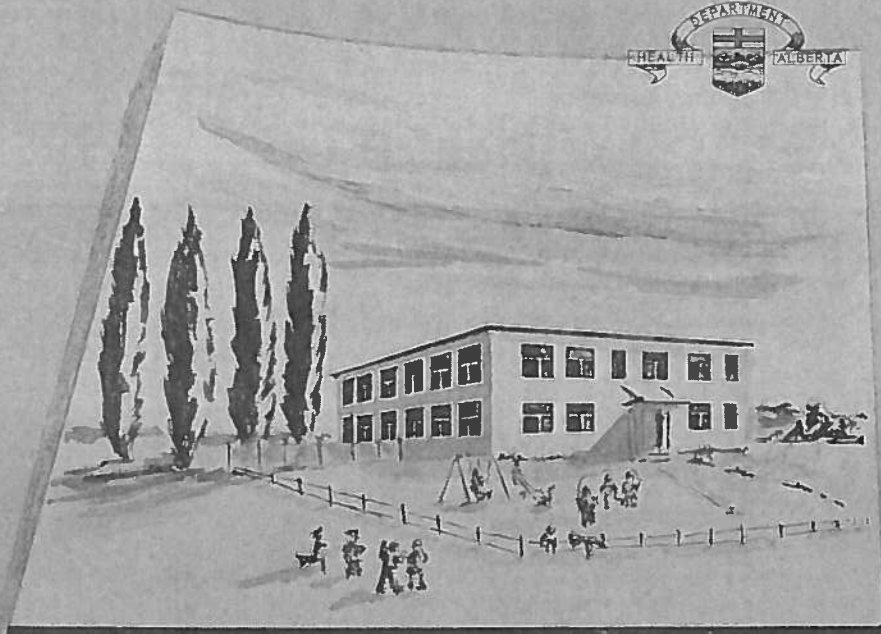
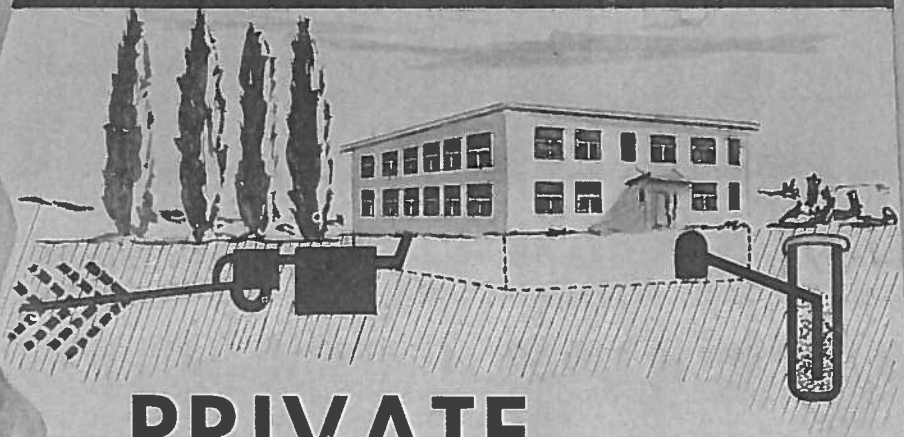




PRIVATE SEWAGE DISPOSAL

DIVISION OF ENVIRONMENTAL HEALTH SERVICES

FOREWORD

The purpose of this pamphlet is to assist the non-urban citizens of Alberta to select and install a private sewage disposal system best suited for their needs and to give them the benefits of the progress which has been made in this field. While the information contained herein applies primarily to dwelling-sized systems, extension of tables of sizes of units makes it suitable for public institutions such as residential homes, schools, and rural hospitals. Of particular interest for these larger installations is a section dealing with the use of lagoons as a means of sewage disposal.

For assistance in locating and planning the disposal systems described herein contact your local Health Unit Office, or

Division of Environmental Health Services
Department of Health
Administration Building
Edmonton, Alberta

Fourth Edition — 1968

CONTENTS

INTRODUCTION

The fact that many of the communicable diseases are transmitted from one person to another as a result of the fecal contamination of food or water makes it necessary that human excreta be so disposed of so that no opportunity will exist for the transmission of infection. Safe disposal of sewage may be defined as that which renders impossible, the contamination of any water supply, effectively prevents any contact whatsoever with the ejected faeces, and successfully insures against exposure to flies and the development of nuisances.

As the Septic Tank system of disposal has proven to be the most satisfactory method, this pamphlet concentrates on that system.

SEWAGE DISPOSAL SYSTEM PERMITS

Persons wishing to install a private sewage disposal system and who live within the limits of a City, Town, Village or Hamlet must make application for a Private Sewage Disposal System Permit to their local plumbing inspector if a local plumbing inspector is available, otherwise to the Division of Sanitary Engineering, Department of Health, Administration Building, Edmonton, Alberta. It is not mandatory to obtain this permit if the installation is to serve a farm home. If the person installing a private sewage disposal system to serve a farm dwelling, or the owner of such an installation wishes an inspection, it is necessary that a request be forwarded to the office of the Division of Environmental Health Services, Edmonton. This request could take the form of a completed Schedule B form which is at the back of this booklet.

If a plumbing permit is obtained and the person, or firm, doing the plumbing within the dwelling or building being served is also installing the private sewage disposal system then no extra fee is required above the plumbing permit fee. However, if a private sewage disposal system permit is required, or requested, the application form must be accompanied by the proper fee of $2.00.

PIPING THE SEWAGE

THE BUILDING DRAIN

The main building drain which conducts the sewage from the building to the septic tank located 3 ft. or more from the building, is required to be of Cast Iron "SOIL PIPE" not less than 4" in size. This pipe is normally laid at a grade of ¼ inch for each foot of its length but under special conditions the grade may vary between ⅛" and ½" per foot.

To allow for any settling in either the building or the septic tank, one caulked joint should be provided between the foundation wall and the septic tank.

Due to its short length, 1½ ft. to 2 ft. of earth cover is normally sufficient frost protection for the building drain.

THE BUILDING SEWER

From the septic tank, or from a point 3 ft. outside the building, the building sewer may be of Cast Iron, Vitrified Tile, Asbestos Cement Pipe, Concrete, or Bituminized Fibre Pipe. Any cemented

hub and spigot joints should be thoroughly swabbed, or previously packed with oakum, to ensure that no blobs of cement protrude into the bore of the pipe.

LAYING SEWER PIPE

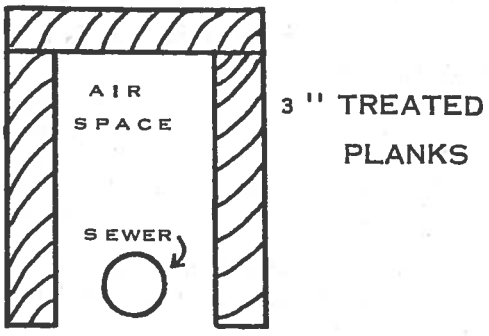
In the laying of piping, the grade per foot and the total length should be used to determine the total fall in the line, (See Fig. 2). By the use of a transit, irrigation level, or sighting along a spirit level, set wooden pegs to the proper depth to indicate the bottom of the line at both ends. Lay pipe on a firmed trench bottom, and by sighting down line of installed sewer, maintain an even and constant rate of fall. Sags cause stoppages.

Intermediate pegs may be used for long lines. For short pipes such as weeping tile or vitrified tile, the use of grade boards nailed flush with the pegs is recommended. See Fig. 8. **All sewer piping within 50 ft. of any water supply must be leakproof.**

PROTECTING SEWERS FROM FROST AND TRAFFIC

All sewer piping located under a driveway, road, path, or bare yard; with less than 4 ft. of earth cover, should be protected by a "frost box". See Fig. 1.

Note· In cases where it is necessary to locate the septic tank some distance from the house, and this line requires protection, the frost box should terminate 3 ft. from the building wall. If carried to the wall, it may conduct odors to the building. Tamp clay tightly around the building drain for this 3 ft. interval.



" FROST BOX" – FROST AND LOAD PROTECTION FOR SHALLOW SEWERS

FROST BOX FIG. 1

THE SEPTIC TANK

PURPOSE

The septic tank is essentially a water-tight storage container into which raw sewage is discharged and retained for 24 hours or more. Its purpose is primarily to allow solids in the sewage to settle out (sludge) or to float (scum) thereby permitting the liquid portion of the sewage to leave the tank comparatively free of settleable and floating solids.

Sewage which has emerged from a septic tank is termed "Sewage Effluent". Thus the subject of sewage disposal falls into two distinct stages: (1) The retention and digestion of floating and settleable solids in the septic tank; and (2) the safe disposal of the effluent.

HOW THE SEPTIC TANK WORKS

There is a common belief that in some mysterious biological manner the septic tank 'purifies' the sewage so that the effluent is completely safe—even for drinking. It is imperative that the septic tank owner thoroughly understands the danger of such a belief and that he attain a definite respect for the dangers of sewage effluent.

This can be achieved when it is understood that the septic tank largely accomplishes its purpose through the digestion of the sludge by anaerobic bacteria. These anaerobes are present in the body wastes. They thrive in an environment which is warm, wet, dark and devoid of fresh air.

The septic tank simply allows the sewage to rest for a 24 hour period under these conditions, so that rapid multiplication of bacteria takes place. If the bacteria which accomplish this digestion can multiply many thousands of times in the septic tank, so also then can the pathogens or disease producing bacteria in the sewage be expected to multiply. Actual tests have shown that the overflow of effluent from a septic tank is often higher in bacterial content than the sewage which entered.

It is because of this danger that the Health Department concerns itself with the matter of septic tanks and sewage disposal.

EFFLUENT

The liquid portion of the sewage passes through the septic tank and is known as effluent. It has a much lower content of fats and solids than the raw sewage. The disposal of this effluent is accomplished by one of the following methods depending on the type of soil encountered:

A) Sand and gravel—septic tank and cesspool.

B) Light sandy loam—septic tank and field and cesspool.

C) Heavy loam with sand—septic tank and field and cesspool.

D) Clay soils—septic tank and large field and cesspool.

E) Clay soils—lagoon if conditions permit.

F) High water table areas—septic tank and above ground effluent disposal system (i.e. place field in fill) and shallow cesspool. In some cases a tight pumpout tank may be required in order to protect water supplies.

G) If any of the systems A to F are unsuitable, a water tight pumpout tank should be used. This may or may not be preceded by a septic tank.

H) Under special conditions a septic tank followed by a sand filter will be permitted.

SEPTIC ACTION STARTERS

Digestion will eventually establish itself spontaneously in a tank receiving normal household sewage providing temperatures are not extreme and the proper environmental conditions exist in the septic tank. The course of such digestion proceeds, however, through a sometimes prolonged odiferous acid stage before reaching alkaline conditions under which digestion proceeds most effectively, and with least odor nuisance. Either seeding with sludge or the addition of lime (not chloride of lime) will reduce the odiferous stage and provide alkaline conditions for the most efficient septic action. Tanks started in cold weather should be partially or totally filled with hot water and also be inoculated with 5 gallons of active sludge for each person contributing to a domestic system. The growth of the bacteria generates heat.

Contrary to a popular rumor, scientific tests indicate that "The addition of yeast does not appear to accelerate sludge digestion in the tank. Seeding with digested sludge appears to be advantageous however."

SLUDGE AND SCUM

Not all of the suspended matter in the raw sewage is digestible in the septic tank. Along with some of the faecal material sand, soil, seeds, fruit skins, etc. settle out and become sludge in the bottom of the tank. Grease, oily substances, soap curds, and fats rise to the surface in the septic tank and eventually form a thick scum. The digestion process and the growth of the anaerobes in the settled sewage produce tiny bubbles of gas. As these bubbles drift upward, they entrain minute particles of suspended solids in the sewage. This also contributes to the scum. The scum, being buoyant, floats partly above the water line — (27%). This is the reason for the 12 inch minimum freeboard or "Depth of Air Space" required in a septic tank.

The accumulated scum roughly averages half the volume of the accumulated sludge.

The scum should not be unduly disturbed between cleanings as it provides a layer of insulation against heat loss and also seals the air away from the anaerobes.

The rate of accumulation of sludge plus scum is considerably greater during the first year of operation. After that, probably due to the compaction and digestion, the rate of accumulation drops from about 18 Imperial gals. per person per year for the first year, to a fairly constant rough average of 5½ Imp. gals. per person per year.

TABLE 1

Number of Years since septic tank was cleaned	Total accumulation of sludge plus scum for each person using tank
1 year	18.0 Imp. gallons
2 years	23.5 Imp. gallons
3 years	29.1 Imp. gallons
4 years	34.6 Imp. gallons
5 years	40.2 Imp. gallons
6 years	45.8 Imp. gallons
7 years	51.2 Imp. gallons
8 years	57.0 Imp. gallons
9 years	62.4 Imp. gallons
10 years	68.1 Imp. gallons

CLEANING THE SEPTIC TANK

TABLE 1 shows the total accumulation of scum and sludge in a domestic septic tank, for each person contributing to the system. Multiply the appropriate figure for the time elapsed by the number of persons to estimate the total accumulation in the tank. If this figure exceeds the appropriate figure in the column in Table 3 which is entitled "Volume Available for Sludge Storage" it is time to clean the septic tank. It will be found that septic tanks built according to the requirements and sizes given in Table 3 will require cleaning every 3 to 5 years.

Note: The septic tank sizes shown in Table 3 provide a sludge storage capacity of about 35 Imp. gallons per person. Many of the previously installed tanks provide a much smaller sludge accommodation.

The figures in Table 1 show averages for a large number of tanks. An individual system may vary largely either way due to such local factors as increased soap accumulation from hard water, cooking habits, use of different soaps and detergents, poor septic tank digestion, etc.

The septic tank should be checked each spring or early summer for the amount of accumulated sludge and scum in it. If the free volume is less than 35 Imperial gallons for each person using the system, it is time for the septic tank to be cleaned.

It is not necessary to thoroughly scrub and flush the septic tank chamber until it is visibly clean. The small amount of sludge that will remain on the floor and walls when the tank is emptied will re-seed the septic tank and contribute to the re-establishment of its normal operation.

Vacuum-pumped sewage hauling tanks are available commercially to clean septic tanks. Such equipment is capable of doing an excellent cleaning job without spillage. Persons wishing to improvise their own equipment and do their own cleaning should be extremely careful about spillage and about thoroughly cleansing and sanitizing themselves, their clothing, and their equipment afterward.

Checking and servicing the sewage disposal system should be considered a part of the regular spring clean-up of the premises, so that bacterial action will have a chance to re-establish a normal action and temperature before the cold weather commences.

If the Septic Tank Is Not Cleaned Soon Enough

the detention period which it will provide for the sewage, will continue to decrease. As a result, more and more suspended solids will be carried into the effluent disposal system, and the percolation surface of the soil will become clogged and eventually a complete blockage and failure of the system will result. The septic tank can usually be cleaned many times for the price of installing a new effluent disposal system.

THE DISPOSAL OF SLUDGE

Many of the pathogenic or disease producing bacteria found in sewage are capable of becoming spores, in which state they can withstand extreme cold or heat and extended drying conditions. For this reason, sewage effluent or sludge from the septic tank should not be used to water or fertilize vegetable gardens.

If the contents of a septic tank, or cesspool are spread on a field of summerfallow where it will be well away from buildings or animals, it will rapidly become inoffensive and is a good nitrate fertilizer. If such a field is not available the Waste Disposal Ground is an approved site for dumping. Burial and covering is always an excellent method.

Never permit sludge to contaminate any surface waters.

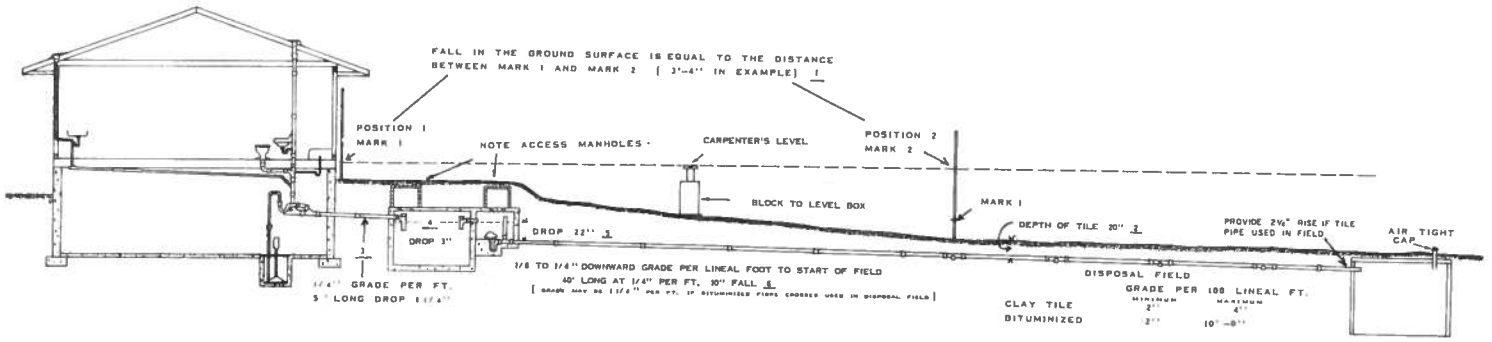
USE OF THE SEPTIC TANK

All domestic plumbing fixtures including the bath, water closet, basin, kitchen sink, and laundry tubs may drain into the septic tank. Rain water, seepage water (if an appreciable amount), and water used to rinse and regenerate water softener units should not be admitted to the system.

An excessive volume of cold water from any source may wash away and seriously deplete the bacteria population in the tank as well as lowering the operating temperature. It has been found that all normal household wastes may safely discharge to the septic tank.

Laundries, hospitals, large public kitchens, etc., may be expected to contribute volumes of wastes which would be better handled by a separate system. An engineer should be consulted in these or any other unusual cases.

Appreciable amounts of lye, strong caustics, acids, disinfectants and other materials which are likely to affect adversely, the development of bacteria, should not be admitted to the septic tank.



TO OBTAIN ELEVATION OF BUILDING DRAIN AT BASEMENT WALL FILL IN THE BLANKS

1 FALL IN GROUND SURFACE	3' – 4"
PLUS	
3 DEPTH OF FIELD TILE	20"
TOTAL	60" [A]

2 1/4" GRADE DOWNWARD PER FT. OF BUILDING DRAIN	1 1/4"
PLUS	
4 LOSS IN SEPTIC CHAMBER	3"
PLUS	
5 LOSS IN SYPHON CHAMBER	22"
PLUS	
6 AT LEAST 1/4" PER FT. DOWNWARD GRADE FOR EACH LINEAL FOOT OF SEWER FROM SEPTIC TANK TO START OF DISPOSAL FIELD HEADER	10"
TOTAL	36 1/4" [B]

[A] minus [B] 23 3/4"

FIG. 2 TOTAL [A] MINUS TOTAL [B] EQUALS DEPTH OF BUILDING DRAIN AT HOUSE WALL FROM SURFACE OF GROUND TO BOTTOM OF PIPE

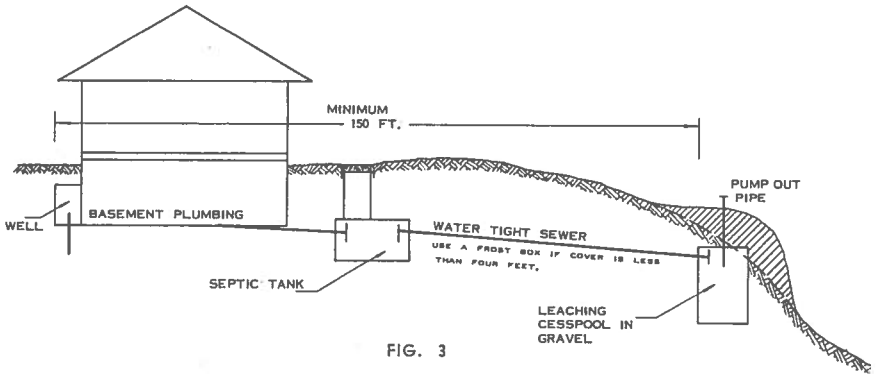


FIG. 3

Small amounts of hypochlorites or household bleaches such as those used to disinfect water supplies or to sterilize dishes will not reduce the septic action, but habitual admission of large amounts may be detrimental.

Elevations Throughout the Private Sewage Disposal System:

The starting point in building a private sewage disposal system is the Cast Iron pipe from the house to the septic tank. This pipe is known as the "building drain" and must be set in place at the proper elevation so that the rest of the disposal system will be at the proper depth.

If an engineer's level is not available, set up an ordinary spirit level on a box midway between the house and the proposed location of the effluent disposal area. Have an assistant stand a board on end on the ground by the house, Position 1, and later at the disposal field site, Position 2. At each location, sight along the top of the spirit level and have the assistant mark the point where your sight strikes the board. The difference between these marks is a measurement of the fall in elevation of the ground from the house to the disposal area.

Figure 2 (See Page 7)

Using Fig. 2 as a guide, obtain the elevation of Cast Iron building drain at basement wall by filling in the blanks in the following:

❶ Fall in ground surface _____"
PLUS
❷ Depth of field tile _____" } Total "A" _____

¼" grade downward for each foot of cast iron building drain _____"
PLUS
❸ loss in septic chamber _____"
PLUS
❹ loss in syphon chamber, if used _____"* } Total "B" _____
PLUS
❺ at least ⅛" downward grade for each lineal foot of sewer from septic tank to start of disposal field header. _____" } "A" minus "B" _____

*(Loss in syphon chamber includes 20 inch drop in syphon chamber plus 4 inch drop to invert, or bottom, of outlet pipe.)

Total "A" minus Total "B" equals **Depth** of cast iron building drain at house wall, from surface of ground to bottom of pipe.

Install this pipe first, and then build the private sewage disposal system outward.

Fig. 5 illustrates why, in a level area, the cast iron building drain must be located at, or above, ground level if the discharge pipe from the syphon chamber is to be at a level which will provide a proper depth of 18 in. to 24 in. for the disposal field. Notice also why it is necessary to mound the earth over the septic tank higher than the original ground level.

Compare Figs. 5 and 6. It is evident that in installations where the syphon chamber is omitted, both the building drain **and** the septic chamber are 20" lower.

PUMPING OF SEWAGE

It is often desirable to have plumbing fixtures located in the basement. If the building is located near a hillside, the building drain may be located below the basement floor, and a comparatively simple system of sewage disposal may be installed as indicated in Fig. 3.

If there is not sufficient slope on the ground surface to permit the use of the Fig. 3 method, the sewage should be raised by other means to an elevation more suitable to the disposal of effluent. See Figs. 4, 4A and 5.

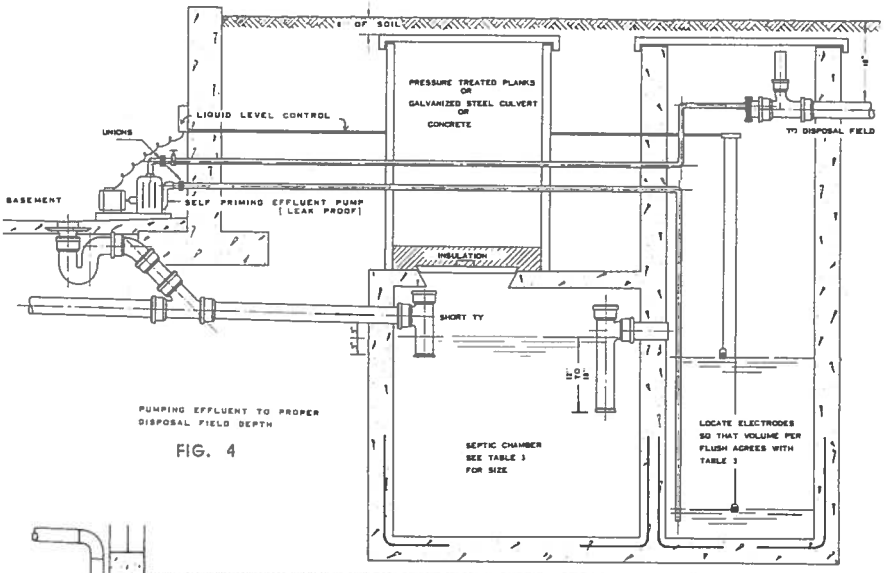


FIG. 4

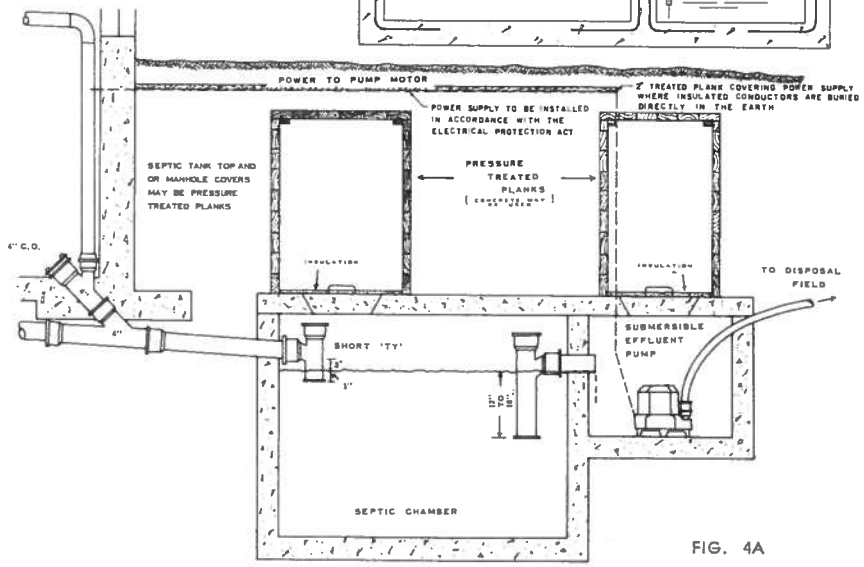


FIG. 4A

(a) Sump Pumps

If the basement plumbing consists of only such fixtures as a floor drain, laundry tubs, or shower, a sump and automatic electric sump pump as shown in Fig. 5 may be installed. This will raise the waste water to the level of the building drain and discharge it to the regular private sewage disposal system.

To control the stale musty odor which may arise wherever soapy water is permitted to enter a sump, a separate local vent pipe, 2" or larger, should connect with an open end into the sump above the water line, and thence run separately through the roof.

It is also recommended that after the laundry is completed, the fixtures and sump be flushed through with clear water to which has been added a tablespoon of a household hypochlorite such as Perfex, Javex, etc.

(b) Sewage Lift Pumps

Systems can be installed where ALL of the raw sewage is pumped to a higher level to enter a septic tank which has been installed at a normal elevation. This system requires the purchase of a special pump capable of handling solids. Such systems require the special attention of experienced architects or engineers.

(c) Effluent Pumps

It is usually much more economical and trouble-free to install the septic tank deep enough to receive the sewage from the building by gravity, and to raise only the effluent to a suitable disposal level. Pumps may be installed as in Fig. 4 or 4A. The discharge rate of such pumps should be between 70 & 90 gallons per minute.

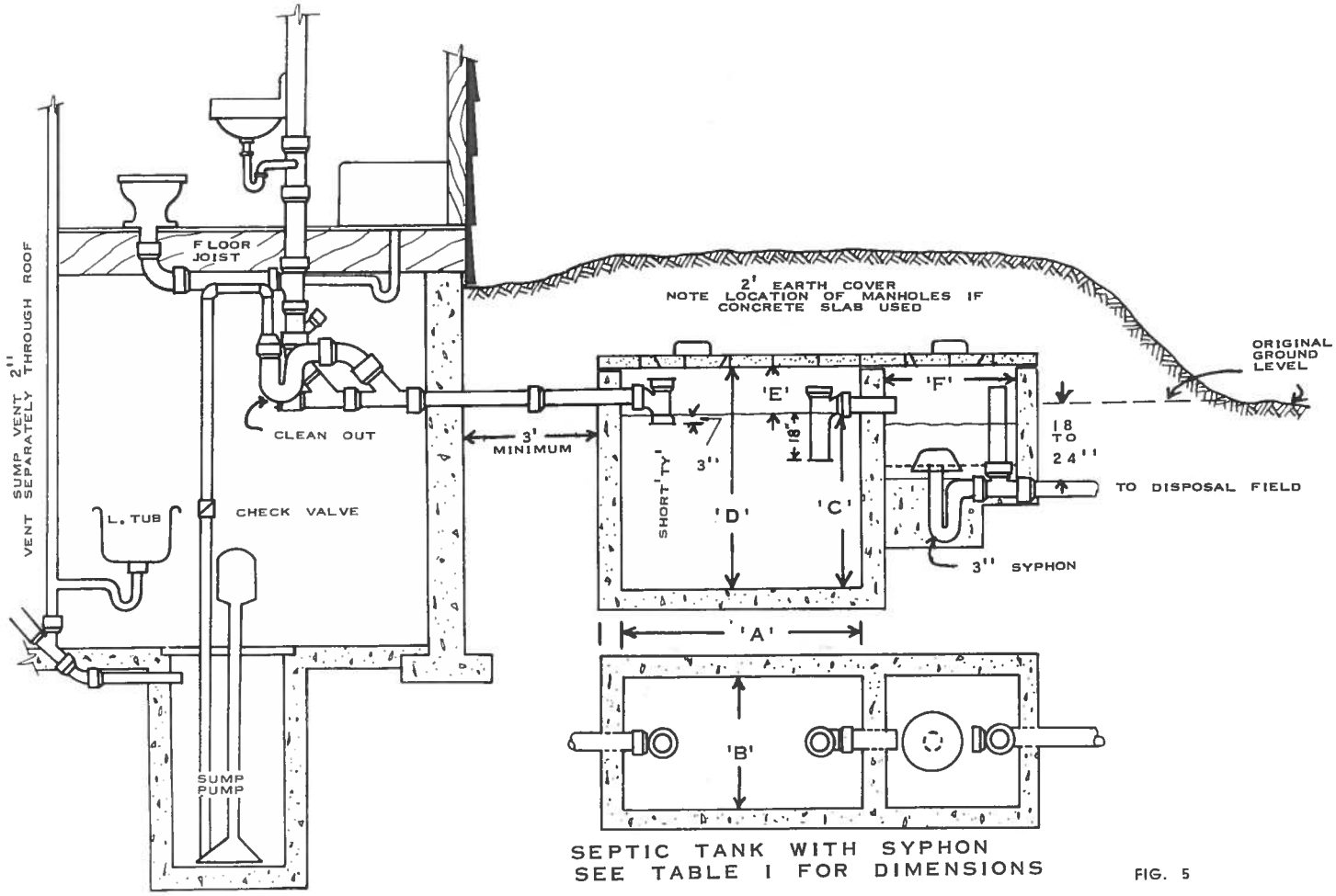
The pump is automatically controlled by electrodes. It is essential that no electric motors, wiring, switches, or working parts of the sewage pumping system be subjected to the highly corrosive and deteriorating effects of the atmospheric conditions which exist in the effluent chamber.

Note in Fig. 4, how the effluent disposal system is ventilated by a vent pipe similar to that found in a syphon chamber. The ventilation route continues through the open topped Tees in the septic chamber, through the building drain, and through the plumbing vent stack through the roof. In the event of the effluent sewer freezing, the effluent could overflow this vent pipe and return to the effluent chamber without overload damage to the pump or motor.

The cross sectional area of the effluent chamber and the setting of the two electrodes combine to determine the volume of effluent per flush. This volume and the effluent disposal system data can be obtained from Table 3.

Electrode Controls

The two electrodes consisting of ⅜ in. brass or stainless steel pipe are suspended in the effluent chamber. These electrodes are of different lengths, the tip of one being at the minimum water level, and the other at the maximum water level. Wiring connects these electrodes to a control unit. Since these controls utilize the earth to complete the circuit, it is usually required to reduce the voltage to 24 volts or less. The proposed system should be approved by the local Electrical Inspection authority before being installed.



SEPTIC TANK WITH SYPHON
SEE TABLE I FOR DIMENSIONS

FIG. 5

SUBMERSIBLE EFFLUENT PUMPS

This type of pump is placed in the pump chamber adjacent to the septic tank and is operated by an electrical power supply from the building being served. This type of pump has a pressure operated switch within its construction which actuates the pump as the effluent rises around it. Care must be taken to install this pump in accordance with the manufacturers instructions. The pump unit must be of a material which will not be affected by the highly corrosive action of the sewage effluent or by sewer gases. An ordinary basement sump pump will not be suitable as an effluent pump as it is not designed for this purpose. Figure #4A shows such an installation and your attention is directed to the fact that the power supply to the pump must be installed to comply with the provisions of the Electrical Protection Act of this Province.

LOCATION OF THE SEPTIC TANK

The prime consideration in locating a septic tank is the protection of the potable water supply. The septic tank is considered to be a water-tight component of the disposal system, and as such it must be located at least 3 ft. from the building wall, 2 ft. from any property line, 10 ft. from any cistern, and 25 ft. from any well or other source of water supply.

The general planning should be to locate the septic tank adjacent to the bathroom and on the opposite side of the house from the water supply. If arrangement permits, the south side of the house is preferable to the north. The surface drainage from the septic tank and effluent disposal system must be away from the water supply and buildings.

SIZE OF THE SEPTIC TANK

The septic tank must be sufficiently large to provide

(a) a 24 hour retention period for the raw sewage and

(b) an equal volume for sludge storage.

The expected Sewage Load Per Day can be obtained from Table 2.

FIG. 6

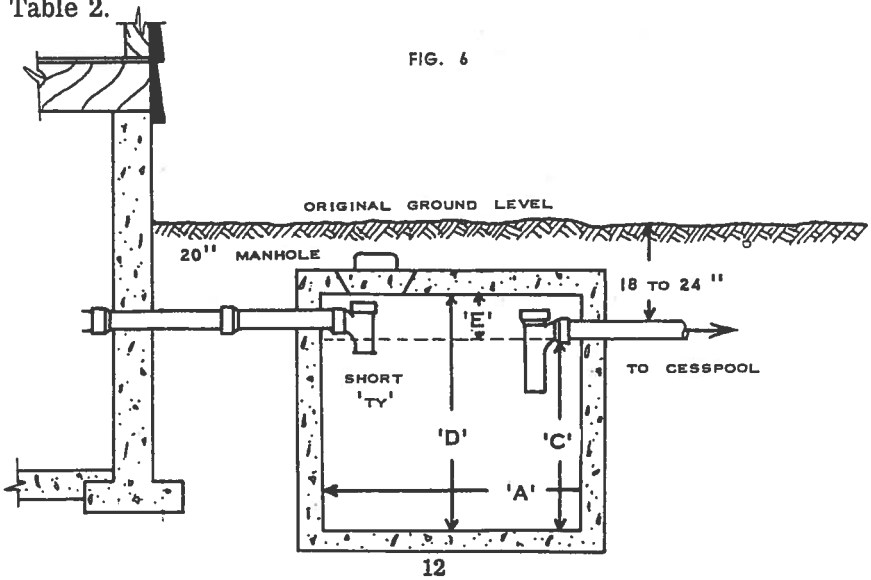


Table 2
Daily Sewage Flow (Imp. Gallons)

Dwellings, boarding schools, residential buildings	35 per cap
Small hospitals (up to 15 beds)	100 per bed
Day schools	10 per pupil
Tourist camps	20 per person
Drive-in theatres	3 per car
Other buildings	15 per person
Highway Service Stations	500 per day
Highway Service Stations with Cafe	1000 per day

The volume for a day for any particular building can then be applied to the column in Table 3 headed "Expected Volume Sewage Per Day". **The particulars and dimensions for correct septic tank can then be read from the same line in Table 3.**

Septic tanks to accommodate waste from **garbage grinders** and/or **automatic clothes washers** should have their capacity increased by 50%.

As previously indicated, a septic tank or settling tank is intended to provide a detention period of 24 hours where the phenomenon of changing raw sewage to a disposable form takes place. It is important to note that when reference is made to sizes and capacities of tanks, one should not consider the syphon (or dosing) chamber in these figures, although the syphon chamber is usually constructed as an integral part of the structure which also includes the septic tank.

All dimensions given in Table 3 are for inside measurements and do not include the concrete thickness. The liquid depth or depth of sewage is measured vertically from the floor to the invert of the outlet of the septic chamber, and in no case may be less than 4 feet. A free board of 12 in. to 18 in. is required from the liquid level to the top of the walls to allow for the escape of gases and the accumulation of scum.

The length of a septic tank is required to be 2 to 3 times that of the width, with the direction of flow parallel to the longer dimension. This is to provide the maximum travel for the sewage between inlet and outlet so that as many solids as possible will settle.

Research has indicated that septic tanks which are too small, regardless of daily sewage flow, are not satisfactory. For this reason the Health Regulations specify a minimum tank capacity of 400 Imperial gallons.

CONSTRUCTION FEATURES OF THE SEPTIC TANK

(a) **Venting:** Fresh air vents should not be installed on any septic tank in Alberta. Ventilation for the equalization of air pressure is provided through the open-topped tees and the building drain to the main plumbing stack. If fresh air were admitted through septic tank vents, it could be expected to have a retarding effect on the anaerobic bacteria. A convection current would be set up which would continually draw cold air into the septic tank and out through the roof terminal of the plumbing stack. This chilling of the septic tank contents would lower the temperature of the effluent and contribute greatly to the freezing of the whole disposal system.

(b) **Steel Reinforcing:** Poured-in-place concrete septic tanks, especially larger ones, should be reinforced with ⅜" or ½" rods:

Top—12" apart, across, 1½" from interior face of concrete.

Walls—6" apart horizontal, 15" apart vertical, 2" from interior face.

Floor—8" apart both ways, 2½" from interior face.

(c) **Concrete Mix:** The recommended mixture for concrete is 1:2:3 (1 sack of cement, 2 cu. ft. of sand, 3 cu. ft. of gravel or crushed stone) with no particles larger than 1½ in. If pit run gravel is used, a mixture of 1 sack of cement to 5 cu. ft. of good clean pit run gravel is satisfactory. Not over four and one-half gallons of water should be used for each sack of cement, if the sand or gravel are normally damp. A fairly stiff mix makes better concrete than a sloppy one.

To determine if sand is clean enough to make good concrete, apply the following test: Put four ounces of sand and eight ounces of 3% lye solution in a 12 oz. bottle, shake, and allow to stand for 24 hours. If the liquid is clear at that time and the silt layer is not over ⅛" thick the sand is satisfactory.

(d) **Materials List:** for a 5 person septic tank with syphon chamber and concrete top:

Cement—27 bags
Sand—1½ cu. yards
Gravel—3 cu. yards
Water—124 gallons
Steel rod—approximately 400 feet.
Cast iron pipe, fittings and syphon valve as illustrated in Fig. 5.

(e) **Covers:** 3" creosoted rough planks laid across the short span of the tank make a good cover. Overlay this with an old piece of floor covering or roofing paper to prevent the earth from trickling through. The finished septic tank should then be covered with at least 18" of heavy soil to prevent odors from escaping, and to protect the contents from temperature changes. For a more durable cover, the planks may be made of reinforced concrete by pouring the concrete mix into appropriately shaped forms. When repairs or cleaning becomes necessary, the whole of the tank can be laid open quite easily, thus providing ample light, ventilation, and access for the work.

If the septic tank is located where traffic or a walk may cross it, a poured-in-place concrete top is required. In this case, a manhole, at least 20" in diameter with a cover must be provided for each compartment. The manhole in the septic chamber should be located to provide access to the inlet TY where stoppages are most likely to occur. The manhole in the syphon chamber should be directly over the syphon bell (see figure 5).

DANGER

Deadly gases are present in a septic tank. Never enter a septic tank unless it has been open for at least 12 hours after being pumped out. Never enter a septic tank unless a rope is tied around the chest and is held by a sturdy assistant.

(f) **Protective Coatings:** The high humidity combined with the gases present in the septic tank have a decidedly deteriorating effect on both the concrete and the cast iron at and above the water line.

The vertical cast iron vent or overflow pipe in the syphon chamber will often develop holes near its base in less than 10 years, thus rendering the syphon completely useless.

Mopping all cast iron parts inside and outside and the concrete above the water line with a protective coating such as hot asphalt or water glass will greatly extend the trouble-free life of the septic tank and syphon chambers.

SINGLE COMPARTMENT SEPTIC TANKS

Single compartment septic tanks should not be used in conjunction with a disposal field.

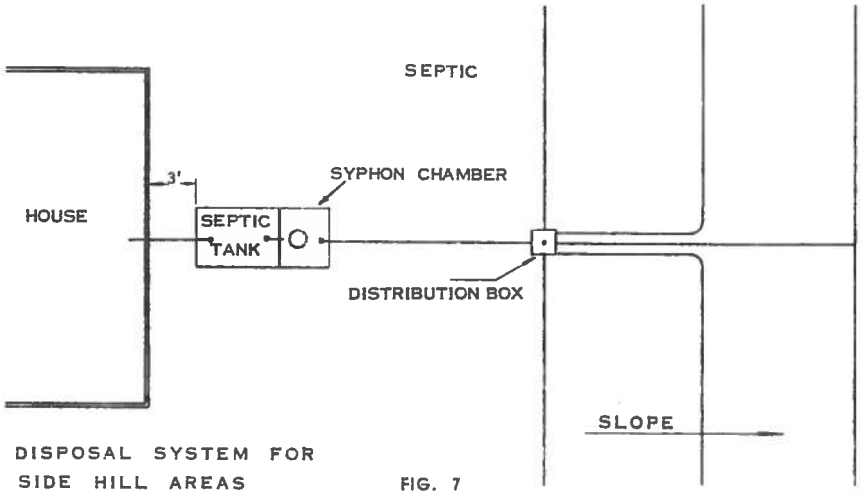
Septic tanks having no syphon chamber may be used where soil conditions and location will permit the use of a leaching cesspool.

The total loss in elevation in a single compartment tank is only 3" compared to 25" for a tank with a syphon. Thus it enables the lowering of the building drain twenty-two inches which may in some cases allow the installation of plumbing or a floor drain in the basement. If it is necessary to have the building sewer near the surface between the single compartment tank and a leaching cesspool, a frost box as illustrated in Fig. 1 may be used over the sewer.

PRE-CAST CONCRETE SEPTIC TANKS:

These are available commercially in some areas and are most commonly used as indicated in the preceding chapter entitled "Single Compartment Septic Tanks". Syphon chambers can be obtained for use in conjunction with pre-cast tanks, making them adaptable for use in any type of domestic-sized sewage disposal system. Their reinforced construction and closely compacted concrete make these tanks more resistant to deterioration than most poured-in-place concrete tanks, thus making them a good choice for a permanent installation.

The design and construction of such tanks must meet provincial requirements. When purchasing the tank, the points listed under the heading, "How to Purchase a Prefabricated Septic Tank", should be checked.



DISPOSAL SYSTEM FOR SIDE HILL AREAS

FIG. 7

STEEL SEPTIC TANKS

For temporary or semi-permanent installations such as emergency housing, lumber camps, summer cottages, etc., a steel septic tank may be installed. The average useful life of steel septic tanks is approximately seven years. A few are guaranteed for 10 years. Corrosion is severe at and above the water line. The life of the tank is largely dependent upon the effectiveness of the coating applied to the steel.

For installation in Alberta, steel septic tanks are required to provide a minimum sewage capacity of 400 Imperial gallons in the septic chamber and be made of not lighter than 12 gauge copper bearing steel or equivalent. All seams are to be welded to give a water tight joint. The tanks must be painted inside and out with a heavy coating of black asphaltum or equivalent material.

"Each tank shall bear a metal plate stamped with the name of the manufacturer, the liquid capacity of the tank and certifying that the tank is made of 12 gauge or heavier iron."

The location of steel septic tanks should be decided with special regard to its proximity to the water supply. They may rust through and leak for years before the fault is discovered. Keep them on the opposite side of the building from the water supply if possible.

HOW TO PURCHASE A PREFABRICATED SEPTIC TANK

1. Look for the name plate fastened to the tank. This should provide the name of the manufacturer, and in the case of steel septic tanks, state that the gauge of the material is 12 gauge or heavier. The plate should state the actual liquid content of the septic tank and this should never be less than 400 Imperial gallons.

2. It must be stamped, labelled, or certified by the merchant to be Approved by the Alberta Health Department. Any steel septic tank bearing this approval is designed and manufactured to standards which are in accordance with modern practices.

3. It should be a horizontal type septic tank with the settling chamber 2 to 3 times as long as it is wide. Its overall depth should never be less than 5 ft., thus providing a minimum liquid depth of 4 ft. and an air space of 1 ft.

4. The inlet to the settling chamber should be provided with a baffle extending 3 inches below the water level. The outlet from the settling chamber should also be provided with a baffle which should extend approximately 18 inches below the water level. The water level referred to is the invert (bottom) of the outlet hole or pipe.

5. The invert of the inlet to the settling chamber should be 3" higher than the level of the invert of the outlet of the same chamber.

6. The entire internal and external surfaces of the tank should be sprayed with a heavy protective coating.

7. The top of each compartment should be provided with a manhole not less than 20" square or in diameter and be fitted with a cover.

8. The settling chamber (and the syphon chamber if such is to be used) should be in accordance with the volumes provided in Table 3, for the expected sewage load per day and for the nature of the soil in which the effluent disposal system is to be located.

9. If water is available, it is always good practice to level and fill each compartment of the tank in succession to check for water leakage, air leakage from the syphon bell, and for proper operation of the syphon before it is installed. It is essential that water does not leak from one compartment to the other.

10. Avoid "bargain rate" septic tanks. The inferior construction and material used will soon deteriorate, and the septic tank, which is essentially a water tight component of the disposal system, will become, in effect, a leaching cesspool. No one would want such a device located 3 ft. from their house or 25 ft. from their well. Such tanks are almost invariably undersized, and since they do not provide sufficient sludge storage, have been known to completely plug the disposal bed in a very short period of time.

11. If in doubt about any prefabricated tank, contact your Plumbing Inspector.

THE DISPOSAL OF EFFLUENT

Easements

Boundaries and property lines are a major consideration in laying out a disposal system in order to avoid legal difficulties or depreciation of property values.

Every part of the disposal system should be at least 2 feet within the property lines of the lot of the building served. An owner having several vacant lots and building on one of them should bear this in mind; he may later wish to sell the adjoining lot and remember too late that his disposal field is located on it.

Sometimes when there is insufficient space on the building lot, permission can be obtained from another owner to install an effluent disposal system on another property. In this event, the verbal permission of the present owner should not be considered sufficient. A written easement should be obtained and attached to the title deeds of the properties concerned. This will be protection in the event of any changes of ownership.

A written easement should also be obtained to cross any public property such as a roadway, street or alley.

SUB-SURFACE DISPOSAL FIELDS (or BEDS)

(a) Purification in the Disposal Field:

Septic tank effluent contains minute particles of sewage, or suspended solids, and intestinal and pathogenic bacteria. When the effluent is percolated into the ground, these impurities are attacked by myriads of biological organisms naturally present in the soil. These organisms utilize the organic materials as food and thus oxidize them into safe and stable compounds. Thus, the "secret" of the purification of sewage effluent in the soil is actually a vital stage in the 'nitrogen cycle' in which the complex organic proteins are broken down into simple and stable inorganic compounds.

The biological organisms which perform this miracle are 'aerobic'; i.e. they require the presence of available oxygen for life. Their natural habitat therefore, is the surface and upper layers of the soil. This explains why lighter soils and comparatively shallow disposal fields are the most efficient for effluent disposal, and con-

versely, why weeping tile laid 6 feet below the surface is not approved.

It also explains the reason for the intermittent flushing of fields, the rest period required between flushes, the air space in laterals, the use of light soil for back-filling of trenches, the use of distribution boxes, the use of more tile than is necessary to hold the effluent, etc.

If a portion of a disposal system is permitted to become constantly saturated, the oxygen is driven out of the soil, the aerobic organisms die, and the soil becomes sour and septic. The process of oxidizing the suspended solids and the pathogenic bacteria ceases, and a danger to health exists. The suspended solids accumulate rapidly and the interstices of the soil become plugged. The rate of percolation into the soil decreases until the whole disposal system becomes an inoperative mess.

One can now understand why, in Table 3, longer rest periods are provided between flushes into heavier soils. If the rest period is insufficient to permit proper aeration of the soil, the system will become clogged much sooner. If adequate aeration of the field and soil is possible, the tile will be found virtually free of deposit even after many years.

(b) Depth of Laterals:

In order to have reasonable protection from freezing and yet be shallow enough to be in the presence of the necessary aerobic organisms, weeping tile laterals in Alberta should be laid at a depth of between 18 in. and 24 in. In very porous soils this depth can be increased to about 30 inches. Proper installation of a lateral is shown in Fig. 8.

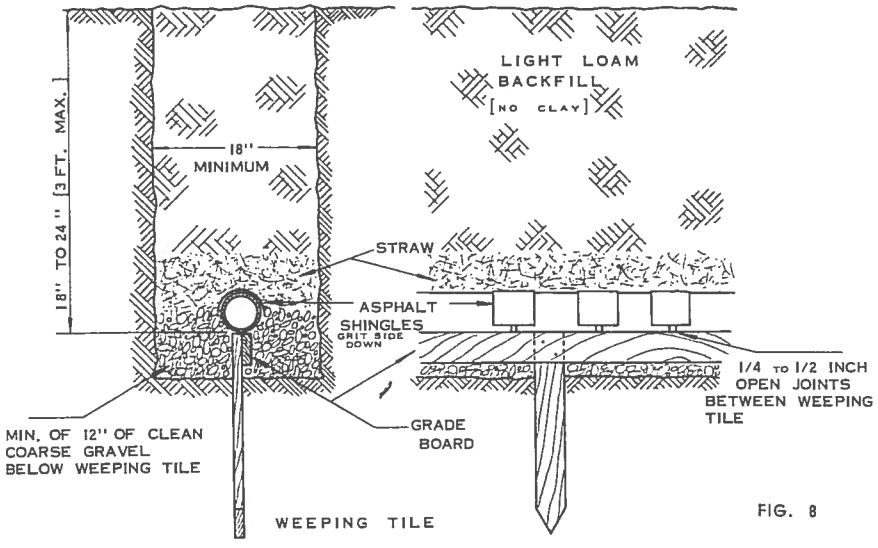


FIG. 8

(c) Laying Weeping Tile:

Dig trenches at least 18 in. wide and 30 in. deep. Drive pegs and install grade boards as explained in the section of "LAYING SEWER PIPE". Laterals should have a slight grade of 2 in. to 4 in. per 100 ft. of length. No lateral should be over 100 feet long.

Fill trenches with clean coarse gravel to the top of the grade board. (The Regulations require a minimum of 6 in. of gravel.) Place the tile carefully in line on the grade board with ⅜ in. to ½ in. spaces between ends. Cover open joints with large pieces of broken tile, asphalt shingles, grit side down, or tar paper. Hand fill with more gravel half way to the top of the tile. Cover with a layer of straw, (preferably flax), to keep earth from filling spaces in the gravel. Back-fill the trench with loam. Do not seal laterals over with a clay back-fill.

(d) Location of Disposal Field:

An approved disposal field must be at least 50 feet from any water supply. A minimum distance of 25 feet from any dwelling is recommended in order to provide some protection against seepage back to the house footings.

Avoid hard packed yards, driveways, paths, etc. If the sewer or header must cross under such a bare spot, use a frost box. Keep 10 ft. away from large trees.

The disposal field should be constructed on elevated, well drained ground, in particular, the field must not be constructed in low areas which may be subject to flooding. Also the drainage of the disposal area should be away from the source of domestic water supply.

A sheltered, well drained sunny location where the snow piles deep in winter and the grass is well kept in summer is ideal. e.g.—under the lawn or garden area. Do not allow rank growth to shade the ground surface.

(e) Freezing of Systems:

A properly installed disposal system has an excellent chance of surviving even the most extreme Alberta winters if a few simple precautions are taken.

Disposal systems which do not receive bathroom sewage or hot water are more likely to freeze. Insufficient earth cover on the septic tank may admit air and frost to the contents. The result will be a decrease in bacterial activity and a colder effluent that will freeze in the field. The admission of chemicals or antiseptics will have a similar effect.

Trickling systems require special precautions such as the liberal use of frost boxes and autumn covering. Syphon chambers assist with the frost problem by saving up the effluent and then flushing it rapidly past cold sections where a trickle would freeze.

Frost boxes should be used to protect any sewer less than 4 ft. deep that is under a road, path, or barn yard.

The liberal use of coarse gravel under laterals and the spacing of tiles from ¼ in. to ½ in. apart allows the effluent to leave the tile quickly and greatly assists in the prevention of frozen fields.

TABLE 3 DISPOSAL SYSTEM SIZING

SEPTIC or SETTLING COMPARTMENT

35 IMP. GALS. PER PERSON PER DAY
PLUS 6 CU. FT. PER PERSON FOR SLUDGE STORAGE
SCHOOLS: 10 IMP. GALS. PER STUDENT PER DAY
PLUS 10 IMP. GALS. PER STUDENT FOR SLUDGE STORAGE

EFFLUENT DISPOSAL SYSTEMS

PERCOLATION TIME 0 - 2 Min. Per In. (Clean Sand or Gravel)

SYPHON CHAMBER and DISPOSAL FIELD 5 Flushes Per Day

LEACHING CESSPOOL 3.3 IMP. GALS. PER SQ. FT. PER DAY

PERCOLATION TIME 3 - 5 Min. Per In. (Light Sandy Loam)

SYPHON CHAMBER and DISPOSAL FIELD 4 Flushes Per Day

LEACHING CESSPOOL 2.5 IMP. GALS. PER SQ. FT. PER DAY

Day Schools No. of Pupils	Residence No. Bedrooms	Residence No. Persons	Expected Volume Sewage Per Day	Volume Available for Sludge Storage	Total Volume of Septic Tank	"A" Length	"B" Width	"C" Liquid Depth	"D" Total Depth	"E" Depth Air Space	Thickness of Concrete Walls	Thickness of Concrete Top	Thickness of Concrete Bottom	"F" Length Syphon Chamber for 3" Syphon	"F" Length Syphon Chamber for 5" Syphon	Volume Flush	Length of 4" Weeping Tile in Laterals	Length	Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume	"F" Length Syphon Chamber for 3" Syphon	"F" Length Syphon Chamber for 5" Syphon	Volume Flush	Length of 4" Weeping Tile in Laterals	Length	Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume	"F" Length Syphon
			Imp. Gal.	Imp. Gal.	Imp. Gal.	Ft.-In	Ft.-In.	Ft.-In.	Ft.-In.	Ft.-In.	In.	In.	In.	Ft.-In.	Ft.-In.	Imp. Gal.	Ft.	Ft.-In.	Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.	Ft.-In	Ft.-In.	Imp. Gal.	Ft.	Ft.-In.	Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.	Ft
	2	5	175	238	413	5-6	3-0	4-0	5-0	1-0	6	3	6	3-0		65	145	6-0	6-0	6-0	144	1350	3-0		65	145	6-0	6-0	6-0	144	1350	3
	3	6	210	240	450	6-0	3-0	4-0	5-0	1-0	6	4	6	3-0		65	145	6-0	6-0	6-0	144	1350	3-0		65	145	6-0	6-0	6-0	144	1350	3
	4	8	280	330	610	7-0	3-6	4-0	5-0	1-0	6	4	6	3-0		76	170	6-0	6-0	6-0	144	1350	3-0		77	170	6-0	6-0	6-0	144	1350	3
35	5	10	350	390	740	7-6	3-6	4-6	5-6	1-0	6	4	6	3-0		76	170	6-0	6-0	6-0	144	1350	3-6		89	200	6-0	6-0	6-0	144	1350	4
or less 40	6	12	420	480	900	8-0	4-0	4-6	5-6	1-0	8	4	6	3-0		88	195	6-0	6-0	6-0	144	1350	3-6		100	226	8-0	6-0	6-0	170	1800	4
50	7	14	490	520	1012	9-0	4-0	4-6	5-6	1-0	8	4	6	3-3		95	212	7-0	6-0	6-0	156	1575	4-3		120	275	8-3	6-0	7-0	200	2100	5
55	8	16	560	560	1120	10-0	4-0	4-6	5-6	1-0	8	4	6	3-9		110	250	8-0	6-0	6-0	170	1800	4-9		140	308	10-0	6-0	7-0	225	2600	6
60	9	18	630	630	1260	10-0	4-6	4-6	5-6	1-0	8	4	6	3-9		123	270	10-0	6-0	6-0	190	2250	4-9		150	346	12-0	6-0	7-0	250	3100	6
70	10	20	700	770	1470	10-6	5-0	4-6	5-6	1-0	10	4	6	3-9		137	300	9-0	6-0	7-0	210	2350	4-9		170	384	14-0	6-0	7-0	280	3700	6
100	15	30	1050	1170	2220	12-0	6-0	5-0	6-3	1-3	10	5	6	4-9		208	460	16-6	6-0	7-0	320	4340	6-0	3-1	260	584	20-0	6-0	8-0	420	6000	8
140	20	40	1400	1450	2850	14-0	6-6	5-0	6-3	1-3	10	5	6	5-9	3-2	282	630	20-0	6-0	8-0	420	6000	7-3	3-8	340	765	29-0	6-0	8-0	560	8700	9
170	25	50	1750	1750	3500	15-0	7-6	5-0	6-3	1-3	10	5	6	6-6	3-5	356	790	27-0	6-0	8-0	530	8100	8-0	4-3	440	970	37-0	6-0	8-0	700	11100	10
210	30	60	2100	2150	4250	17-0	8-0	5-0	6-3	1-3	10	5	6	7-3	3-10	425	940	34-6	6-0	8-0	650	10000	9-0	4-7	520	1170	46-6	6-0	8-0	840	14000	12
280	40	80	2800	2850	5650	20-6	8-0	5-6	6-9	1-3	10	5	6	9-9	5-1	570	1270	46-6	6-0	8-0	840	14000	12-0	6-3	700	1550	64-0	6-0	8-0	1120	19200	16
350	50	100	3500	3700	7200	24-0	8-0	6-0	7-3	1-3	10	5	6	12-0	6-3	700	1550	60-0	6-0	8-0	1050	18000	15-0	6-8	875	1950	81-0	6-0	8-0	1400	24300	20

Results of percolation test MUST be included with applications for permits

TABLE 3 DISPOSAL SYSTEM SIZING

EFFLUENT DISPOSAL SYSTEMS

1 - 2 Min. Per In. (Gravel)

LEACHING CESSPOOL 1.6 IMP. GALS. PER SQ. FT. PER DAY

Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume
Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.
6 - 0	6 - 0	144	1350
6 - 0	6 - 0	144	1350
6 - 0	6 - 0	144	1350
6 - 0	6 - 0	144	1350
6 - 0	6 - 0	144	1350
6 - 0	6 - 0	156	1575
6 - 0	6 - 0	170	1800
6 - 0	6 - 0	190	2250
6 - 0	7 - 0	210	2350
6 - 0	7 - 0	320	4340
6 - 0	8 - 0	420	6000
6 - 0	8 - 0	530	8100
6 - 0	8 - 0	650	10000
6 - 0	8 - 0	840	14000
6 - 0	8 - 0	1050	18000

PERCOLATION TIME 3 - 5 Min. Per In. (Light Sandy Loam)

SYPHON CHAMBER and DISPOSAL FIELD 4 Flushes Per Day

"F" Length Syphon Chamber for 3" Syphon	"F" Length Syphon Chamber for 5" Syphon	Volume Flush	Length of 4" Weeping Tile in Laterals
Ft.-In	Ft.-In.	Imp. Gal.	Ft.
3 - 0		65	145
3 - 0		65	145
3 - 0		77	170
3 - 6		89	200
3 - 6		100	226
4 - 3		120	275
4 - 9		140	308
4 - 9		150	346
4 - 9		170	384
6 - 0	3 - 1	260	584
7 - 3	3 - 8	340	765
8 - 0	4 - 3	440	970
9 - 0	4 - 7	520	1170
12 - 0	6 - 3	700	1550
15 - 0	6 - 8	875	1950

LEACHING CESSPOOL 2.5 IMP. GALS. PER SQ. FT. PER DAY

Length	Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume
Ft.-In.	Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.
6 - 0	6 - 0	6 - 0	144	1350
6 - 0	6 - 0	6 - 0	144	1350
6 - 0	6 - 0	6 - 0	144	1350
6 - 0	6 - 0	6 - 0	144	1350
8 - 0	6 - 0	6 - 0	170	1800
8 - 3	6 - 0	7 - 0	200	2100
10 - 0	6 - 0	7 - 0	225	2600
12 - 0	6 - 0	7 - 0	250	3100
14 - 0	6 - 0	7 - 0	280	3700
20 - 0	6 - 0	8 - 0	420	6000
29 - 0	6 - 0	8 - 0	560	8700
37 - 0	6 - 0	8 - 0	700	11100
46 - 6	6 - 0	8 - 0	840	14000
64 - 0	6 - 0	8 - 0	1120	19200
81 - 0	6 - 0	8 - 0	1400	24300

PERCOLATION TIME 6 - 10 Min. Per In. (Heavy Loam with Sand)

SYPHON CHAMBER and DISPOSAL FIELD 3 Flushes Per Day

"F" Length Syphon Chamber for 3" Syphon	"F" Length Syphon Chamber for 5" Syphon	Volume Flush	Length of 4" Weeping Tile in Laterals
Ft.-In	Ft.-In.	Imp. Gal.	Ft.
3 - 0		65	145
3 - 3		70	158
3 - 6		90	200
4 - 6		115	250
4 - 9		140	300
5 - 6		160	360
6 - 6		190	420
6 - 6		215	475
6 - 6	3 - 5	240	525
8 - 0	4 - 2	350	780
9 - 9	5 - 2	465	1025
10 - 6	5 - 6	575	1275
12 - 0	6 - 3	700	1560
16 - 0	8 - 4	930	2300
20 - 0	10 - 0	1170	2600

LEACHING CESSPOOL 1.6 IMP. GALS. PER SQ. FT. PER DAY

Length	Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume
Ft.-In.	Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.
6 - 0	6 - 0	6 - 0	144	1350
6 - 0	6 - 0	6 - 0	144	1350
8 - 6	6 - 0	6 - 0	175	1900
9 - 9	6 - 0	7 - 0	220	2500
12 - 6	6 - 0	7 - 0	260	3300
13 - 6	6 - 0	8 - 0	310	4000
16 - 0	6 - 0	8 - 0	350	4800
19 - 0	6 - 0	8 - 0	400	5700
21 - 6	6 - 0	8 - 0	440	6500
34 - 6	6 - 0	8 - 0	650	10000
49 - 0	6 - 0	8 - 0	875	14700
62 - 6	6 - 0	8 - 0	1090	18800
76 - 6	6 - 0	8 - 0	1320	23000
102 - 6	6 - 0	8 - 0	1740	30800
131 - 6	6 - 0	8 - 0	2200	39500

PERCOLATION TIME 10 - 20 Min. Per In.

SYPHON CHAMBER and DISPOSAL FIELD 2 Flushes Per Day

"F" Length Syphon Chamber for 3" Syphon	"F" Length Syphon Chamber for 5" Syphon	Volume Flush	Length of 4" Weeping Tile in Laterals
Ft.-In	Ft.-In.	Imp. Gal.	Ft.
4 - 0		87	195
4 - 9		105	235
5 - 6		140	310
6 - 9		172	382
7 - 3	3 - 10	212	470
8 - 0	4 - 5	248	550
9 - 6	5 - 0	278	615
9 - 6	5 - 0	312	690
9 - 6	5 - 0	348	770
12 - 0	6 - 3	525	1170
14 - 9	7 - 9	700	1550
16 - 0	8 - 3	875	1940
18 - 0	9 - 4	1050	2325
24 - 0	12 - 6	1400	3100
30 - 0	15 - 8	1750	3900

LEACHING CESSPOOL 0.8 IMP. GALS. PER SQ. FT. PER DAY

Length	Width	Depth Below Incoming Sewer	Area of Percolating Surface Excluding Bottom	Volume
Ft.-In.	Ft.-In.	Ft.-In.	Sq. Ft.	Imp. Gal.
12 - 0	6 - 0	6 - 0	220	2700
15 - 9	6 - 0	6 - 0	260	3500
23 - 0	6 - 0	6 - 0	350	5200
25 - 0	6 - 0	7 - 0	436	6500
27 - 0	6 - 0	8 - 0	525	8000
33 - 6	6 - 0	8 - 0	620	8750
37 - 0	6 - 0	8 - 0	700	11100

NOTE—

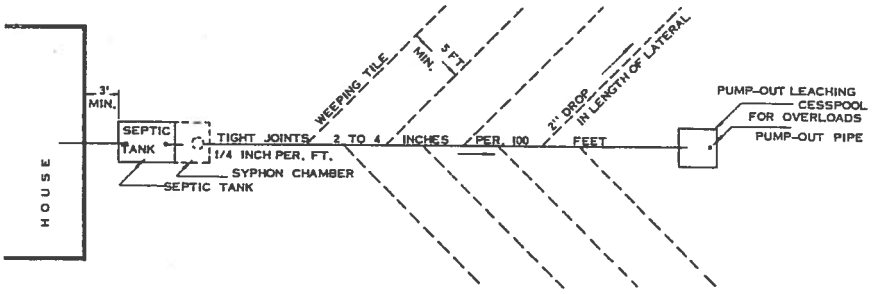
1. For heavier Soils (Over 30 Min. per In.) Install a Pump-Out Leaching Cesspool at end of Disposal Field Main. Select dimensions for a Cesspool which will provide a volume equal to total expected Sewage Load for 7 days.
2. Expected volume of Sewage per day and results of Percolation Test on soil will indicate Disposal System.

Results of percolation test MUST be included with applications for permits

Fresh air admitted to any part of the system will be drawn through to the stack and may freeze everything along the way. Keep vents on cesspools and access pipes tightly covered.

Cover the field with potato vines, straw, or manure in the fall and encourage a snow cover by the use of hedges or snow fences. Do not permit trampling or packing of this snow cover.

Hot water or steam admitted into the field vent in the syphon chamber will often thaw a minor freeze-up.

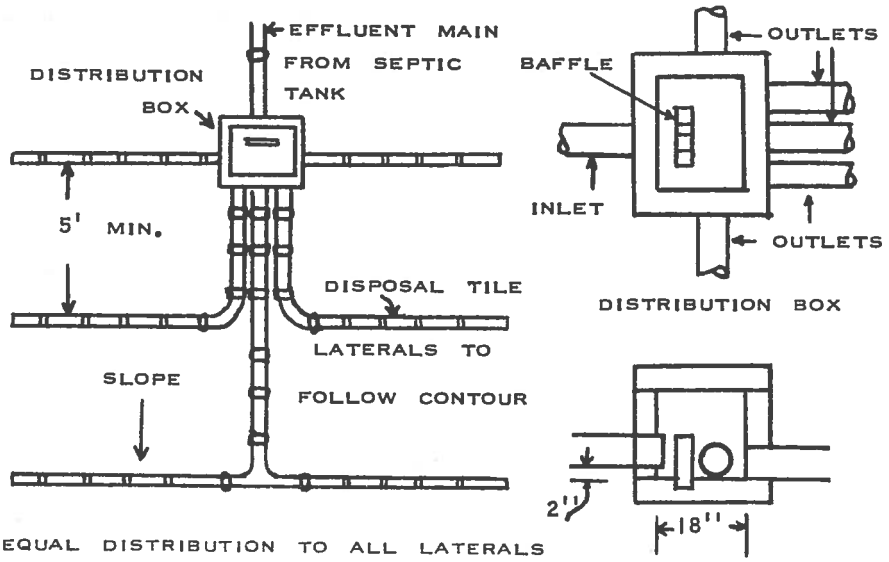


CLAY TILE DISPOSAL SYSTEM FOR LEVEL GROUND FIG. 9

(f) The Clay Tile or Herringbone Disposal Field:

The system as shown in Fig. 9 has long been the standard method of effluent disposal.

The effluent may trickle into the field at will but the use of a distribution box is advisable so that all laterals will be equally supplied. See Fig. 10.



EQUAL DISTRIBUTION TO ALL LATERALS FOR HILL SIDES DISPOSAL FIELDS.

FIG. 10

If the system is larger, a syphon chamber should be used to supply the herringbone field. It is advisable also to construct a leaching cesspool at least 6' x 6' x 6' in size at the end of the main header to handle any overload. In this case, the end of the header should be tilted upward 2½ in. as shown in Fig 11. This is to ensure that the field is filled to capacity and only the excess effluent may escape to the leaching cesspool.

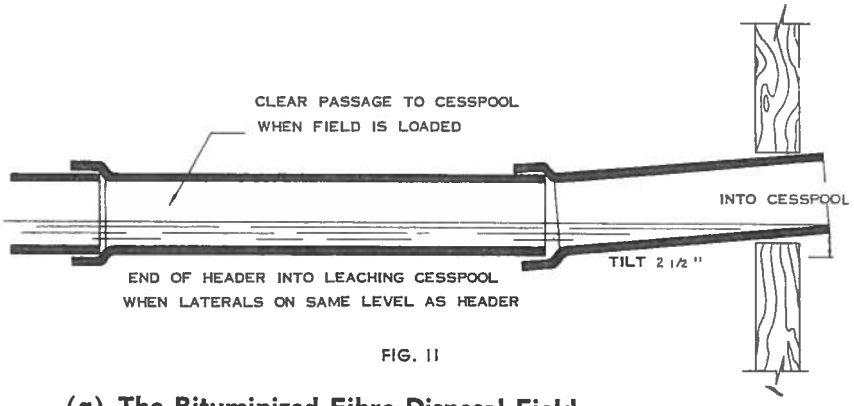


FIG. 11

(g) The Bituminized Fibre Disposal Field:

This system uses "crosses" to connect the laterals to the header or main distributor. See Fig. 12.

The header is higher than the laterals and each lateral is filled in succession. **When using crosses in a field, it is essential that a syphon be used,** and that the capacity of the syphon chamber is approximately the same as the total volume of the laterals. Otherwise, only the first laterals will be supplied with effluent. That portion of the field would become water-logged and septic while the remainder of the field would be wasted. The proper sizes for disposal fields and corresponding syphon chambers are given in Table 3.

A cribbed leaching cesspool with a capped access pipe for emergency pumping is recommended for the end of the header. In the event of the laterals becoming loaded or frozen, the excess effluent has clear passage through the elevated header to the leaching cesspool. This system has proven very successful in Alberta. With this system the end of the main effluent sewer must not be inclined just before entering the cesspool.

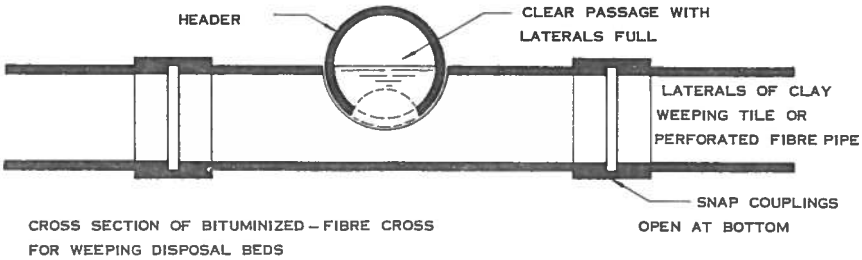
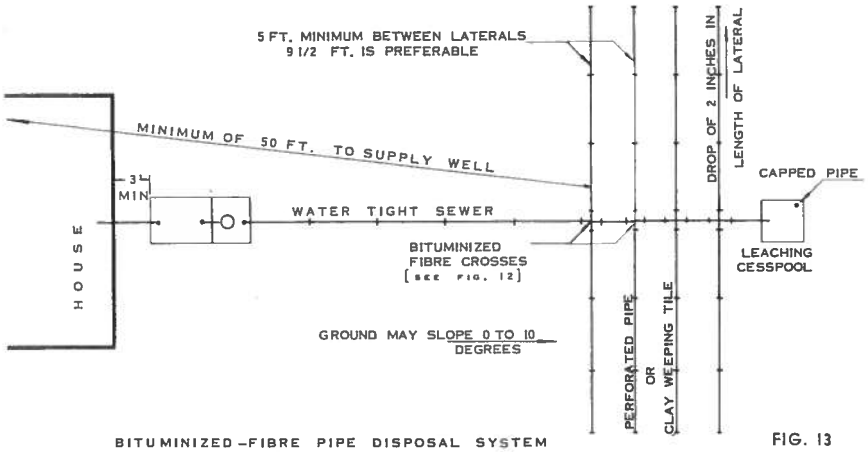


FIG. 12



BITUMINIZED-FIBRE PIPE DISPOSAL SYSTEM FIG. 13

(h) Sloping Ground Systems:

Where it is necessary to locate a disposal field on a sloping area, special precautions must be taken to see that all laterals are equally supplied with effluent and yet each is at a proper depth. This can be accomplished by the use of a distribution box as shown in Fig. 10, or if the slope is not in excess of 10%, a bituminized fibre "cross" system may be used as shown in Fig. 13. If the latter is used, the header should be run directly downhill so that the laterals which come off at right angles will be level.

THE PERCOLATION TEST

By the use of Table 3, complete data can be obtained for any effluent disposal system using a disposal field or a leaching cesspool if the following two things are known:

(1) Daily Sewage Flow.
(2) The Percolation Capacity of the Soil.

The Percolation Test is very simple. Dig or auger a 4 in. to 12 in. diameter hole to the depth of the bottom of the trench. Keep the hole well supplied with water, preferably overnight, until the surrounding soil is **thoroughly saturated.** Stand a yardstick in the hole and note the time required for the water level to drop 1 in. This time may then be applied directly to Table 3 and the data for the disposal system is immediately available.

THE SYPHON CHAMBER

The syphon chamber, although usually constructed as an integral part of the septic tank, should be considered as part of the effluent disposal system. It contributes nothing to the treatment of sewage.

By saving up the effluent and discharging it rapidly and intermittently it provides:

(a) even distribution of effluent throughout the field.
(b) the important rest period in the field.
(c) some protection against freezing.

See Fig. 5 for detail of a 3 inch syphon chamber. The "vent" should be raised high enough so that failure of the syphon will be evident in the operation of the plumbing before trickling has caused harm in the field.

Syphon Data

Size of Syphon	Depth from invert of inlet to floor	Depth of Effluent at start of flush	Approx. Draw Down	Total loss in elevation, invert of inlet to invert of outlet	Rate of discharge Imp. Gals. per min.
3"	20"	17"	14"	24"	90
5"	32"	29"	27"	37"	250

One feature of the syphon chamber is sometimes a disadvantage. It requires an appreciable total loss of elevation in the system. The 3 in. syphon is commonly used, but by examining Table 3 it is evident that for larger fields it would be an advantage to use a 5 in. syphon since the greater drawing depth permits the construction of a shorter syphon chamber. A 6 in. sewer and header must be used with a 5 in. syphon although the laterals may still be 4 inches.

The syphon chamber varies in size with the porosity of the soil. Heavier soil requires a longer rest period between flushes, therefore, the storage capacity of the syphon chamber is given with each effluent disposal system in Table 3.

LEACHING CESSPOOLS

Leaching cesspools admit the effluent directly to the soil in a concentrated area. Since the surrounding soil is kept saturated, there is little likelihood that the aerobic organisms which purify the effluent in the disposal field will be present. A cesspool should therefore be considered as a means of getting rid of the effluent rather than a means of purification. For this reason, the site for the location of the cesspool should be selected with particular regard to the contamination of ground waters.

Regulation number 11-24-17 of the Provincial Plumbing and Drainage Regulations states as follows:

"A cesspool shall not be located or be maintained in use where there is any danger of contaminating a water supply, well, spring, lake or stream, or of causing a nuisance. Cesspools shall be located at least 150 feet away from any spring or well, except in the case of drilled wells, the casing of which is carried down to a depth of at least 100 ft., in which case cesspools shall not be located within 75 feet thereof. No abandoned water supply well shall be used as a cesspool or leaching compartment for any system of sewage disposal."

Cesspools may be constructed of planking or of hollow concrete blocks. See Figure 14 A, B, C and D. If hollow concrete blocks are used to construct the cesspool it is usual to turn every other row of blocks on their side in order to allow the effluent to pass through the blocks and into the surrounding soil. Care must be taken while backfilling around the cesspool to prevent pushing in the walls, therefore, it is recommended that substantial supports be placed across the width of the cesspool before backfilling. Coarse gravel should be used as a backfilling material between the earth and the outside of the cesspool.

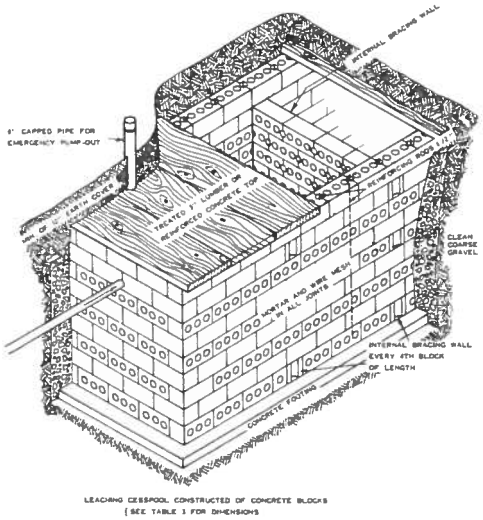


FIG. 14A

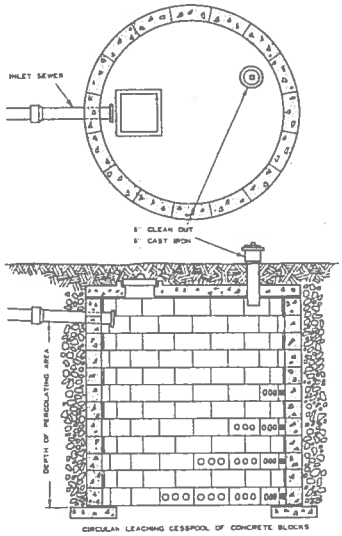


FIG. 14B

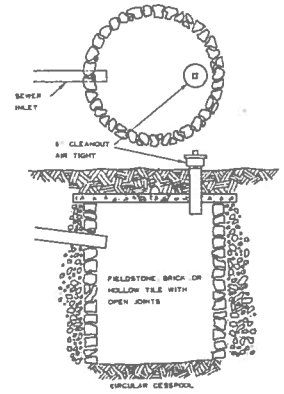


FIG. 14C

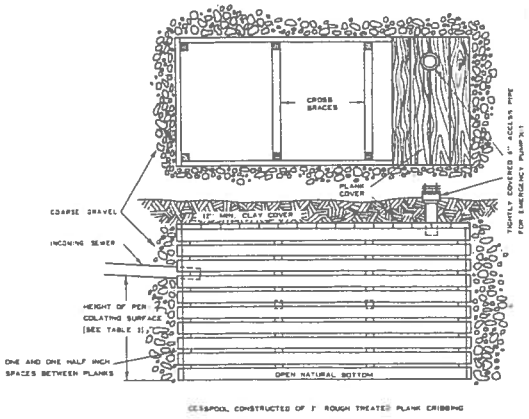


FIG. 14D

The Regulations require the cesspool to be sized according to the type of soil. It must provide a percolation surface below the inlet level, exclusive of the bottom, which will provide 3 sq. ft. of percolating surface for each 5 to 10 gallons admitted to the system per day. Cesspool sizes can be obtained from Table 3 after a Percolation Test has been run on the soil.

Table 4 gives the capacity and the percolating surface per foot of depth.

Table 4
Capacities of Cylindrical Leaching Cesspools

Internal Diameter	Percolating Surface Area per Ft. of Depth	Volume per Ft. of Depth
6′	19 sq. ft.	177 Imp. Gals.
7′	22 sq. ft.	241 Imp. Gals.
8′	25 sq. ft.	314 Imp. Gals.
9′	28 sq. ft.	398 Imp Gals.
10′	31 sq. ft.	491 Imp. Gals.
11′	35 sq. ft.	594 Imp. Gals.
12′	38 sq. ft.	707 Imp. Gals.

ARTIFICIAL SAND FILTERS

These may be installed as shown in Fig. 15 where the filtered effluent may be discharged to a permissible natural outlet. The sand around the upper distributing tile may become clogged and require replacement from time to time. Note that the effluent must filter through a minimum of 30 in. of sand.

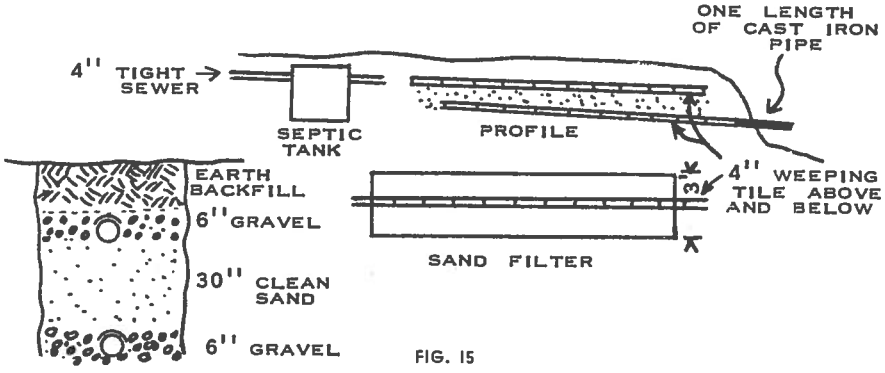


FIG. 15

WATERTIGHT SYSTEMS REQUIRING PUMPING

In congested areas where the minimum distances cannot be provided for other forms of disposal, it may be necessary to install a water-tight tank and haul all sewage away for disposal in a suitable location. Such tanks need not be preceded by a septic tank. This may be the only method of disposal for some locations satisfactory to the Health Department. The high cost of operation dictates that this method be used only where absolutely necessary. The capacity of the holding tank should be equal to at least 4 days volume of sewage.

ABOVE GROUND SEWAGE EFFLUENT DISPOSAL SYSTEM

The above ground filter as shown in Fig. 16 may be used where the water table is extremely high or the soil is exceptionally impervious. The effluent is pumped to the distribution box in the center of the filter by an effluent pumping system as shown in Fig. 16.

The final disposal bed for the above ground sewage disposal system is on the surface of the ground, it thus takes advantage of the fact that the soil close to the surface is more porous than at deeper levels. By providing good distribution and intermittent flow

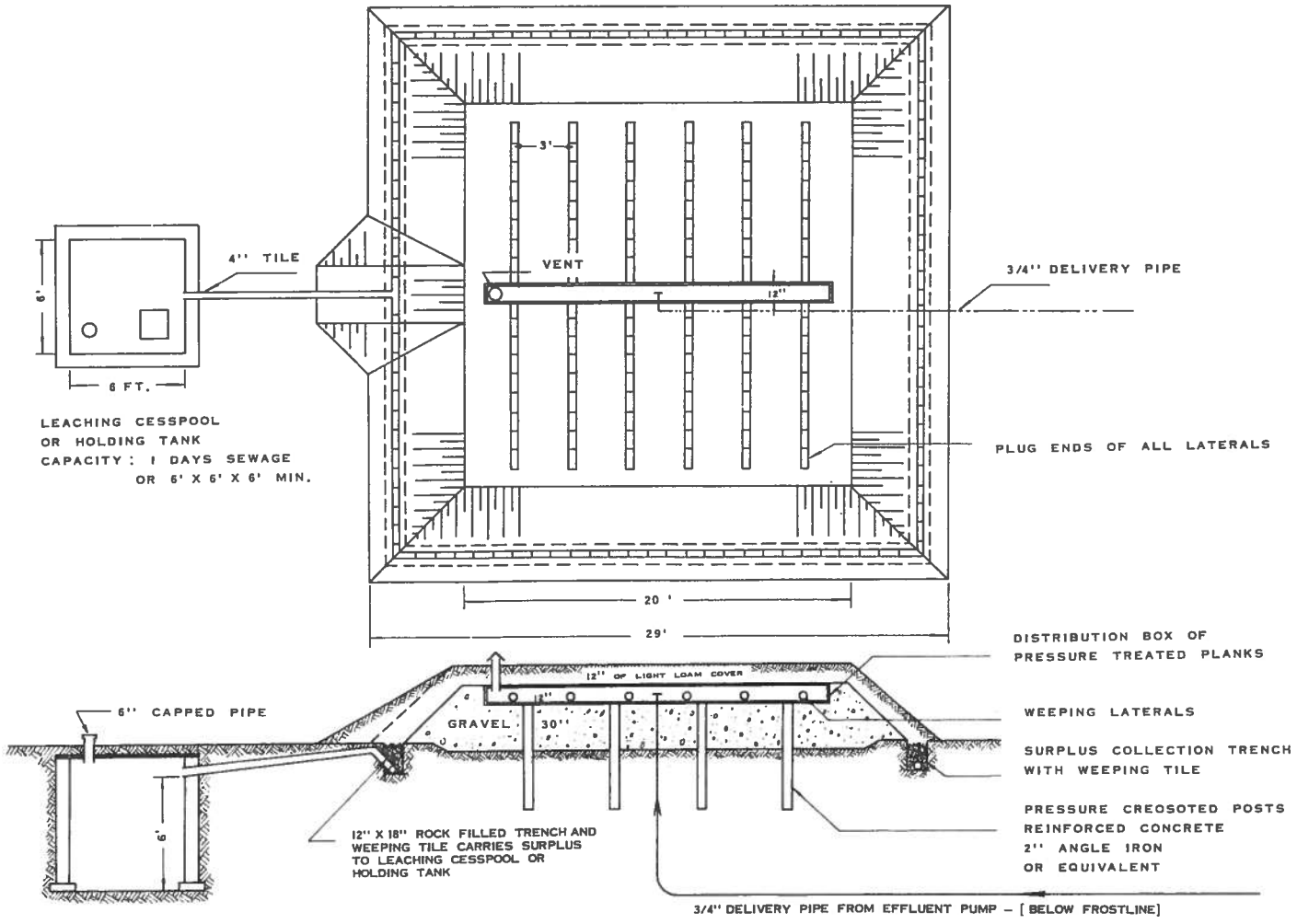


FIG. 16 ABOVE GROUND SEWAGE EFFLUENT DISPOSAL SYSTEM

of the effluent into the final disposal bed, the efficiency of the bed for absorbing the effluent is greatly improved. A disposal bed so located also provides ideal conditions for the action of aerobic bacteria. This is necessary for destroying all forms of contamination. These bacteria are most abundant and most active in the top 2 or 3 feet of the earth's crust.

The proper size of the surface sewage disposal bed depends on the volume of effluent run into it per day and on the capacity of the soil under the bed to absorb it. Soils differ in this respect on the surface as well as deeper down. (See Table 6 for sizing.)

The gravel used in a system of this type should range in size from about ¾ to 1½ inches in size. It should be clean gravel with no clay or other foreign matter in it. It is also recommended that a cesspool be used in conjunction with this system as shown in Fig. 16. In order to improve the ability of the soil to absorb the effluent it is considered good practice to keep the soil well cultivated around the pile to a point approximately 40 feet back from its edge at grade level.

PONDING OR LAGOONING OF SEWAGE

Septic tanks followed by an effluent disposal system (field tile or seepage pit) are most commonly used for disposal of sewage from farm homes, however larger installations such as those for rural schools, hospitals and work camps, may consider ponding or lagooning of sewage.

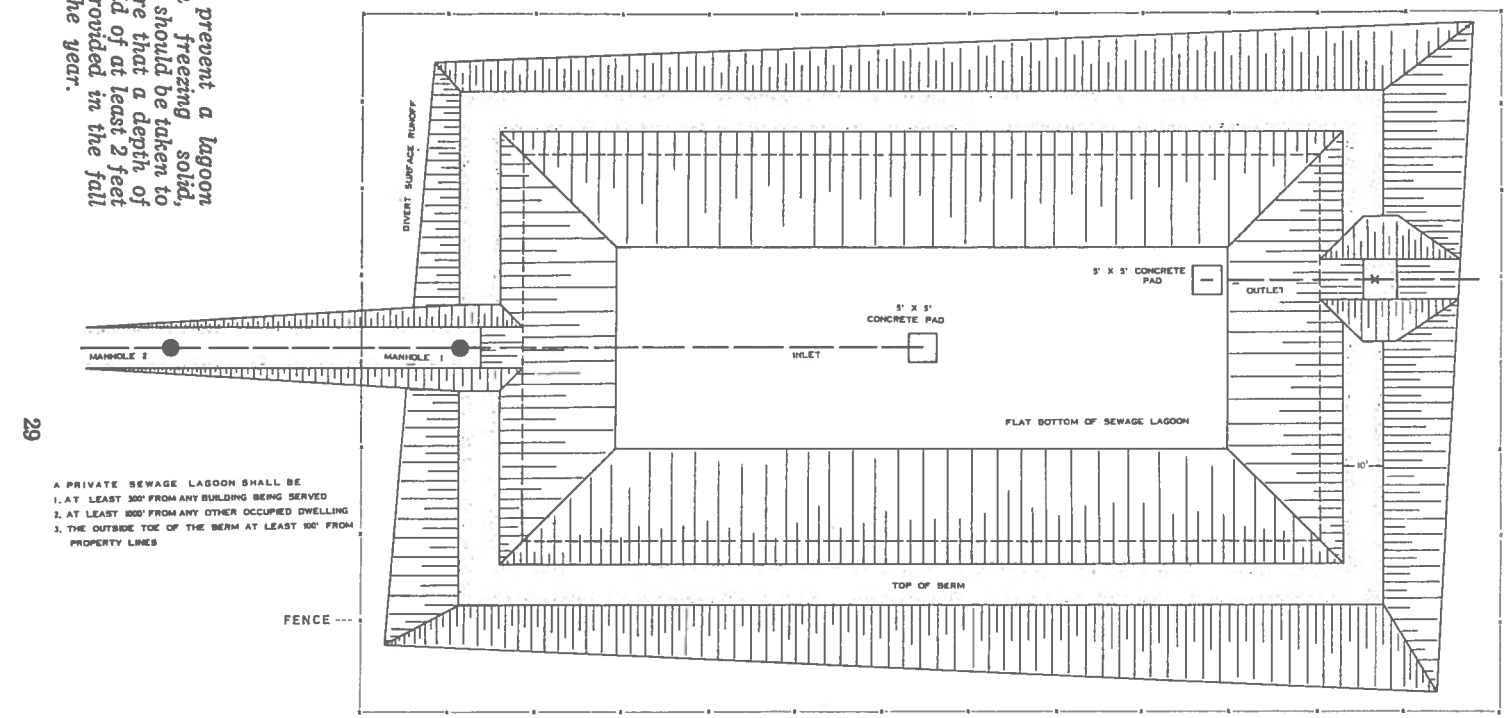
This method is widely used as a means of disposal for towns. In the smaller installations, the sewage flows into a pond where it is retained for a period of one year. The detention of the sewage for this period of time permits disease producing bacteria to die off, and also holds the sewage at one point rather than having it drain into a creek or stream, where the possibility of spreading disease is stretched out over many miles.

The pond system has been used successfully for several rural schools in Alberta. Generally the pond is made large enough to hold one year's flow of sewage and some care is taken to avoid shallow areas by excavating at the edges where the ground has a natural gentle slope. The pond should be one thousand feet or more from residential or school areas. They are recommended particularly in areas where the heavy clay subsoil would make the use of a subsurface effluent field unreliable. They are not recommended for individual homes because with very low flows freezing might be a problem. In addition, the length of pipe required to locate the pond some distance from the home would make the cost at least equal to a septic tank installation.

The sewage going into the pond may have prior treatment (by septic tank) or may flow directly to the pond with no treatment. Experience has shown that odors are not a problem.

Figure 17 shows details of sewage lagoon construction. Table 5 gives recommended sizes for use in disposal of sewage from schools and hospitals.

*To prevent a lagoon from freezing solid, care should be taken to insure that a depth of liquid of at least 2 feet is provided in the fall of the year.



A PRIVATE SEWAGE LAGOON SHALL BE
1. AT LEAST 300' FROM ANY BUILDING BEING SERVED
2. AT LEAST 1000' FROM ANY OTHER OCCUPIED DWELLING
3. THE OUTSIDE TOE OF THE BERM AT LEAST 100' FROM PROPERTY LINES

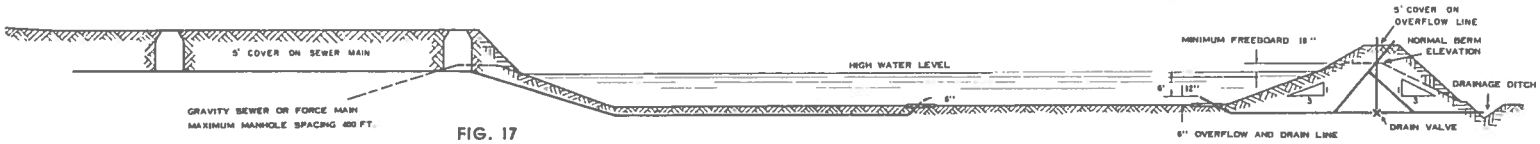


FIG. 17

Treatment is accomplished through aerobic digestion in contrast to the action of anaerobic bacteria and anaerobic digestion which occurs in the septic tank. The combined action of bacteria and algae accomplish the treatment of sewage in lagoons. The design and location of all lagoons, within the scope of the Provincial Plumbing and Drainage Regulations, must be approved by the plumbing inspector.

The design of a sewage lagoon for private sewage disposal is to be such that it has a level bottom and a liquid depth of four (4) to six (6) feet with a detention period of one year. Influent lines are to be placed near the centre of the bottom for effective distribution of sewage. The outlet pipe shall be placed such that one foot of liquid remains in the pond after maximum drawdown, with a pipe, or ditch, carrying the effluent directly to the drainage course. Lagoon berms must be constructed of compacted clay with all black dirt stripped and berms properly keyed so that any seepage is eliminated. Berms are to have a ten foot top width and slopes of three horizontal to one vertical with 18 inches of freeboard. Surface runoff is to be diverted around the lagoon. Fencing of all lagoons, adequate to its location with proper posting is required.

The operation of a sewage lagoon requires regular inspection, control of grass and weed growth on the berms. To prevent a lagoon from freezing solid care should be taken to insure that a depth of liquid of at least two feet is provided in the fall of the year.

Drainage should be done at the time of year when the effluent will least affect the drainage course receiving it. Consideration must be given to owners of land which may be affected by the lagoon effluent.

TABLE 5

SIZES FOR SEWAGE PONDS

SCHOOLS			HOSPITALS		
Number of Classrooms	Volume Imp. Gals. —6' Depth	Inside Base Size	Number of Beds	Volume Imp. Gals. —6' Depth	Inside Base Size
10	700,000	120' x 120'	25	1,825,000	203' x 203'
15	1,050,000	150' x 150'	40	2,920,000	260' x 260'
20	1,400,000	175' x 175'	60	4,380,000	324' x 324'
25	1,750,000	198' x 198'	100	7,300,000	423' x 423'

Figures based on 6 foot water depth and one year retention period—
Schools based on 10 g/p/d. for 200 day year
Hospitals based on 200 g/d/bed for 365 day year

TABLE 6

SIZING ABOVE GROUND SEWAGE EFFLUENT DISPOSAL MOUNDS

DESIGN FACTOR: Area of flat **TOP** of mound to provide not less than one and one half square feet of area per gallon per day. See Regulation 11-24-25 for expected volume of sewage per day.

Expected Volume Of Sewage Per Day (Imperial Gallons)	TYPICAL SOURCE Building	No. of Beds In Hospital	Area of Top of Mound	Typical Dimensions of Top of Mound	Typical Dimensions of Base of Mound	Feet of Weeping Tile in Distribution Laterals	Minimum Volume	Dimensions of Pump-out for Surplus Effluent Liquid Length	Width	Depth	Volume Per Flush Into Distribution Laterals	Approximate Cubic Yards of Gravel in Mound
(Minimum Size) (Evaporation Mound) 400 gals.	Residence or 1 Classroom School	4	600 sq. ft.	20' x 30'	29' x 39'	180'	1350 gals.	6'	6'	6'	54 gals.	120
600 gals.	2 Classroom School	6	900 sq. ft.	20' x 45'	29' x 54'	270'	1350 gals.	6'	6'	6'	81 gals.	170
750 gals.	Serv. Stn. no Cafe	7	1125 sq. ft.	20' x 56'	29' x 65'	340'	1350 gals.	6'	6'	6'	102 gals.	200
900 gals.	3 Classroom School	9	1350 sq. ft.	20' x 68'	29' x 77'	400'	1350 gals.	6'	6'	6'	122 gals.	240
1200 gals.	4 Classroom School	12	1800 sq. ft.	20' x 90' or 25' x 72'	29' x 99' or 34' x 81'	540'	1350 gals.	6'	6'	6'	162 gals.	310
1500 gals.	5 Class'm Sch. or Ser. Stn. & Cafe	15	2250 sq. ft.	25' x 90' or 30' x 75'	34' x 99' or 39' x 84'	600'	1500 gals.	6' 9"	6'	6'	180 gals.	370
1800 gals.	6 Classroom School	18	2700 sq. ft.	25' x 108' or 30' x 90'	34' x 117' or 39' x 99'	720'	1800 gals.	8'	6'	6'	216 gals.	440
2100 gals.	7 Classroom School	21	3150 sq. ft.	25' x 126' or 30' x 105'	34' x 135' or 39' x 114'	840'	2100 gals.	9' 4"	6'	6'	252 gals.	510
2400 gals.	8 Classroom School	24	3600 sq. ft.	25' x 144' or 30' x 120'	34' x 153' or 39' x 129'	960'	2400 gals.	10' 7"	6'	6'	288 gals.	580
2700 gals.	9 Classroom School	27	4050 sq. ft.	25' x 162' or 30' x 135'	34' x 171' or 39' x 144'	1080'	2700 gals.	12'	6'	6'	324 gals.	650
3000 gals.	10 Classroom School	30	4500 sq. ft.	25' x 180' or 30' x 150'	34' x 189' or 39' x 160'	1200'	3000 gals.	13' 4"	6'	6'	360 gals.	710

Pertinent Excerpts from the Plumbing and Drainage Regulations which are made and issued under the

PUBLIC HEALTH ACT

11-1-43 "Plumbing system" means the sewerage system and that portion of any water system essential to the operation of the sewerage system within or in immediate connection with any building, and shall include the building drain AND ANY PRIVATE SEWAGE DISPOSAL SYSTEM CONNECTED THEREWITH.

11-1-44 "Potable water" means water which is safe for human consumption.

11-1-45 "PRIVATE SEWAGE DISPOSAL SYSTEM" means a private system consisting of one or more settling or septic tanks and an absorption field or some other approved method of liquid disposal.

11-1-46 "Pump-out Tank" shall mean a water tight receptacle used to receive waste water and sanitary sewage and need not be preceded by a septic tank.

11-1-49 "Sanitary Sewer" means a sewer which carries any waste water except storm water.

11-1-50 "Seepage Pit" or "Cesspool" means a covered pit through which septic tank effluent or other settled sewage may seep or leach into the surrounding soil.

11-1-51 "Sewage" means any liquid waste containing animal, vegetable or mineral matter in suspension or solution.

11-1-52 "Sewage Effluent" means sewage after it has passed through a septic tank or has undergone some other form of treatment.

11-6-9 . . . Where a proposed plumbing system is to be operated in conjunction with a privately owned sewage disposal system, the application for a permit shall include a ground plan showing the relative positions of the property lines, house to be served, and the sources of domestic water supply within 150 feet of sewage disposal portion of the plumbing system together with Schedule B Form properly completed.

Pertinent Excerpts from the Regulations Respecting Nuisances and General Sanitary Nuisances:

34-2-2-b No person shall create, establish or maintain: any street, pool, ditch, water course, sink, cistern, water or earth privy, urinal, cesspool, drain, dung pit or ash pit, so foul, or in such a state as to be injurious or dangerous to health, or which may hinder in any manner the prevention or suppression of disease.

Pertinent Excerpts from the Regulations Respecting Water and Ice:

10-14-1 No person shall discharge any sewage, trade waste or other liquid, by means of any sewer or other conduit whatsoever, from any house, premises, works, or other place, into the waters of any stream or lake, . . .

PRIVATE SEWAGE DISPOSAL SYSTEMS

General

11-24-1 The design of an individual or private sewage disposal system shall take into account the location of wells or other sources of water supply, topography of the ground, water table, soil characteristics, area available, use and maximum occupancy of the building served.

11-24-2 The system shall be designed to receive all sewage including laundry and kitchen waste, but not roof water or other storm water drainage. It shall consist of a septic tank or settling tank with or without a syphon compartment, discharging into either a subsurface disposal field or one or more cesspools. Where soil or other conditions are such that neither a field nor seepage pit can be used, the approval of an alternative design shall be obtained from the plumbing inspector.

11-24-3 Septic tanks should be so located that surface drainage therefrom is away from all sources of domestic water supply, and the elevation must be such to permit a minimum fall of ⅛ inch per foot in the building sewer.

11-24-4 Septic, biological or other sewage treatment and disposal tanks may be constructed and used where no public sewerage system is available, or likely to become available within a reasonable time, or in rural districts.

11-24-5 Where necessary, in accordance with regulation 11-2-4 or 11-2-5 permission to construct same shall be obtained from the local or Provincial plumbing inspector as the case may require.

11-24-6 Persons making application for such permission from the Provincial plumbing inspector shall include completed forms, obtainable from the Department of Health, covering the proposed installation.

11-24-7 In all cities, towns, villages or hamlets all sewage treatment and disposal tanks shall have one or more compartments constructed of substantial water-tight materials. The sewage from the building shall be discharged into a treatment tank, and thence by an inverted outlet to a leaching compartment, drainage tile, a filter bed or into a permissible natural outlet.

11-24-8 The minimum liquid capacity of septic tanks shall be 400 Imperial gallons in the sedimentation compartment. The inside liquid depth below the outlet shall be not less than 4 feet.

11-24-9 The inlet and outlet of every septic tank shall be provided with a TY with the top left open. The bottom of the inlet TY shall extend not more than 3 inches below the liquid level. The bottom of the outlet TY shall extend not less than 18 inches nor more than 24 inches below the liquid level of the sewage in the tank. The fittings and pipe in a septic tank shall be of the same material as approved for building sewers. The invert of the outlet pipe from every septic tank shall be at least 3 inches lower than the invert of the inlet pipe. The depth of the septic tank shall be not less than 48 inches below the tank outlet pipe, and the inside length of the tank shall be two to three times the inside width. The direction of flow of sewage within the

septic tank shall be parallel to the longest dimension of the tank. The tank shall be provided with at least one man-hole and cover. All man-holes shall be not less than 20 inches square or in diameter, inside measurements, and shall be extended to within 6 inches of the surface of the ground.

11-24-10 A septic tank must be located at least 3 feet from a foundation wall and, if possible, a caulked joint should be made between the foundation wall and the septic tank.

11-24-11 No water-tight compartment of the system shall be located within 2 feet of any lot line or 10 feet of any cistern, or 25 feet from any well, spring or other source of water supply used for domestic purposes, and where practicable greater distances shall be provided.

11-24-12 All manufactured septic tanks shall conform to the provisions of this Division of the Provincial Board of Health Regulations.

11-24-12-1 All metal septic tanks shall be made from 12 gauge copper bearing steel, or pure iron, and shall provide the capacity required by the provisions of this Division of the Provincial Board of Health Regulations. All seams shall be welded so that the tanks are water tight and shall be painted inside and out with an approved protective coating. Each tank shall bear a metal identification plate stamped with the name of the manufacturer, the working capacity of the tank and certifying that the tank is made of 12 gauge or heavier iron.

11-24-12-2 All septic tanks made from materials other than that specified in section 11-24-12-1 shall be subject to the approval of the Chief Provincial Plumbing Inspector and shall bear an identification plate stamped with the name of the manufacturer, his model number, and the working capacity of the tank.

11-24-12-3 All identification plates will be located on the top of the septic tank near the manhole.

11-24-13 No septic tank shall be constructed in any basement or under any building, except with the permission of the Provincial Board of Health.

11-24-14 The liquid flowing from a sewage treatment tank may be disposed of by some method of ground absorption such as cesspool, drainage tile, filter beds or some other manner approved by the Provincial Board, providing such disposition does not cause a nuisance or objectionable conditions.

11-24-15 A cesspool shall consist of a chamber or well walled up with material which allows water to percolate through it, such as dry rubble or dry brick work. The bottom is left open to the soil. The cesspool shall be not less than 6 feet in diameter or less than 6 feet square, and shall have a depth, where practicable, of 6 feet or more below the inlet pipe depending on the character of the soil. It shall be equipped with a covered man-hole not less than 20 inches square or in diameter inside measurement. The capacity of the cesspool below inlet level shall be such as to provide 3 square feet of percolating sur-

face (excluding bottom) to every five to ten gallons of water contributed to the scheme per day, the lower limit being for clay or compact soil and the upper limit for sand and gravel.

11-24-16 No person shall deposit effluent or sewage wastes into any drilled, bored or dug well.

11-24-17 A cesspool shall not be located or be maintained in use where there is any danger of contaminating a water supply, well, spring, lake or stream, or of causing a nuisance. Cesspools shall be located at least 150 feet away from any spring or well, except in the case of drilled wells, the casing of which is carried down to a depth of at least 100 feet, in which case cesspools shall not be located within 75 feet thereof. No abandoned water supply well shall be used as a cesspool or leaching compartment for any system of sewage disposal.

11-24-17-1 A cesspool shall not be located within 50 feet of any dwelling or cistern.

11-24-18 In the event that drainage tile is to be employed to dispose of the effluent from a sewage treatment tank, any dosing chamber constructed in conjunction with the said scheme shall be of such a size that upon flushing, the volume of the liquid so discharged shall be at least one-fifth that of the total expected volume of sewage per day entering the septic tank. All syphon chambers shall be provided with a man-hole similar to that specified in Regulation 11-24-9.

11-24-19 The volume of the disposal tile and feeder pipes laid in connection with any dosing chamber shall in no case be less than 120% of the discharge volume of the dosing chamber. Lateral lines of weeping tile shall be laid at least 5 feet apart, and under no circumstances shall weeping tile forming any part of any system of sewage disposal be located within 50 feet of any well, spring or other source of water supply used for domestic purposes.

11-24-20 The pipe line leading from any sewage treatment tank to the point where sewage is to be ultimately disposed of shall comply with all the requirements of these Regulations respecting building sewers.

11-24-21 No private system of sewage disposal shall be constructed on any premises once a public sewer is made available within 150 feet of the building.

11-24-22 No person shall construct any cesspool (i.e. a hole in the ground with cribbed sides and open bottom) for the disposal of raw, untreated sewage within the limits of any city, town, village or hamlet.

11-24-23 Sludge removed from any sewage treatment tank or its units shall be hauled away to an approved waste disposal ground if possible. Otherwise it shall be buried or disposed of in such a manner as not to create objectionable conditions or cause a nuisance.

11-24-24 Septic tank sizes for dwellings shall be as follows:

Based on a sewage flow of 35 gal/cap/day, with sludge Storage of 6 cu. ft. per capita

Number of bedrooms	Maximum number of persons served	Width (inside) ft. in.	Length (inside) ft. in.	Liquid Depth ft. in.	Total Depth (Minimum) ft. in.
2 or less	5	3 0	5 6	4 0	5 0
3	6	3 0	6 0	4 0	5 0
4	8	3 6	7 0	4 0	5 0
5	10	3 6	7 6	4 6	5 6
6	12	4 0	8 0	4 6	5 6
7	14	4 0	9 0	4 6	5 6
8	16	4 0	10 0	4 6	6 0

11-24-25 The septic tank design for other than individual dwellings shall be based on a minimum sewage flow as follows:

Boarding schools and communal residences	35 g.p. person
Small Hospitals (up to 15 beds)	100 g.p. bed
Day Schools	10 g.p. pupil
Tourist Camps	20 g.p. person
Drive-in Theatres	3 g.p. car
Other buildings	15 g.p. person
Highway Service Station	500 gallons per day
Highway Service Station with Cafe	1000 gallons per day

11-24-26 The retention period in the design of septic tanks for other than dwellings shall be selected with care to provide for sludge storage and the wider fluctuations in the water use and the related sewage flow.

11-24-27 A distribution box with a removable cover may be provided at the inlet end of the distribution system if it is considered necessary because of sloping ground or other unusual conditions. The inlet to the box should be about 2 inches above the outlets and all outlets should be at the same elevation.

11-24-28 Drainage pipe in the distribution system should be 4 inches diameter and laid on a flat slope not exceeding 4 inches per 100 feet. The maximum length of any line should not exceed 100 feet.

11-24-29 Except in very porous sub-soil all drainage pipe shall be laid in a trench on a bed of gravel or crushed rock. In such cases there shall be not less than 6 inches of gravel or crushed rock beneath the drainage pipe.

11-24-30 The leaching pipes in a sewage effluent disposal field shall have a minimum of 18 inches and a maximum of 24 inches of cover except where otherwise approved by the plumbing inspector.

11-24-31 An above ground sewage effluent disposal filter shall be located similarily to a leaching cesspool or seepage pit and in accordance with section 11-25-2.

11-24-32 A sewage lagoon for private use must be:

(a) at least 300 feet from the dwelling, school, or other building being served;

(b) at least 1,000 feet from any other dwelling, school, hospital or other occupied building;

(c) designed to provide a minimum of one year detention at a working depth of not greater than 6 feet;

(d) designed to provide a minimum berm slope of 1 vertical to 3 horizontal;

(e) provided with a submerged inlet located near the center of the lagoon and not more than 6" above bottom;

(f) provided with an overflow at least 18 inches below the top of the berm:

(g) provided with a drain which will permit emptying the lagoon to not less than 12 inches from the bottom;

(h) landscaped and maintained to allow observation of the condition of the berm;

(i) adequately fenced to suit its location;

(j) the outside toe of the berm must be at least 100 feet from the property line;

(k) designed to provide a berm 10 feet wide at the top.

MINIMUM DISTANCES REQUIRED BY THESE REGULATIONS

11-25-1 Water-tight septic tanks or pump-out tanks:
2 feet from any property line
10 feet from any cistern
25 feet from any well
3 feet from any foundation wall

11-25-2 Leaching cesspools or seepage pits:
50 feet from any dwelling
50 feet from any cistern
75 feet from wells over 100 feet deep
150 feet from wells less than 100 feet deep
150 feet from any spring or other source of water

11-25-3 Weeping tile fields:
50 feet from any well
50 feet from any other source of water supply
A reasonable safe distance from any dwelling

11-25-4 The above measurements include any well in the vicinity of the premises installing a sewage disposal system.

11-25-5 Where minimum distances cannot be provided, the Local or the Provincial Board may require the owner to provide a water-tight pumpout tank for the retention of sewage or sewage effluent.

SUMMER COTTAGE PLUMBING STANDARDS

11-26-1 Buildings constructed for twelve months per year occupancy shall comply in all respects with this Division of the Provincial Board of Health Regulations.

11-26-2 Buildings constructed for summer occupancy only, which include a water closet as part of the plumbing system, shall comply with this Division except that:

(a) a 250 Imperial gallon septic tank may be installed;

(b) plastic piping may be used providing it is properly sized, protected from damage and graded for complete drainage;

(c) all plumbing fixtures must be adequately trapped and vented;

(d) a water closet of the type which requires approximately one quart of water to flush it may be installed providing the septic tank has a capacity of 250 Imperial gallons and the water supply is protected against back syphonage from the water closet bowl or waste.

(e) if a steel septic tank is installed it must be made from 12 gauge material.

11-26-3 Hot water piping, as well as the pipe from the pressure tank to the hot water tank, must be of copper or galvanized pipe.

11-26-4 Buildings constructed for summer occupancy only, which do not include a water closet as part of the plumbing system:

(a) may omit the septic tank, but

(b) must dispose of all liquid waste into an approved subsurface disposal system.

11-26-5 It will be considered a violation of this Division if a dwelling approved on the basis of summer occupancy only is occupied during the winter months.

SEE TABLE 3

Form PHSE 4 (1961) Schedule B

GOVERNMENT OF THE PROVINCE OF ALBERTA
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH SERVICES

Permit Fee: $2.00 Where applicable (See Regulation No. 11-6-17)

APPLICATION FOR PRIVATE SEWAGE DISPOSAL SYSTEM PERMIT

_____ _____
(Property Owner) (Property Address)

Driving directions to this installation _____

This disposal system will be installed by _____

of _____ Phone: _____

Type of building to be served _____

Number of persons using system _____

Expected volume of sewage per day (see 11-24-25) _____

Percolation test: Time for water to fall one inch _____

Description of soil _____

IF MANUFACTURED SEPTIC TANK USED: Steel ( ); Concrete ( ).

Name of Maker _____

His designation or number for this tank _____

Liquid volume of first compartment _____ Imp. Gallons

With _____" syphon; No syphon ( ); Gauge of steel _____

IF POURED-IN-PLACE CONCRETE SEPTIC TANK USED: _____ (Imp. Gallons)

Inside dimensions of Syphon Chamber (if used):

Length _____ Width _____ Liquid Depth _____

Size of Syphon _____"

Final Method of Disposal of Effluent:
Will be similar to Fig. as shown in the booklet "PRIVATE SEWAGE DISPOSAL".

IF DISPOSAL FIELD: Total Length of Weeping Tile _____ ft.

Depth of clean gravel under tile _____ in.

IF LEACHING CESSPOOL ( )

or WATER TIGHT PUMP-OUT TANK ( ):

Diameter or Dimensions _____

Depth below incoming sewer _____

Liquid capacity _____ Imp. Gallons

Material used for cribbing _____

6" capped pipe to surface for pump-out _____

If evaporation mound, sewage lagoon or other system used, provide detailed sketch. This must be accompanied by a plot plan of system:

see over

(Reverse of PHSE 4)

All 'Applications' for Private Sewage Disposal System Permits must be accompanied by a plot plan showing:

Location of Property Lines — Buildings

Privies within 200 feet — Driveways

Depth and type of wells or other sources of water within 200 ft.

Show the complete disposal system as it will sit on the property.

The plot plan should be drawn to scale or show all distances in plain figures.

Minimum distances required by Plumbing & Drainage Regulations:

11-25-1 Water tight septic tanks or pump-out tanks:

- 2 feet from any property line
- 10 feet from any cistern
- 25 feet from any well
- 3 feet from any foundation wall

11-25-2 Leaching cesspools or seepage pits:

- 50 feet from any dwelling
- 50 feet from any cistern
- 75 feet from wells over 100 feet deep
- 150 feet from wells less than 100 feet deep
- 150 feet from any spring or other source of water

11-25-3 Weeping tile fields:

- 50 feet from any well
- 50 feet from any other source of water supply
- A reasonable safe distance from any building

11-25-5 Where minimum distances cannot be provided, the Local or the Provincial Board may require the owner to provide a watertight pump-out tank for the retention of sewage or sewage effluent.

This space may be used by applicant to draw plot plan as required above.

Printed by L. S. Wall, Queen's Printer for Alberta, 1968