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SUSTAINABILITY OF WATER AND SANITATION SYSTEMS

Physical-chemical emptying of latrines for sustainability

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APPLICATION OF A physical-chemical technique in emptying pit-latrines offers sustained use of the same pit and probably the superstructure. The successful use of this technique requires that a pit is prequalified.

The candidacy of a pit-latrine unit or scheme to the application of the aforesaid technique is made by the following factors :-

- Presence of stable, non-collapsible soils consisting the walls of the pit. This feature is established by observation around the unit as well as within the remaining unfiled height of the pit.
- Presence of a sound foundation plinth beam. This component can be observed from within the pit and partly around the outside of the unit.
- Presence of a sound floor slab. This slab should be free from structural cracks.
- Well drained surroundings - This feature will contribute to the overall soundness of the unit including the pit walls.

The favourable evaluation of above factors will lead to prequalification of the pit for a physical-chemical emptying operation.

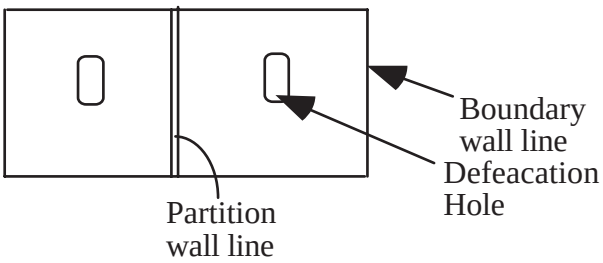
The emptying operation will be favored by the following :

- Presence of trained staff in manual emptying operations, and
- Existence of favourable weather conditions.

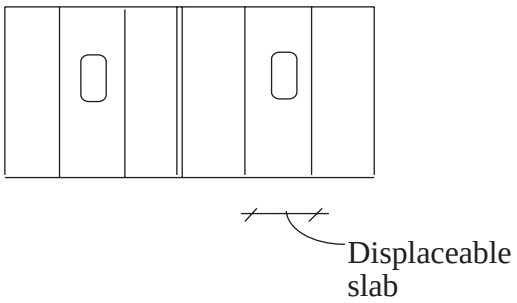
Engineering content

The general floor plan of a unit looks as follows :-

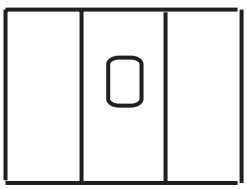
a) Prior to the operation



i) 2-door stance with solid slab

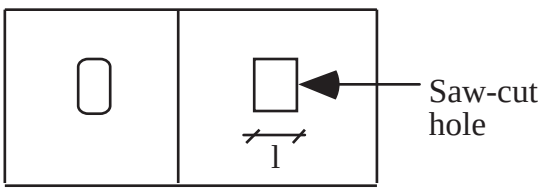


ii) 2-door stance with a floor slab containing displaceable slab component

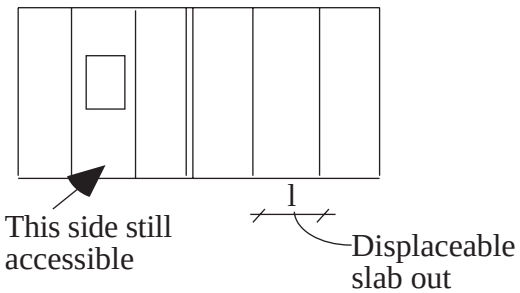


iii) 1-door stance with / without displaceable slab.

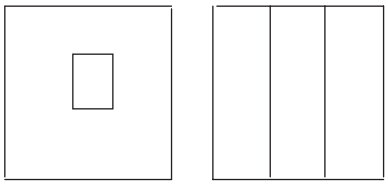
b) During the Emptying operation



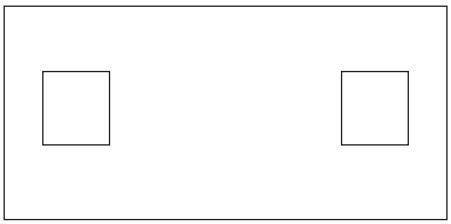
(i) 2-door stance with a saw-cut enlarged hole.



(ii) 2-door stance with displaceable slabs lifted out.



(iii) 1 door stance with saw-cut hole / displaceable slab



(iv) Septic tank or large lagoon.

A candidate pit will have it's slab sawcut or have it's displaceable slab lifted out with a craw bar.

The size of the saw cut hole should be big enough to allow a bucket to be lowered and lifted through with ease. Normally a bucket diameter will be a good rough dimension.

This size should also be big enough to allow a human being to go through to and from the pit.

Requirements

(a) Physical
- Hoe(s)
- Shovel(s)
- Bucket(s)
- Nylon Rope (12 mm diameter)
- Wheelbarrow(s)
- Water and basin
- Concrete saw / chisel
- Craw bar
- Hammer

(b) Chemicals
- Verpona
- jezz
- medicated powder (talc)
- soap
- Disinfectant cleaners like pine solution etc.

Operation

A day before the operation mild disinfectant is applied to the area so that the stench is controlled. A large hole is then dug adjoining the candidate pit or unit. The size of the hole is dependant on the size of the parent unit to be emptied. This can be determined on site.

On the day of operation, the hole is saw cut in the solid slab or the displaceable slab is lifted out. Verpona solution (1: 40) by volume is poured in the pit through the opening and left for about 20 minutes. Generally, this time will allow all visible pathogens to be destroyed.

Removal of contents will commence soon after the incubation period using the bucket till the active depth is completed (usually about 1.2m). The contents are dumped in the adjoining pit.

The operator at this depth will normally go down the pit and slowly start excavating the harder contents. The excavated material is placed again in the bucket which is pulled out by another helper.

The operation will continue till about 75 percent of the original depth is recovered.

Greater depths are possible but fumes (ammonia, methane etc.) become a hazard to the operator. In fact, at these depths, using torches becomes necessary.

Finally, the contents exhumed are covered with soil, the toilet structure flushed and the saw-cut hole covered with another concrete slab or preferably a wooden slab which is dully facilitated with the right size hole.

A 2-door unit can be finished within two days of favorable weather.

Case studies

In 1989 a group of 150 units belonging to a public housing establishment were contracted from the Kampala City Council . These units were revamped satisfactorily and cheaply within two to three weeks. The cost per unit was about $92 (United States Dollars) and a unit was equivalent to a 2-door stance.

In early 1991 , another project was contracted out by Kampala City Council consisting of about 200 units including large septic tanks which had been out of order for sometime. These units were revamped within three weeks of favorable weather at about the same unit cost as in the above case.

A third large scale project involved emptying an extensive tertiary stabilization lagoon for a large regional hospital. This project was completed within four weeks and was done at nominal cost.

Finally, many private household units have continued to be revamped at a cost about 30 percent the cost of a would be new structure.

Environmental impact statement

The liquid chemicals verpona or substitute(s) which have been used by the author of this paper are used in spraying agriculture products. Thus , they are unsafe for use in the emptying operation above.

Conclusion

The use of this technique in candidate pit latrines ensures sustained use of the same pit cavity provided the candidature criteria is satisfied.

It is suitable for emptying septic tanks which are usually clogged and hardly accessible by the conventional cesspool emptier. The technique has been demonstrated on a large structure like a stabilization pond, thus making it ideal for the many out of use lagoons which were built along some large hospitals in Uganda.