Standard Operating Procedure For Rehabilitation of Septic Tank

WASH Flood Response and Recovery in Kerala - 2018 - 19

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Standard Operating Procedure for Desludging & Retrofitting Septic Tanks

1. Introduction

The aim of this document is to explain the field level procedures in cleaning septictanks and the safe disposal of sludge.There are very few less than 4 major Fecal Sludge Treatment Plants in the state of Kerala.The floods of 2018due tosouth west monsoon, caused a very great havoc in 13 districts of Kerala by inundating all the wells and septic tanks. The flood water mixed with faecal sludge and the black water of the flooded septic tanks contaminated the wells causing health hazards.

UNICEF and the Government of Kerala associated with Gramalaya started the relief works in 5 most affected districts of Kerala. The local Panchayat authorities and the State Government authorities assisted the team in assessing the damages caused to the wells and septic tanks of the villages in the districts of Alappuzha, Ernakulam, Pathanamthitta, Thrissur and Wayanad. A project planned to repair and retrofit the septic tanks and the wells to create models of the method of cleaning and repair in such situations.

2. Observations in Kerala

In Kerala majority of the houses have toilets, it is the state with the highest percent of toilet coverage. Various types of Septictanks are used in the households. Most households use the twopit or threepit cylindrical rings for septic tank construction. The bottom of the rings of the third chamber are not plastered and it acts like a leach pit. The present septic tanks and leach pit type model in most places are not constructed as per the specified models. The labourers and the agencies engaged in support services of cleaning and transporting of fecal sludge are not following the safety methods. The untreated sludge is being disposed into the open fields or roadways which is even more hazardous or equal to open defecation.

3. Survey of Toilets and Septic Tanks

The Toilet and Septic tank in the flood affected areas should be surveyed as given in the survey format as per WHO guidelines.

The pre and post flood scenario of the septic tank should be noted.

The pre and post flood scenario of the wells, water level and damages caused by the floods should be recorded.

The cross-sectional drawing of the septic tank with details should be drawn with respect to some temporary bench mark established at site.

The damages to the cover slabs placed on top of the septic tank and other damages are also to be noted.

Details of the air vent pipe also to be noted for damages.

Details of soak pit provided or not provided also to be noted.

3.1 THE SURVEY FORMAT

SURVEY PROTOCOL FOR TOILETUNICEF - KERALA FLOOD RECOVERY PROJECT

Sl. No.	Particulars	Details
1	Name of the Block	
2	Name of the Gram Panchayat	
3	Name of the Village	
4	Name of the Beneficiary	
5	Address of the Beneficiary	
6	GPS Co-Ordinates	
7	Location of TBM(Temporary Bench Mark)	
8	Toilet type	
9	What type of septic tank provided	
10	Is bathroom attached to the toilet?	Yes No
11	Model of the Septic tank 1.Standard Septic tank 2.Circular pit 3. Single pit with closet	4. Cylindrical septic tank 5. Circular Septic tank.
12	Size of the septic tank (L x B x D)	
13	Number of members using the toilet	
14	Distance between the septic tank and dug well	
15	Whether Toilet is under usage?	Yes No
16	Is it used Before Flood?	Yes No
17	Is it used After Flood?	Yes No
18	Whether septic tank cleaned after flood?	Yes No
19	If yes, Septic tank was cleaned by whom? a) If no, when it was cleaned?	1. Septic Tank cleaners 2. Beneficiary themselves
20	When was the toilet built by the beneficiary	
21	Is the septic tank plastered inside?	Yes No
22	Is the septic tank bottom plastered?	Yes No
23	How many times it is filled in case of septic tank and emptied by the sludge operators	
24	How much amount paid by the beneficiary to the septic tank cleaners for each time	
25	Whether the Sludge is deposed safely? (mode of cleaning)	Yes No
26	Specify the disposal method	1.Septage plant
		2. Disposed in pit 3.Mixed with near by water
27	Where the emptied sludge was disposed	

Sl. No.	Particulars	Details	
28	Cost of cleaning the septic tank		
29	Is the septic tank Abandoned?	Yes	No
30	Whether there is ex filtration chamber? a If Yes Specify	Yes	No
31	Whether the septic tank is damaged? a If Yes Specify	Yes	No
32	Whether the Septic tank is filled after flood?	Yes	No
33	Whether the septic tank has air vent pipe?	Yes	No
34	Still under usage after flood?	Yes	No
35	Beneficiary is willing for field test?	Yes	No
36	Did the house hold have dug well?	Yes	No
37	Depth of water from ground level		
38	Distance between the septic tank and nearest dug well		
39	Distance between the toilet and septic tank		
40	Level difference between the toilet and septic tank(height)		
41	Is the pipe from toilet to septic tank properly covered? If no, give the details	Yes	No
42	Risk Assessment	Very High Medium	High Low
43	Is the toilet selected for the project demonstration? a If yes, give the details for selection b If No, give the details for non selection	Yes	No
44	Any other details		
45	Whether rough hand sketch of the household surveyed (Map) attached	Yes	No
46	Did the Photo of the well attached?	Yes	No

Note:The format is based on WHO Guidelines on Sanitation and Health

Name of the District Coordinator: **Signature :**

Name of the Verifying Officer: **Signature :**

In India, a sewerage system is present mostly in metropolitan cities. Rural areas with no sewerage system are expected to have more septic tanks. It is observed that the rural regions predominantly go for leach pits instead of septic tanks. Availability of land and non-availability of fecal sludge emptying services are considered to be the reasons for this choice. However, a substantial number of the septic tank is observed in the villages of states like Kerala, Punjab, and Haryana.

Indian Standards for construction of a Septic Tank

A septic tank is a rectangular watertight structure used to treat liquid waste with high settleable solids. According to the available literature, a scientifically designed septic tank involves two chambers with an inlet to collect the liquid waste from the pour flush cistern and an outlet to expel the effluent to soakage pit or a sewer. As the black water flows through ST, the solids settle at the bottom of the first chamber and scum moves to the top. The first chamber of the septic tank should be two third of the total length of the septic tank. Over time, due to anaerobic digestion, the sludge reduces, and a portion of the solid turns into liquids and gas which rise to the surface in the form of bubbles. At the top of the septic tank, a vent is built to expel the gases produced due to anaerobic digestion of the solid waste (Kumar, 2010).

Table 1:

Parameters of septic tank construction (Source: BIS,1993) Size of the tank:

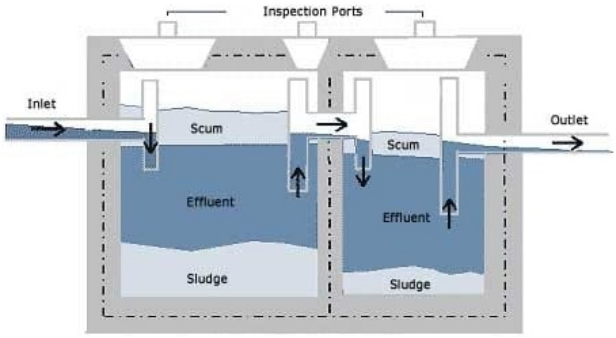
The Septic tank shall have a minimum width of 750mm and depth of one metre below the outlet with a liquid capacity of 1000 litres. For rectangular septic tanks, the length of the tank shall be 2 to 4 times the width. For circular tanks, the minimum diameter shall not be less than 1.35 metre, and operating depth shall not be less than 1.0 m. Inlet and outlet: For the tanks not more than 1200mm wide, the inlet and outlet are T shaped dip-pipe. The inlet pipe shall be fixed inside the tanks with top limb rising above scum level and the bottom limb extending about 300 mm below the top water level. Outlet pipe should be fixed inside the tank with top limb rising above scum level and the bottom limb extending to about 1/3rd of the liquid depth below top water level.

Partitions: Where the capacity of the septic tank exceeds 2000 litres, the tank may be divided into two chambers using a fixed durable barrier. The partition shall be located so that the capacity of the first chamber is twice that of the second chamber. Ventilating pipe: Every septic tank should be provided with a ventilating pipe of at least 50 mm diameter. The top of the pipe shall be provided with a suitable cage of mosquito proof mesh.

Floor: It is essential that the floor of the tank be watertight and adequate strength to resist earth movement and to support the weight of the tank walls and contents. The floor may be of concrete of minimum M15 grade and a minimum slope of 1:10 may be provided towards the sludge outlet to facilitate desludging. Walls: walls should be thick enough to provide adequate strength and water tightness. Walls built of bricks should not be less than 200 mm thick and should be plastered to a minimum thickness of 12 mm inside and outside. Desludging: Small domestic tanks for economic reasons may be cleaned at least once in 2 years provided the tank is not overloaded due to use by more than the number for which it is designed. A portion of the sludge not less than 25 mm in depth should be left behind in the tank bottom which acts as the seeding material for the fresh deposits.

Commissioning the tank: The sewerage system should be complete and ready for operation before connected to the building. The tank should be filled with water to its outlet level before the first time the tank is used. It should preferably be seeded with small quantities of well-digested sludge obtained from the septic tank or sludge digestion tanks.

Soak pit: Soak pit is a pit through which effluent is allowed to seep into the surrounding soil. It should be 1.5-4 metre in depth and at least 30 m away from any source of drinking water.



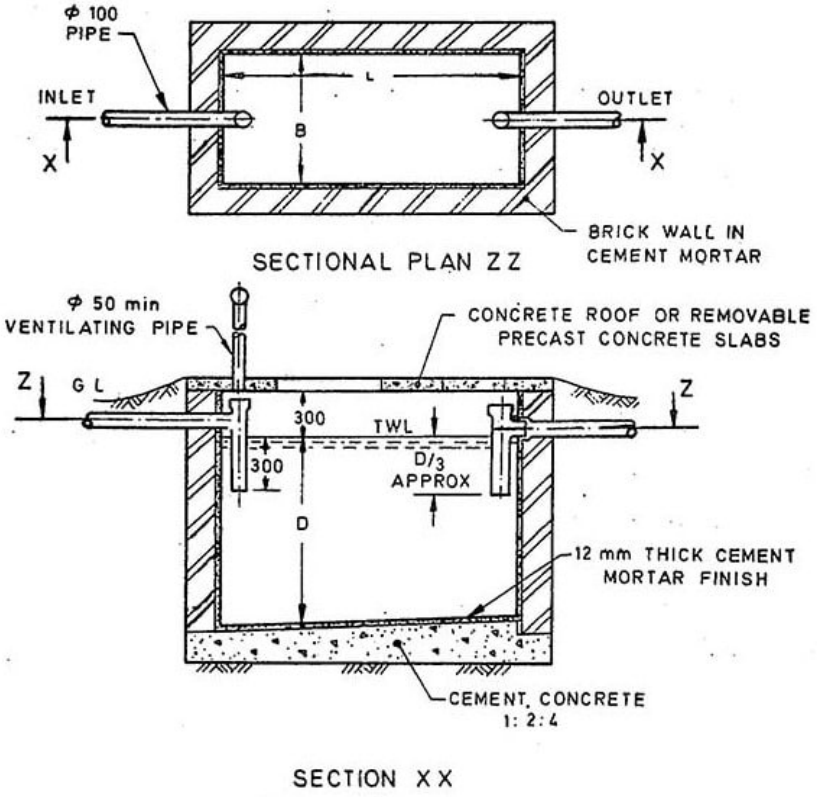
In 1993, Bureau of Indian Standards (BIS) came up with the Indian standard code of practice for installation of septic tanks and disposal of septic tank effluent. The standards are not very different from that of the specifications mentioned in the literature on sanitation technologies.

The standard code mentions that 'in unsewered areas sewage should be treated in a septic tank which should be given a secondary treatment either in a biological filter, upflow anaerobic filter, on the land or in a subsurface disposal system.' The document also suggests that the septic tank should be located at a 'place open to the sky…and should not be located in swampy areas or areas prone to flooding' (BIS, 1993).

In 2017, the organization Water Aid conducted a primary survey of the sanitation technologies commissioned by Ministry of Drinking Water and Sanitation. Four types of septic tanks are found in India based on the number of chambers and the location of septic tanks in relation to the toilet superstructure. The four types of septic tanks popular among the masses according to the report are

1. Septic tank (single-chambered) off set
2. Septic tank (single-chambered) below the toilet
3. Septic tanks(chambered) off set
4. Septic tanks (chambered) directly under the toilet

Since septic tanks are in demand in many states like Kerala, Punjab, Haryana, Bihar, etc. it is important to develop a protocol for fecal sludge disposal and provide the necessary infrastructure for its treatment. Every district should have sewage cum fecal sludge treatment plant for effective secondary treatment of septic tank waste



4.Faecal Sludge Management

The Faecal Sludge Managementmethod isdivided into threepartsandin each partthe workpattern is explained.

Aspects	Activities
Desludging of Septage	1. Desludging team 2. Desludging equipment and management. 3. Following of Safetyand Hygienic methods.
Disposal of fecal sludge Offsite- Process	1. Decantingof fecal sludgeat theFecal Sludge TreatmentPlant.
Disposal of fecal sludge Onsite	1. Constructing of Onsite disposalof sludge. 2. Executionof On site disposal of sludge.
Data Collection and Record Keeping	1.Maintaining ofrecordsatall stages

5.Desludging team

- Drivers and Tank operator, Health supervisor
- Workersforremovingandreplacing the septictank cover.

6. Desludging

Equipment and management

Holding Tank, Cleaning pump, Hose pipes, Foot valve and Strainer	Tank attached sludge removing vehiclesand accessoriesto transport fecal sludge.
Desludging pump	Hosepipes attached toamotorized pump is suitable.A straineris tobeattached to the foot valve of thehose
Shovels or septic tank cover	Equipment for replacing cover of the septic tank Sludge removing vehicle should be provided with sufficient equipment like shovels or septic tank cover, gloves.
Safetydresses Sufficient number of Gumboots.High qualityhand gloves. Safety Goggles. SturdyHelmets. Disposable masks.	Workers engaged in removing fecalsludgeand handling chemicals must compulsorilyuseGloves,Gum Boots, face mask and googles.Goggleshavetobe used compulsorilyby thoseworkershandling Chlorine and Lime. Thefacemaskwill arrest the badodourofthefecal sludge.
Watertanks and Plastic Buckets	Plasticbucketsareused forcleaning the equipmentand washing hands afterusing chemicals.
Bleaching powder	Bleaching powder needed for sprinkling around the septictank
Lime	Hydrated Lime. This should be sprinkled around the places where the septage leaks during removal or on the sand upto to 2inches thickness can be filled. Lime should be sprinkled around the septictank and toilet after removing the sludge. Care should betaken to use gloves and handling equipment while handling limeas itis ahazardous chemical.
Safety Clothing	The clothes used while sludge removal should be washed.Dirty clothes will spread germs and contaminate thehouse. The gloves and boots have to be thoroughly washed after use.

7. Safety and Hygiene Arrangements during de sludging

- During all the sludge removing stages, safety and hygiene arrangements have to be compulsorily arranged.
- The supervising staff should have full knowledge about the sludge disposing site.
- All the workers engagedin the septic tankcleaning work should be trained to follow safety and personal hygiene methods.
- The basic knowledge of Faecal Oral Transmission process should be known.
- The faecal sludge should not be handled without wearing proper gloves.
- Separate dresses should be used while cleaning the septic tanks and they should be removed while going back to house.
- The clothes used while cleaning the septic tanks should be washed thoroughly.The workersshould change their dresses after cleaning the septic tank and bathe using soap.
- Hands should be washed thoroughly using soap before eating.
- If the Sludge Treatment Plant is not located near, the sludge should be transported in a closed tanker vehicle to the centralized Sludge Treatment Plant for safe disposal.

7.1 Training for septic tank operators and workers

- On awareness of Faecal Oral Transmitted diseases and the preventive measures.
- Hygiene procedures of removing the septage and training on the Standard Operation
- Procedures.
- Should be given training or knowledge about the procedures to be adopted in times of accidental septage spill.

7.2 Things to be present in the vehicle

- One Bathing soap
- One Washing soap
- Five packets of ORS powder
- One bottle house hold disinfectant.

7.3 Information for Sludge Treatment Plant from driver and workers

- Thedate and time of removalof sludge, name of the place of removal of sludge
- The number of tanks of septage that need to be emptied at the treatment plant.
  The septage is then emptiedin the treatment plant with the help of the employees of the plant.

7.4 Instructions to septic tank driver in case of accidental leakage of sludge

- A shovel and 2 bags of 25 kgs of Lime should be kept ready in the vehicle to meet the exigency of spilling of septage.
- Lime powder should be sprinkled over thel eak.
- Sand upto 2inches should be put on the leak of septagef or the leaked septage will cause health hazard to the people.
- If the In case of spillage or leakage of septage, inform the concerned departments on
- Date, time and place where the slurry is spilled and the amount of slurry spilled.

8. Disposal of Faecal Sludge Offsite – process

The panchayat employees and the workers engaged in sludge removal shouldbe properly trained in the skills of cleaning of septictanks.
The removal of septageis as follows: Arrangement should be made to make aclear way for the sludge to travel in the Hose pipe.
The end of the hosepipe has to be placed properly at the bottom of the tank.
Water is tobe added to dissolve the fecal sludge, if found hard, for easy removal.
The filled tank is to be transported to the nearest treatmentsite.
10% of the sludge is to be left in the tank after removing 90%.This will help the composting of the sludge with the bacteria present in the 10% sludge and the continuous usage of the toilet.
Chlorine or Lime should not be added to the septic tank after cleaning. This will kill the live bacteria present in the remaining sludge
The cover removed from the septic tanks hould be replaced properly with cement mortar.
After replacing the cover of the septic tank lime should be sprinkled around the septic tank
on the leak of septage.
The air vent pipe should be replaced properly with a mosquito net at the top to arrest mosquito and flies breeding.
Bleaching powder should be sufficiently sprinkled around the toilet and the septictank.

9. Onsite Process of Disposal of Fecal Sludge

Two methods are discussed here.

Septage unloded at Treatment plant

9.1 Disposal of faecalsludge in anearbyplace:

- Aseparateplacehastobeselectedforthedisposalofsludge.
- NowaterbodieslikeRiver, Lake, Tank,Pond should befound around 15 metresnear thedisposalsite.
- A pit should bedug with sufficient lengthand breadthwith adepth of1.0m.
- Thesludgeremovedfromtheseptictankshouldbeemptiedandcowdungorhorsedung
- should beputinthe pit.
- Alayerofmudshouldbefilledabovethesludgetoaheightofminimum30cm. Marking
- should bemade to notifythepit.
- Thesludge willturn into manurein aperiodof 3 months

9.2 Disposal in Constructed Wet Lands

- When there is no septage treatment plant near by to diopose the septage from the septic tank a constructed wetland can be built inevery panchayat level.
- A pit should be dug in a public place with 5 metres X 15 metres dimension of length andbreadth.
- The floor of the pit should be provided a slope of 1:30 ratio. To pour the sludge, a small tank should be constructed at the entrance of the pit.Pebbles or crushed stones should be filled in the pit as shown in the diagram.

- Grass varieties like Reeds and CannaIndica should be planted above the bed.
- The water residue can be used for gardening and agricultural purposes.

10. Recording Details

10.1 Records to be maintained by Health supervisorworker

- Dateanddetailsofthetoiletfromwhere sludgeisremoved.
- Number of tanksof sludge removed.
- Number of tanks of sludge emptied in the onsite tanks.

10.2 Records to be maintained by the Septage Treatment Plant:

- There gistration number of the septictank vehicle, Driver's name and the telephone number and name of the company.
- Thenumber oftanksreceived and theircapacity.
- Time of arrival of the vehicle to the plant.
- The name and details of the place of septage removal

4. RECOMMENDATIONS

- The Kerala government needs to build septage treatment plants (STPs) in all the districts.
- Wherever there is no septage treatment plant nearby to dispose the septage from the septic tank a constructed wet land can be built in every panchayat.
- The untreated fecal sludge extracted from the septic tanks have to be drained in the designated treatment plants.
- The septic tanks or the leach pits are to be placed at a safe distance of 15 meters from the dug wells to avoid contamination by seepage.
- Disposal of untreated fecal sludge into the water bodies should not be allowed.
- Thorough hygiene education has to be given to all those involved in this work
- Knowledge about Sewerage Treatment Plant and Fecal Sewage Treatment Plant has to reach all walks of people.
  Onsite toilet technology training to be provided to the masons to ensure the right construction method.
- Networking of sludge tank operators with GPS installations to be installed for ensuring themovement of the effluent to the designated sites.
- Fecal Sludge Management campaign should be imparted at State level to reach everyhousehold.
- Existing septic tanks should take care of properly filtering the septage water by well designed soak pits to discharge the surplus water. Such soakpits should feature in areas where they are unable to move the contents regularly to STPs.
- Training on FSM and FSTPs have to be imparted to all the LSG and District level officials.

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6. Acknowledgements:

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