CAMP SANITATION

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CAMP SANITATION

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Introduction

Hygiene is "that department of sanitary science which deals with the preservation of health, especially of household and communities; a system of principles or rules designed for the promotion of health"; the word hygiene comes from the Greek and means sound and healthy.

The health of a camp primarily depends upon its sanitary condition. Negligence in this important factor in camp management will not only cause serious trouble for everyone concerned but is the direct responsibility of the superintendent, who may be held legally responsible for any and all trouble that might occur. Typhoid fever, malaria, diarrhoea, and infections from unclean environment are well-known camp diseases easily eradicated by sanitary measures and preventable by sanitary precautions.

Since the employees or workmen as found in all logging camps are closely associated with each other during their leisure time around camp, as well as out in the field, the question of sanitation is one of great importance and cannot be considered lightly. "Thou shalt love thy neighbor as thyself" is a sound rule of health and one which will be put in practice by the majority of individuals, but there are always exceptions to every rule. Unlike the soldier, who is subjected to military discipline and rigid inspections as far as

sanitary measures are concerned, civilians are more or less on their own and occasionally one is likely to become careless of his own well-being as well as thoughtless of the results it may have on his fellow workmen. Due to this natural tendency on the part of a few, it becomes necessary to provide adequate facilities to meet the demands of all concerned and to insist that these facilities be used even to the extent of discharging any individual guilty of negligence. The number of individuals engaged in sanitary work around the camp is of very little importance unless the employees are loyal to the laws of cleanliness.

LAW OF THE STATE OF OREGON STATING DUTIES OF THE STATE BOARD OF HEALTH

The state board of health shall have direct supervision of all matters relating to the preservation of life and health of the people of the state. It shall keep the vital statistics of the state, and make sanitary surveys and investigations and inquiries respecting the causes and prevention of diseases, especially of epidemics. The board shall have full power in the control of all communicable disease. It shall make and file in the office of the secretary of state such rules and regulations, and is hereby empowered to enforce such rules and regulations for the control of any and all communicable diseases, by quarantining; or the adoption of any other reasonable measures as seem best for limiting the spread of communicable diseases, and for the preservation of the public health; and it shall be the duty of all executive officers, including police officers, sheriffs, constables and all county officers and employees of the state, to enforce such regulations, subject to the authority of the state health officer. (L. 1903, p. 82, par. 2; L. O. L., par. 4687; L. 1919, c. 264, par. 2.)

RULES AND REGULATIONS CONCERNING ESTABLISHMENT OF CAMPS

A. Permit Required Prior to Establishment of Camps.

No person or persons shall establish a labor or industrial camp, either temporary or for permanent quarters, in which there are five or more persons, without first obtaining

permission to establish such camp from the jurisdictional health officer. Mining, lumber, timber, woodcutting, railroad, repair or construction, fishing, berry-picking, hop-picking, fruit-packing and other labor and industrial camps shall come under the purview of this section. The person in authority in such camp shall make application for permission to establish such camp by telegraph, telephone, or letter, and upon such application, such health officer shall make an inspection of the site as proposed site for such camp and shall establish the purity of the water supply for such camp, and prescribe such rules and regulations as he may deem necessary for the preservation of the health of those employed and the general public. No such camp shall be established nearer than the high water point to any creek, spring, branch, brook, well, or other source of water supply of said camp or any source of water which supplies any city, town, community, or camp in which there are more than five (5) persons. For his services as herein provided, such health officer may charge a reasonable fee, which shall be paid by the person or persons, firm or corporation desiring to establish such camp. For the purpose of these regulations, any camp which has been occupied for a period of six months or longer shall be considered a permanent camp.

B. County Health Officers to Report on Camps.

The health officer of each county shall report to the State Health Officer on the location of all industrial or construction camps within his jurisdiction.

C. Location of Proposed Camps to be Sent to State Health Officer.

Whenever a county health officer shall receive information as to the proposed location of new camps within his jurisdiction, he shall notify the State Health Officer, giving the location of the proposed camp, and the name and address of the person or persons responsible for such camp.

D. Reasonable Means to be Employed to Protect Workmen.

All contractors and other persons responsible for the control and management and construction of industrial camps must use all reasonable precautions to protect the persons in their employ from disease, and to that end shall follow, as closely as the individual surroundings of each camp will permit, the instructions furnished by the State Health Officer.

SANITATION IN CAMPS

Location

The topography of the locality where the camp is to be constructed will govern its location. That is, the slope of

the ground, the type of soil, the nearness of streams and lakes, the major direction of wind movement, the amount of precipitation and the type of ground cover will determine the location and layout of the camp. In selecting a camp site be sure that the drainage is good. Avoid boggy land and stagnant water because this means mosquitoes and a consequent source of trouble. Ground near the foot of a hill generally has a damp subsoil and remains muddy for an extended period of time. Chose a location where the water will drain off readily, and if the weather is warm there will be a free circulation of air.

Where sub-surface drainage is good, a camp may be located on flat ground; otherwise, a gentle slope is best suited for this purpose. If the location is on a side hill, a drainage ditch should be built around the camp so as to divert all surface water which may run down from higher elevations. Since soil of gravel formation has a tendency to lessen the amount of mud encountered in wet weather as well as the amount of dust during the summer, it should have priority over other types whenever possible. This feature, besides being good sanitary practice, adds to the comfort and materially boosts the morale of the workmen.

Before establishing the final location, examine the streams or lakes in the immediate vicinity to determine whether or not they are being poluted from nearby farms or other sources, consult a local physician or health officer and get the vital statistics of the area. The locality should be free

from communicable diseases, such as malaria, typhoid or diarrhoea. Poluted soil will cause as much trouble as poluted water.

As stated above, the camp should be located on well-drained ground. This rule should always be followed. The kitchen, commissary, and living quarters should be on the higher ground with stables and corrals on the lower so that the surface drainage will always be from the former towards the latter.

Arrangement of the houses in accordance with modern town planning will add to the appearance of the camp and will facilitate keeping it clean.

Layout

The distance between buildings or spacing will largely be determined by the cost of the land, plus the cost of water supply and sewage pipe as well as the type of individuals occupying the houses. Rigid rules in this respect are rather difficult to apply unless the camp is going to be subjected to close sanitary supervision. It is well to place the bunk-houses or dwellings at least 25 feet apart but where conditions permit, 50 feet is much more satisfactory.

In a well planned layout, the kitchen, dining rooms and commissary buildings should be at least 200 feet from the sleeping quarters and the stables at least 800 feet from the kitchen and about 600 feet from the living quarters.

Toilets of the pit type,if used, should be at least 75 feet to the rear of the houses. However, this type of toilet

or any other that does not exclude flies from coming in contact with the excrement before it can be properly disposed of, is dangerous and a constant threat to the health of the entire camp. Regardless of the efforts made to keep such toilets fly-proof, it is only a matter of time until, thru checking of the lumber and carelessness of the users, flies are admitted and thereby become a menace to the health of the camp. If the camp is of such a temporary nature that the use of privies seems advisable, the danger from them should never be overlooked and extreme care should be taken to make them as fly proof as possible. A preferable type of sewage disposal for camps is the water carriage system with a septic tank. This system will be described later under the subject of sewage disposal. It is not, as so many people think, excessively expensive.

HOUSES

For camps that are to be in use for more than a year, it will pay to construct durable buildings. Particular emphasis should be placed on the specifications drawn up for the construction of the foundations because light wooden structures such as camp buildings can easily be kept in repair for an indefinite period of time if they are placed on solid footings. Whereas, carelessness in this respect results in sagging door and window frames within a relatively short period of time after the building has been erected and become practically useless. For foundations, concrete slabs having sufficient bearing area to uphold the superimposed

load are preferable. Where wooden mud sills are used, care should be taken to see that they are large enough in area and are set level on solid ground. Cedar or Redwood will give the best results when used for this purpose.

In cold climates, the walls and floors of the buildings should be doubled and constructed in a manner that will facilitate keeping them warm during the winter. This isn't so important in warmer climates where light construction is preferable.

For comfort in summer weather, the houses should have verandas and plenty of window space. When it is desirable to screen the windows and verandas, the screening should be attached to well constructed frames of a convenient size for removal and storing during the winter months. Although its first cost is much higher, bronze screening 14 to 16 inch mesh will prove to be more economical than the ordinary dipped or galvanized screening in such climates as experienced along the sea coast or places of excessive rainfall because of its rust resisting qualities.

Tents and tent-houses can be recommended for only the most temporary type of camps for various reasons. They are cold during the winter, unbearably hot during the summer (unless equipped with a "fly"), and difficult to ventilate properly at all times. In damp climates, the repeated wetting and drying out process due to rain and sunshine will so rot the fiber of the canvas that it can readily be torn to pieces

in a wind storm. Where it is necessary to use a stove, sparks from the pipe may fall on the canvas burning holes and, in some instances, completely destroying the tent.

Regardless of the type of construction, whether tents, temporary or permanent buildings, the rooms should be of such size as to afford at least 500 cubic feet of air for each person and should be properly ventilated at all times.

WATER SUPPLY

A plentiful supply of pur water should be available at all times. If a spring is used as a source of supply, it should be housed in, (Figure 2), and carefully guarded against all sources of contamination. The same degree of care must be exercised in protecting a stream if it is to be utilized for this purpose. In addition to housing in the source or intake, the stream should be fenced against stock for a reasonable distance above the intake. The intake should also be cleaned regularly. In using a stream for the water supply, one must always consider that small streams are often dangerous because it is practically impossible to afford it proper protection. Wells, if used, should be protected against surface drainage and walled in to insure them against becoming contaminated by seepage from pit privies or cesspools.

Water should be furnished to the various houses by pipe lines of sufficient size to furnish a pressure of 20 pounds per square inch at the tap or hydrant at all times. Figure 1 gives the discharge of pipes of various sizes in gallons per minute. If an ordinary gravity system is inadequate, this

pressure may be had by installing a tank and tower or constructing a tank on a hillside at a higher elevation and within a reasonable distance of the camp. If the tank is at a higher elevation than the intake, a small gasoline pump, placed at the intake and operated a few hours each day, will keep the tank filled. A hydraulic ram may also be used for this purpose.

During periods when the temperature (atmospheric) is below freezing, it may be necessary to operate the pump continuously in order to maintain a flow of water through the tank and exposed portions of pipe to keep them from freezing.

Periodic examination of the water supply should be adhered to and whenever the purity of the water is questionable, an analysis should be made by a health officer or physician. Practically all State Boards of Health are equipped to make this examination and analysis. From the standpoint of psychology and as a means of getting the jump on the other guy, complete information concerning the water supply should be given the employees because during the summer months, a few individuals are inclined to blame all ailments, regardless of the natural cause, on the impurity of the water supply.

Shower Baths

An adequate number of shower baths to take care of everyone should be provided in all well managed camps. Figure 3 shows the floor plan and general design for a bath house. These showers should be provided with hot and cold water at all seasons of the year and should be located within a short

distance of the sleeping quarters. For temporary or spike camps, an improvised shower may be made out of a barrel which has elevation to furnish the required lead, a supply pipe and a perforated tin can.

GARBAGE DISPOSAL

At temporary camps, garbage may be disposed of by burial but at permanent camps this method of disposal is highly inadvisable. It is much better to burn all the garbage or use it for hog feed. Using as feed for chickens is very insanitary in that a large percentage of all refuse remains uneaten and consequently forms a breeding ground for flies.

Incineration is the most sanitary method of disposal and can be accomplished quite easily in camps of 40 or 50 men by means of a pit which has been dug about three feet deep. All garbage is drained and is as dry as possible under the circumstances before being dumped in the pit, where it is sprinkled with crankcase oil and then burned. For the larger camps, it will be necessary to construct a more elaborate incinerator to take care of, or properly burn, all garbage. (Figure 4.) In large camps, where the expense of collection and burning becomes a problem, it is advisable to make arrangements with some farmer to collect all garbage (daily), free of charge, for use as hog feed. Besides saving the expense of collection and burning, this method has other good points in that the value of the refuse is conserved, and the management is relieved of the responsibility of disposal.

All garbage should be kept in a fly-proof galvanized metal container until it can be disposed of permanently. Before placing in the can, the garbage should be as dry as possible and wrapped. No more effective method for collection can be devised than first draining and then wrapping in an old newspaper prior to placing in the container. This routine is convenient to the housewife, insures dry garbage and lessens the amount of material adhering to the sides of the can.

Tin Cans

All tin cans should be crushed and either burned or buried. They are always a source of danger in that they either fill with water and become a breeding place for mosquitoes or else there is a small amount of the contents left which putrifies and becomes a haven for flies.

Kitchen Slops

In temporary camps, the disposal of kitchen slops occasionally becomes a problem. The usual procedure is to dig a pit which is covered with a tight fitting lid and into which all slops are dumped. The success of this method depends on the porosity of the soil, and the amount of liquids to be disposed. If the soil is too heavy for good percolation, it becomes necessary to dig new pits and cover the old ones as soon as possible.

Disposal of Stable Refuse

Manure piles are the favorite breeding places of flies and should not be permitted to accumulate. The stables should be thoroughly cleaned each day and the manure either spread in

thin layers over a field, placed in properly constructed compost piles or burned.

When manure is spread in thin layers, not over one inch in thickness, it soon becomes unattractive to flies and if any eggs or larva are present, they will be killed when exposed to the heat of the sun. Whenever it is impractical to dispose of the manure each day, it may be sprinkled with a solution of hellebore (one gallon of solution per cubic foot of manure), which will kill about 99% of all fly eggs and larva without having any harmful effects on chickens or impairing the value of the manure as fertilizer.

SEWAGE DISPOSAL

There is probably no other subject upon which sanitary engineers so thoroughly agree as on the inherent vileness and danger of the open privy and cesspool as ordinarily constructed. Fresh sewage is not always injurious to health, nor is its odor very offensive, but putrifying excreta and kitchen slops, especially during hot weather, are very offensive as well as being a source of attraction for countless numbers of flies which carry disease germs that may be deposited on the food of the workmen.

Flush toilets and septic tanks are preferable but if they seem to be impractical because of inadequate supply of water, or some other reason, fly proof privies may be used.

The Open Privy

In camps of a temporary nature, the privy (Figure 5) may be permissable but it must be kept sanitary at all times

and both the pit and housing must be made fly-proof. All openings including knot holes should be screened and all cracks between the boards should be battened. The bottom of the housing should be banked with earth so that there will be no openings thru which the flies may gain access to the contents of the pit. Doors should be provided with hinges of the coil spring type and as an added precaution, the seat should be equipped with a cover that will automatically fall in place when the seat is not in use. The addition of chlorinated lime to the contents of the pit will deodorize the excreta and make it less attractive to flies as well as killing any larva that are present. Such a system of sewage disposal cannot be recommended for permanent camps and can be used with safety only when care is taken that the building and pit are fly-proof at all times.

Cesspools

In the past, at permanent camps as in small towns, it has been the practice to convey sewage by the water carriage system into a cess pool, and because the cesspool was far enough away from the buildings that the gases did not become a nuisance, it was considered as being a proper method of disposal. Undoubtedly, in some instances and in some types of soil, this is a good method but in order to insure septic action and constant percolation, the water should seep into the ground at the same rate it enters the pool. Due to the inconsistancy of flow entering the pool, the level of the contents will rise and fall causing a deposition of scum around

the sides of the pool which will eventually result in the clogging of the pores in the soil and the resultant overflow of the pool. When this overflow occurs, the pool becomes a menace to the health of everyone in the vicinity and any disposal system that doesn't preclude the possibility of flies coming in contact with the excreta is very unsatisfactory.

Septic Tanks

A septic tank, (Figure 6), in its most simple form, is nothing more than a non-leaching cesspool provided with an overflow which keeps the level of the contents more or less constant. It is not as generally believed, a costly structure, but is really quite simple in construction and operation. The septic tank with its irrigation system (Figure 7), is adapted for use in any part of the United States in that the porosity of the soil isn't an important factor in determining its dependability.

The purpose of the septic tank is to provide a settling basin in which the solid particles of excreta will separate or settle out and then be destroyed by bacterial agencies. Part of the material will settle readily, part of it will remain in suspension for a longer period of time and some will be so fine that it will remain in suspension indefinitely. These colloidal particles, may be removed by running thru a filter bed or in the percolation process which the effluent undergoes in the irrigation system where it comes in contact with the aerobic bacteria of the soil and is destroyed. In the theory of operation, these solids whether in suspension

or having settled, are attacked by bacteria and reduced to other forms, part liquid and part gaseous, which either settles to the bottom of the tank or rises to the top and forms a scum. Since this scum excludes the light and air and is an aid to the septic action of the tank, it is desirable that it remain undisturbed except when it is necessary to clean the tank.

Table I gives the size of tank required for various numbers of individuals and various amounts of sewage.

For large installations or when local conditions require, it will be necessary to construct a leaching cesspool (Figure 8), or a series of cesspools at the end of each irrigation ditch. (1)

INSECT CONTROL

Flies--Characteristics and Development

In its development, the fly passes through four stages; the egg, larva, pupa and adult, which may be accomplished--conditions favorable--in seven or eight days. Consequently, material favorable for the growth and development of this insect if neglected for more than a week may produce countless numbers of flies and an equal number of potential carriers of filth and disease.

Characteristics important in its control:

1. Choice breeding places--manure, human excreta and decaying vegetable matter.
2. Necessity for warmth, moisture and food for development of the larva.

3. Ability of larva and adult to crawl through loose manure or earth.

4. Eggs and larva killed at temperatures above 115 degrees Fahrenheit.

5. Attraction of flies to light.

6. Attraction to food by odor.

7. Optimum temperature for breeding, 85 to 90 degrees Fahrenheit.

8. Rests on vertical or hanging objects.

Control:

The control of flies depends upon a knowledge of the characteristics enumerated above and the measures taken to render their breeding places unfavorable, to kill the larva and the adult, to properly dispose of human excreta so that it will be inaccessible and to protect the food supplies which are to be used for human consumption.

In camps using horses the control of fly breeding places is essentially the problem of the proper disposition of manure. There are several ways in which this may be accomplished but the best is by burning. However, if this is impractical, composting or close packing of the manure on a platform will prove very satisfactory. By doing this, relatively high temperature is built up within the interior portion of the pile which will kill the eggs and larva. The exterior portions may be sprayed with a larvacide made by combining two parts cresol with twenty parts of kerosene and seventy-eight parts of fuel oil. This mixture, if sprayed over the top and sides of compost pile daily, will prove effective in reducing the number of flies around the camp.

Fly sprays are useful in the sleeping quarters and mess hall. A very good formula for this purpose is five parts of oil of citronella to ninety-five parts of kerosene.

The Mosquito

Mosquitoes are of importance to the health either from the standpoint of being transmitters or transmitting agents of disease producing parasites or as pests which are sources of discomfort to man. Their control therefore is to prevent the spread of disease and to lessen the discomfiture experienced from the bites of the insects.

Characteristics and life cycle:

Mosquitoes develop by a complete metamorphosis. That is, the life cycle consists of the egg, larva, pupa and the adult. In the control of the insect, we are primarily concerned with the female of the species; being blood suckers, they are potential carriers of disease, whereas the male is a vegetarian and is relatively unimportant either as a source of discomfiture or a transmitting agent. Their breeding places are in still or relatively slow moving water, such as ponds, marshes, swamps, streams, drains, water receptacles and roof gutters.

Control Measures:

There are four major measures of control: 1. Protection of the individual, 2. Elimination of breeding places, 3. Destruction of larva, 4. The destruction of the adult.

1. Protection of the individual.

a. Screening the living quarters is of value only

when done properly; otherwise it is useless. Screen doors should open outward and be equipped with good spring hinges. All window screens should fit tightly and the screening material should be of high quality with 18 mesh openings per lineal inch.

b. Mosquito nets are of value to the person while sleeping but are occasionally objectionable to the individual.

c. Deterrants: Oil of citronella, if used frequently on exposed portions of the body,or, one part epsom salts and 10 parts of water daubed on and permitted to dry will prevent the adult from biting.

2. Elimination of breeding places:

a. Empty water containers each week.

b. Drainage of surplus surface water by means of "U" shaped ditches which are either open--requiring frequent attention--or rock filled and tiled. The latter, a "U" shaped trench dug on grade having open jointed tile in the bottom and the remainder of ditch filled with rocks from two to six inches in diameter, is relatively easy to construct and requires a minimum amount of attention. Consequently, it is best suited for subsurface drainage in camps of a permanent nature.

c. Filling of low places or sink holes in which surface water collects.

3. Destruction of the larva:

This may be done easily and cheaply by oiling--one-half pint per 100 square feet--but the film of oil must be maintained for two or three hours in order to assure killing all of the larva. For this purpose, non volitile oils are ineffective. The killing effect is caused by the toxic action of the volatile gasses of the oil after inspiration into the tracheal tubes. Waste motor oil is cheap, easily secured and very effective.

4. Destruction of the adult.

This is best accomplished by swatting the adult mosquito and by spraying the interior of buildings.

The Louse

Life cycle:

The life cycle of the louse, like a great many other insects, consists of three stages, the egg, larva and the adult.

The egg of the louse is pin point in size and of a yellowish white color. When the adult lays her eggs, she excretes a form of cement which tends to fasten them to the hairs on the body of the host and unless removed, they will hatch within eight to twenty-four days after having been deposited.

The larva, resembling the adult and not unlike it in its feeding habits, requires blood within twenty-four hours if they are to survive.

The adult survives for approximately a month and within twenty-four hours after developing from the larva stage, it starts to lay from five to ten eggs per day. This continues during the entire existence of the insect and one female can produce approximately four thousand offspring within a month or an average lifetime.

Habits:

Thru development and environment, the louse has become adapted to various parts of the body and if separated from its host, will die within two days.

Control Measures:

The control measures consist chiefly in the eradication of the louse. This is done by a thorough clean-up job con-

sisting of covering the body with kerosene, letting it remain for a half hour, followed by a good bath with plenty of soap and the boiling or dipping in gasoline of all clothing and bedding with which the individual has come in contact.

Bed Bugs

Bedbugs exist whenever they can live in close association with man. Consequently, they become a serious pest around the bunkhouse. Although at present there is no definite proof of them having transmitted any diseases, they are blood suckers and it is possible for them to act as transmitting agents for any disease in which there is an infection of the blood stream.

Characteristics.

There are three stages to the life cycle of this pest, the egg, the larva and the adult. The eggs are white, oval shaped objects about one mm. in length which are deposited in cracks, crevices, between boards and any other place which affords them concealment and protection. During warm weather these eggs hatch in five or six days and the larva--a yellowish white insect resembling the adult except for size and color--starts its feeding habits. The time required before maturity is usually between six and eleven weeks depending upon the amount of food and the temperature.

The adult, being somewhat nocturnal in its feeding habits, are capable of surviving six or more months without food but are very sensitive to high or low temperatures. They are readily killed when exposed to a humid temperature of 113 degrees Fahrenheit, or by prolonged exposure in temperatures below freezing.

Bedbugs are usually spread from place to place by means of bedding, clothing or any other article that has been exposed. Bats are also a means of spreading this pest. Wherever bats are nesting, there is usually plenty of bugs.

Control Measures

1. Kill all bats and spray their nests with kerosene, turpentine or gasoline.

2. Fumigate all houses where bedbugs are known to exist. This one of the best measures of control but it is necessary to use a gas which will penetrate into the walls, floors and furniture of the dwelling. Hydro cyanic acid gas is very penetrating and if used properly will destroy all forms of the insect. However, the gas is fatal to humans as well as the bugs and care must be exercised when it is being used. Sulphur diocide may be used but it has very poor powers of penetration and is destructful when coming in contact with fabrics. For this reason, it isn't very satisfactory.

3. Kerosene is of value when used as an insecticide. For the best results, it should be applied with a paint brush. Spraying isn't very successful.

The Tick

The common wood tick is the most important of all species found in the United States for transmitting disease. It is found quite generally throughout the states and is regarded with grave concern in those localities where Rocky Mountain spotted fever is prevalent because the tick is the means of transmitting this disease to man. It is also a means by which tularemia may be transferred from animal to man.

The life cycle of this insect consists of four stages, egg, larva, nymph, and adult. The adult deposits several thousand eggs in a mass on the ground which will hatch within one to six months, depending on weather conditions. As soon

as the eggs hatch, the larva seeks a warm blooded host--squirrel, rabbit, etc.,--upon which it feeds for a few days then drops to the ground where it remains dormant for several weeks. At the end of this dormant period, they moult, become nymphs and again seek a warm blooked host. The nymph feeds for a week or ten days then drops to the ground and after a lapse of several weeks, moulting again occurs and the adult emerges. The adult, as soon as the opportunity presents itself, finds a host upon which it feeds for a few days, then copulates. Within a few days the female drops to the ground to deposit her eggs and then dies.

Control

The control of the tick is accomplished mostly thru the control of its animal hosts such as squirrels, ground hogs and rabbits.

This may be accomplished by:

1. Trapping, poisoning and shooting all the rodents in the area.

2. Grazing of sheep in the area--ticks become tangled in the wool and can neither get food nor can they escape.

3. Introduction of a small gnat, Ixodiphagus caucertei, which is parasitic on the tick and consequently a means to assist in its eradication.

CONCLUSION

In camps where unsanitary conditions are permitted, the employer as well as the employee suffers. This is due to the material loss caused by the discontentment among the workers and the resultant large turnover in labor.

Experience (3) has shown that unsanitary conditions may decrease the efficiency of the workmen as much as 25 per cent. In a camp of 50 men with an average daily wage of $6.00, a 25 per cent decrease in efficiency results in a daily loss of $75.00 or, when based on a period of 200 working days per year, a yearly loss of $15,000. One roustabout or flunky at a daily wage of $4.00 could, if the camp was put in first class condition, keep it clean, and an additional expenditure of $4.00 per day would take care of the necessary repairs and extra labor. Therefore, $240 per month or $2,880 per year, would be the cost of good sanitation but it may result in a saving of $12,120 per year. Of course the initial cost of the sanitary installation would be deducted from the first year's saving. This cost for a camp of 50 men should not exceed $3600, leaving a net saving for the first year of the operation of $8,520.

In conclusion may I ask, "Is it worth while?" I think so, both from the standpoint of a saving in cold cash to the employer and a means of preserving the health and happiness of the workmen.

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WATER DEVELOPMENT
U.S. FOREST SERVICE REGION 6

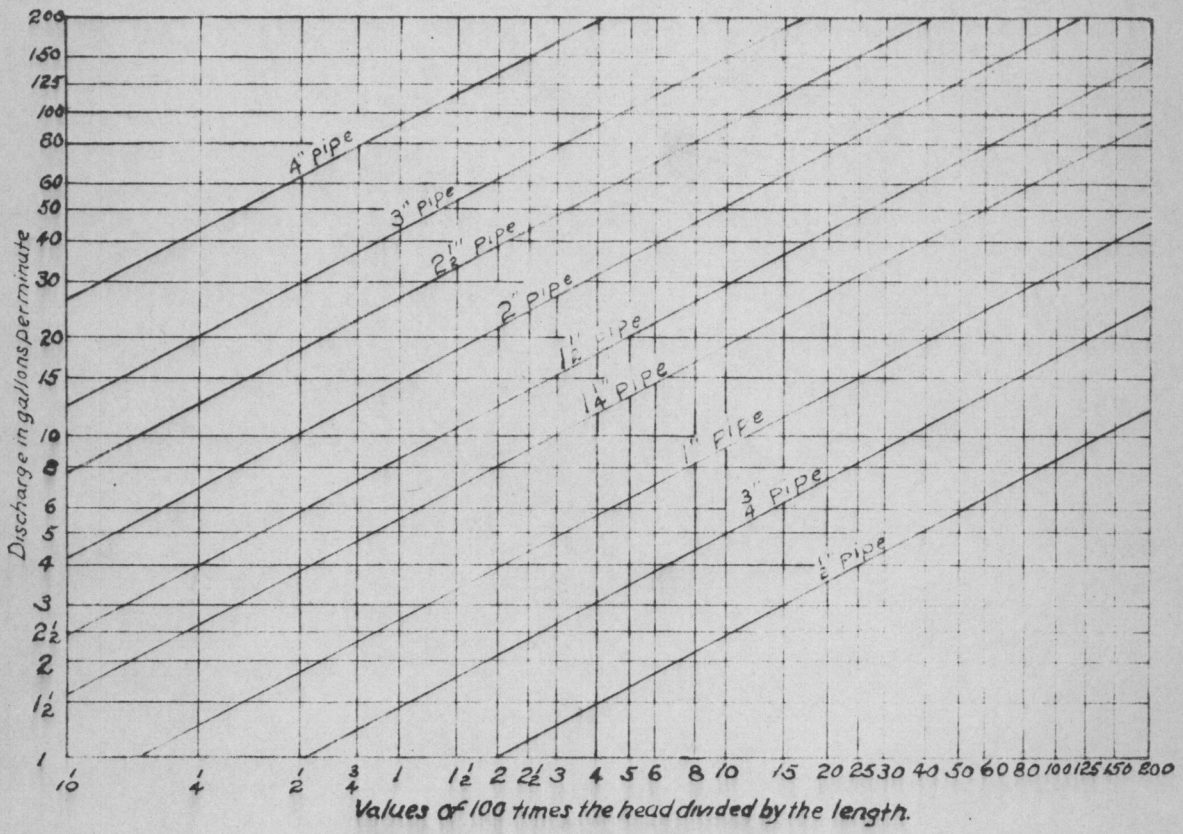
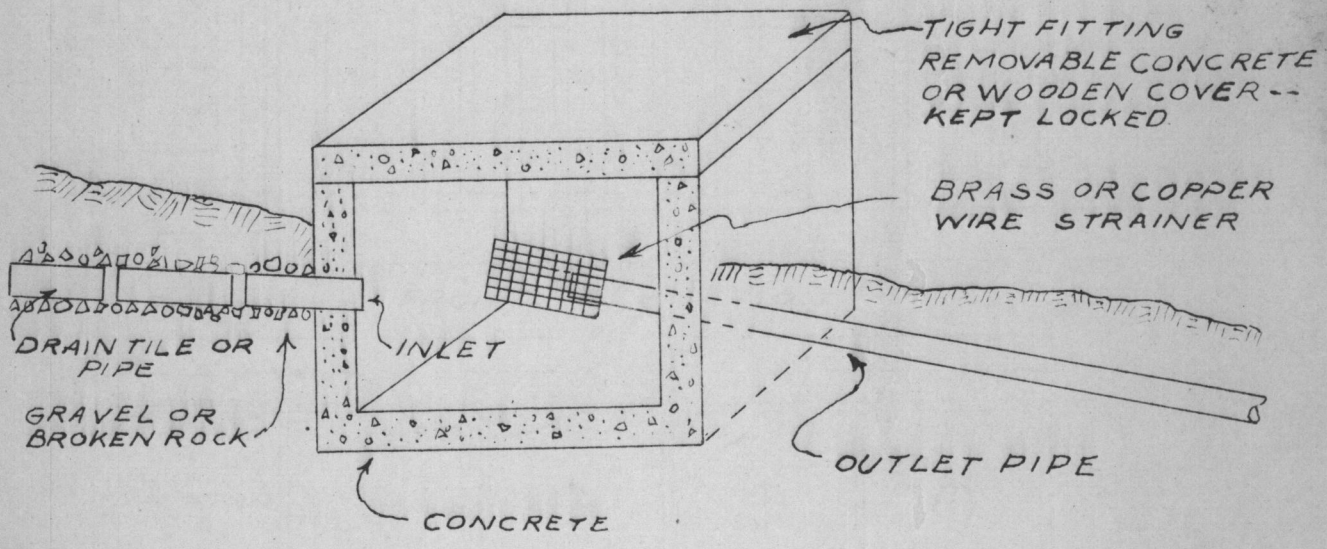


Diagram giving the discharge of ½ to 4 inch straight water pipes.
Directions:- Measure vertical distance in feet from delivery end of the pipe to the surface of the water at the intake; multiply this distance by 100 and ÷ by the length of the pipe in ft.; find this value on the lower line of diagram, follow upward to line giving size of pipe and thence to the left to obtain discharge in gallons per minute.

Figure - 1

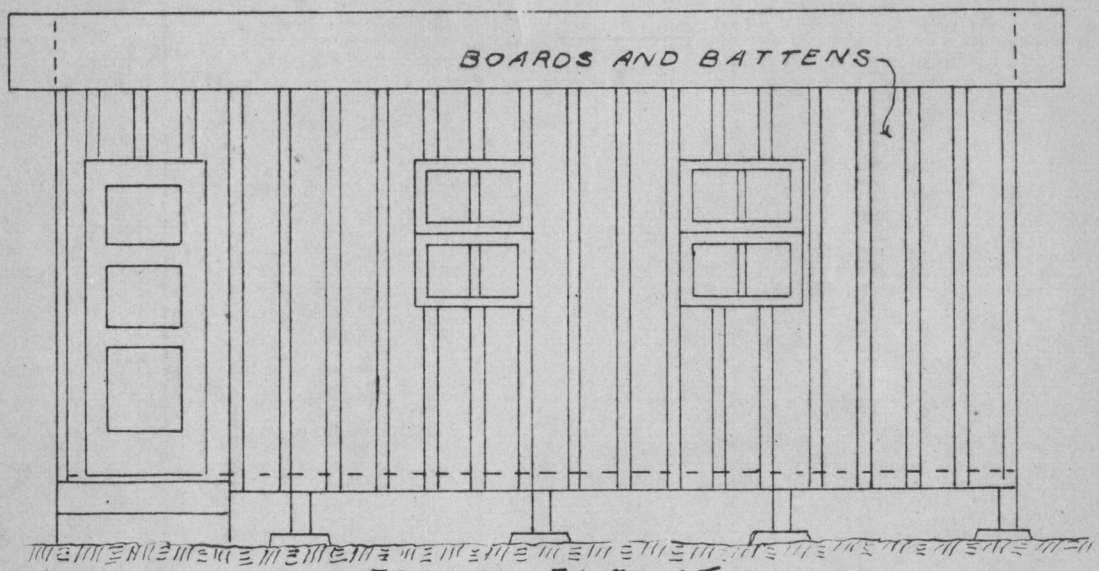


COLLECTING BOX FOR SPRINGS

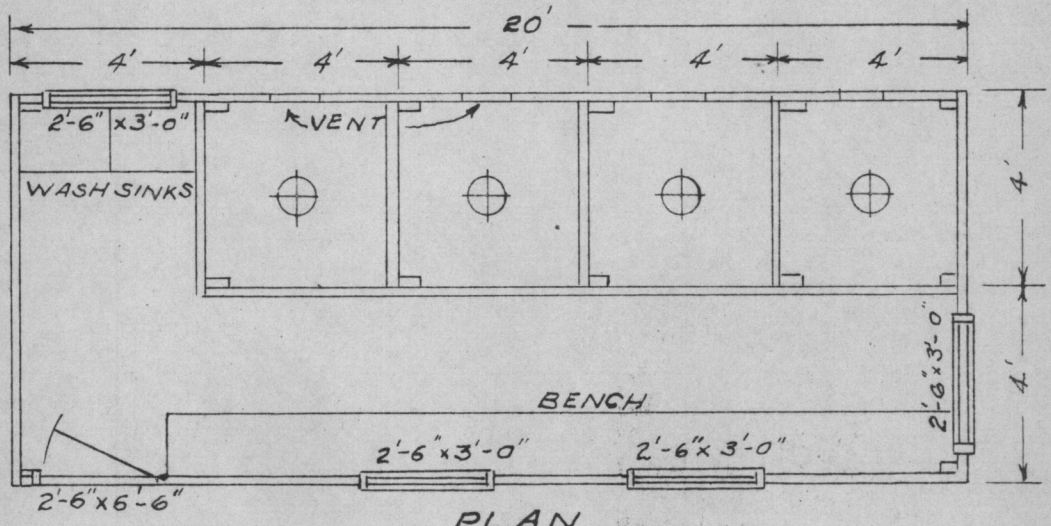
SPECIFICATIONS

1. Box to be of 1:2:4 concrete mix - well tamped.
2. Cover either of concrete or tongue and grove lumber.
3. Box to extend above ground surface.
4. If spring issues from under box, provide openings in bottom and place gravel under the box.
5. Dimensions governed by flow of spring.

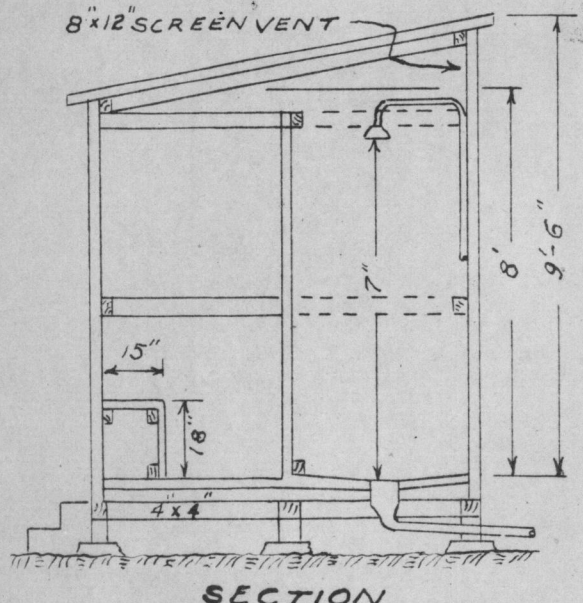
Figure - 2



FRONT ELEVATION



PLAN



SECTION

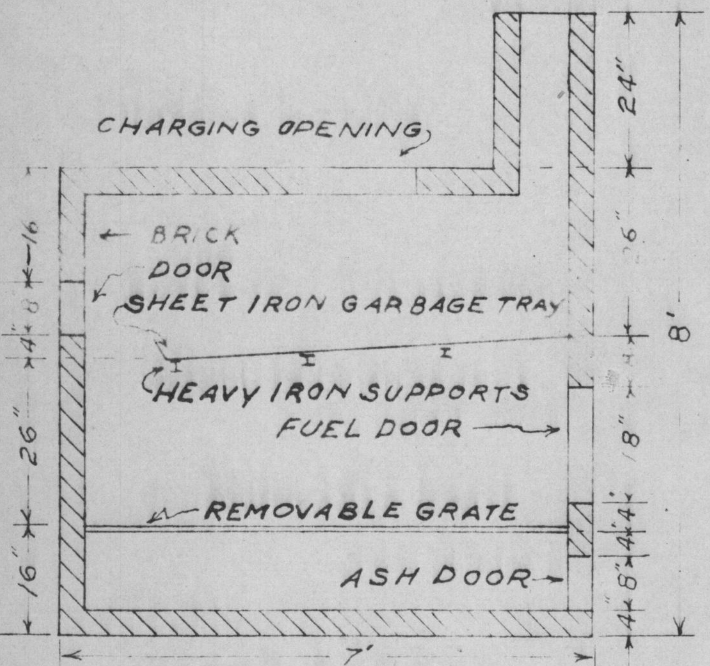
BATH HOUSE

SCALE : $\frac{1}{4}$" = 1'

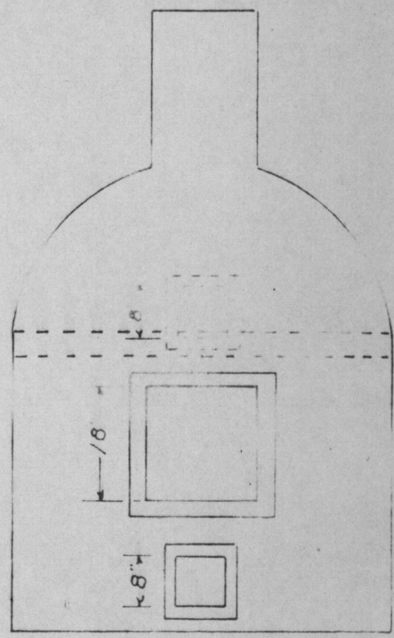
SPECIFICATIONS

1. Floor of tongue and groove lumber.
2. Roof of sheating and 2 ply tar paper.
3. Impervious walls and floor in each shower.
4. Adequate drain to carry away waste water.
5. Screened vent in each shower room.
6. Concrete or cedar footings.

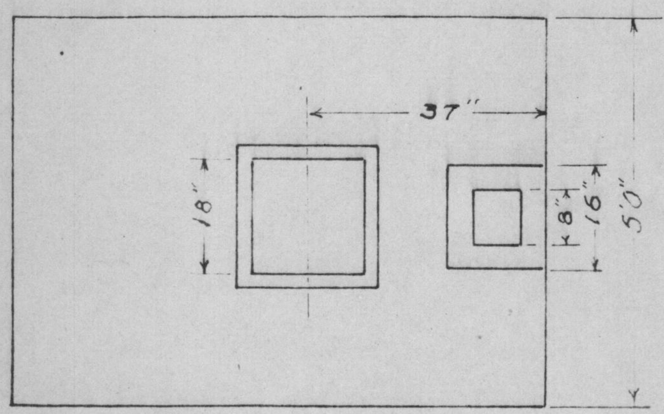
Figure-3



CROSS SECTION



FRONT VIEW



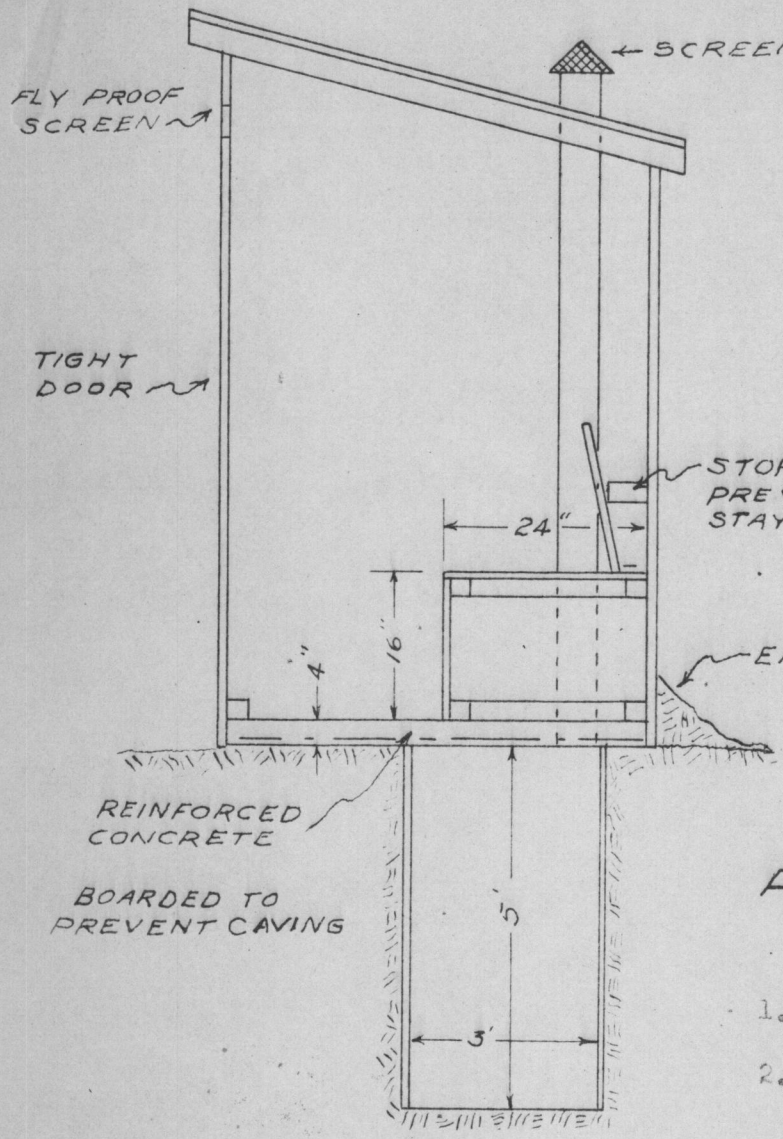
TOP PLAN

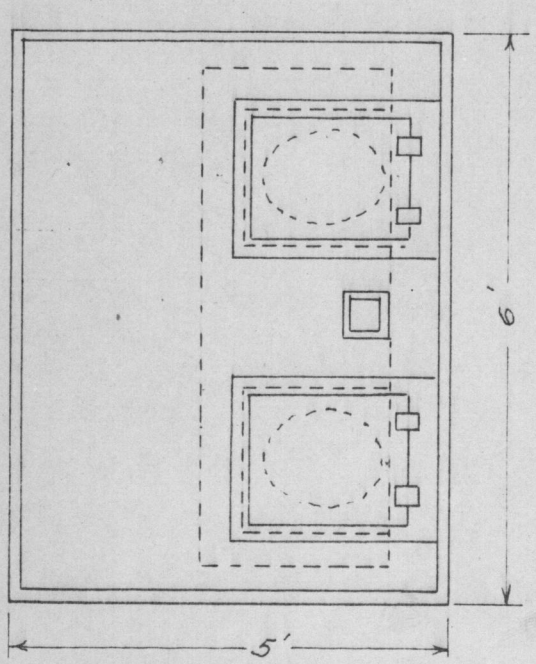
GARBAGE & REFUSE INCINERATOR

SPECIFICATIONS

1. Doors and door-frames of cast iron.
2. Door sizes may be changed.
3. Desirable to line with fire brick.
4. Garbage tray supports of heavy iron or steel.

Figure -- 4





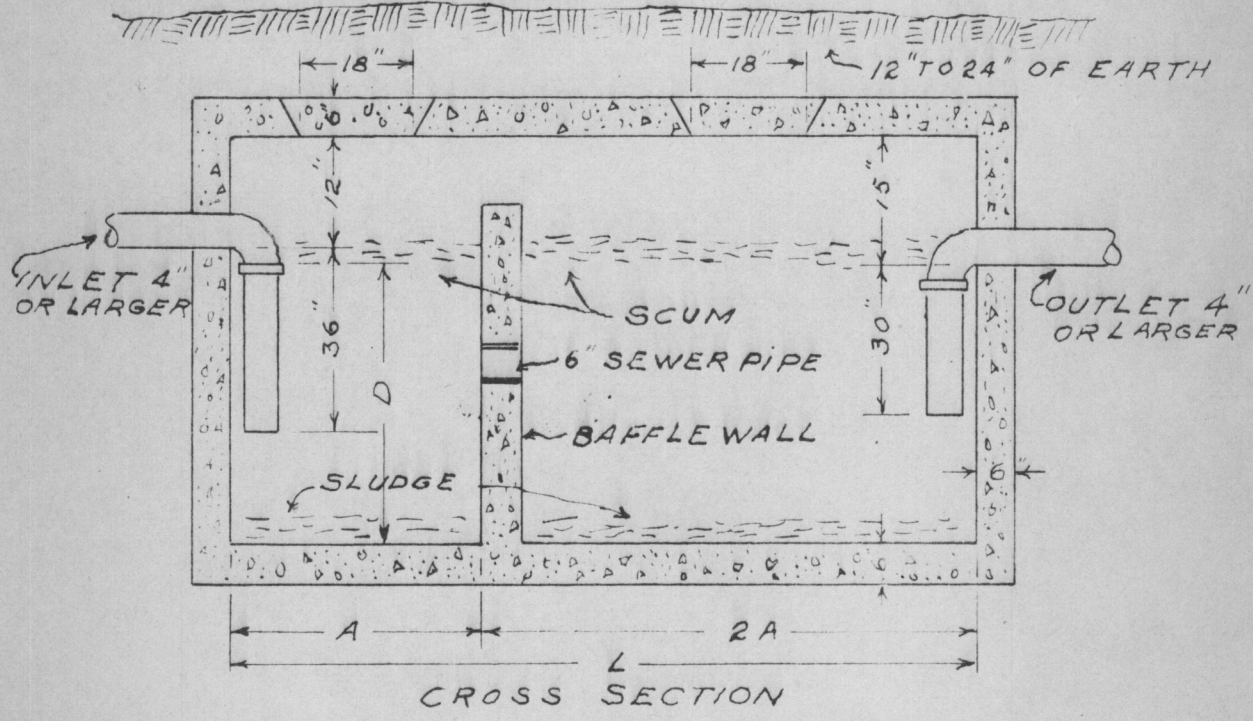
FLOOR PLAN

PIT PRIVY

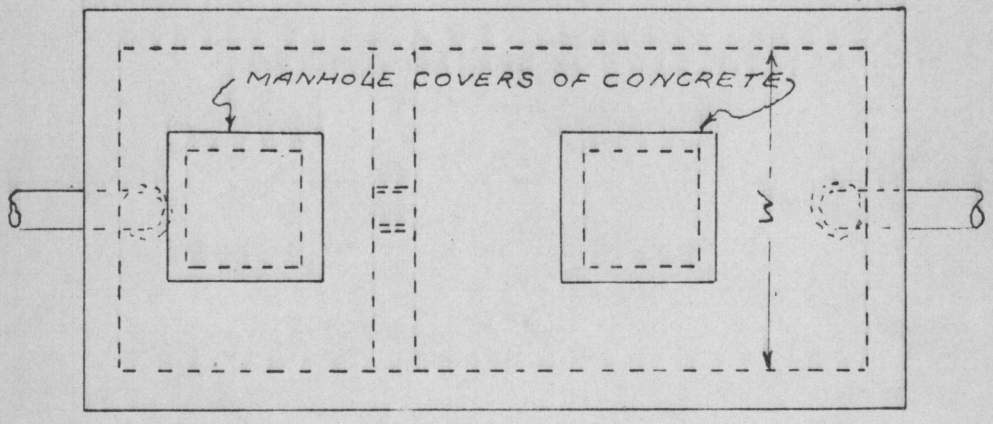
SPECIFICATIONS

1. Entire building to be fly-tight.
2. Concrete 1:2:4 with about ten pounds of steel wire for reinforcing.
3. Screen above door large enough to give plenty of light.
4. Spring hinges for covers.
5. Doors kept closed by spring or weighted cord.

Figure-5.



CROSS SECTION



TOP VIEW

TWO COMPARTMENT SEPTIC TANK

Figure -- 6.

TABLE I. (1)

SIZES FOR SEPTIC TANKS

Number of Persons	Gallons of Sewage Per Day, Maximum	Suggested Dimensions in Feet D	L	W
15	450	4	7	4
30	900	5	8	4½
45	1350	6	9	5
60	1800	6	10	6
75	2250	6	10	7½
90	2700	6	11	8
120	3600	6	15	8
150	4500	6	18	8½
180	5400	6	20	9

Note:

In two compartment tank A = 1/3 of above Table

D = Depth of Sewage below inlet pipe.

L = Inside length of tank.

W = Inside width of tank

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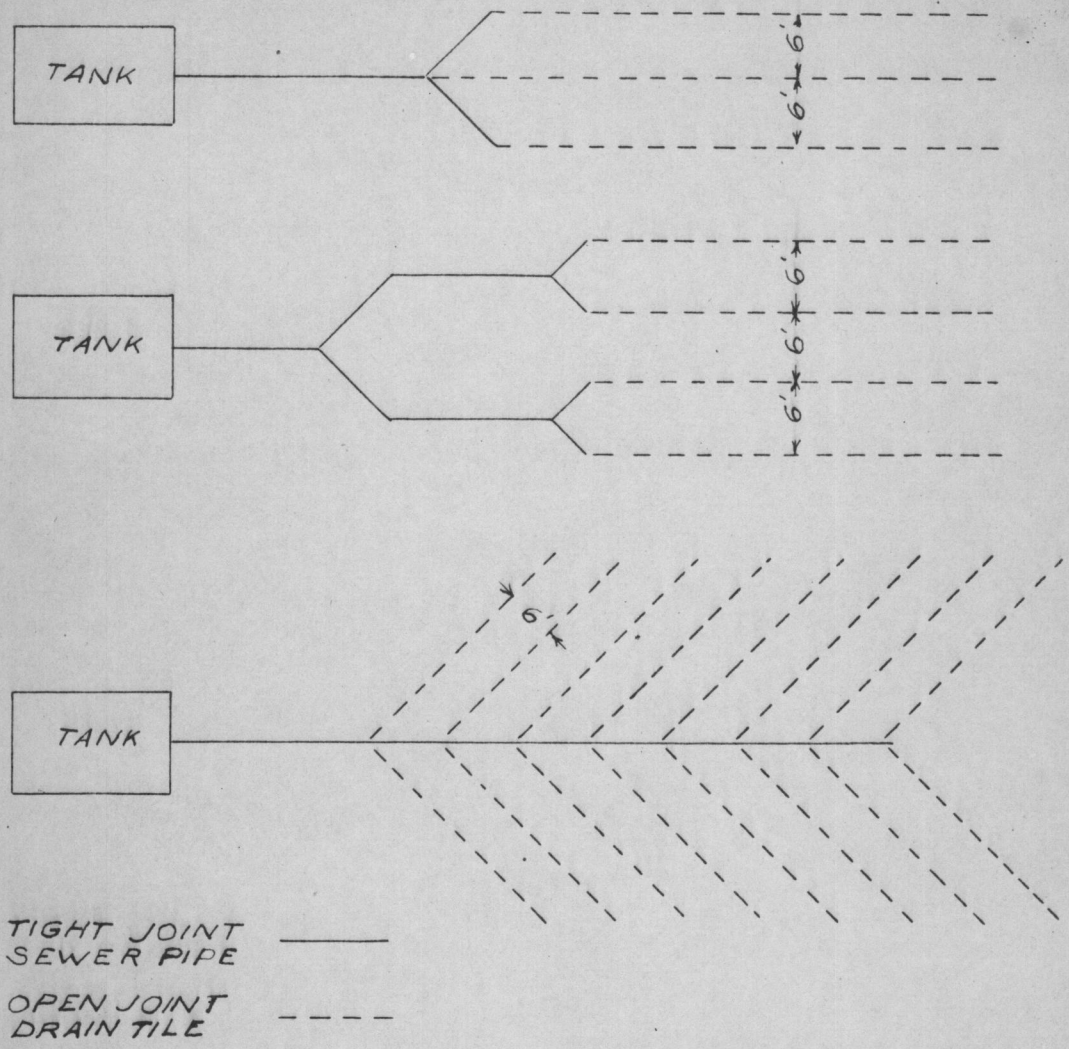
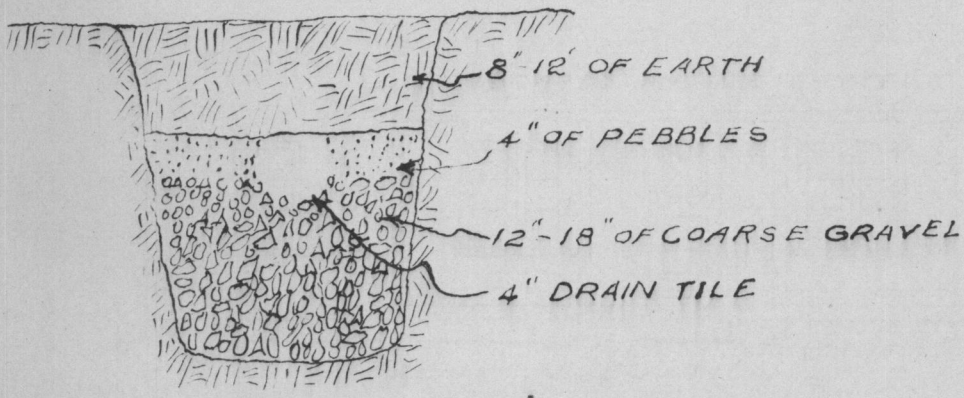


IRRIGATION SYSTEMS

SPECIFICATIONS

1. No pipe less than 4" in diameter.
2. Main lines to be of tight joint sewer pipe.
3. Distribution lines to be of open joint drain tile.
4. Distribution lines at least 6' apart.
5. Length of distribution lines depends upon porosity and slope of soil and number of persons using tank. 20 to 50 feet of line per person is usually required.
6. Advisable to construct trench for drain tile according to accompanying sketch.

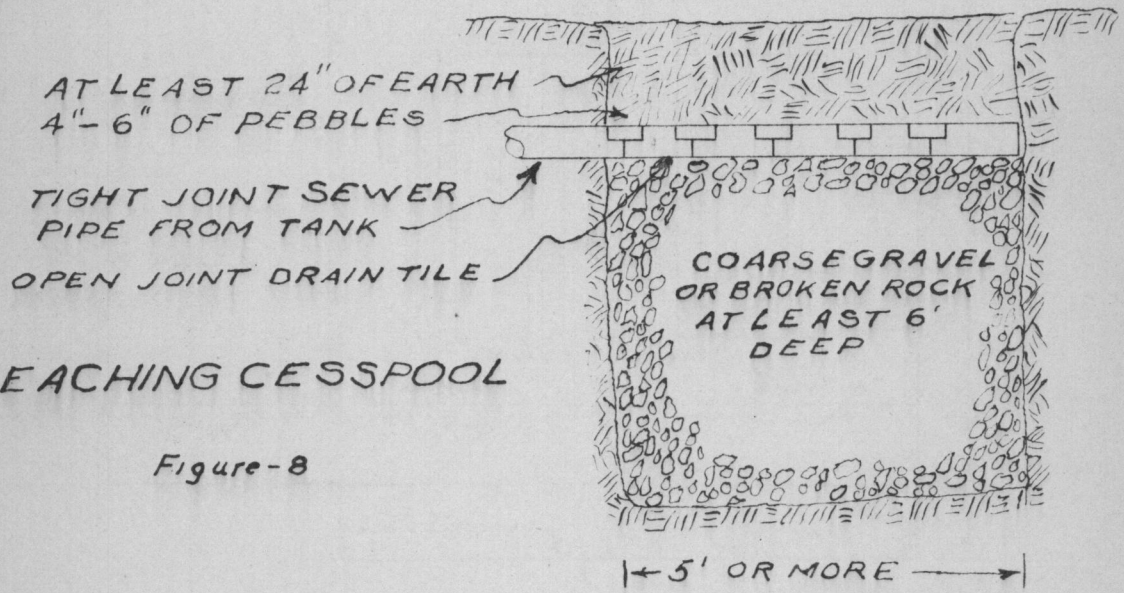
Figure - 7.



TRENCH CONSTRUCTION

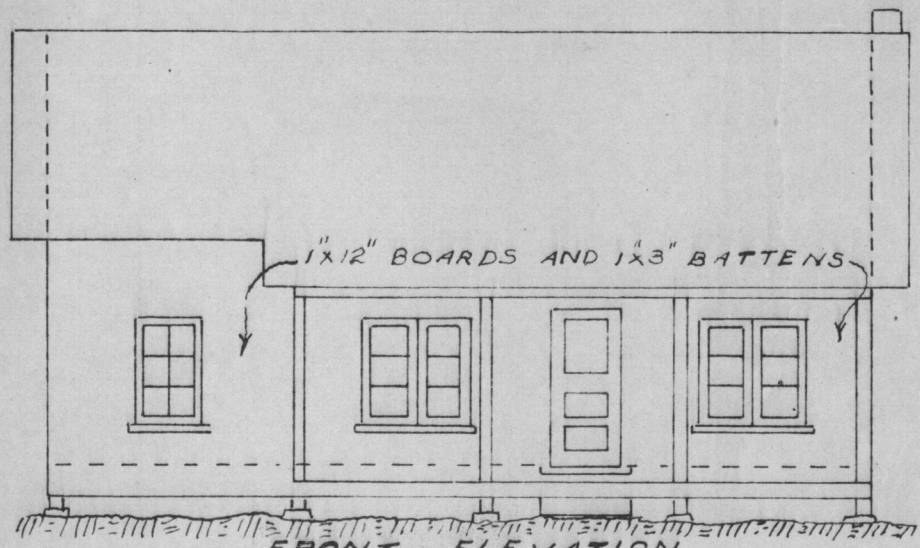
(Recommended for use with irrigation systems shown in Figure 7.)

May be necessary to construct a leaching cesspool or series of cesspools at end of each line.

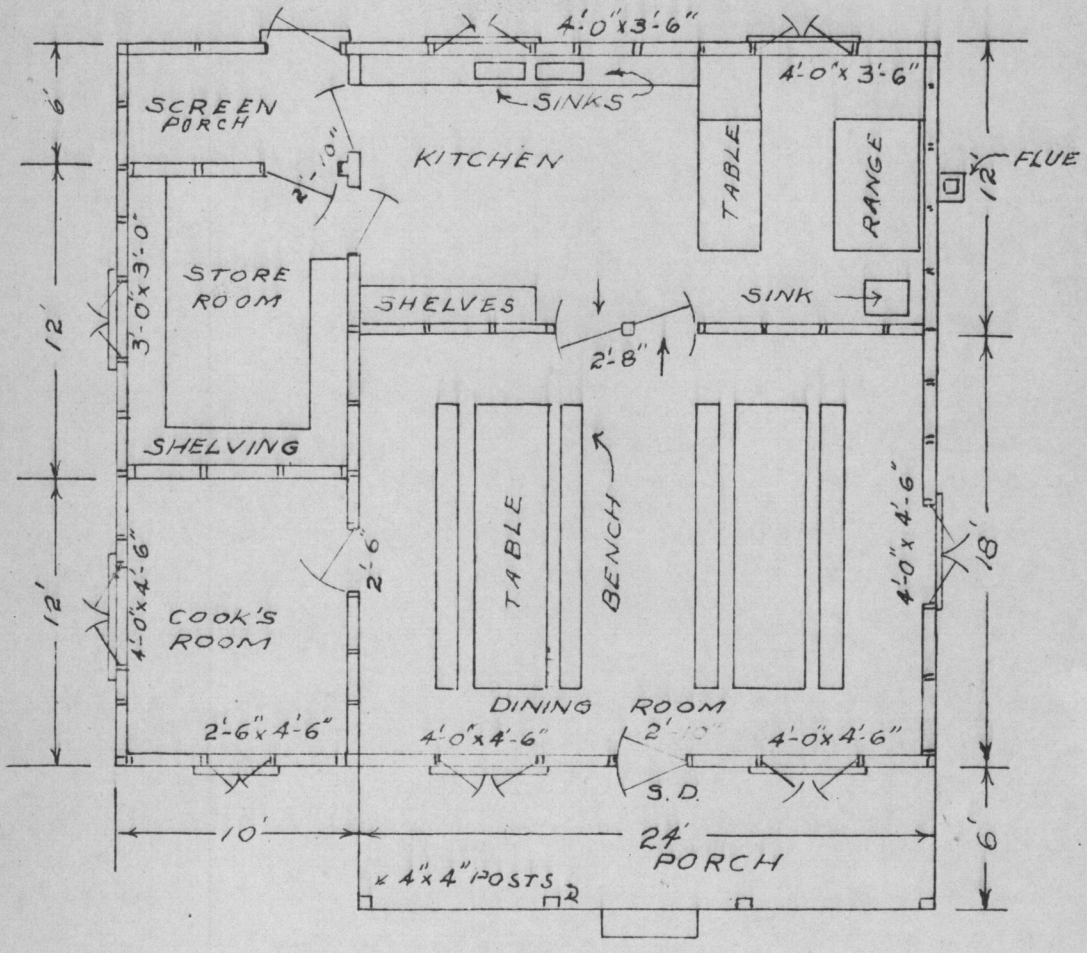


LEACHING CESSPOOL

Figure-8



FRONT ELEVATION



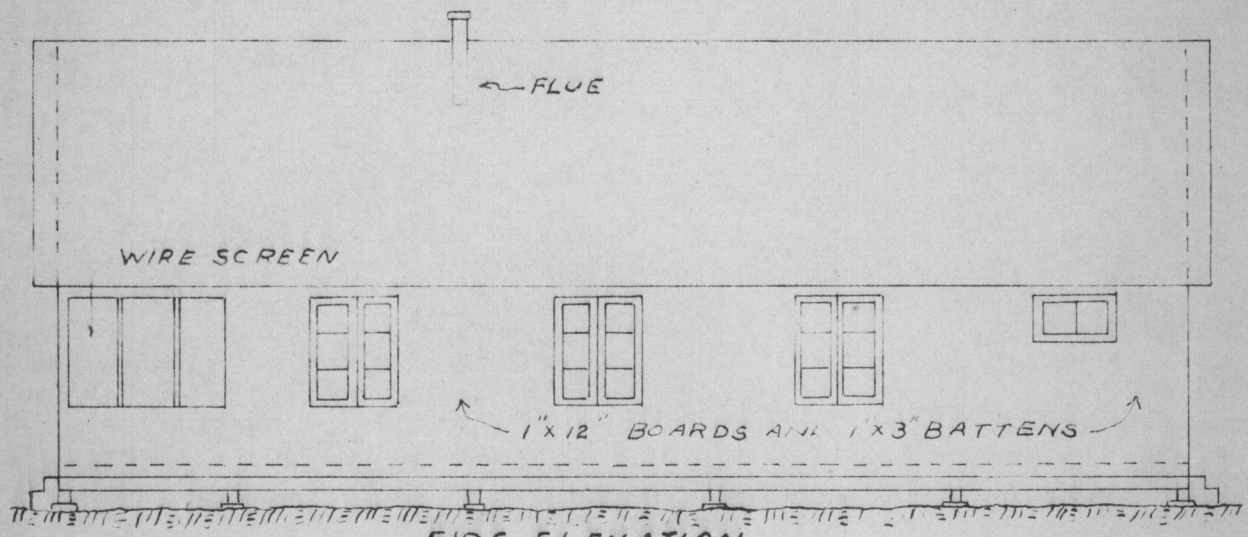
FLOOR PLAN

20 MAN DINING QUARTERS

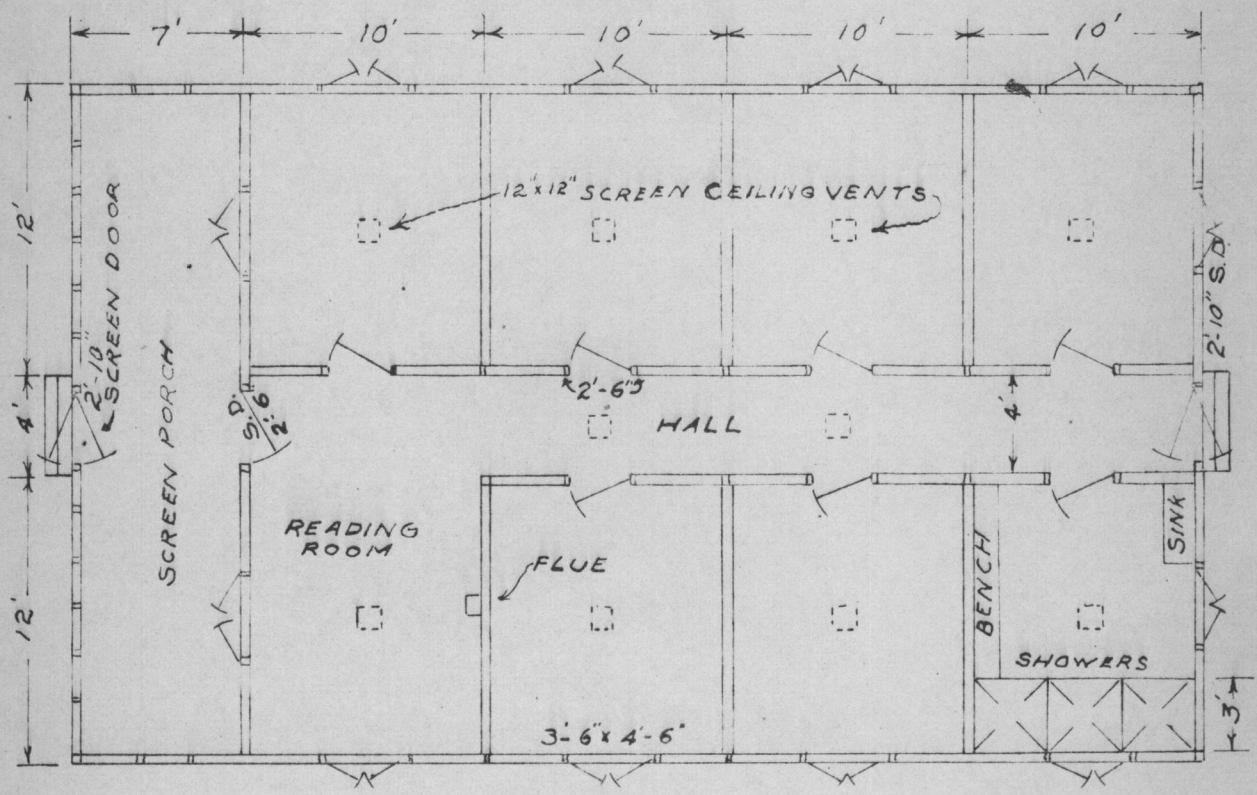
SCALE -- $\frac{1}{8}$" = 1'

Figure -- 9.

ADAPTED FROM SANITATION AND HOUSING, CALIFORNIA



SIDE ELEVATION



FLOOR PLAN

12 MAN QUARTERS

SCALE -- 1/8" = 1'

Figure--10.

ADAPTED FROM SANITATION AND HOUSING, CALIFORNIA