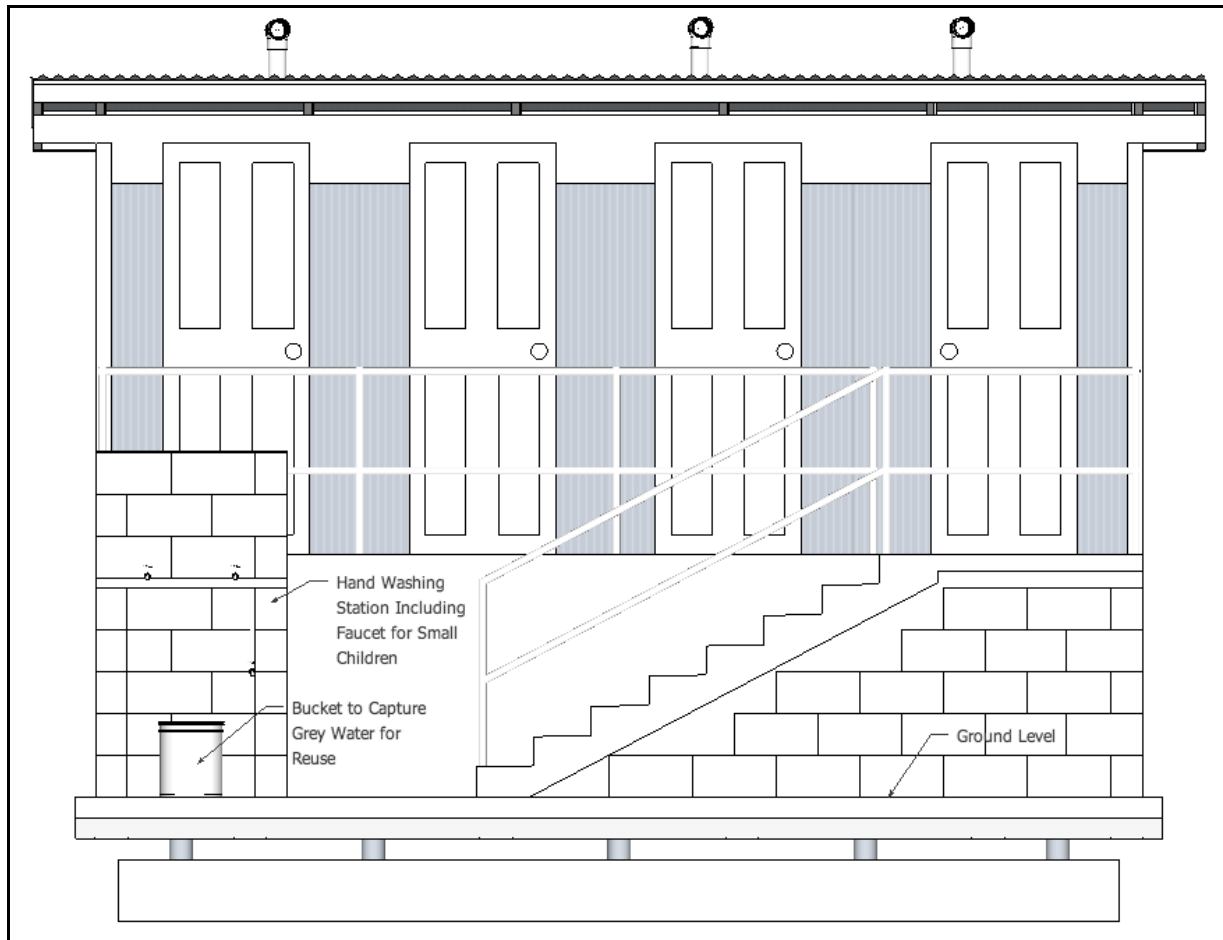


Figure 3 - Elevation view

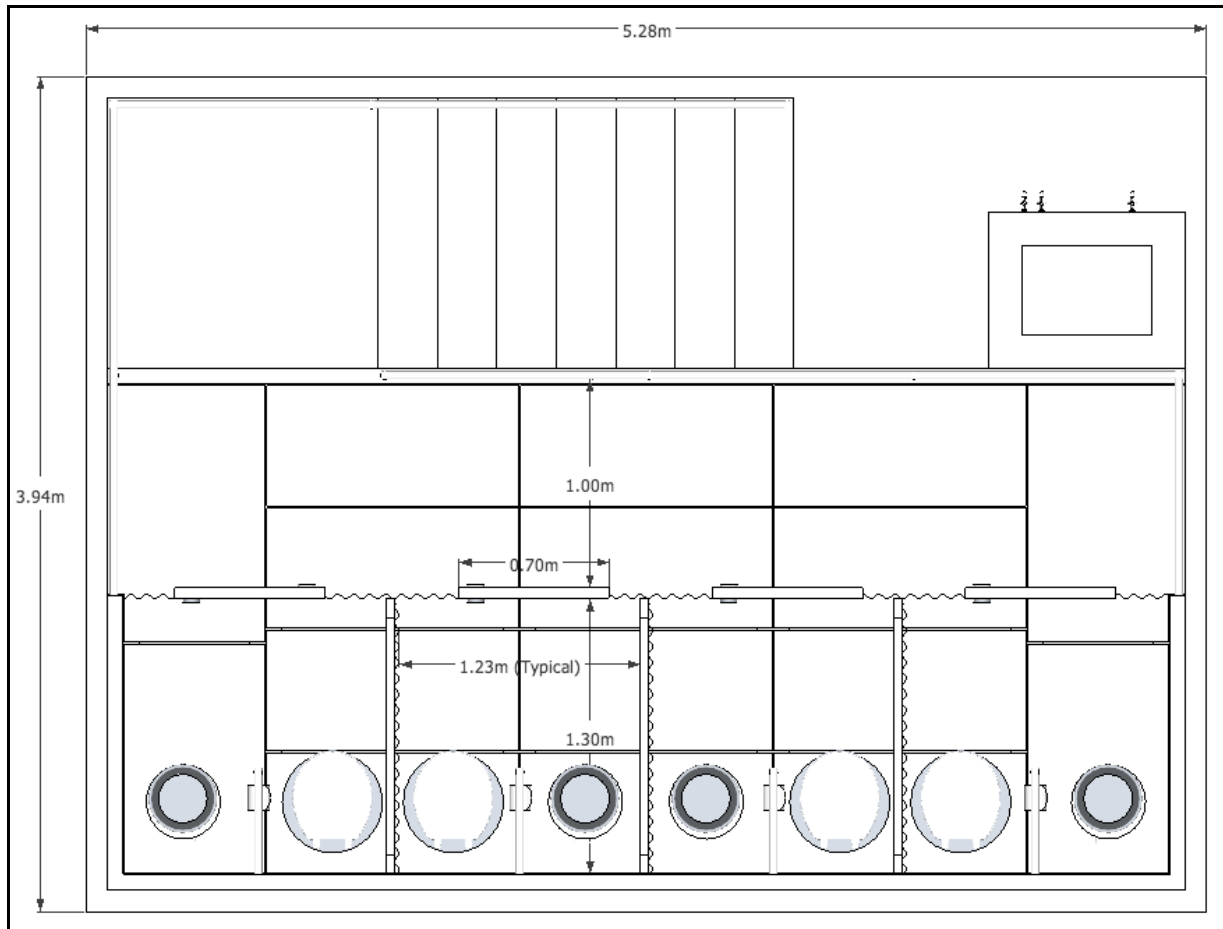


Figure 4 - Plan View

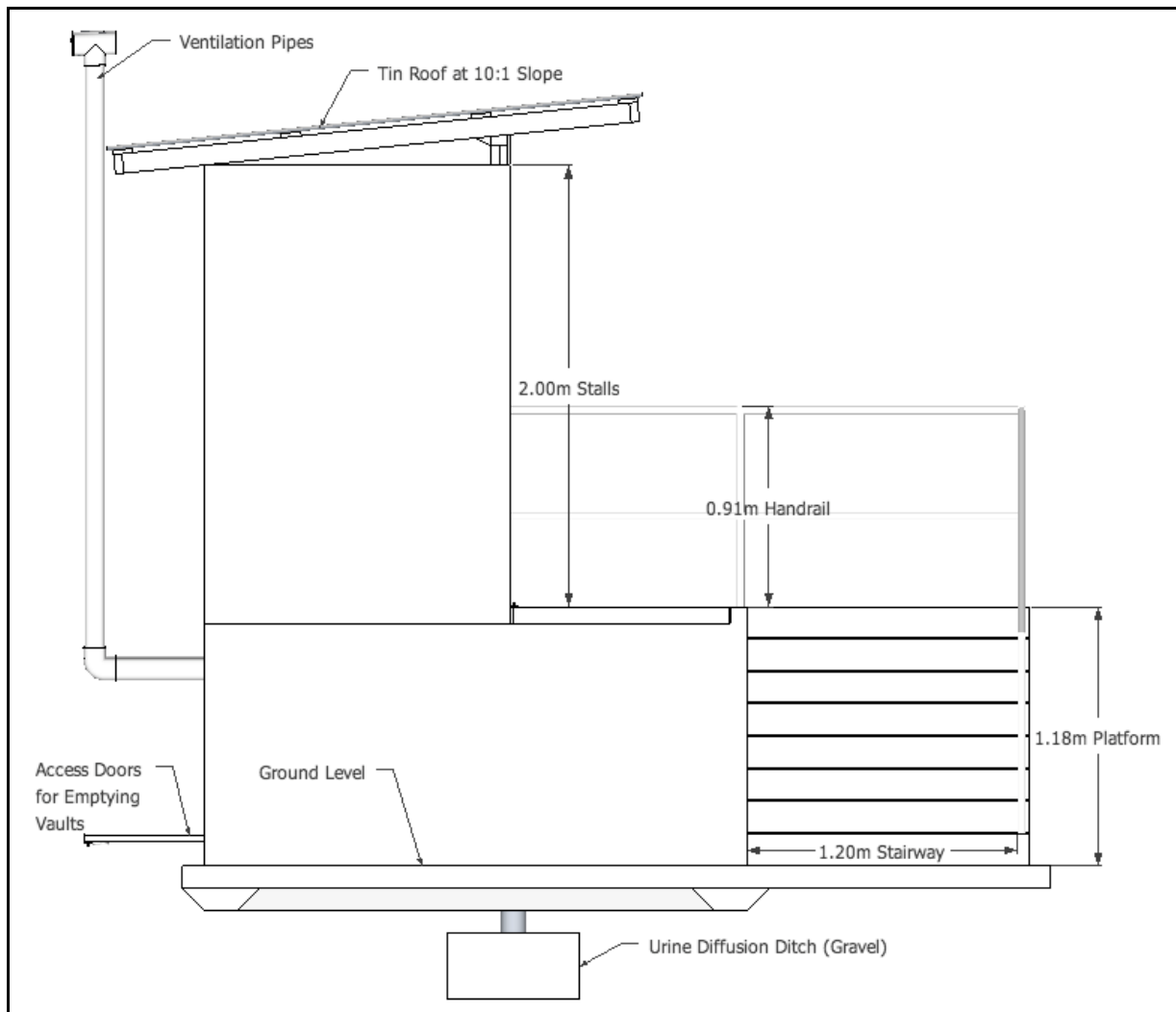


Figure 5 - Profile view (hand wash station not shown for clarity)