4-1953

EC701 Revised 1953 Farm Water System : Insulated Pump House

M. L. Mumgaard

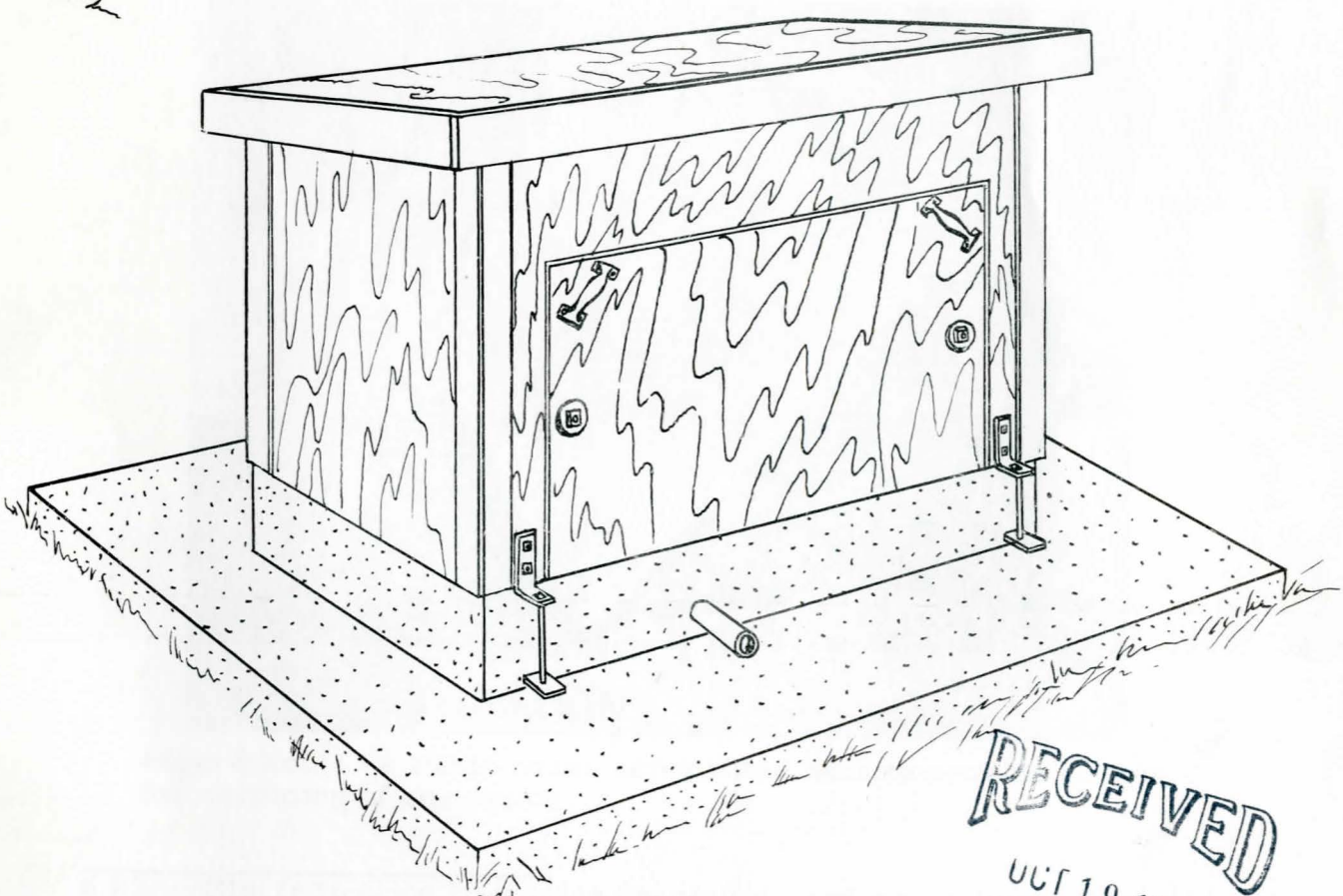
E. A. Olson

April 1953

E.C. -701

FARM WATER SYSTEM

INSULATED PUMP HOUSE



Published Cooperatively by
University of Nebraska College of Agriculture
and U. S. Department of Agriculture
W. V. Lambert, Director
and
Nebraska State Department of Health
Lincoln

Insulated Pump House

by
M. L. Mumgaard and E. A. Olson*

Insulated pump houses for sheltering farm water systems have proved to be both satisfactory and economical. Material for the pump house described in this circular will cost $50.00 to $55.00. Several of these installations in use for the past five years are giving satisfactory service.

The installation of equipment in an insulated house has a number of advantages. Most important of these is a sanitary water supply which assures the family of good quality drinking water. In areas where Grade A milk is produced this type of system is meeting with the approval of farmers as well as wellmen and plumbers and is recommended by sanitarians and milk producers. Servicing of equipment in the pump house can easily be done by removing the front door panel. The house can be tilted back or removed if work on the well is necessary. Life of equipment has proved to be increased in a dry house. Most pits are damp, causing corrosion and rust on electrical contacts and other moving parts.

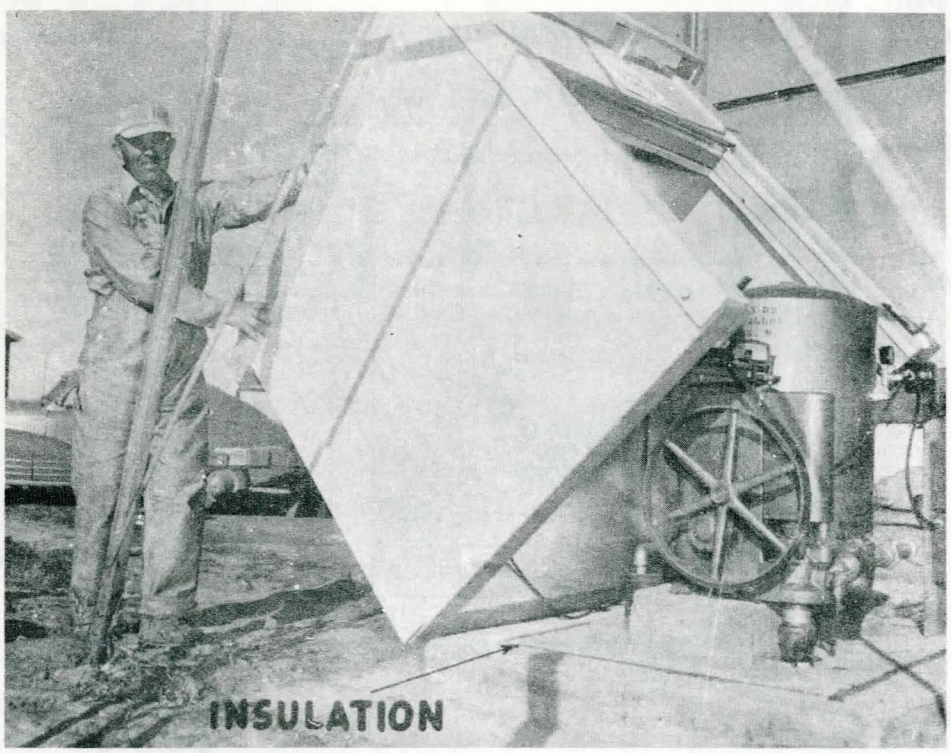
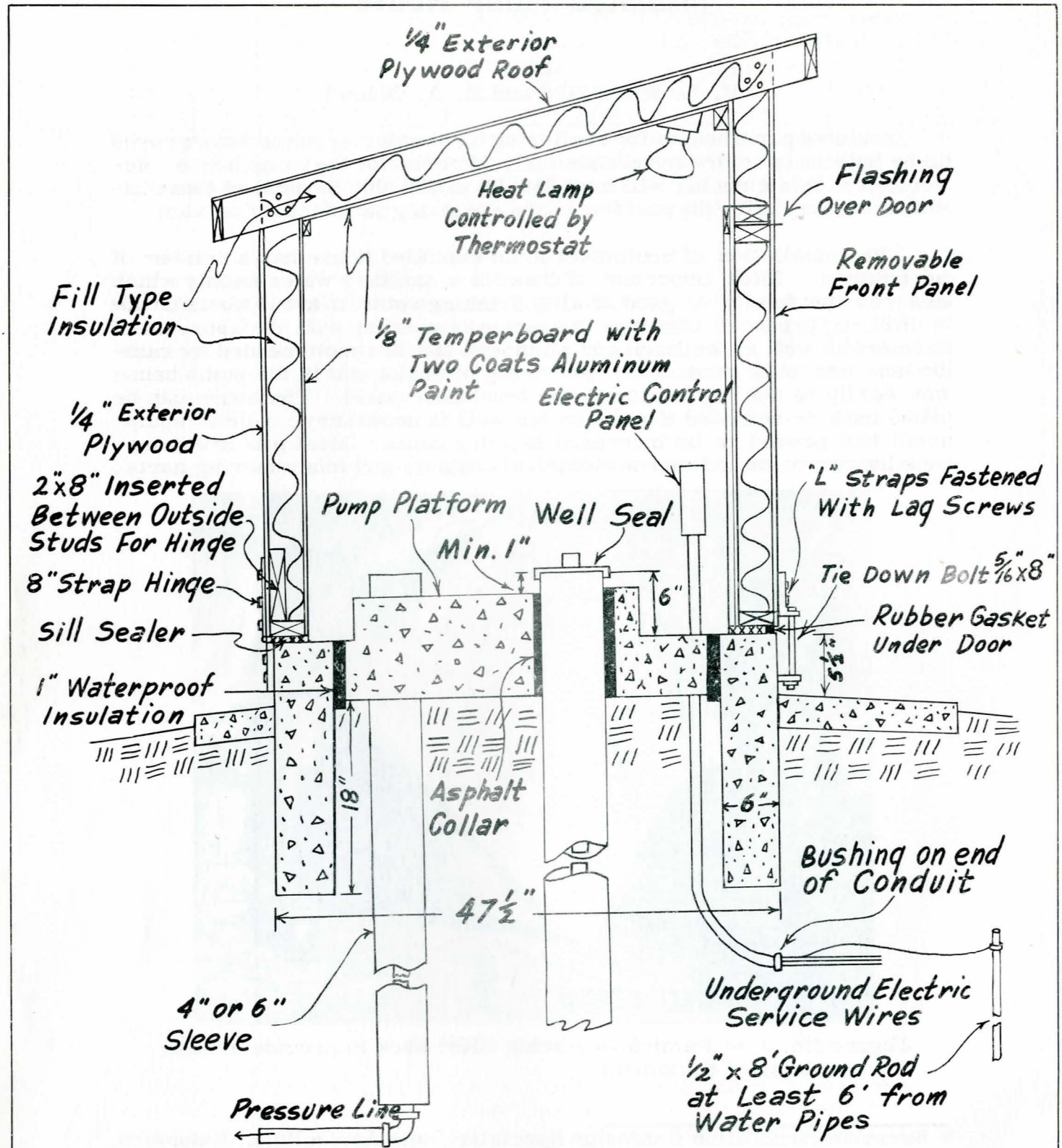


Figure No. 1 -- Pump house being tilted back to provide access for servicing of equipment.

* Farm Electrification Extension Specialist, and Agricultural Extension Engineer, respectively.

The authors wish to express their appreciation to the Division of Sanitation of the State Health Department for contributions and suggestions in the preparation of this circular.



— CROSS SECTION OF HOUSE ON PLATFORM —

FIGURE NO. 2

Freezing is eliminated in the insulated pump house. Heat given off by water being pumped (at 50 - 55° F.) and from the electric motor helps maintain the temperature above freezing. In eliminating the danger of freezing, a heat lamp controlled by a thermostat may be installed as a safety device. Observations show in most cases these will not use over 3 to 5 kilowatt-hours of electricity during one season. To prevent freezing during long power outages at low temperatures a kerosene or gasoline lantern, a blow torch or canned heat can be placed in the house. When this is done the door should be loosened in the opening to provide air.

The house illustrated in this circular is large enough for most pumping equipment now on the market. However, for some long-stroke pumps and multi-stage jet pumps additional height can be obtained by raising the foundation wall to form a curb above the platform. It is advisable to use a low or "squat" type pressure tank in the pump house. These are available in 42-gallon capacity, 20 inches in diameter and 36 inches high, at a slightly higher cost than the regular 42-gallon tank. However, this higher cost is offset by reducing the height of the house.

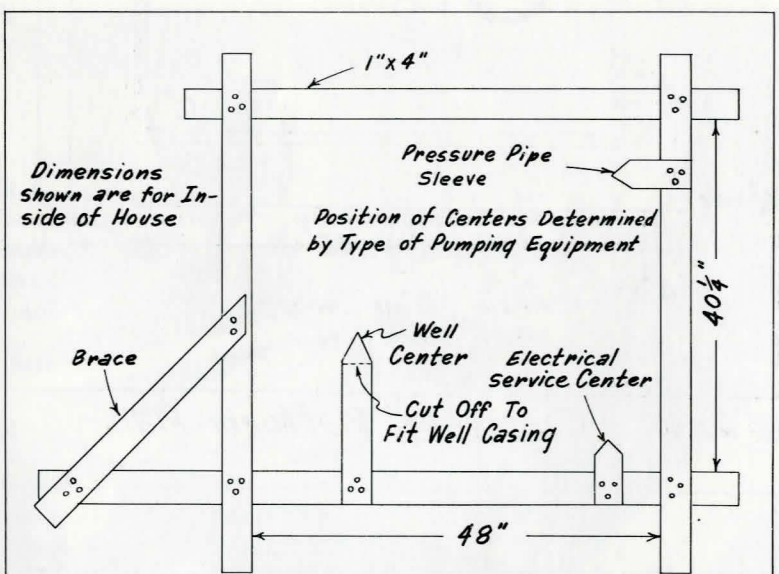


FIGURE. NO.3 - Template For Platform Construction -

CONSTRUCTION HINTS

1. For good surface drainage the ground surface at the well should be higher than the surrounding ground. It is suggested that the finished grade be at least 6 inches higher, with the well casing extending 12 inches above finished grade.

2. First, make a platform template as shown in Figure No. 3. Arrangement and location of equipment can be determined by "coupling up"

pump and tank on level ground in desired arrangement. Also determine position of pressure pipe and electrical service. Sleeve for pressure pipe need not be located directly under tank opening. Leave 4 inches of clearance between equipment and house.

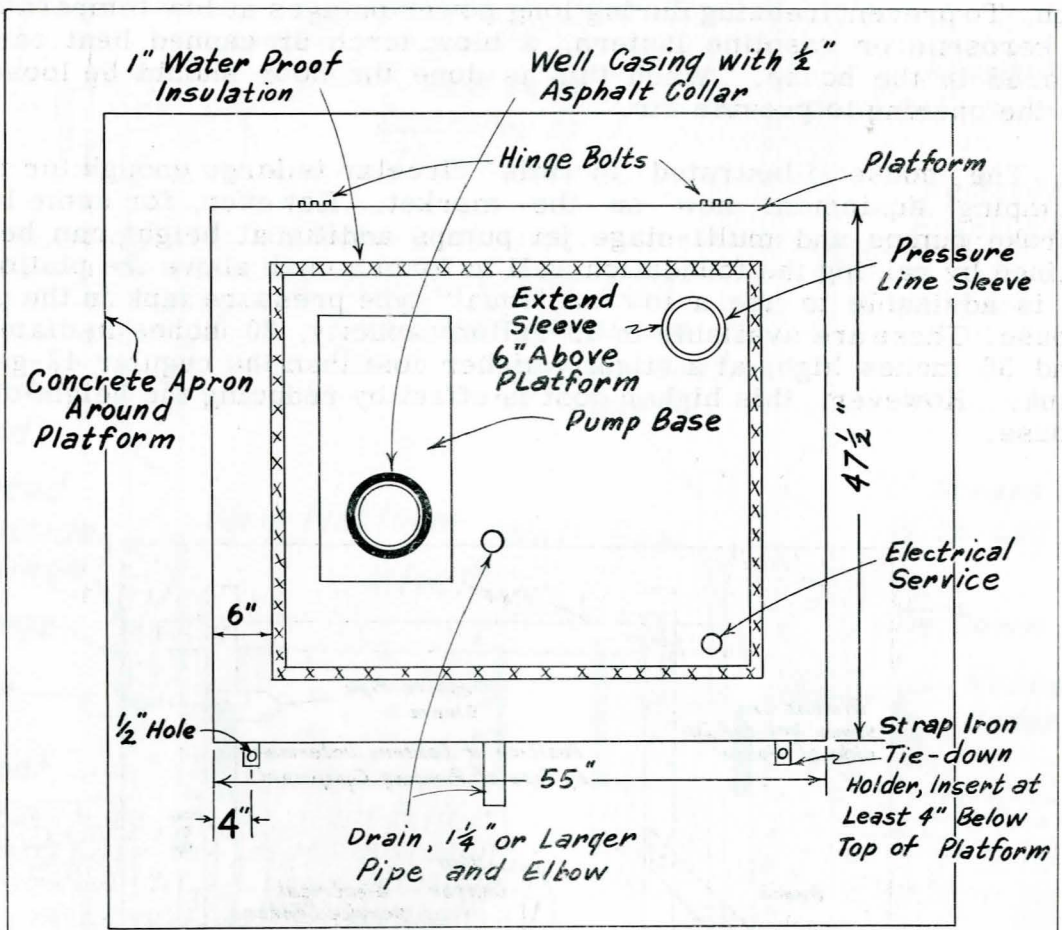


FIGURE NO. 4 -Concrete Platform Plan-

3. Use template for determining locations of electrical service and pressure line in relation to well casing. Sleeve for pressure line extends to frost line and helps prevent freezing. Insulation should not be used in sleeve; it may become damp and increase danger of freezing. After pressure line is installed, place hail screen or hardware cloth over top of sleeve.

4. Install underground wiring, (type U. S. E.) in conduit as shown in Figures No. 2 and 8. This arrangement will usually be as economical and more satisfactory than overhead wiring. If overhead wiring is used, set pole beside house and place wire underground from pole. Service should be 3 wire, 115-230 volts if electric motor is 1/2 H. P. or larger. Size of wires will depend on motor size and length of run.

5. Two electric switches that operate independently will be required, one for the 230-volt motor, and the other for the 115-volt heat lamp. (See Figure No. 8.) When a motor overload protection switch is installed, it can also serve as the motor switch. A receptacle outlet should be provided for the heat lamp and thermostat so they can be disconnected when the house is removed. If only 230-volt service is available, use a 230-volt thermostat and heat lamp, or, two 115-volt lamps of the same wattage in series.

6. For fire protection, wiring to the pump should be direct from the meter pole with service connected ahead of the pole breakers. Use a separate circuit breaker or fuse box at the meter pole for service wires to the pump.

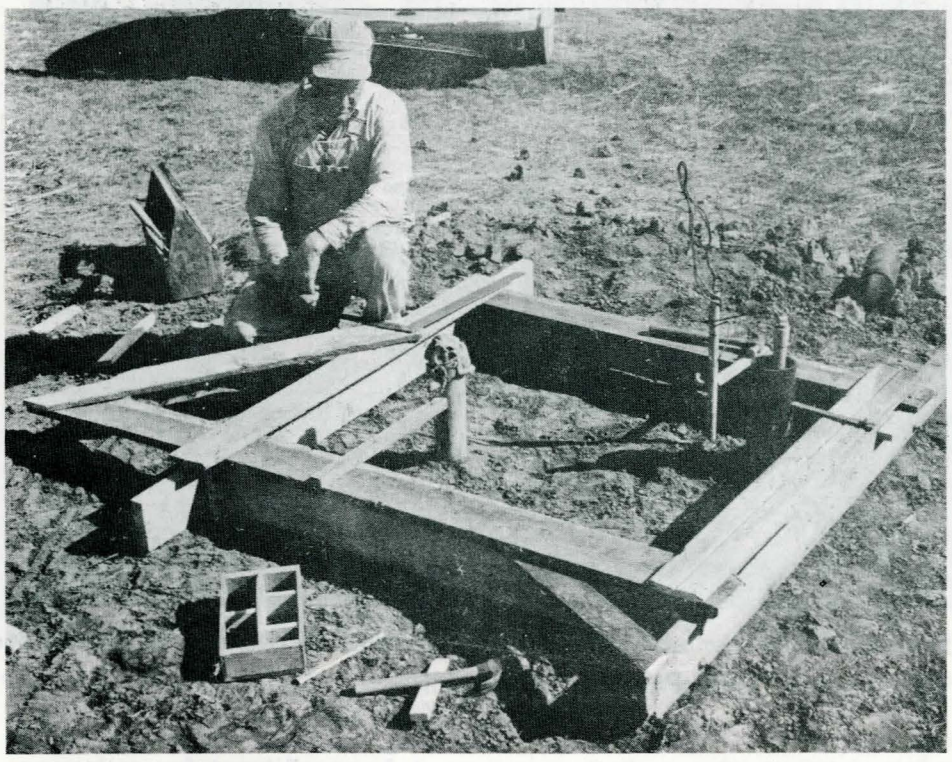


Figure No. 5 Template nailed to forms to aid in positioning forms and locating trench for foundation wall.

7. Trench for foundation wall should extend 18 inches below grade. To provide added stability, dig 6-inch post holes in each corner to a depth of 3 feet below grade.

8. Platform forms can be built of 2" x 6" material. Construct as shown in Figure No. 6 with dimensions as shown in Figure No. 4. This allows house to extend 1/2 inch beyond platform. Before assembling forms, make holes for hinge bolts, drain pipe, and tie-down straps. Holes in hinges should be drilled to 3/8 inch. Drain should discharge to south side of house. Thread outer end of drain pipe.

9. Set forms so that top of well casing will be 6 inches above the finished floor. See Figure No. 2. Template can be used for positioning forms as shown in Figure No. 5.

10. After forms have been set, place reinforcing and floor drain. A 3-foot length of 3/8-inch reinforcing rod is used in center of each corner post hole. Continuous reinforcing is also placed near the bottom of the foundation wall. Platform reinforcing is placed as shown in Figure No. 7.

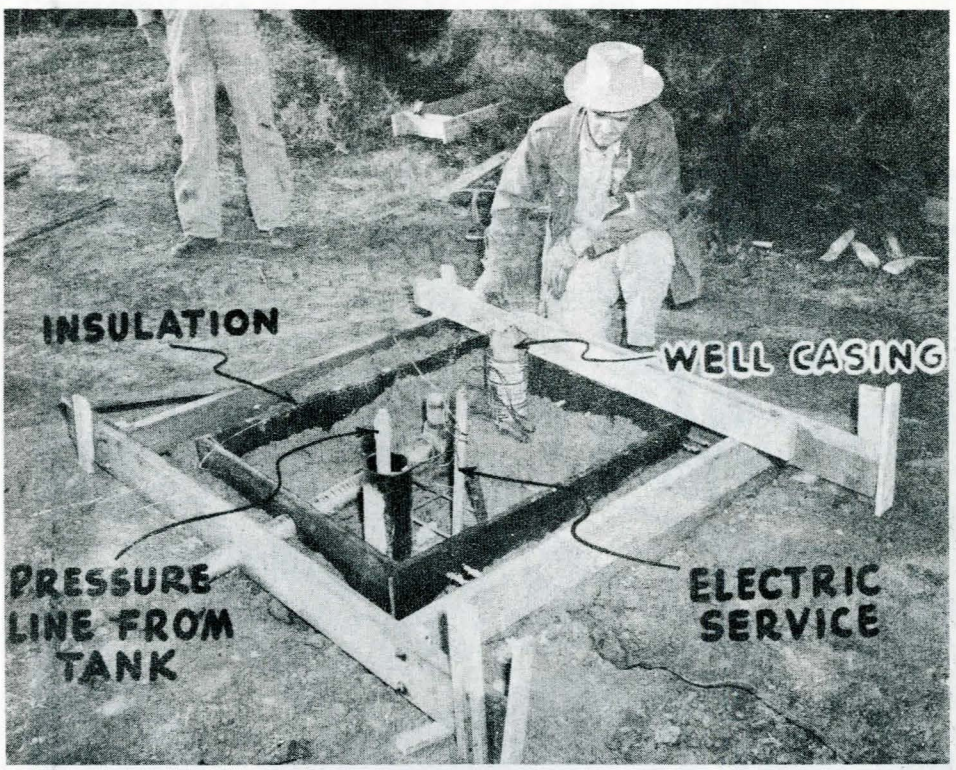


Figure No. 6 View showing forms staked in place and concrete being placed.

11. Insulation in platform helps prevent loss of heat from house. Use a waterproof insulation board. Place strips of insulation after part of concrete has been placed as shown in Figures No. 1, 2, and 6. Also place can or metal collar around well casing to allow space for asphalt collar.

12. Bend hinge bolts slightly, near the head, to hold them securely in the concrete.

13. Since the well casing extends 6 inches above platform, the pump must be set on a base as shown in Figures No. 1, 2, 4, and 8. This concrete base should be made at the same time as the platform unless a metal pump base extension is available. To facilitate locating bolts for securing pump, a template can be made from scrap temperboard.

14. Use a good quality concrete for platform. For best results, use not more than 6 gallons of water for each sack of cement. Further details on mixing and placing concrete are given in Portland Cement Association Circulars, "Making Good Quality Concrete" and "Proper Mixes for Small Jobs." Copies can be obtained from your County Extension Agent, or by writing Extension Service, College of Agriculture, Lincoln.

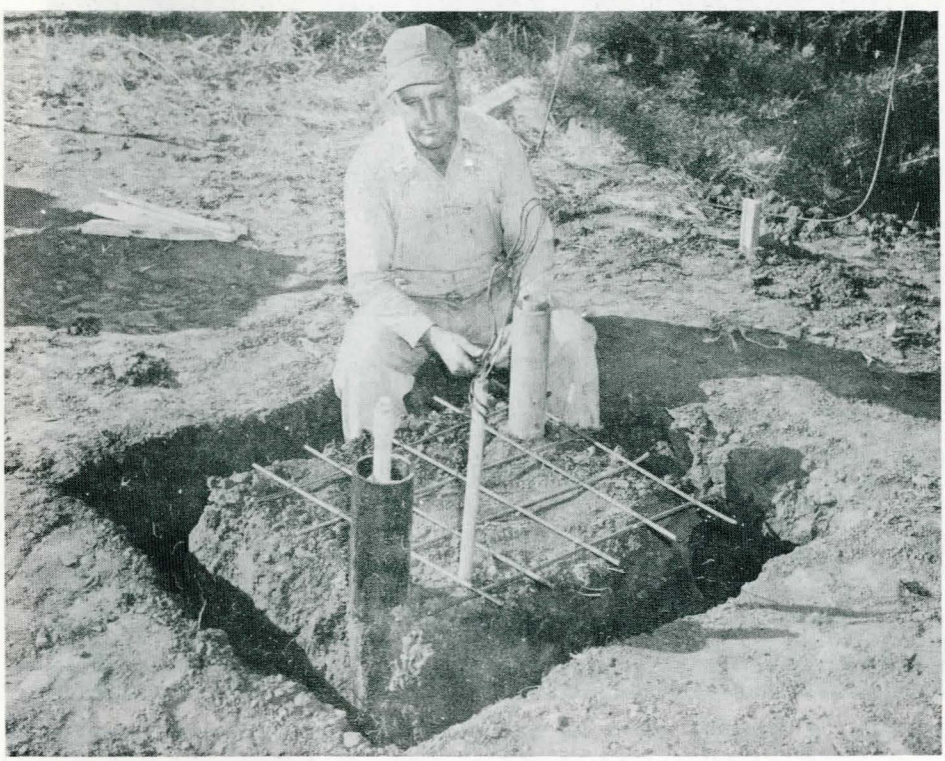


Figure No. 7 Foundation tench has been completed. Note reinforcing placed for platform.

15. Slope finished floor slightly to the floor drain to provide for good drainage.

16. A concrete apron around the platform at least 12 inches wide, as shown on the cover, will prevent erosion and also facilitate servicing of equipment. This can be poured at the same time as the platform or later. To prevent shifting a continuous piece of reinforcing should be placed in the apron.

17. Before installing pump, place asphalt in space provided around well casing. Best results will be obtained by using an asphalt and asbestos fiber roofing compound. Secure and install a sanitary well seal before setting pump in place. The use of this seal will help keep well free from contamination. Set tank on concrete blocks or bricks to facilitate piping and to prevent rusting. Use copper tubing from pressure relief valve and pump packing gland to floor drain to help keep house dry. (See Figure No. 8.) To prevent rodents from entering house, place a pipe cap on the threaded end of the drain. The cap should be drilled with several 3/8-inch holes in the end and around the sides.

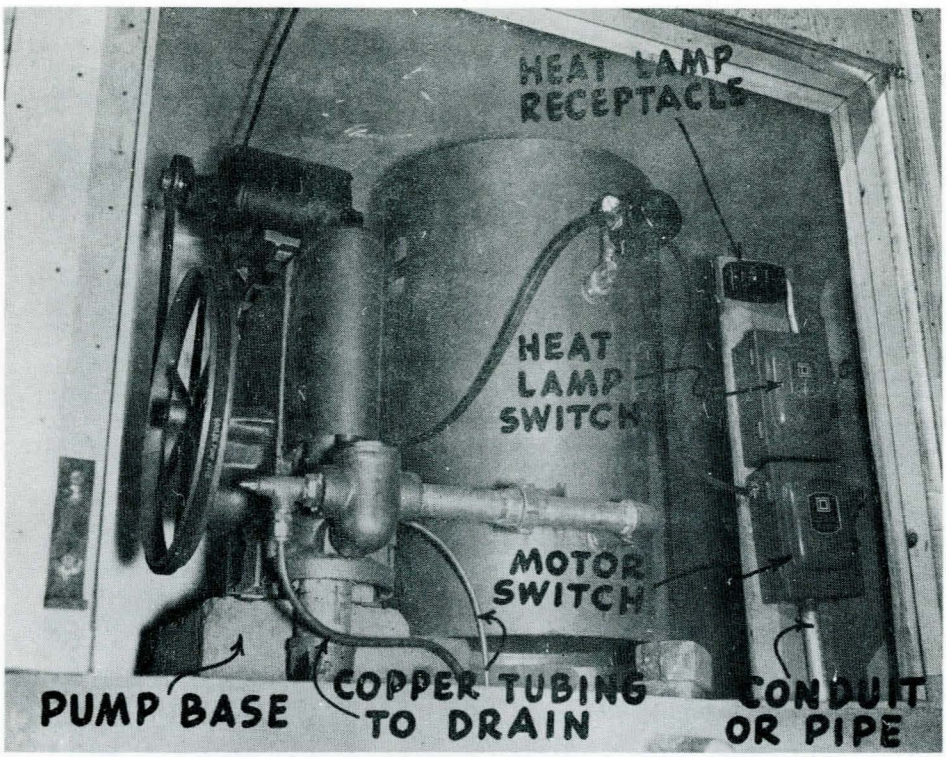


Figure No. 8 Inside view of pump house showing arrangement and location of equipment. Note board can be used to help support switches. Clamp lower end of board to conduit.

18. House is constructed with 2" x 4" farming, 1/4" exterior plywood and temperboard (see Bill of Materials, page 16.) Exterior plywood, made with a waterproof glue that will withstand weathering, has proved to be a durable building material. Cost will not exceed that of conventional siding. Labor is also saved during construction. (See cutting plans for plywood and temperboard, Figures No. 17 and 18.)

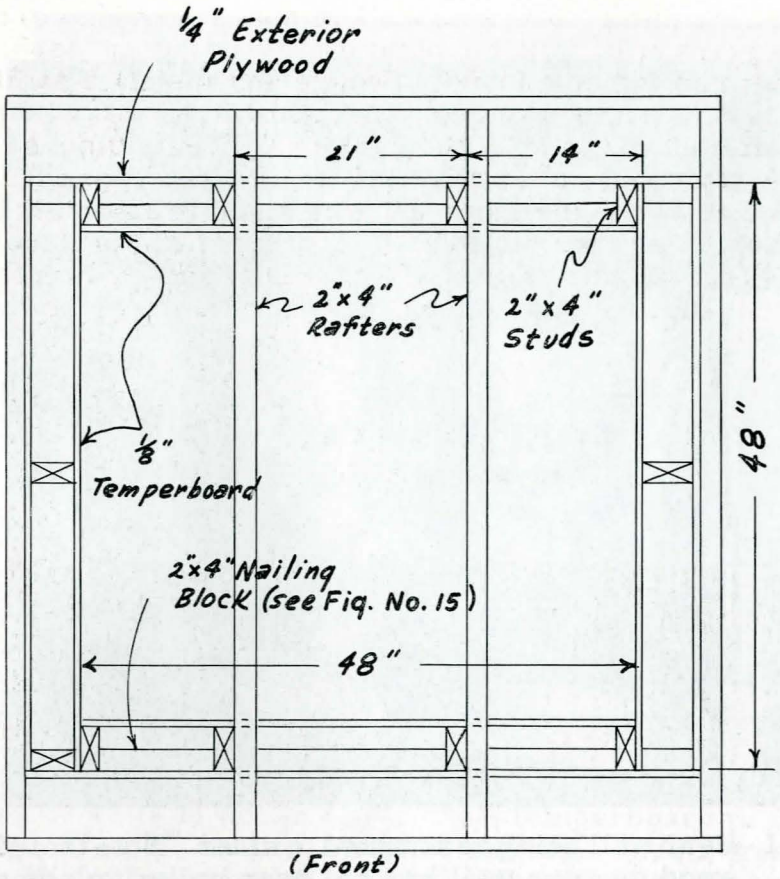


FIGURE NO. 9 -Framing Plan-

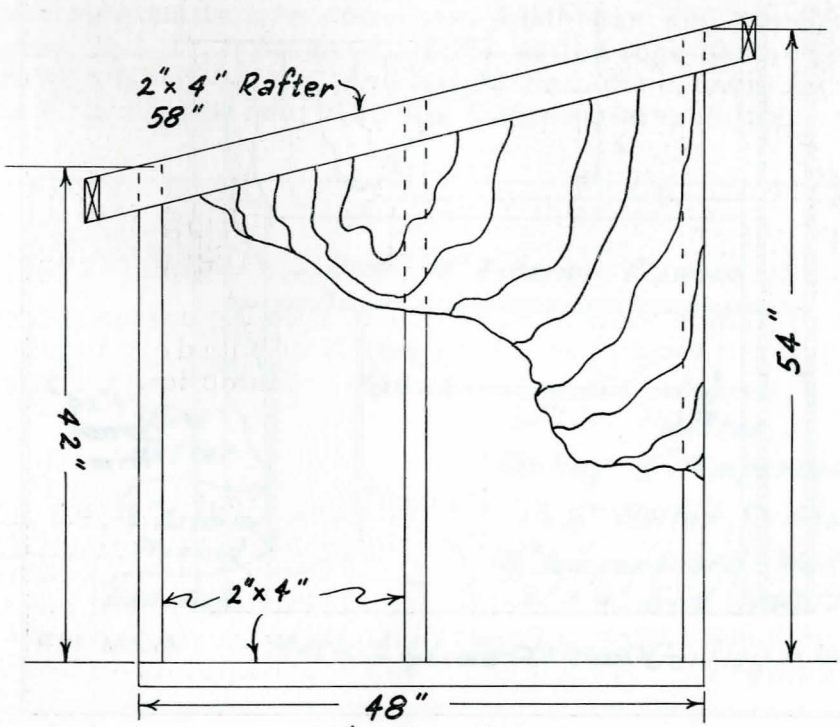


FIGURE NO. 10 -Side Framing-

Figure No. 11 Rear wall being assembled to sides. Note that plywood on rear wall has not been nailed in place.

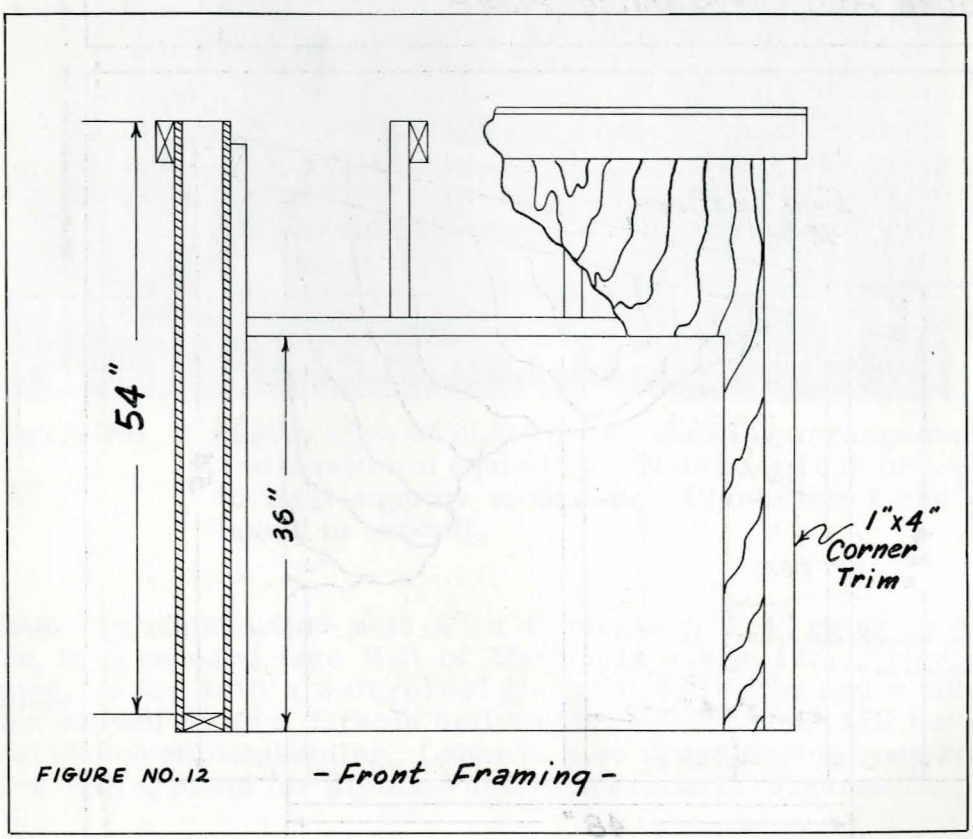


FIGURE NO. 12 - Front Framing -

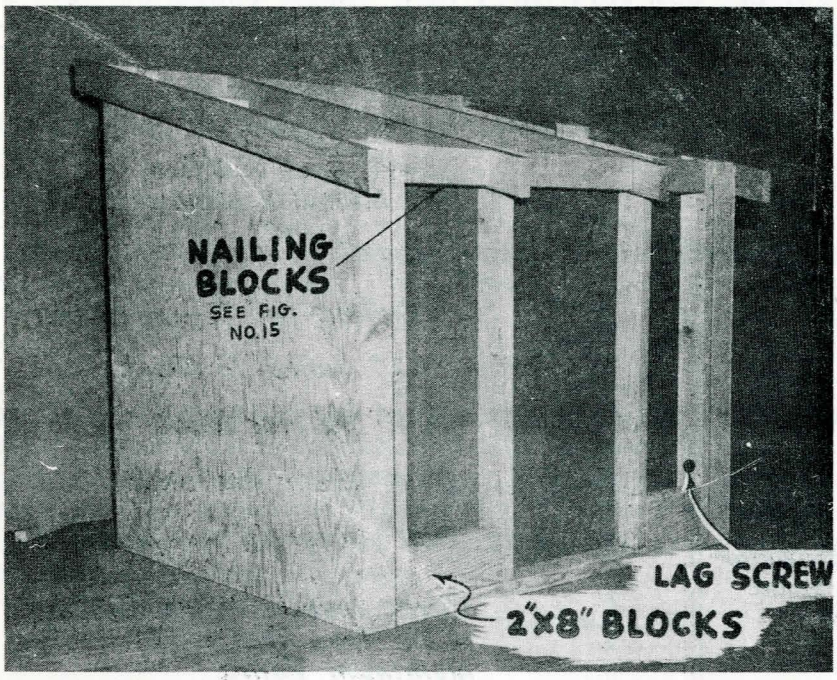


Figure No. 13 Rear view of pump house before plywood has been nailed to rear wall.

19. Build side walls of house first. Nail temperboard to inside of framing and 1" x 2" nailing strip for ceiling. (See Figures No. 11 and 14.) Nail plywood with 4 D galvanized nails, placed 3 to 4 inches apart. Since plywood will lack about 1 1/2 inches of reaching to top of stud, place plywood scrap between rafter and stud before nailing rafter.

20. After side walls are complete, add rear and front walls. (See Figure No. 11.) Studs should be nailed together at corners and lag screws placed before plywood is nailed on back and front. Note 2" x 8" blocks in rear wall for fastening hinges to house.

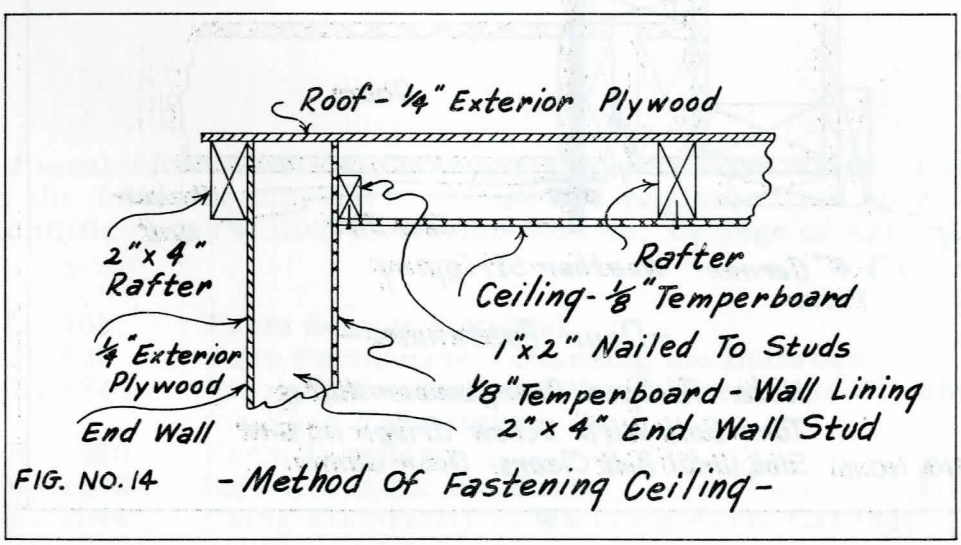


FIG. NO. 14 - Method Of Fastening Ceiling -

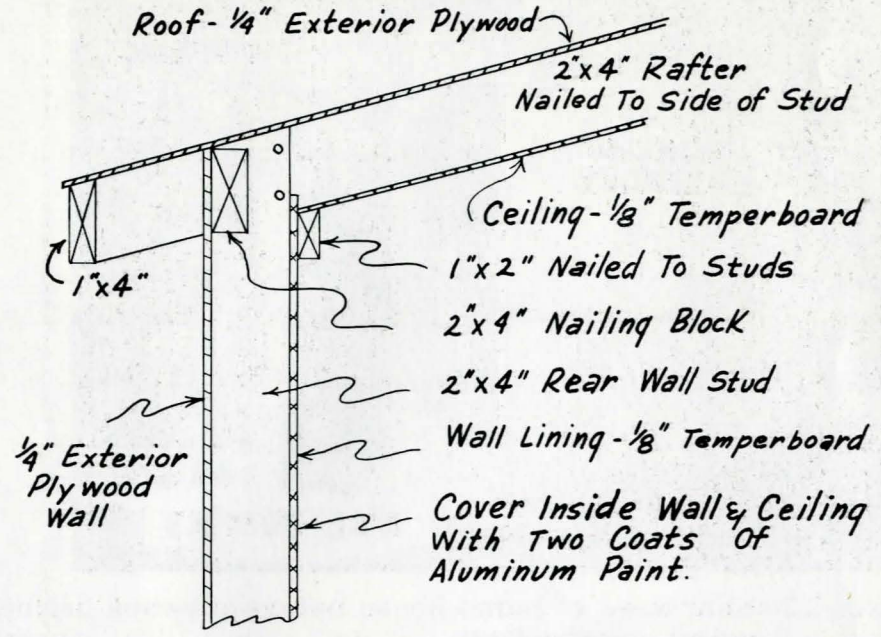
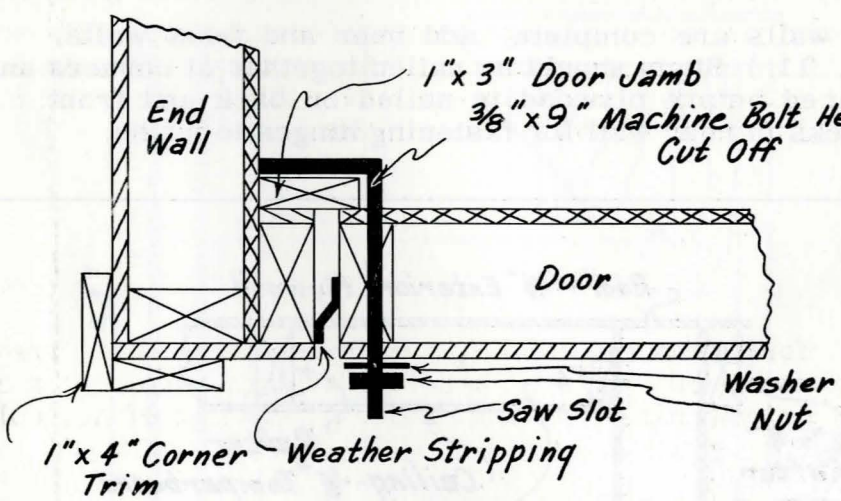


FIGURE NO. 15 — METHOD OF FASTENING CEILING AND INSIDE WALL LINING. —



-Door Fasteners-

Note: To Open Door, Loosen Nut & Turn Bolt With Screw driver in saw Slot, Until Bolt Clears Door Jamb.

FIG. NO. 16

21. Figure No. 13 shows house with rear wall and rafters in place. When plywood is nailed to rear and front wall and after ceiling has been placed, insulation can be poured in side walls and ceiling. Tapping walls as insulation is placed will compact the insulation and prevent settling later.

22. Since plywood roof is in two sections, use a caulking compound at joint to make weatherproof.

23. Insulated door is constructed to fit front opening. Provide about 1/4 inch door clearance at sides and top to permit use of weather-stripping as indicated in Figure No. 16. Rubber gasket is nailed to bottom of door as shown in Figure No. 2. Door is held in place with bolts as shown in Figure No. 16. Two bolts are used, one on each side of door as shown on cover.

24. Remove hinge pins before installing hinges. Top half of hinge should be reversed to permit edge of house to extend over platform. Before locating holes for top half of hinges, place sill sealer on platform under house sill.

25. Paint inside and outside walls and roof of house. Use good grade of exterior paint on outside. For inside of house, apply two coats of aluminum paint. The aluminum paint will act as a vapor barrier and prevent moisture from collecting in the walls. It also acts as an insulator and helps keep the house warmer.

Additional information for planning a complete farm water system is given in the following circulars. These are available from your county extension office or by writing Extension Service, College of Agriculture, Lincoln.

E. C. 703	Farm Sewage Disposal
M. P. 638	Your Farmhouse - Planning the Bathroom
M. P. 674	Planning the Electric Water System and Plumbing for Your Farmstead
F. B. 1426	Farm Plumbing
F. B. 1978	Safe Water for the Farm
F. B. 2044	Using Electricity in Watering Farm Gardens

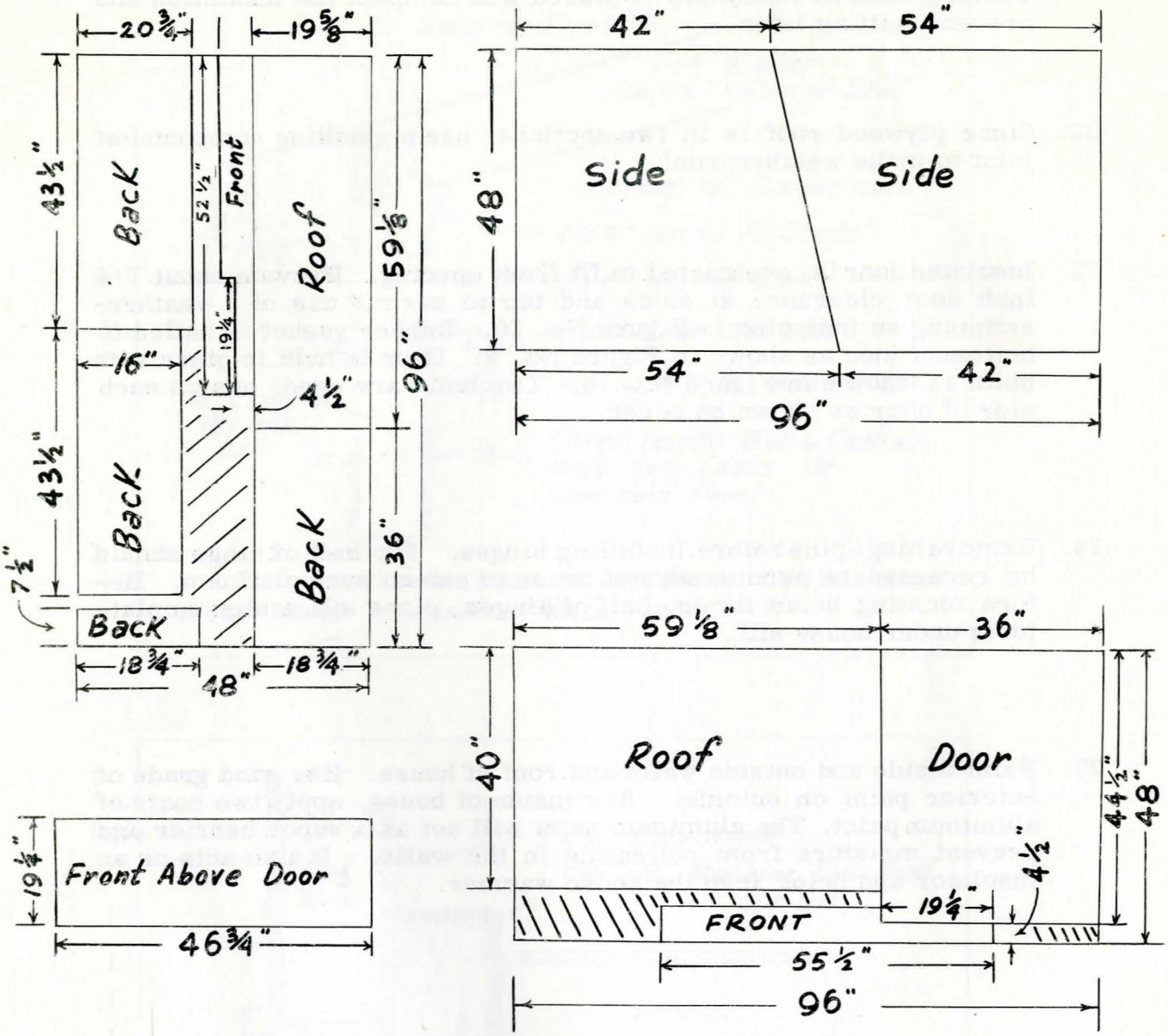


FIGURE NO. 17 -PLYWOOD CUTTING PLANS-

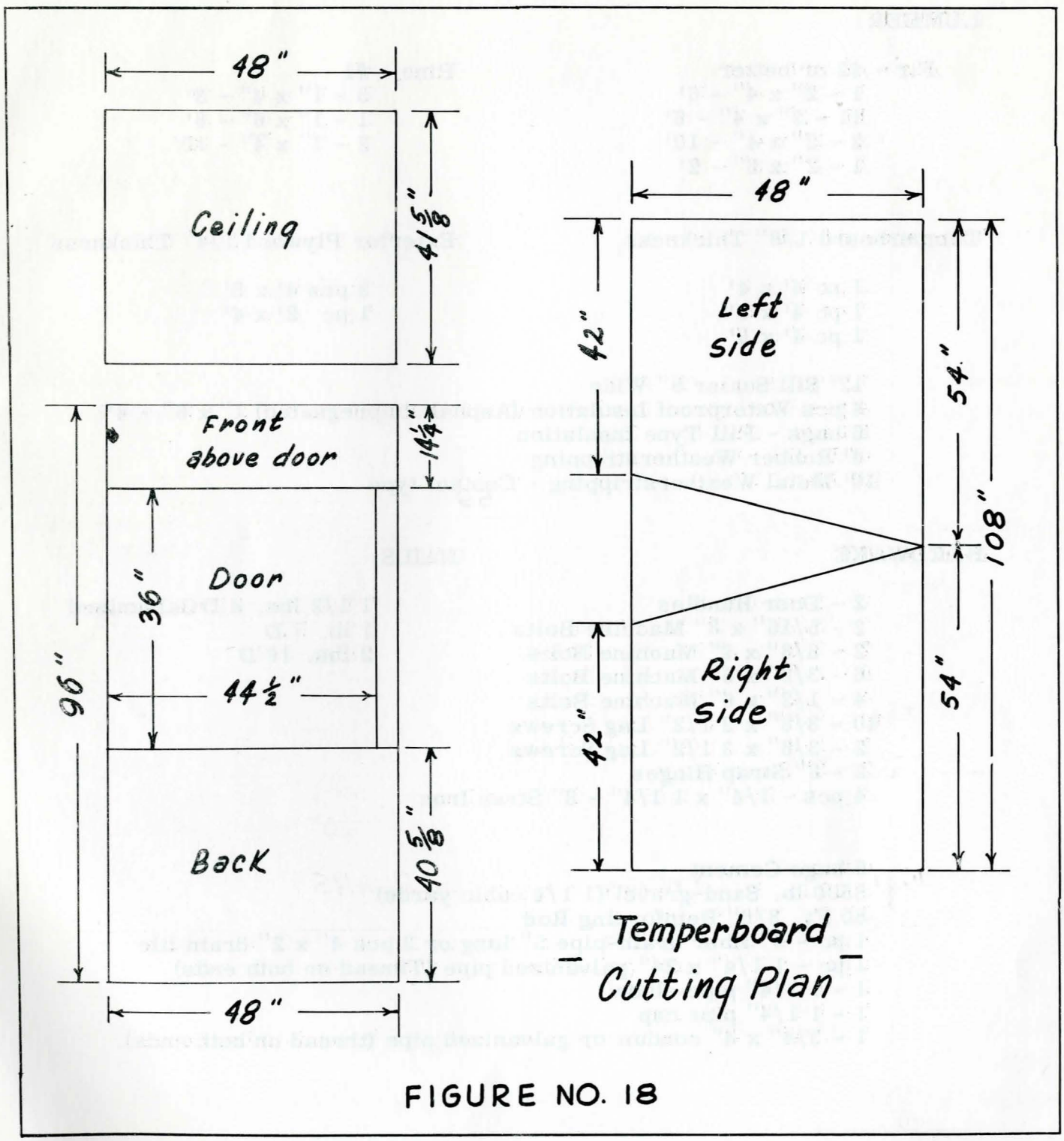

48"
Ceiling
41 5/8"
Front above door
14 1/4"
Door
36"
44 1/2"
96"
Back
40 5/8"
48"
48"
Left side
42"
54"
108"
Right side
42"
54"
Temperboard
Cutting Plan

FIGURE NO. 18

BILL OF MATERIALS

Pump House and Concrete Platforms

LUMBER

Fir - #2 or better
- 1 - 2" x 4" - 6'
- 11 - 2" x 4" - 8'
- 2 - 2" x 4" - 10'
- 1 - 2" x 8" - 2'

Pine - #1
- 5 - 1" x 4" - 8'
- 1 - 1" x 6" - 8'
- 2 - 1" x 4" - 10'

Temperboard 1/8" Thickness
- 1 pc 4' x 4'
- 1 pc 4' x 8'
- 1 pc 4' x 9'

Exterior Plywood 1/4" Thickness
- 3 pcs 4' x 8'
- 1 pc 2' x 4'

- 12' Sill Sealer 6" Wide
- 4 pcs Waterproof Insulation (Asphalt Impregnated) 1" x 6" - 4'
- 6 bags - Fill Type Insulation
- 4' Rubber Weatherstripping
- 10' Metal Weatherstripping - Contact type

HARDWARE

- 2 - Door Handles
- 2 - 5/16" x 8" Machine Bolts
- 2 - 3/8" x 9" Machine Bolts
- 6 - 3/8" x 6" Machine Bolts
- 4 - 1/2" x 6" Machine Bolts
- 10 - 3/8" x 2 1/2" Lag Screws
- 2 - 3/8" x 3 1/2" Lag Screws
- 2 - 8" Strap Hinges
- 4 pcs - 1/4" x 1 1/4" - 8" Strap Iron

NAILS

- 1 1/2 lbs. 4 D Galvanized
- 1 lb. 7 D
- 2 lbs. 10 D

- 6 bags Cement
- 3500 lb. Sand-gravel (1 1/4 cubic yards)
- 80 Ft. 3/8" Reinforcing Rod
- 1 pc - 4" fiber drain-pipe 5" long or 3 pcs 4" x 2" drain tile
- 1 pc - 1 1/4" x 24" galvanized pipe (Thread on both ends)
- 1 - 1 1/4" pipe elbow
- 1 - 1 1/4" pipe cap
- 1 - 3/4" x 4" conduit or galvanized pipe (thread on both ends).