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Discussion paper: An experiment of upgrading a sanitation system

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Discussion Paper

An experiment of upgrading a sanitation system

by R.A. Bocarro and C.K.I. Williams

Introduction

Since January 1983, the Overseas Development Administration have funded a project to design, develop and manufacture a low volume flush toilet (LVFT) for use in developing countries. The main details of this project are contained in the paper by Wakelin, Swaffield and Bocarro (ref.1) also to be presented at the 1987 WEDC Conference.

The purpose of this discussion paper is to present a new idea of sanitation upgrading which was first tried out in Maseru, Lesotho. The exercise consisted of converting a ventilated improved double pit (VIDP) latrine (ref.2) to a two compartment septic tank and soakage trench which collects foul waste from a prototype LVFT.

Location of experiment and existing sanitation systems

In Lesotho, a total of 53 LVFTs have been installed in the period August 1985 to August 1986. This work was carried out with the assistance of the Urban Sanitation Improvement Team (USIT) of Maseru, Lesotho. One aspect of the Lesotho project has been to look at the various excreta disposal systems available for the LVFT in Lesotho; such as piped sewers, septic tanks and conservancy tanks.

One of the key projects was in Khubetsoana, a district of Maseru. The majority of houses in the area were low income and had been constructed as part of a self help housing scheme. Services were limited to an outside standpipe shared with other dwellings and each home had a VIDP. The typical cost of the VIDP latrines was about R400 (£121). However, on the same estate, there are 41 high income homes which are supplied with electricity, individual piped water but with no piped foul sewerage. Piped sewerage in this area was not economically feasible. The high income homes were provided with VIDPs and not flush toilets. Since 1983, USIT had been aware that a number of these clients had installed flush toilets with a conservancy tank to collect the foul waste. Conservancy tanks were illegal in Lesotho, as the local water authority only had a limited number of tankers for emptying and a conservancy tank may fill up in only 1-3 weeks.

In Khubetsoana 2 of the 5 clients with existing conservancy tanks were encouraged to replace their conventional 12 litre flush toilets with a 3 litre LVFT. In this way it was hoped that the volume of foul waste generated would be reduced and thus the rate of filling of the conservancy tanks should also decrease.

New design of a 2 compartment septic tank and soakaway

In Khubetsoana, a number of clients were then identified who were interested in a LVFT. It was originally intended that the foul waste for 3 of the 5 clients should be collected in the VIDP. The VIDP would then be converted to a two compartment septic tank with a soakaway. However, a level survey revealed that relevant sites would not permit sufficient falls for running a drain from the WC to the first compartment of the VIDP. Instead a new septic tank was designed according to Pickford (ref.3). The cost of constructing the septic tank, soakaway and WC installation was R1000 (£303).

The two compartment septic tank is shown in Figure 1. The relatively small size of the tank permitted the use of USIT pit latrine cover slabs. The smaller septic tank was possible due to the tank collecting wc waste only. In addition the volume of foul waste generated by the LVFT is considerably less than for a conventional wc (an LVFT uses about 75-100 litres for a family of 5 per day compared to 300-350 for a conventional toilet). In Khubetsoana, the high income housing was provided with a separate soakaway to treat kitchen and bath greywater. A separate soakaway trench was required for the septic tank (as shown in Figure 2). Note that the depth of the trench does not exceed 1m.). Locally, the permeable layer of soil was restricted to a depth of only 1-1.5 metres and below that the soil was impermeable.

Upgrading a VIDP to a 2 compartment septic tank

One of the high income homes proved suitable for carrying out a conversion a VIDP. Figure 3 shows the original VIDP and Figure 4 shows how the VIDP was converted. The cost of the conversion was R600 (£182). This cost included a soakage trench identical to the type shown in Figure 2. The conversion was carried out in August 1986.

Prior to the conversion, only the first compartment of the VIDP had been used and was only 3/4 full. It may be necessary in future conversion to empty the VIDP with a BREVAC or similar tanker before the inlet and outlet pipes can be fitted within the VIDP.

After conversion, the superstructure was retained, in addition to the fibre glass pedestal seat over the latrine slab. This allowed the client to have an alternative privy in the event of a drought when the LVFT could not be used.

Note Figures 1 to 4 will be handed out at the conference.

References

1. Wakelin, Swaffield, Bocarro (1987), "Low Volume Flush WC Design, Development and Site Trial Appraisal", WEDC Conference, Malawi, April 1987.
2. Carroll, R.F. (1982), "Sanitation for Developing Countries", Overseas Building Note No. 189, BRE, Garston.
3. Pickford J. (1980), "The design of septic tanks and aqua-privies", Building Research Establishment, Building Note No. 187.