LATRINES FOR AREAS WHERE THERE IS NO PIPED WATER SUPPLY

1. Scope

This Specification sets out the requirements in relation to the location and types of latrines in areas where there is no piped water supply.

2. Precautions

Care must be exercised to ensure that:

(a) disease transmitting flies and other insects do not have access to the excreta.

(b) there is no nuisance to the public or the neighbours.

(c) the sub-soil water is not polluted if it is likely to be used for domestic purposes.

(d) the biological oxygen demand (BOD) of any resulting effluent is limited to the requirements of the Department of Health so that streams rivers and oceans are not polluted.

3. Location

The latrines must be screened from public view and be located not less than:-

(a) 30 metres from any well or other similar potable source of water.

(b) 6 metres from the front or street boundary of the allotment.

(c) 3 metres from any boundary other than the front or street boundary.

(d) 3 metres from any dwelling within or outside the allotment.

4. Types of latrines

The following disposal methods can be used .

1. Dry on-site treatment: dry pit latrines and composting latrines.

2. Wet on-site treatment: wet pit latrines, aqua privies, septic tanks, and biogas plants.

All these disposal methods rely on the reduction of BOD by aerobic bacteria (where free oxygen is available) and/or anaerobic bacteria (where free oxygen is excluded).

4.1 Composting Latrines (Fig 4.1) are of two types, the single-vault continuous operation type and alternative twin-vault batch systems such as the WHO Vietnamese design.

Continuous-operation types utilize aerobic bacteria to act on excreta and vegetable wastes suspended on a rack above the floor of the ventilated vault. Urine is evaporated off or drained away. As the mixture decomposes, it falls through the rack and is removed for use as fertilizer.

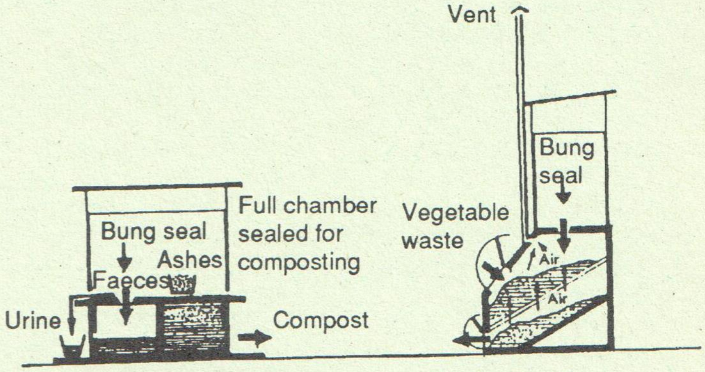


FIGURE 4.1 COMPOSTING LATRINES

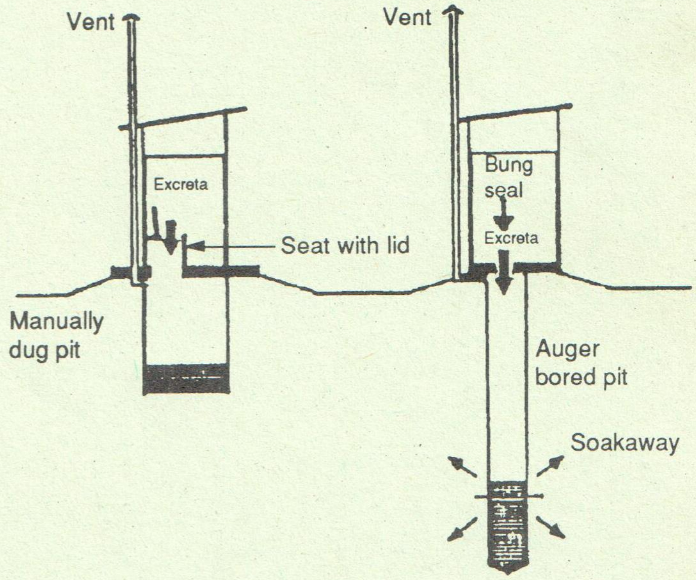


FIGURE 4.2 DRY (NONFLUSH) PIT LATRINES

In the alternating twin-vault type, one vault at a time receives excreta. Urine is drained away in a separate surface channel. The excreta are covered with loose earth, ashes, or sawdust to reduce odors. When the vault is nearly full, it is sealed with lime mortar and left for a few months to compost by anaerobic bacterial action. Contents are then removed and used for fertilizer. During this time the other vault is used as the latrine. Both types work best in warm climates and with little or no urine loading.

4.2 Dry Pit Latrines have no flushing facility (Fig 4.2). They are manually dug pits or mechanically bored holes a few meters deep over which a squatting plate with a bung seal or seat with lid is placed. These latrines operate more efficiently when the bottom of the pit is below the water table, which allows excreta to be decomposed by anaerobic bacteria below water level and to soak away into the surrounding ground. However this could lead to the pollution of potable water sources in the area. Gases generated, such as methane, are vented through a tall vent pipe. When pits are dry, a combination of anaerobic and aerobic decomposition takes place. When a pit is almost full, the surface cover is removed and the top of the pit filled with a mixture of lime and earth. A new pit is then dug.

4.3 Wet Pit Latrines are bucket-flushed, water-seal, floor-pan latrines with a soak-away pit in porous soil. Digestion of excreta is by anaerobic bacteria below water level. The lower section of the pit is lined to retain water when the pit does not reach the water table. Gases from the digestion are vented through a tall pipe.

For more details of dry pit and wet pit latrines see Annexure 1 to this Specification.

4.4 Aqua Privies (Fig 4.4) are simplified septic tanks with a single chamber and without a full flush pan. Where bucket-flushed squat plates are used, excreta enters the tank through a short pipe that penetrates below the surface of the liquid in the tank to minimise odours. Alternately,

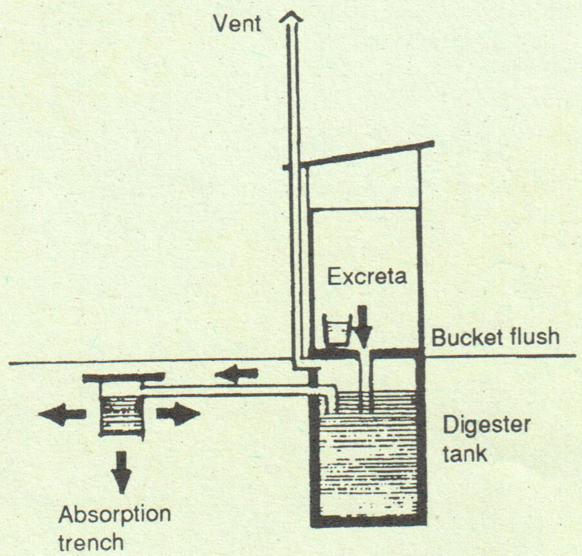


FIGURE 4.4 AQUA PRIVY

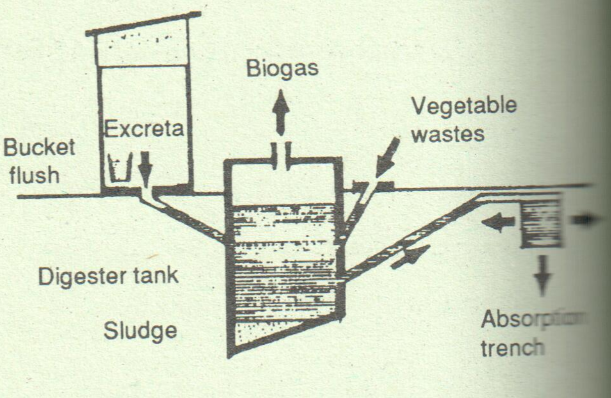


FIGURE 4.6 BIOGAS DIGESTER

excreta may enter through a low-volume, water seal, bucket-flushed floor trap set in the squat plate. Decomposition is by anaerobic bacteria below water level in a permanent tank, which periodically requires desludging. Gases generated in this process of decomposition are vented through a tall vent pipe. Excess effluent from the tank is drained to absorption trenches.

4.5 Septic Tanks can be either single or double chamber. They are generally used with full cistern flush water-seal pans. Single-chamber designs use anaerobic digestion; in double-chamber designs the second chamber is ventilated and uses aerobic bacteria for digestion. The permanent tanks need desludging periodically. The effluent is piped into absorption trenches. For details of septic tanks see Annexure 2 to this Specification.

4.6 Biogas (Gobar Gas) Digestors (Fig 4.6) operate similarly to a single-chamber anaerobic septic tank, but provision is made to trap the gas, which is largely methane, given off during digestion. The methane gas can be used as fuel for cooking and lighting buildings. For efficient gas production, the contents of the digester tank should have a carbon: nitrogen ratio of approximately 30:1. Vegetable wastes are usually added to the excrement to raise the carbon content in the tank. Excess effluent from the tank is often drained into ponds, where algae are grown as feed for domestic animals such as ducks. The digestor tank requires desludging periodically.

The choice of latrine is determined by local ground conditions, rainfall, water table, water supply, ground temperature range, and social, cultural, and religious influences within the community.

PIT LATRINES

1 Introduction

Pit latrines can be of two types - dry pit and wet pit.

This specification covers the details of both. When correctly constructed and maintained according to this specification and details available from the Health Department , the nuisance from flies and bad odour could be substantially reduced.

2 Location

Pit latrines whether wet or dry must be located:

(a) at least 30m away from any well or other potable source of water if the pit does not go through any fissured rock or coral;

(b) 3 m from any dwelling within or outside the allotment;

(c) 6 m from any boundary with a street;

(d) 3 m from boundaries other than with a street;

(e) preferably at a lower ground than where a potable source of water is located;

(f) such that it is accessible to the household at all times; and

(g) so that the prevailing wind around the latrine is not shaded.

Where the pit penetrates through fissured rock or coral through which liquids from the pit might pass unfiltered, the advice of the Health Department must be sought on the location. Otherwise all the fissures must be closed with concrete or cement mortar.

The site must be on firm ground which will not cave in or slump while digging the pit. If there is some problem in this regard, one solution could be to line the affected area with an old drum with both ends removed. The site should not be subject to flooding or remain water-logged.

3 Calculation of dimensions

The pit volume depends on the number of users, the period for which it is used and a freeboard allowance of 0.5 m depth. If the pit remains dry the annual accumulation of sludge is about 0.08 m^3/person. In wet pit latrines or where washing water is allowed to enter it, the accumulation rate could be taken as 0.05 m^3.

For example, for a family or 5 which plans to use the pit for 5 years, the volume required to hold the sludge would be:

For a dry pit- 5 x 0.08 x 5 =2.0 m^3

For a pit area of 0.6 m x 1.0 m,

the depth required for the sludge = 2.0/(0.6 x 1.0)= 3.3 m

Add freeboard allowance = 0.5 m
Total depth required = 3.8 m

For a wet pit, the volume of sludge
= 5 x 0.05 x 5 = 1.25 m^3

For a pit diameter of 600mm, area of cross-section
= 0.6 x 0.6 x 3.14/4 = 0.28 m^2
Depth of pit for sludge = 1.25/0.28 = 4.5 m
Add freeboard = 0.5 m
Total depth = 5.0 m

If these depths are considered impractical either the sectional size of the pit can be slightly increased (for instance, for 700mm diameter the depth of the pit would be 3.8m for a 5 year life) or the depth reduced to cater for a shorter life for the pit.

A cover slab of size 1.4 m x 1.0 m would be appropriate for the dimensions chosen for the dry pit if the sides of the pit are very stable; otherwise the size of the slab must be larger. The pit need not be rectangular in shape. It can be an auger bored circular pit of 600 to 700 mm diameter.

4 Construction

4.1 Digging the pit

The pit may be dug manually in which case it is usually rectangular or square. A power operated or hand auger can be used to dig circular pits. Whichever method is used care must be exercised to ensure that the dimensions at the top remain true. Otherwise there could be difficulty and additional cost in placing the cover slab.

Where it is necessary to close off any fissures or crevices in rock or coral in the pit, the pit dimensions must be sufficient for someone to be lowered down to do the work. Great care must be exercised in lowering anyone. A safety rope must be used and at the first sign of any cave- in or other problem others on top must promptly pull the person from out of the pit. If the fissures are large concrete to a mix or 1 part cement, 2 parts clean sand and 4 parts gravel/ coral/stones must be used to close them. If not use cement mortar with 1 part cement and 2 parts sand. The concrete or mortar must be to a stiff mix.

4.2 Foundation

The foundation provides a sealed support for the cover slab and raises it above the surrounding ground. The foundation may be cast in concrete or be made up of concrete block masonry or durable timber. The ground around the pit must be levelled and preferably raised with a layer of gravel, coral or earth before pouring/erecting the foundation.

4.3 Cover slab

Cover slabs are of two types:

(a) squat type with small platforms for the feet; or

(b) a pedestal type on which the user can sit.

The cover slab can be purchased from the Health Department or from private suppliers. It could also be locally precast using detailed instructions available from the Department of Health. Figures 4.3 A and B give some details of the cover slab.

The cover slab must be placed over the foundation so that it is fully supported without any gaps. Cement mortar may be used to firmly seat the slab over the foundation. The finished surface of the slab must be at least 150 mm above the immediate surrounds.

4.4 Vent pipe

A 100mm PVC vent pipe may be erected over the pit to remove foul gases generated by the decomposition of the waste matter. The squat slab has a matching PVC insert shown in Figures 4.4A and 4.5 on which the vent pipe can be erected. The vent pipe must be supported to the frame of the shed over the pit. One way of strapping the pipe is also shown in Figure 4.4A. The vent pipe must be at least 2.5 m high and 500 mm above the roof at the point of penetration or the nearest point. The open end of the vent must be covered with durable fly screen to prevent flies and mosquitoes from entering the pit (Figure 4.4B).

Mosquitoe breeding inside the pit is not a likely problem where a pour-flush water seal is used over the cover slab (see figure 4.3B). In the case of a squat slab a wooden bung seal can be used to cover the squat hole when it is not being used. This would prevent mosquitoes and flies from gaining entry into the pit. In the case of seats without a water seal, a folding lid can be used to keep it covered when it is not in use.

It is good to extend the squat hole or (seat without water seal) into the pit by about 300mm by using an insert. This would reduce the chances of the foul gases escaping through the hole rather than through the vent. (When the restricted space in the shed gets hot from the sun, foul gases would tend to escape through the hole in the slab rather than through the vent).

4.5 The shed

A typical shed is shown in Figure 4.5. Although it could be built of any locally available material, it should be durable and firmly held down. Otherwise it could be blown away during cyclones and act as a wind-borne missile. The shed must afford privacy and have good ventilation. Good ventilation would keep the shed less hot in summer and thereby reduce the chances of foul gases escaping through the hole in the cover slab. The interior of the shed must be shaded from too much light as flies are attracted to light.

5 Maintenance

The pit latrine must be kept clean at all times. However do not use strong disinfectants in large quantities. It is best to use a wet mop or wet rag soaked in diluted disinfectant or cleaning agent to clean the cover slab and seat. If chemicals and cleaning agents are allowed inside the pit, they would drastically affect the bacterial degradation of the waste matter and there could be problems with foul smells and the pit could be filled sooner.

Any erosion of the fill around the foundation must be noted and repaired. The fly screen cover over the vent pipe must also be checked periodically and replaced promptly if damaged. The shed over the pit must be kept in good repair.

6 Pit closure

When the pit is full to within about 0.5 m of the cover slab it must not be used any more. Another pit must be located at least 3 m away (the deeper the pit, the greater the separation distance). The cover slab, vent pipe, and shed can be re-used over the new pit.

The remaining space in the old pit must be filled with earth. It is good to over-fill and form a mound so that enough surples earth is available when the material subsides with decomposition. The pit can be dug out after a minimum period of one year and the material safely used as a fertiliser.

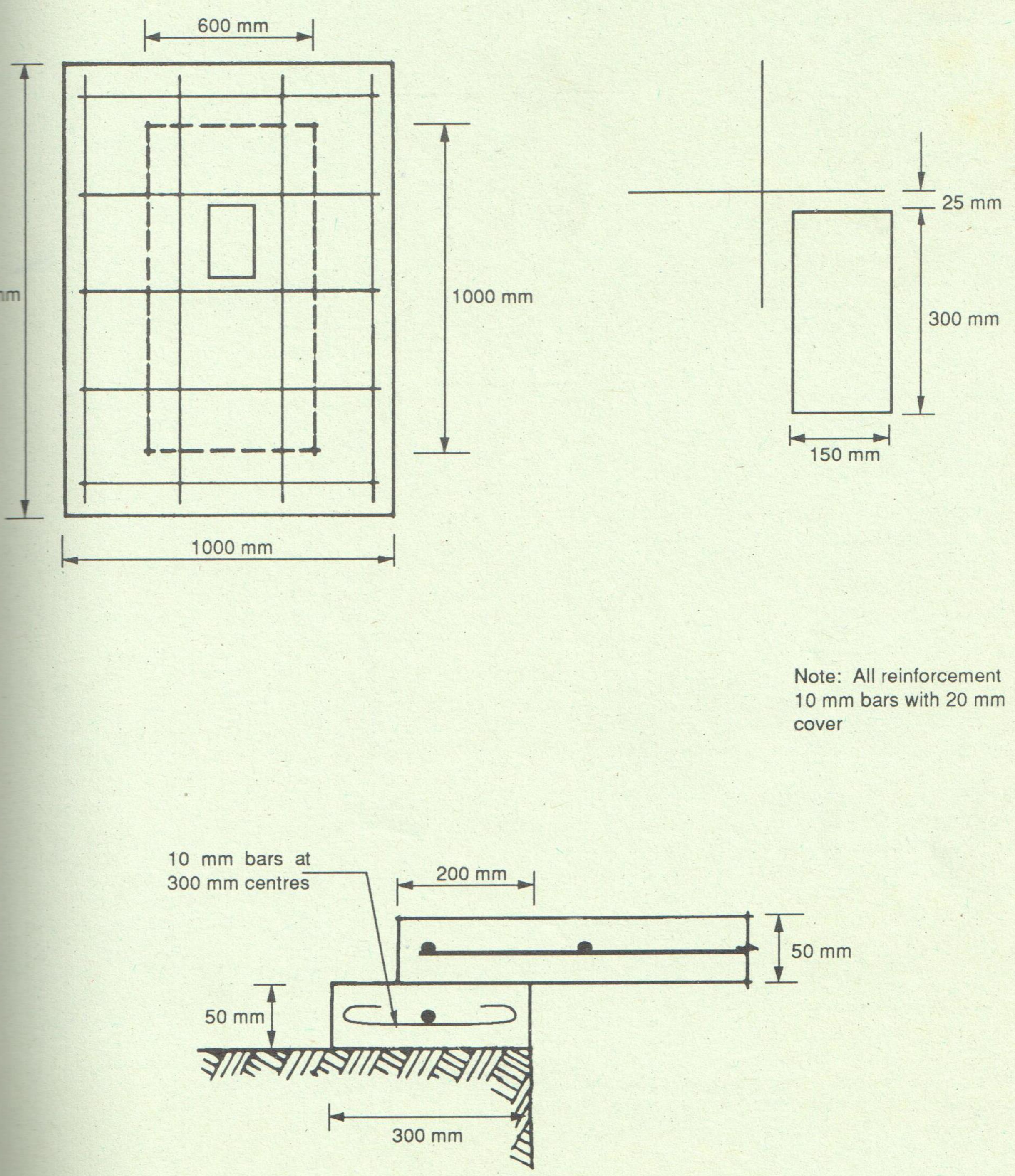


FIGURE 4.3A DETAILS OF SQUAT TYPE COVER SLAB

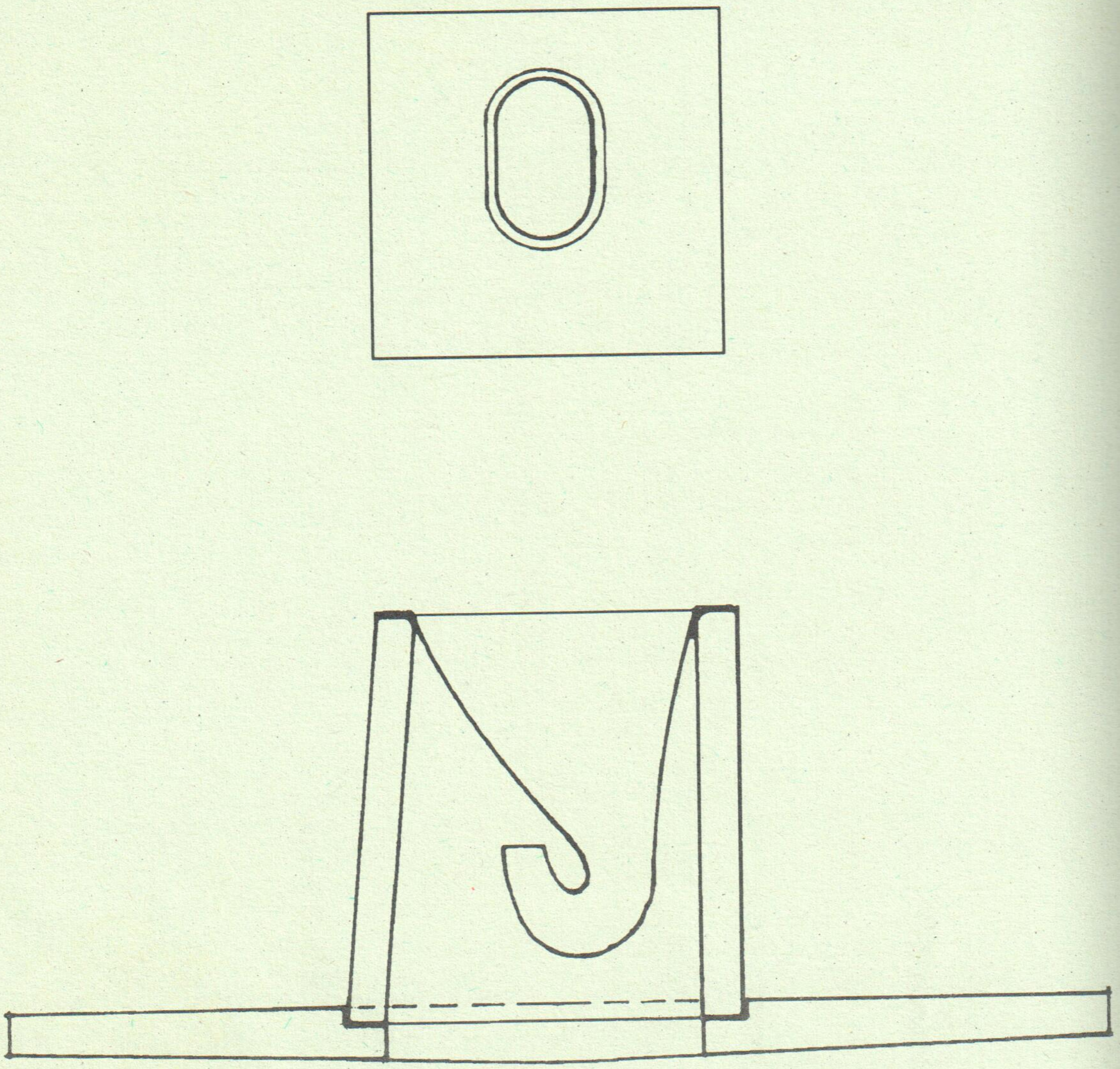
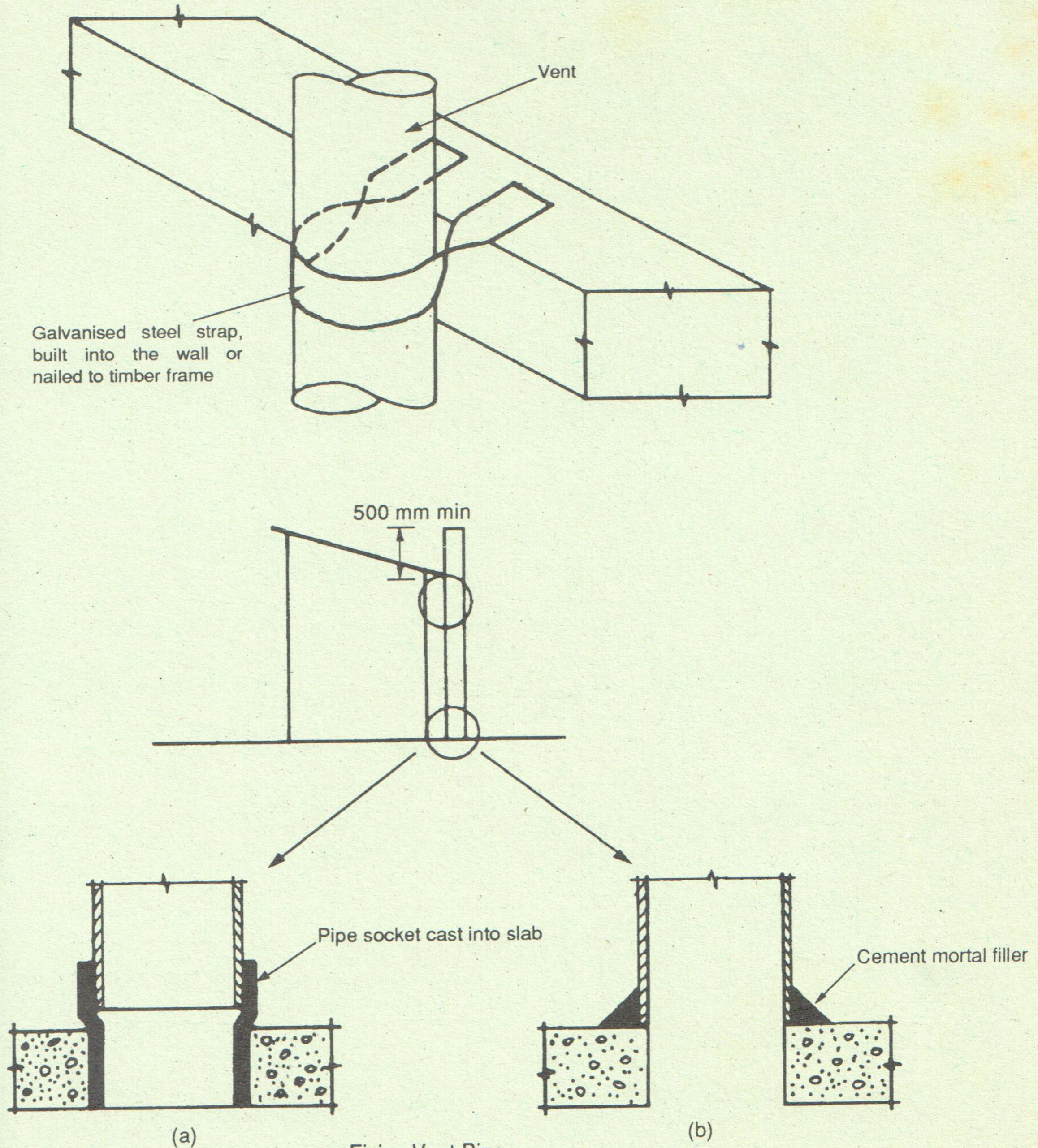


FIGURE 4.3B COVER SLAB WITH POUR-FLUSH WATER SEAL SEAT



Fixing Vent Pipe

FIGURE 4.4A METHODS OF FIXING THE VENT PIPE

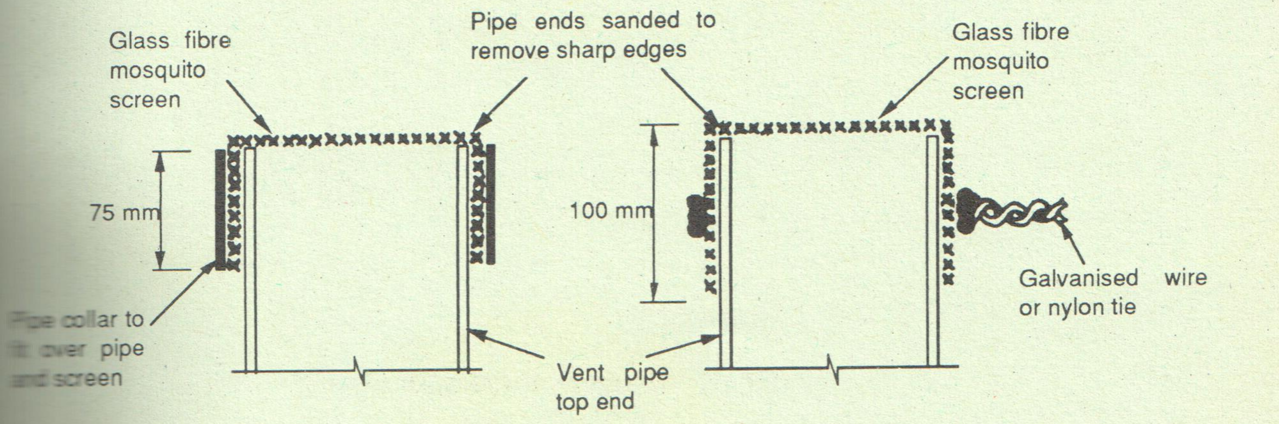


FIGURE 4.4B FIXING OF INSECT SCREEN OVER VENT PIPE

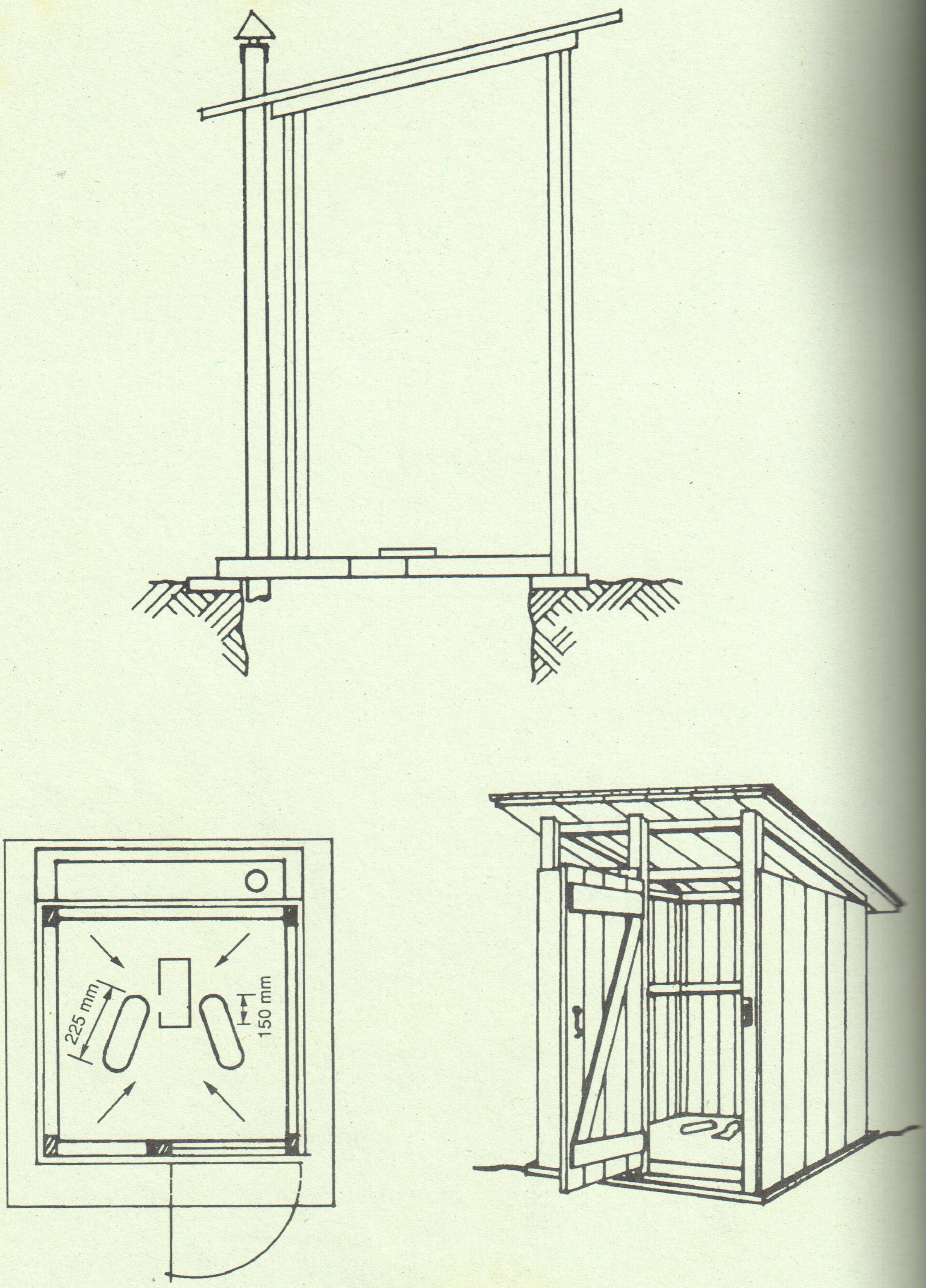


FIGURE 4.5 GENERAL ARRANGEMENT

SEPTIC TANKS FOR DOMESTIC USE

1 Function of a septic tank

The basic function of a household septic tank is to receive normal liquid household wastes and to condition them for such a time, and in such a manner, that the clarified effluent may be percolated efficiently into the subsoil, where it is absorbed and evaporated. In order to perform this basic function, all septic tanks must fulfill the following requirements:

(a) Remove solids

A septic tank must have a primary or liquefying chamber of such shape and size that the rate of flow of all sewage is so reduced that at least the larger solids sink to the bottom and are retained and the clarified effluent is discharged. The inlet and outlet pipes of this primary chamber must be so shaped and located that the scum which forms on the surface of the sewage is not disturbed. The capacity of the tank is usually kept equal to the inflow during 24 hours to allow a day's retention.

(b) Promote bacterial action

To ensure that the solids and liquids in the tank will decompose it is necessary that the tank be designed so that either-

(i) a variety of bacteria - anaerobic bacteria - which thrive in the absence of free oxygen are present; or

(ii) a variety of bacteria - aerobic bacteria - which thrive with access to air is also present.

A tank that is designed to achieve the purpose defined in (i) is a single-treatment septic tank, and a tank that is designed to achieve the purpose defined in (ii) is a double-treatment septic tank. A double-treatment tank is generally more expensive. Therefore details of only single-treatment tanks with or without aerobic filters will be included in this Specification.

(c) Store sludge

A fine silt-like sludge accumulates at the base of the primary tank. It follows that the primary tank must be of sufficient size to store sludge for a considerable period; otherwise, if the tank is not cleaned out at frequent intervals, the sludge will eventually be scoured from the tank and clog the outlet drain, the absorption trench or soil and an aerobic filter where provided.

2 Location

Septic tanks and other connected works such as absorption trenches and soak pits must be located at a sufficient distance to prevent contamination of potable water sources and nuisance. Figure 2 shows typical layouts with the minimum separation distances marked on them. It will be seen that a minimum distance of 30 m is *required* between soak pits and potable water sources whereas this distance is only 15 m in the case of absorption trenches.

Another important consideration in the siting of a septic tank is that an adequately absorbent area must be available for discharging the effluent through absorption trenches or soak pits.

3 Construction

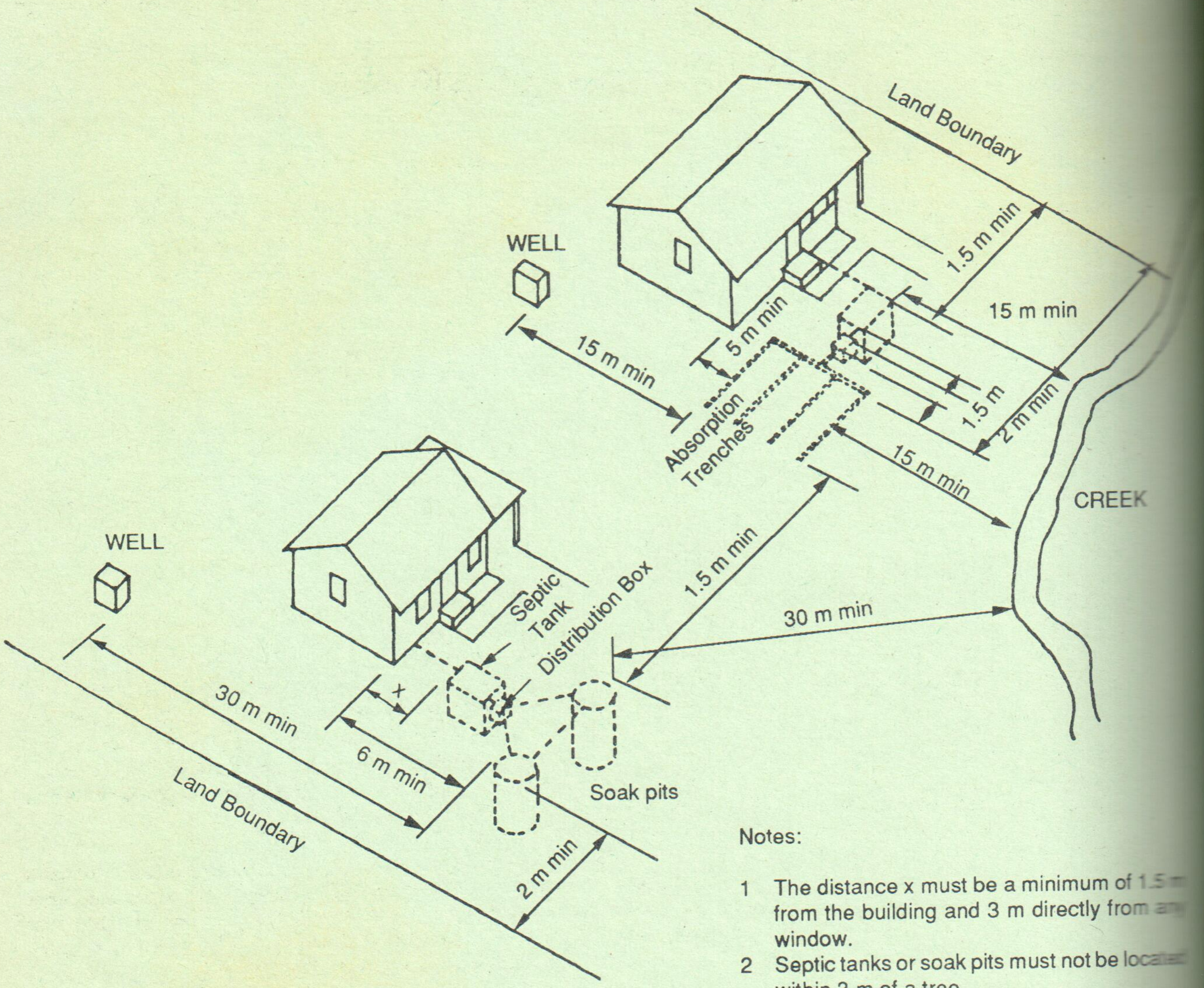
3.1 Septic tanks may be of reinforced concrete or of reinforced block masonry walls over a reinforced concrete base. Tanks of precast concrete construction may be made from rectangular slabs which are assembled on the site, or be of cylindrical construction, either as a single cylinder open at the top, or a stack of short, open-ended cylinders. There are also prefabricated septic tanks made of fibre glass.

3.2 Whatever form of construction or materials are used for the sides and bottoms of septic tanks the resulting work must be impervious to water. For tanks of rectangular section, it is important that all internal angles be well-rounded, so as to minimize shrinkage cracking. Leakage at the corners of tanks of precast concrete construction made from rectangular slabs, or at the joints of precast tanks made from a number of open-ended cylinders, must be detected and corrected in advance.

3.3 Every septic tank of block masonry or concrete construction must be covered with reinforced concrete slabs and removable manhole covers fitted over every compartment. The manholes are used when it is necessary to pump out or otherwise clean the tanks. Inspection openings are also required over the inlet and outlet square *junctions*. The aerobic filter where provided must be filled with hard, impervious and durable stone, coral or gravel. These must be graded from 60 mm to 75 mm.

3.4 Design details

The design of the type of septic tank system to be installed will be governed by the results of the investigations of the site and locality, taken in conjunction with the results of the percolation test discussed in clauses 5.2 and 5.3. Where the soil is of a suitable type and is sufficiently absorbent, and where the absorption area is sufficiently large to dispose of the final effluent, a single treatment septic tank



Notes:

1 The distance x must be a minimum of 1.5 m from the building and 3 m directly from any window.
2 Septic tanks or soak pits must not be located within 3 m of a tree.

FIGURE 2 TYPICAL LOCATION OF SEPTIC TANK SYSTEMS WITH MINIMUM REQUIRED SEPARATION DISTANCES

will be suitable. If there is any doubt about the porosity of the site and that the effluent might seep on to adjoining premises or public places, then an aerobic filter must be installed with a septic tank. A surface area of one square metre of filtering materials must be provided in aerobic filters for up to every 0.9 m^3 of flow of sewage per day. This works out to about 1 m^3 of filter for 50 m^3 of daily flow of sewage.

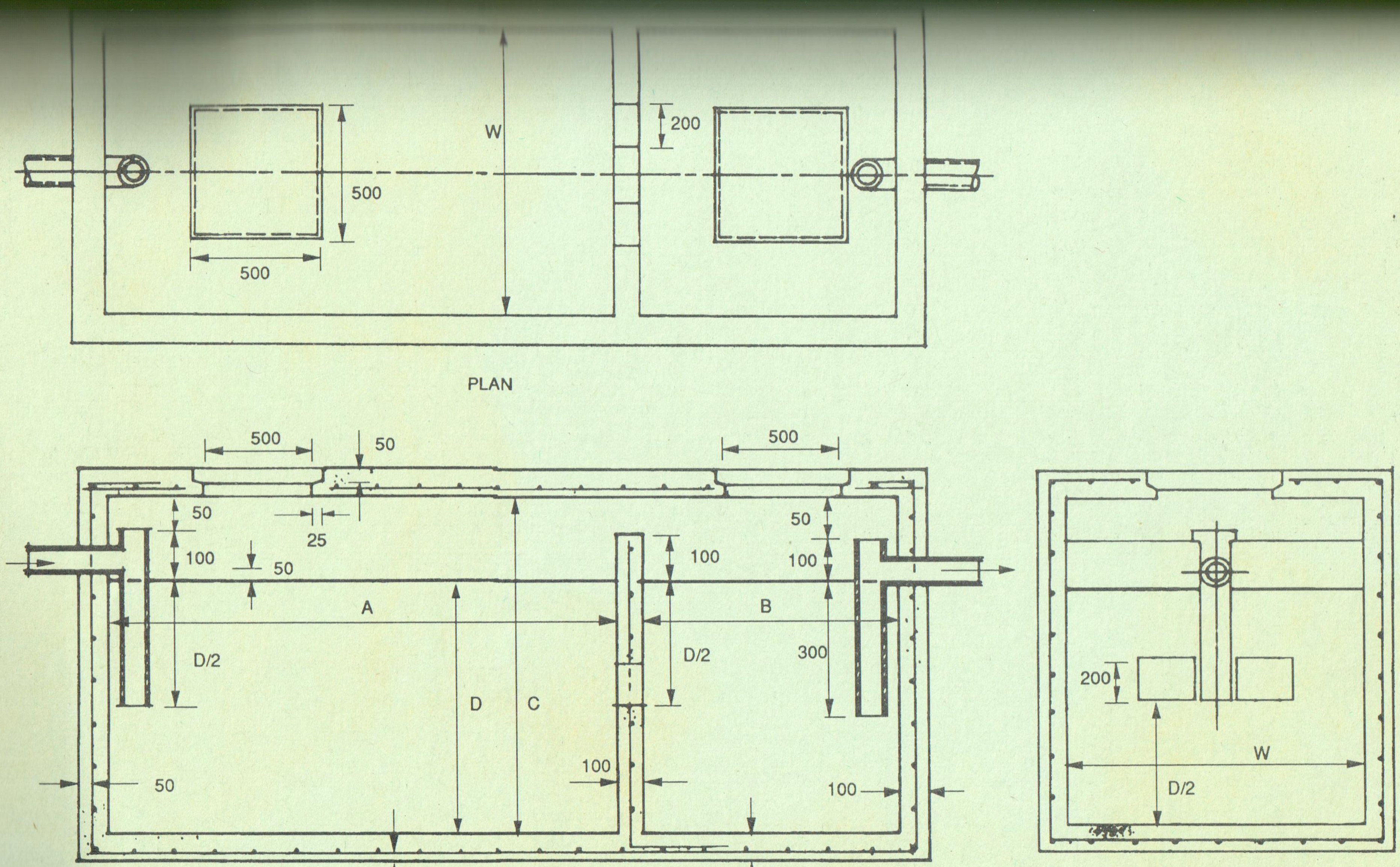
Figures 3.4A, B and C and Tables 3.4A and B give details of the dimension required of built-in-situ septic tanks. Table 3.4A also gives the volume of 60-75 mm stones for any aerobic filter that may be provided.

3.5 Figure 3.5 shows an arrangement for aerobic filters. The filter chamber can also serve as a distribution box for the absorption trenches.

4 Grease traps

4.1 The satisfactory disposal of the discharge from kitchen *waste fixtures* is frequently difficult because it is charged with grease which cannot be satisfactorily dealt with in a septic tank. This difficulty may be overcome by a grease trap located near the kitchen through which all discharge from the kitchen must pass before entering the *drain* to the septic tank. For satisfactory working of the trap it is necessary that both laundry and roof waters, and liquid and powder detergents, be exculded from it. A grease trap constructed as shown in Fig. 4.1 has been found effective in arresting grease. Alternatively, a smaller precast concrete or other type of grease trap may be installed.

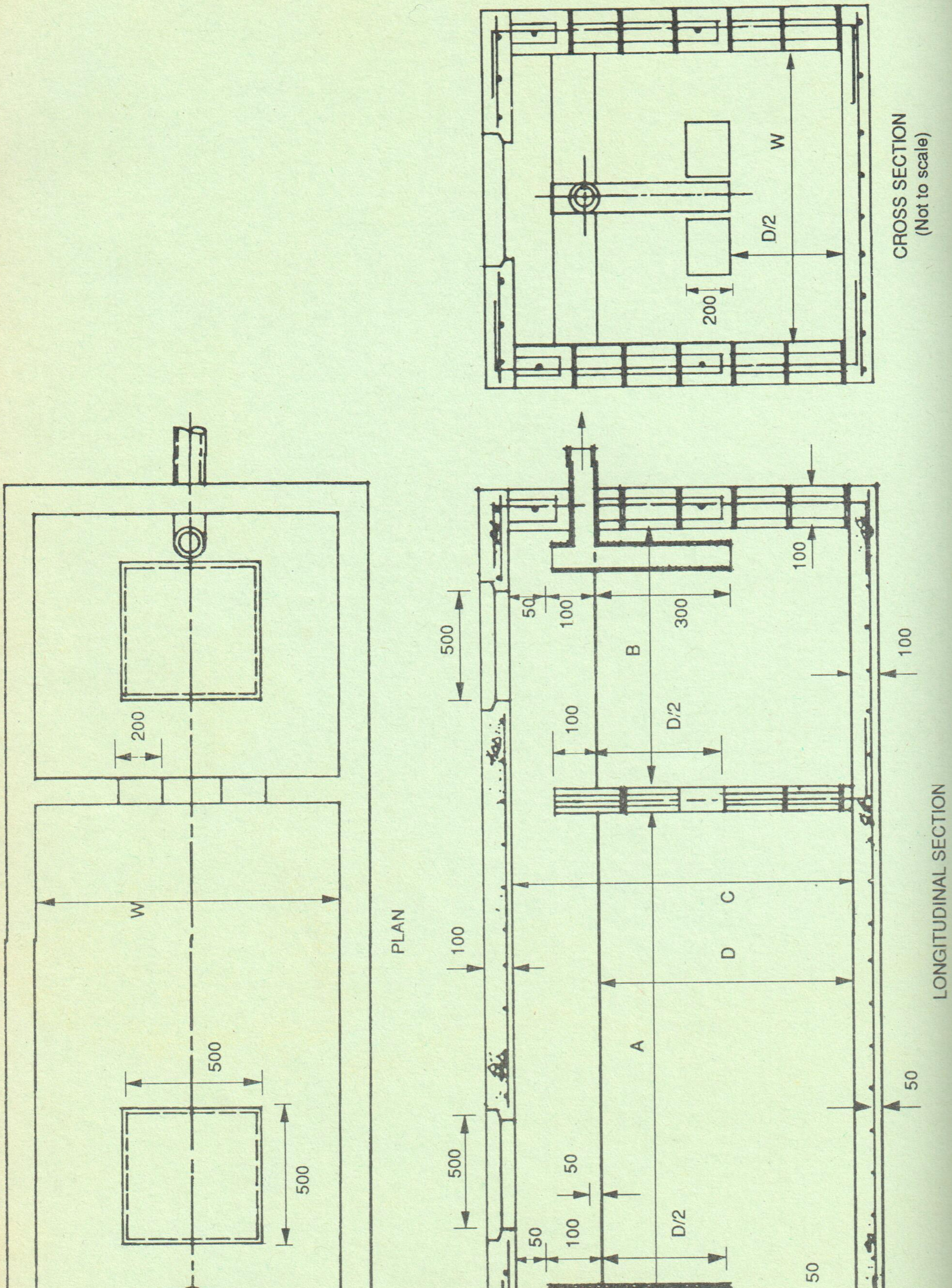
The capacity of the grease trap below the level of the invert of the outlet must be not less than the total capacity of the sinks and dishwashers served. The cover over the trap should be removable to facilitate the cleaning of the trap.



Notes:

1 All dimensions in mm.
2 Concrete to be 20 MPa grade.
3 Reinforcement - 665 mesh or D10 at 250 crs both ways all around.

FIGURE 3.4A DETAILS OF REINFORCED CONCRETE SEPTIC TANK



Notes:

1 All dimensions in mm.

[illegible]

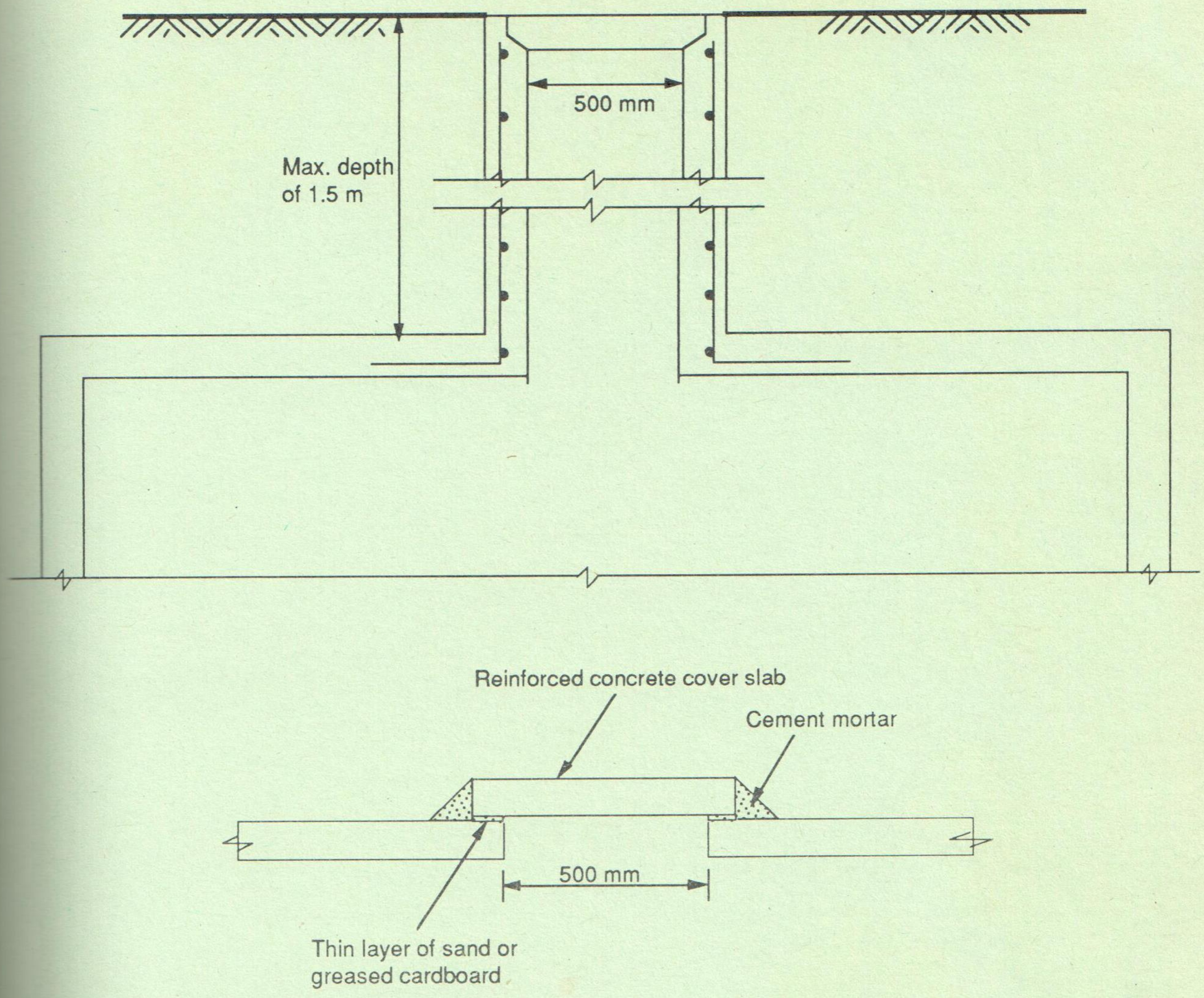


FIGURE 3.4C TWO ALTERNATIVE METHODS OF PROVIDING MANHOLE COVERS

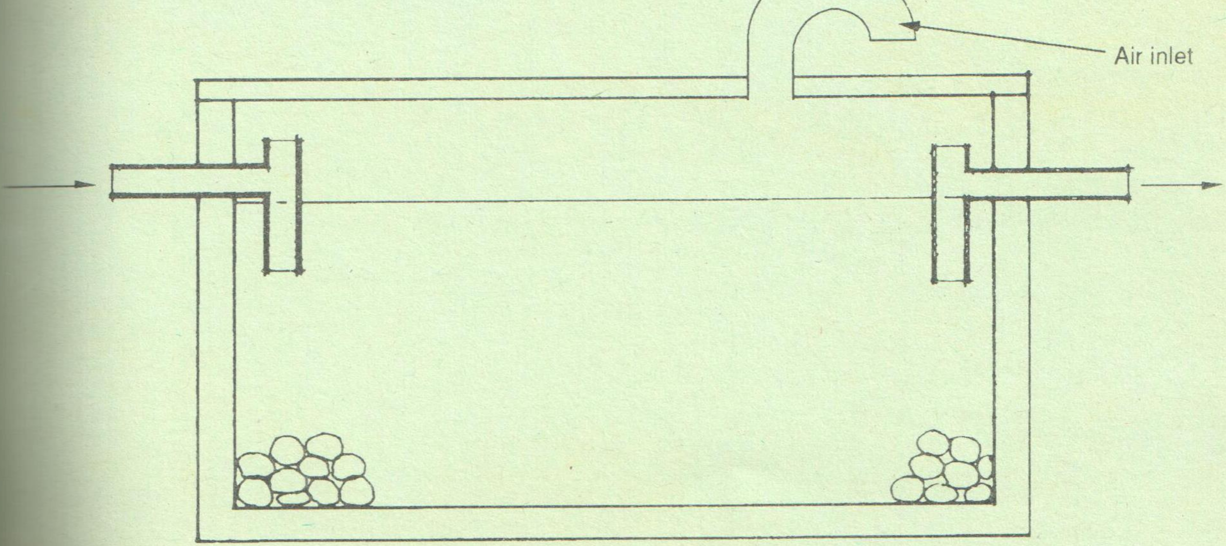


FIGURE 3.5 AEROBIC FILTER

TABLE 3.4A

SEPTIC TANK DIMENSIONS AND VOLUMES OF AEROBIC FILTER

No. of Persons	ONLY SOIL WASTE						
	A	B	C	D	W	V (m^3)	F (m^3)
8	1000	400	1000	850	800	0.95	0.02
10	1000	600	1000	850	800	1.22	0.02
12	1000	600	1000	850	800	1.22	0.02
15	1000	600	1200	1050	800	1.34	0.03
25	1200	800	1200	1050	1000	2.10	0.05
50	1600	800	1400	1250	1000	3.00	0.06
100	2400	1200	1400	1250	1200	5.40	0.11
150	2600	1400	1600	1450	1400	8.12	0.16
200	3000	1600	1600	1450	1600	10.67	0.21
300	3400	1800	1800	1650	1800	15.44	0.31
400	4000	2200	1800	1650	2000	20.46	0.41
500	4200	2200	1800	1650	2400	25.34	0.51
600	4400	2400	2000	1850	2400	30.19	0.61

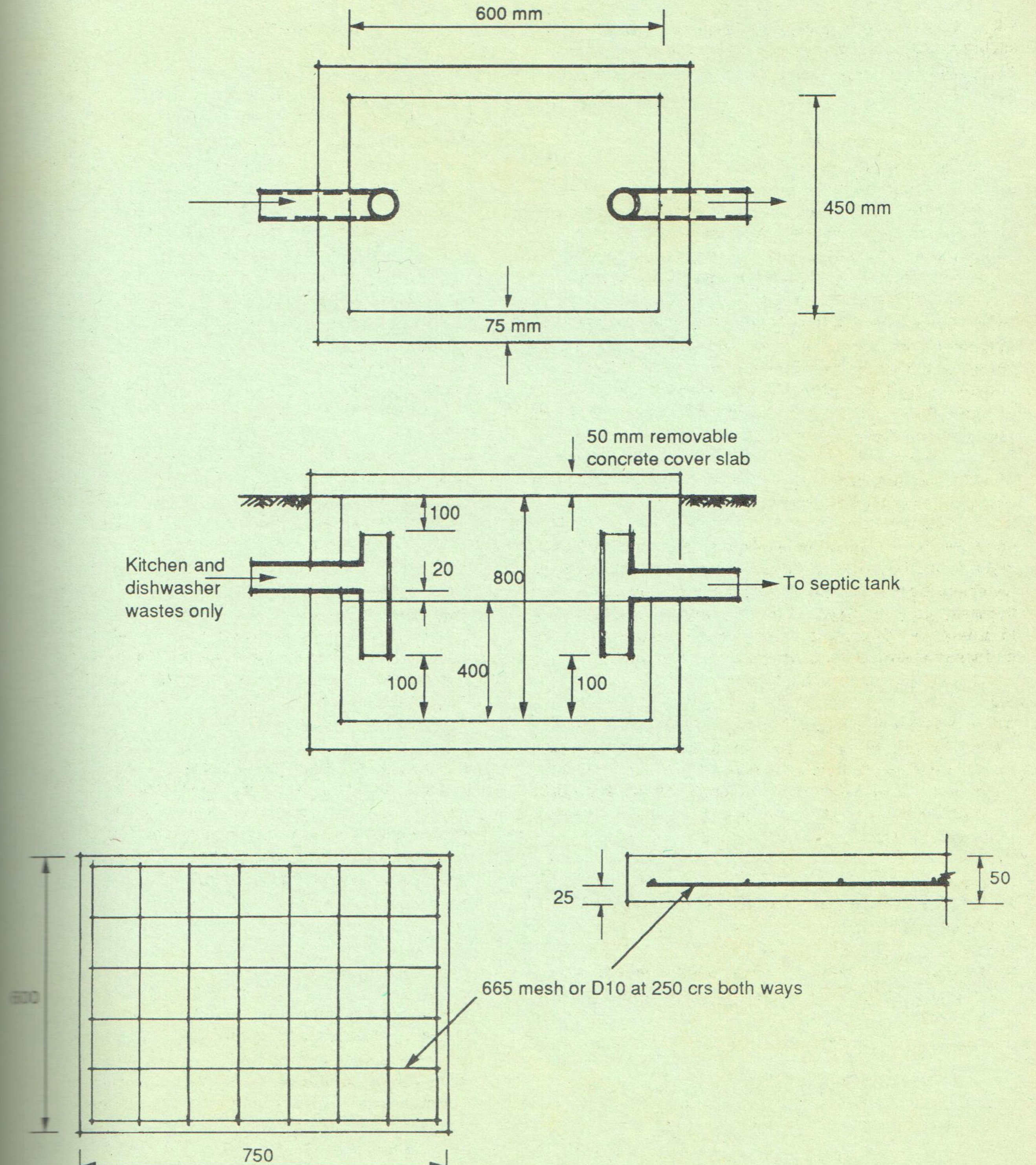
No. of Persons	ALL DOMESTIC WASTE						
	A	B	C	D	W	V (m^3)	F (m^3)
8	1400	800	1000	850	1000	1.87	0.04
10	1400	800	1200	1050	1000	2.31	0.05
12	1800	800	1200	1050	1000	2.73	0.06
15	1800	800	1200	1050	1200	3.28	0.07
25	2000	1200	1400	1250	1400	5.60	0.11
50	3200	1600	1600	1450	1600	11.14	0.22
100	4000	2000	1800	1650	2200	21.78	0.44
150	5000	2400	2000	1850	2400	32.86	0.66
200	5600	2400	2000	1850	3000	44.40	0.89
300	6600	3400	2000	1850	3600	66.60	1.33
400	8000	4000	2000	1850	4000	88.80	1.78
500	8200	4200	2000	1850	4800	110.11	2.20
600	9000	4800	4000	1850	5200	132.76	2.66

V = Volume of Septic Tank; F = Volume of Aerobic Filter; For details of A, B, C, D and W see Figures 3, 4A and B

TABLE 3.4 B

REINFORCEMENT FOR MASONRY SEPTIC TANKS

Block wall thickness	Height of Tank (m)	Vertical bars	Horizontal bars
150	1.0	D10 @ 600	D12 @ 600
	1.2	D12 @ 600	D12 @ 600
	1.4	D12 @ 400	D12 @ 600
200	1.6	D12 @ 400	D12 @ 600
	1.8	D16 @ 600	D12 @ 600
	2.0	D12 @ 400 fill all cells	D16 @ 600



Notes:

1. All dimensions in mm.
2. Concrete to be 20 MPa grade
3. Reinforcement - 665 mesh or D10 at 250 crs both ways all around.

FIGURE 4.1 DETAILS OF A GREASE TRAP

4.2 If grease traps are not regularly cleared of the accumulated grease it would give rise to the blocking of *drains*, unsightly overflow through the sides of the cover slab of the trap and unpleasant odour.

5 Effluent absorption area

5.1 An important factor when considering the installation of a septic tank is is to determine whether the soil is suitable to absorb the effluent, and whether the soil is of adequate depth and area. Generally, it can be said that the most suitable soil for an absorption area is a sandy or silty loam, and the most unsuitable soil, hard impervious clay, or rock. Where an impervious stratum such as rock or clay is present, it may not be possible to provide an absorption trench. If the slope of the ground allows the provision of imported absorbent fill of sufficient thickness, it will still be possible to have a trench or soak pit.

5.2 The absorption rate of the soil may be ascertained by carrying out the following percolation test:

At a number of representative spots within the area to be used for installation of the absorption *drains*, dig holes 300 mm square to the depth of the absorption *drain*. Pour water into the holes to a depth of 150 mm or more, and allow the water to soak away. Again pour water into the holes to a depth of 150 mm and record the times taken for the surface of the water to fall 25 mm.

5.3 The recommended dosage of effluent in litres per metre of absorption trench per day, according to the time taken for the water surface to fall 25 mm in the test is given in Table 5.3, and the minimum length of the absorption trench in metres may be determined from the formula at the base of the Table.

TABLE 5.3
LENGTH OF ABSORPTION TRENCH FOR DIFFERENT ABSORPTION RATES

Time for water level in test to fall by 25 mm (minutes)	Dosage of effluent in litres per metre of trench per day (E)
1	75
2	60
5	45
10	30
20	18
30	15
60	11

NOTES:

(a) Length of absorption trench in metres = 1000 V/E, Where V is the volume given in cubic meters in Table 3.4A.

(b) If the time taken for a fall in level of 25 mm is more than 60 minutes the soil is not suited for absorption trench method of disposal.

6 Absorption trenches

6.1 Typical dimensions for an absorption trench are approximately, width 450 mm and minimum depth of 400 mm. The trenches are packed with 75 mm size hard stone, gravel or coral to a height of 150 mm, over which a line of perforated pipes is laid along the centre of the trench, commencing about 300 mm from the beginning of the trench and thereafter running the full length of the trench. The drain pipe conveying the effluent to the trench extends into the trench and butts against the first perforated pipe.

6.2 The joints between the pipes in the trench must not be sealed. The pipes should be surrounded and covered with 75 mm broken hard stone or hard coral to within a few millimetres from the top of the trench, over which should be placed a protective covering of old iron, bag, bark or the like, before covering the trench with soil or turf.

6.3 The absorption trench may also be constructed of concrete slabs laid in such a manner that there are many vertical joints left open so as to allow the effluent to escape. Concrete slabs are used to cover the top of the trench, and these may themselves be covered by soil or turf.

6.4 The absorption trench should be constructed along the general contour of the ground. It must be so positioned that the prepared ground level at the trench is lower than the invert of the outlet pipe from the septic tank so as to prevent the effluent back-flooding into the septic tank. Typical absorption trenches are shown in Fig. 6.4 A and their general layout in Fig6.4 B.

6.5 Moisture-seeking shrubs or other vegetation planted in the vicinity of the trench will assist in the absorption of the effluent, but care should be taken in selecting the shrubs so that their roots are not likely to interfere with the efficiency of the trench. Roof water, and as far as possible surface and ground water, must be excluded from absorption trenches, so as to maintain their efficiency .

7 Soak pits

Where sufficient area for absorption trenches is not available, but there is sufficient depth of absorbent material, soak pits may be used. A typical arrangement is shown in Figure 7. Old bitumen drums with the ends removed are shown arranged in tiers. The drums are pierced at about 200 mm centres with a pick or so. They are surrounded by 75 mm hard stone, gravel or coral. The effluent is drained into the drums. The minimum thickness of stone surrounding the drums must be 300 mm. The actual dimensions of the soak pit will depend on the nature of the soil and the volume of effluent.

In general a soak pit is not as effective or desirable a means of disposal as absorption trenches.

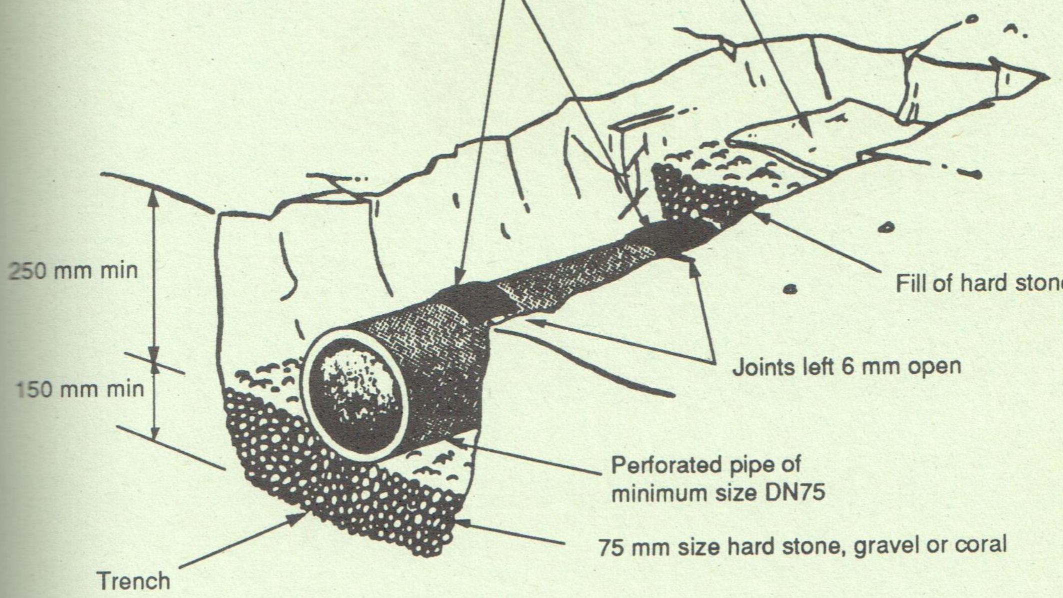
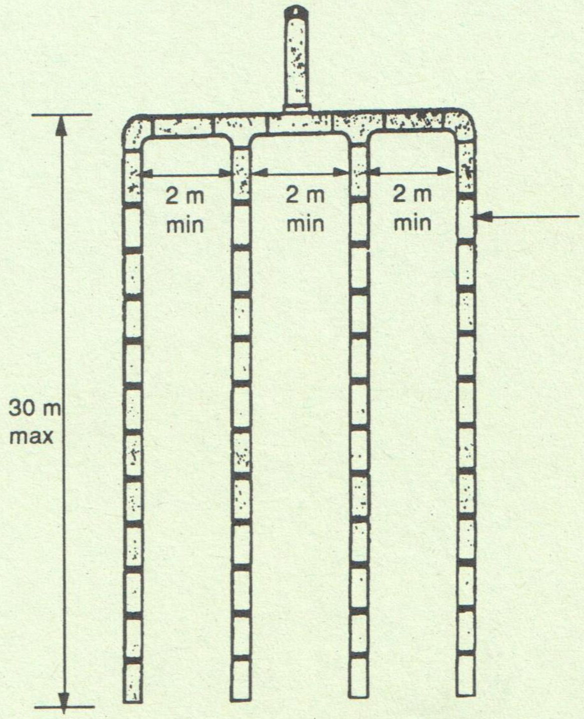


FIGURE 6.4A EXAMPLE OF AN ABSORPTION TRENCH



Note: The trenches need not be parallel. Each line could follow a different contour.

FIGURE 6.4B GENERAL LAYOUT OF ABSORPTION TRENCH

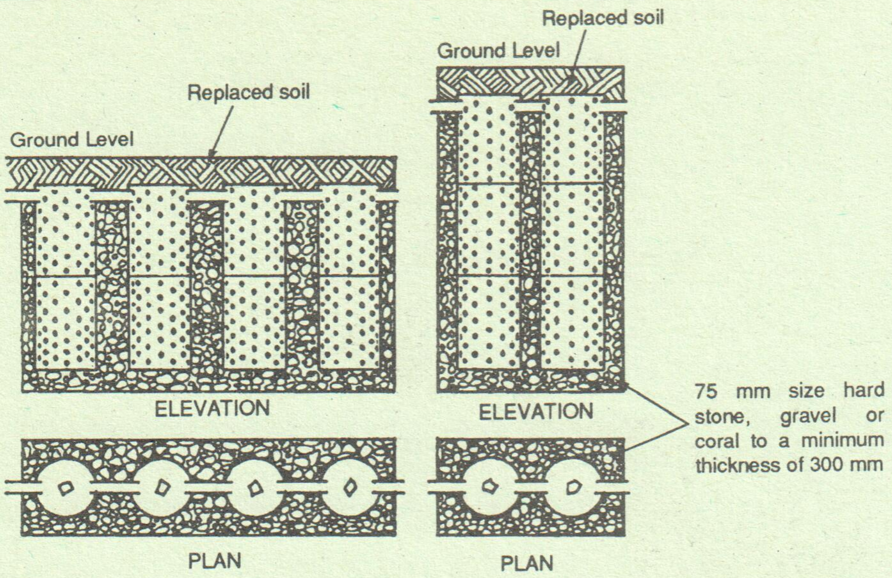


FIGURE 7 TWO ARRANGEMENTS OF DRUMS USED IN SOAK PITS

8 Special circumstances

8.1 Site conditions can necessitate the adoption of special measures, such as:

(a) Importation of suitable soil and its retention to act as an absorption area. Alternatively, it may be necessary for wastes from the kitchen, laundry and bathroom to by-pass the septic tank and be absorbed in an area away from that used to absorb the effluent from the septic tank.

(b) It may be necessary to construct a number of trenches as a grid, to distribute the effluent over as wide an area as possible. A distributor may be incorporated in the effluent-*drain* system, to direct the effluent to any desired trench. Typical examples of distribution boxes are shown in figure 8.1.

(c) On some sites it may be necessary to locate the absorption area up-hill from the septic tank, and to install an electric pump. The pump is operated by a float switch and automatically pumps the effluent up to the absorption trench when the effluent in the tank reaches a nominated level. The cost of installing and maintaining such a pump should be considered.

(d) In some areas where there are many septic tanks, a drainage system can be made available to take the effluent away from each septic tank, either by gravity or by pumping, to an absorption area, public sewerage, or treatment ponds.

9 Vents

A vent is *required* in order to allow ventilation through the septic tank and drainage system. Vents are usually of PVC capable of withstanding ultra violet radiation, and are normally taken off at the head of the house *drain* farthest away from the septic tank. At various stages in the operation of a septic tank, offensive odours may be given off. The height and location of the vent outlet must be a minimum of 150 mm above its point of penetration through any roof covering and 600 mm above the top of any opening situated within a radius of 3 m from the vent.

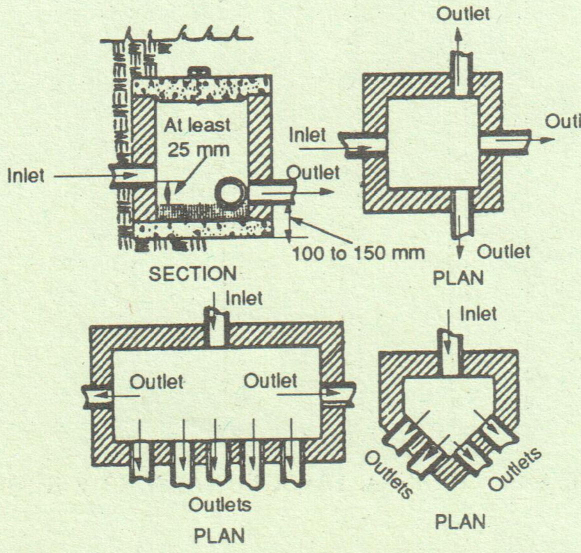


FIGURE 8.1 EXAMPLES OF DISTRIBUTION BOXES