

Piloting of a Mobile Fecal Sludge Transfer Tank in Five Divisions of Kampala

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Photograph 1: Transfer tank in a slum within Makindye Division, Kampala

Background

Water For People in 2013 partnered with GIZ to increase access to sanitation coverage through promotion of sustainable sanitation technologies and scaling up the pit emptying business in three parishes: Bwaise I, Bwaise II and Nateete. Among the achievements of this engagement was the recruitment of six entrepreneurs, of which five are still active to-date, and development of business plans for the entrepreneurs. The entrepreneurs could empty over 400 pit latrines by the end of the project period. One of the challenges to the gulper entrepreneurs and clients during the 2013 project was the high costs of gulping. The business model implemented was deemed to be more expensive for some communities, particularly due to transportation costs that are factored into the cost per trip made to dumping site, and thus borne by the client. The project recommended the need to have a system that will ensure affordable collection costs incurred by the client.

A pilot test of a small fixed transfer tank system in the fecal sludge management (FSM) chain (Figure 1) which would allow transport cost savings for manual pit latrine emptying businesses was initiated. However, the project failed due to land issues that are common in Kampala. Some

land owners were not authentic. In other areas, the development plans would not allow permanent transfer tanks, while hiring private land or buying is not only expensive but unsustainable. It is with this background that an idea of mobile sludge transfer tanks was conceived.

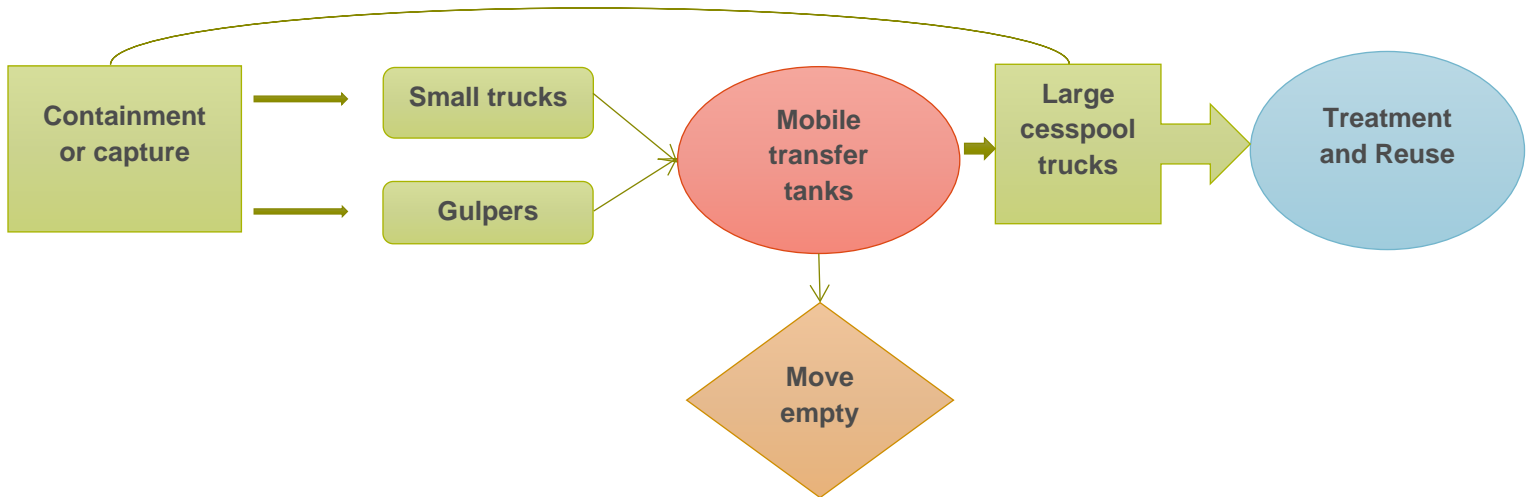


Figure 1: Transfer station in FSM

Design Process

Two 5m³ grounded cesspool trucks (Photo 2) belonging to Kampala Capital City Authority (KCCA) were to be remodeled into mobile sludge tanks. Suitability of these grounded trucks for this purpose was assessed, and the extent of damage and workable components were all identified.



Photograph 2: Grounded cesspool emptier

Based on this assessment, a detailed engineering design drawing (Figure 2) of the transfer tank was drafted using AutoCAD 3D software. Design was wholly aimed for the semi-mechanical gulper operators, and thus all systems, for loading and offloading fecal sludge to and from the transfer tank was made manual. For ease of dumping at the treatment sites, a 6-inch valve was considered for the outlet, horizontal and vertical hydraulic systems were also installed to tip and open back compartments during gravitational force driven dumping.

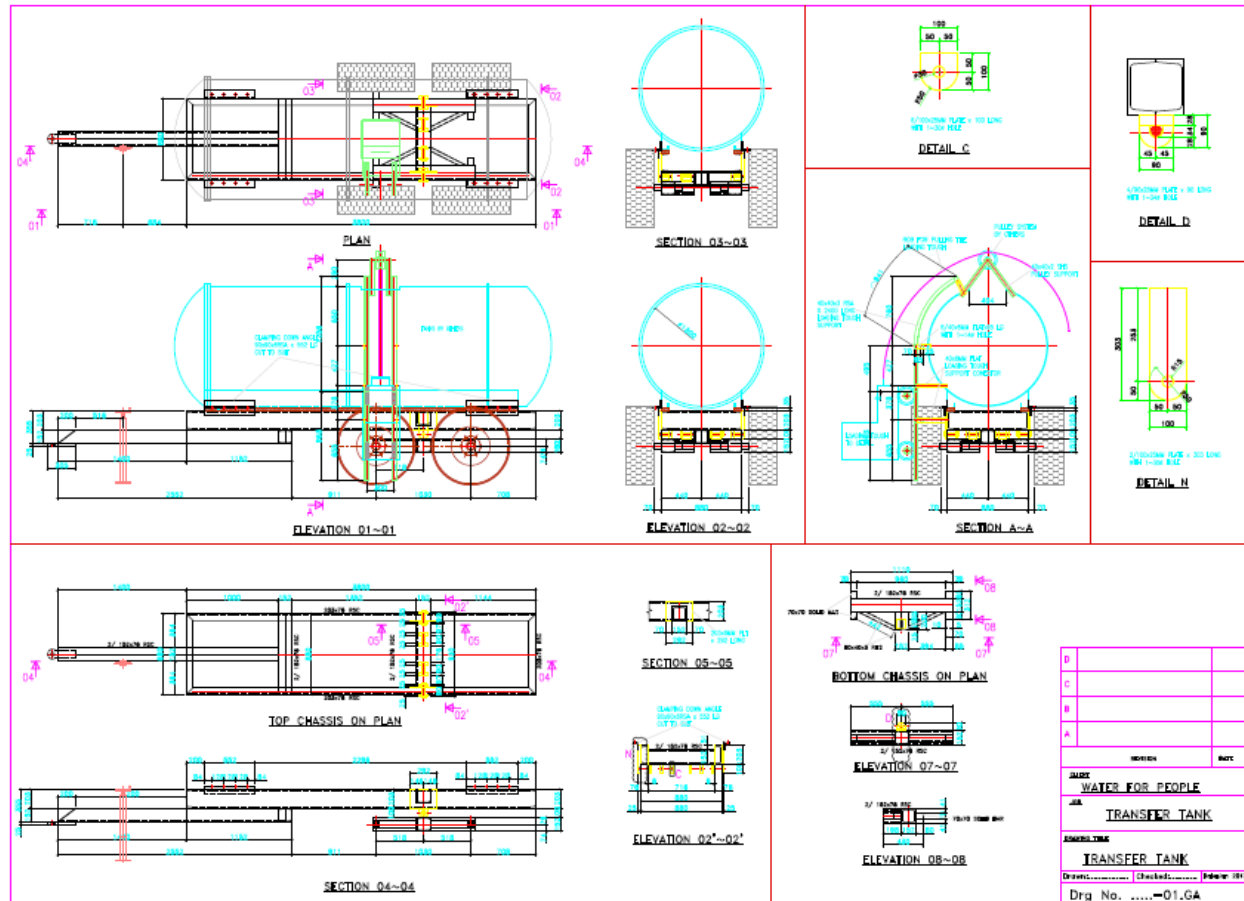


Figure 2: Technical design drawing of the transfer tank

Fabrication Process

Chassis: The two chassis were fabricated with a walking beam axle and tire size 12.5/80 (Photo 3). The chassis type fabricated was of design strength 10 tonnes, and a towing bar was included for easy towing by a tractor

Tank mounting and fixing: The tanks from the grounded trucks were placed and attached to the chassis, and all leakages and valves were fixed.



Photograph 3: Mounting tank on new chassis

Loading trough: A loading trough was fabricated and fixed on a fixed pulley along each tank (Photo 4). A 1000kg winch was fixed on the opposite side of the trough to reduce effort and increase manual loading efficiency. The loading winch system was later automated with a 24V battery to reduce operator loading time and effort. This loading trough was fabricated and fixed as per the design to ensure zero spillage in the self-loading process.



Photograph 4: fabrication of sludge loading system

Hydraulic systems: Vertical and horizontal hydraulic systems (Photo 5) were installed to enable vertical and horizontal tipping for easy sludge removal and tank cleaning.



Photograph 5: installing hydraulic systems on the tank

Final fill welding and red oxide coating: Full welds were applied to all joints and connections to ensure a proper finish and durable connection. A red oxide undercoat was finally sprayed on the tanks (Photo 6).



Photograph 6: A modified transfer tank

Pilot Test Phase

The two mobile sludge transfer tanks are hauled by a tractor on a rotational basis to target areas for the pilot (Photo 7): Kanyanya, Mutungo, Kamwokya 2, Busega and Kibuye. However, more trips of the transfer tank are concentrated within the Water For People model parish, Kibuye 1.



Photograph 7: Tractor hauling the transfer tank to one of the sites

The tanks are suitably stationed around KCCA rubbish skip areas (Photo 8) or private appropriate grounds.



Photograph 8: Transfer station at one of the KCCA rubbish skip sites

Gulper operators empty their filled sludge barrels into these tanks (Photo 9) which on fill-up are hauled by the same tractor to Bugolobi treatment plant for dumping (Photo 10). The sludge loading mechanism was initially manual where sludge from barrels is poured in an L-shaped loading trough which is then lifted using a manual 1 tonne capacity winch and pulley system to the inlet at the top of the tank. However, the manual loading is slow and requires considerable operator effort. A later automated loading mechanism has been adopted by use of a DC powered winch

system that runs with a 24V battery. Accordingly, a 200-litre barrel can be loaded within 120 seconds.



Photograph 9: Gulper operator delivering sludge to the transfer tank



Photograph 10: Dumping at Bugolobi sewage treatment plant

With this model, prior sensitization is carried out in households, and each parish is notified when the transfer tank and gulper operators will be in their area. For more effective community awareness, an advertising firm Nomad agency carried out a sensitization campaign dubbed 'wetaase' (Photo 11). The transfer tanks were branded, and marketing campaigns are carried out to inform households of the availability and schedules of the transfer stations.



Photograph 11: Marketing and awareness campaigns

The operational costs of the gulper pit emptying operators in terms of transport and dumping charges are significantly reduced, and in turn, the cost of latrine pit emptying per 200-litre barrel has been brought down from more than UGX30,000 to UGX 20,000 in the areas where the mobile sludge transfer tank operates.