Work team _____
Project # _____
Date _____

TYPICAL DECK CROSS SECTION

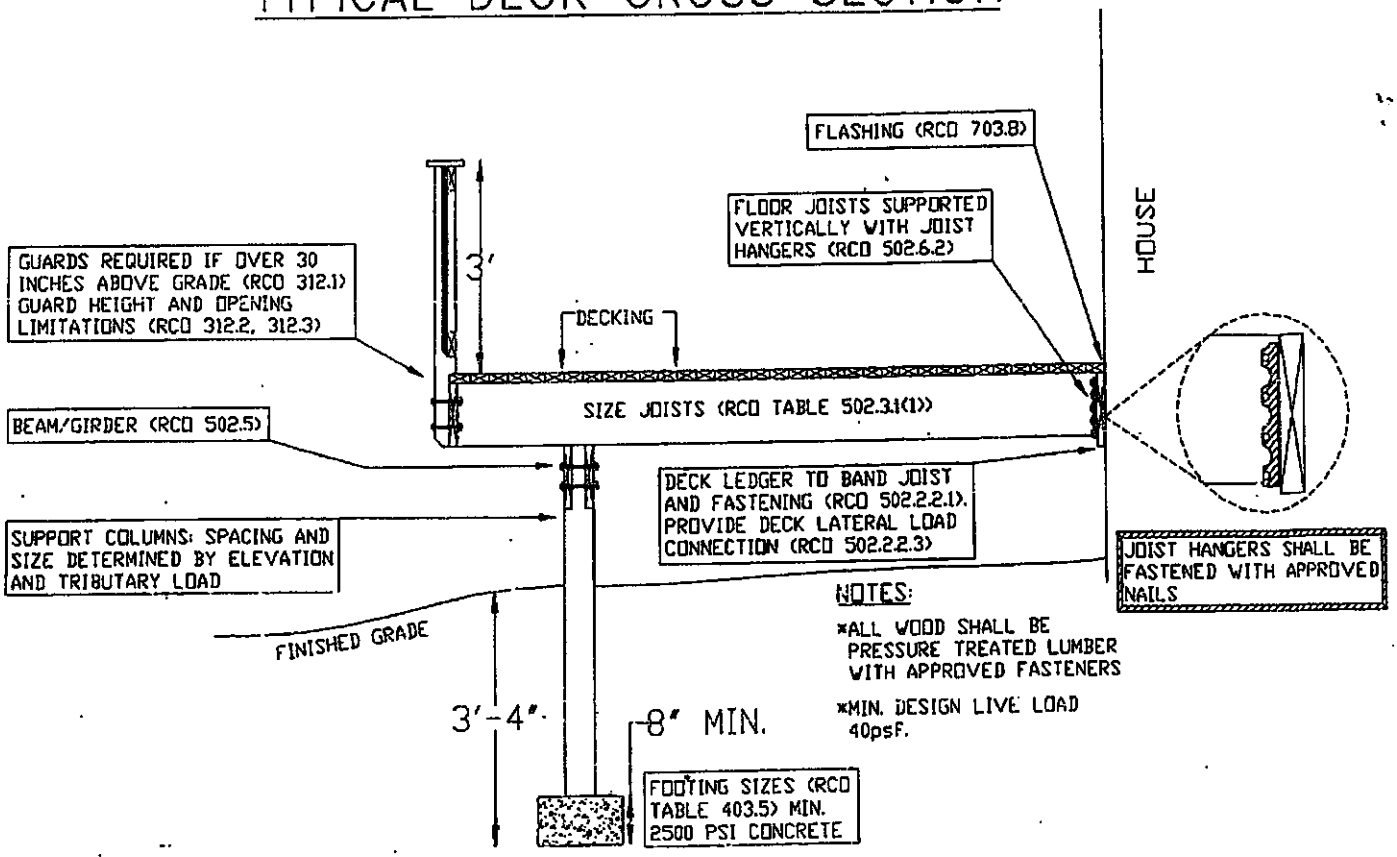


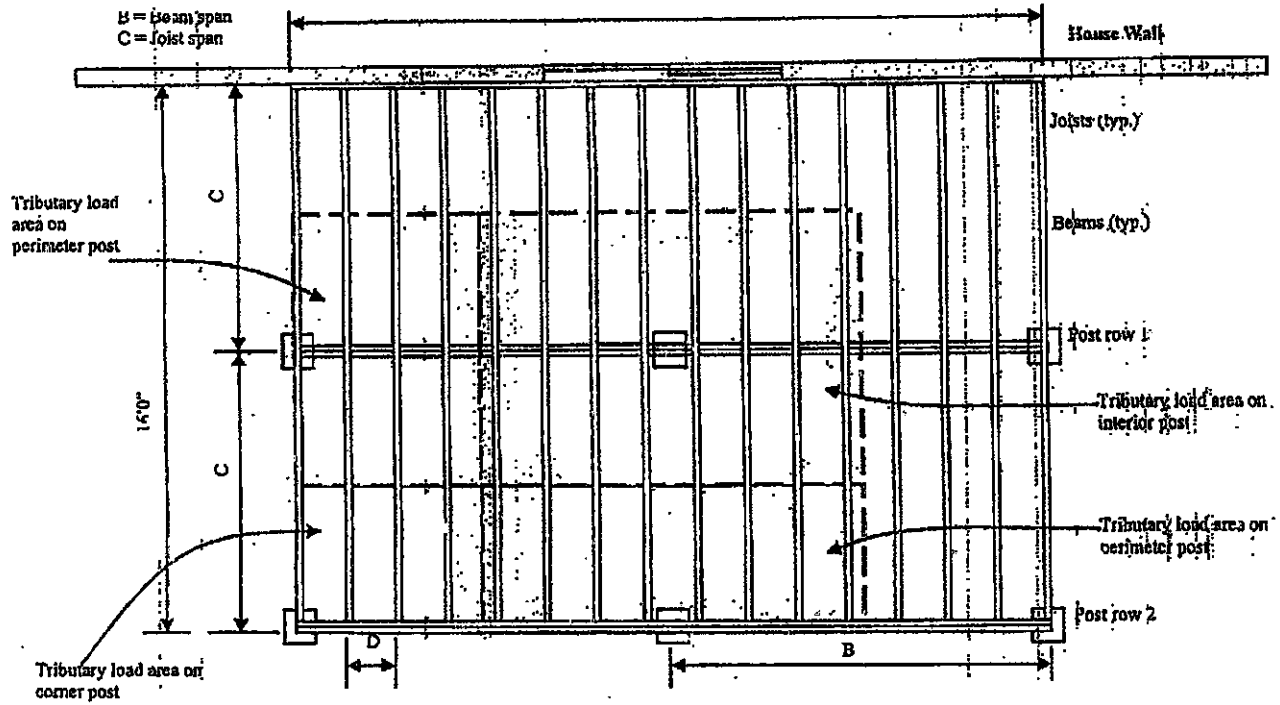
TABLE 403.5

MINIMUM FOOTING SIZE FOR DECK FOOTINGS WITHOUT ROOF LOADS

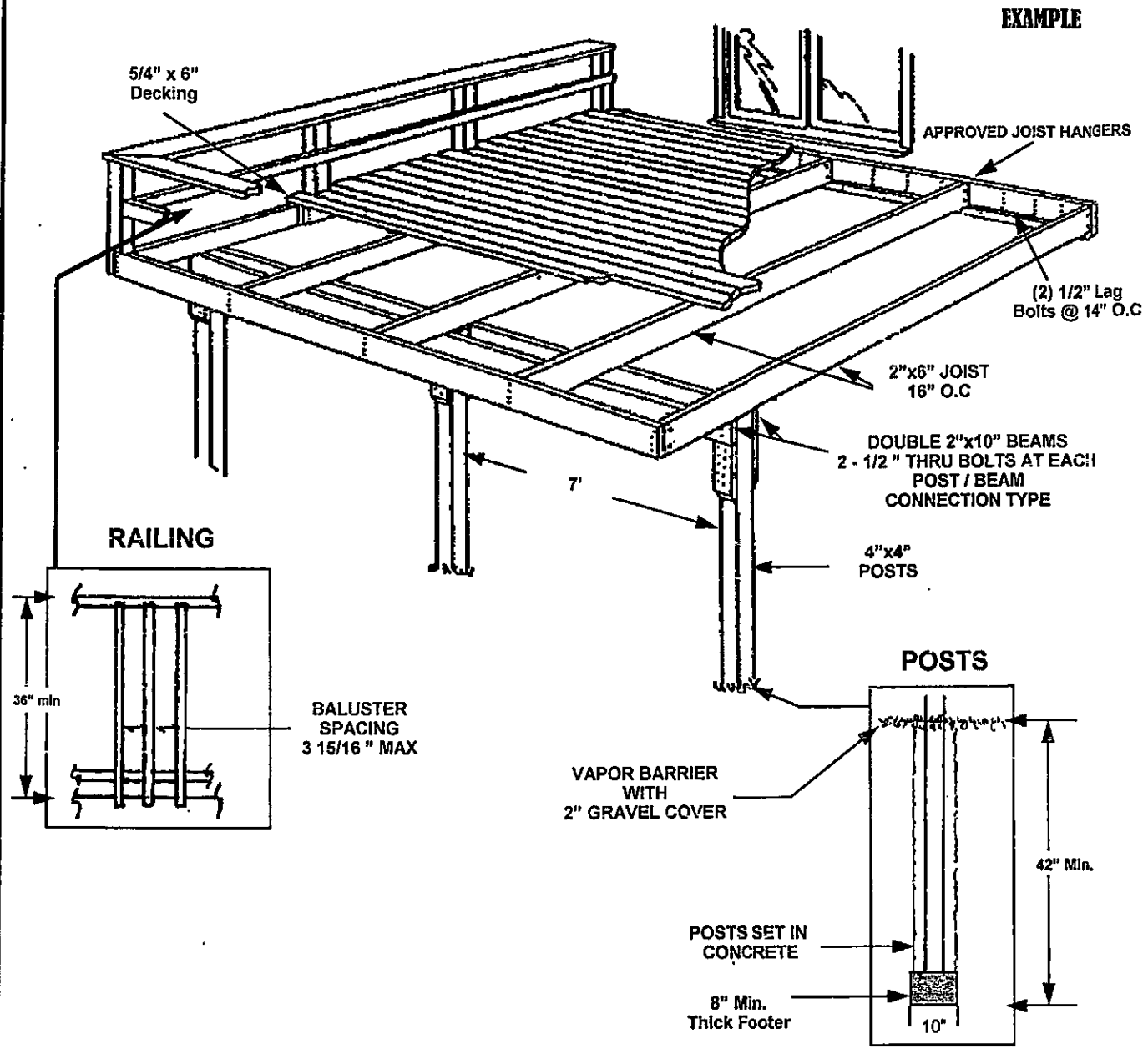
EXTERIOR DECK AND PORCH FOOTING SIZE IN INCHES [a]		
Diameter	***Square***	***Maximum Tributary Area Allowed Per Post (square feet)***
8	*8 x 8*	*14*
10	*9 x 9*	*22*
12	*11 x 11*	*31.6*
14	*13 x 13*	*42.8*
16	*15 x 15*	*56*
18	*16 x 16*	*70.8*
20	*18 x 18*	*87.2*

a. Based upon 2000 lbs. per square foot soil bearing capacity.

b. Based upon 40 lbs. per square foot live load and a 10 lbs. per square foot dead load.


B = Beam span
C = Joist span
House Wall
Joists (typ.)
Beams (typ.)
Tributary load area on perimeter post
C
C
16'0"
Post row 1
Tributary load area on interior post
Tributary load area on perimeter post
Post row 2
Tributary load area on corner post
D
B

DECK CONSTRUCTION



DECK CONSTRUCTION REQUIREMENTS

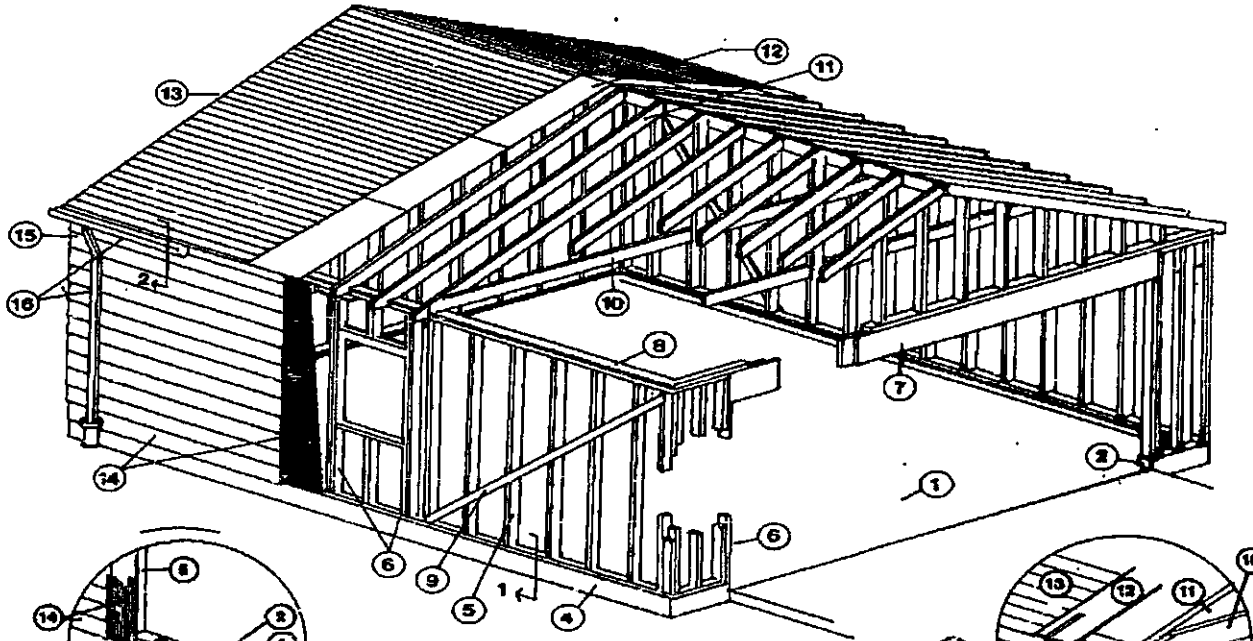
Patio decks are becoming the most common improvement that the property owners themselves are attempting to encounter. Decks should be designed to accommodate the family's needs and be constructed of lasting materials and be safe and sound.

1. Before constructing a deck, a building permit must first be obtained from the Building Department. At the time of application for the permit a plot plan (bird's eye view drawing), showing lot measurements, length and width of house and the size of deck, must be submitted. Also needed is two complete sets of construction drawings.

2. Lumber to be used may be pressure treated or untreated structural lumber which then must be painted or stained to withstand the weather. Untreated post shall be treated with a preservative on the portion that will be below grade.

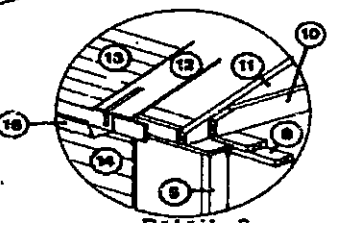
SECTION 2

GARAGE CONSTRUCTION



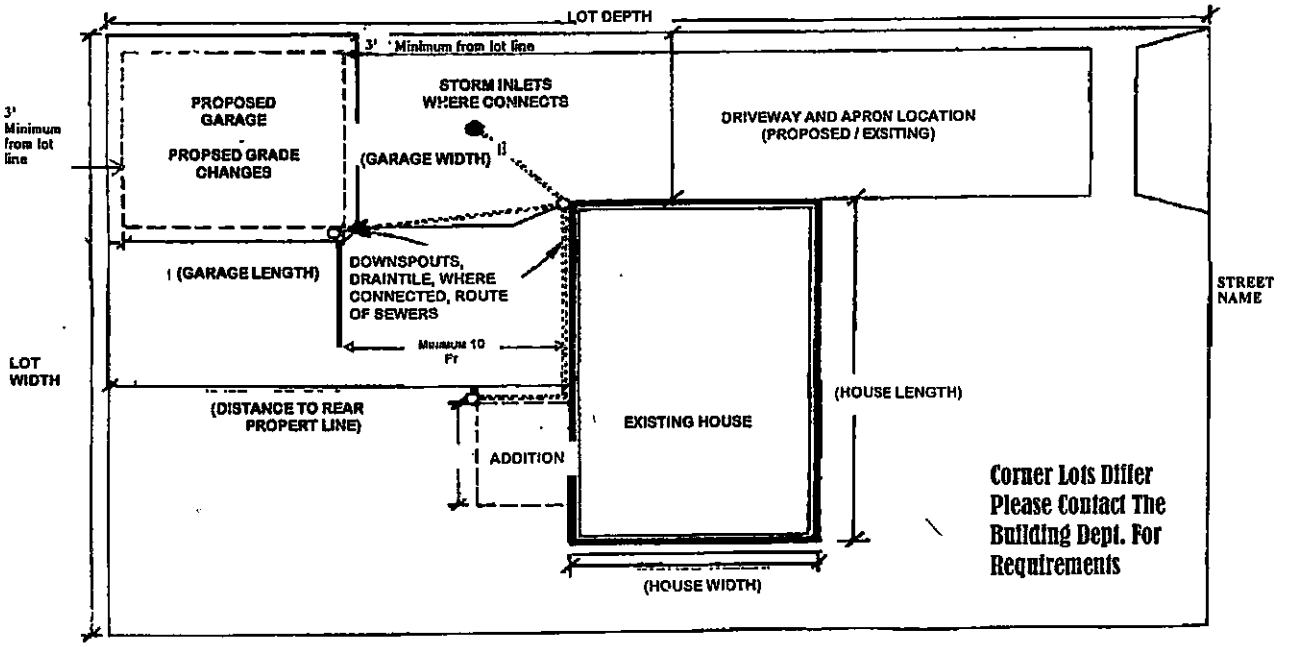
Detail 1

Numbers refer to the following garage requirements list.



Detail 2

PLOT PLAN FOR GARAGE CONSTRUCTION (this diagram is just an example)



CONSTRUCTION CONFORMANCE REQUIREMENTS FOR GARAGES

1. Before construction can begin, a building permit must be obtained from the Building Department. When applying for a permit, plot plans (2) (a birds eye view drawing) specifying the property lines (width and length of lot), the size of house, the measurement from rear of the house to property lines and where the proposed garage is to be built is required. The plot plan must include size of new garage, distances from property lines and from other structures, and where the existing driveway is located. (See example of plot plan)
2. Two complete sets of construction drawings are needed.
3. A demolition permit is required if an old garage is to be torn down.

GARAGE CONSTRUCTION REQUIREMENTS

1. Garage floors shall be concrete with a minimum thickness of 4 inches and shall be placed on compacted granular fill. Garage footing shall be 12 inches by 12 inches. 12 inches by 42 inches for attached garage or garages larger than 600 sq. ft. Reinforcement in the form of one # 5 or Two #4 bars in the middle third of footing depth. The garage cannot be larger than 24 feet X 24 feet and no higher than 15 feet.
2. A curb 8 inches above finished grade and 6 inches wide, shall be formed and poured integrally with the floor slab.
3. Anchor bolts (which secure the garage framing to the concrete pad) shall be placed 12 inches from each corner and a maximum of 6 feet apart. Minimum 2 bolts per plate.
4. Before anchoring the bottom treated plate, a 1/2 inch bedding sill seal shall be applied to the curb top to assure a level condition.
5. Garage framing studs shall be spaced 16 inches on-center. Corners shall be constructed with double studs.
6. All openings shall have double studding (one full length and one jack stud).
7. Garage door headers shall be a minimum of two 2 x 12's nailed together with a 1/2 inch plywood flitch plate between.
8. Top plates shall be doubled and shall lap each other at corners to tie walls together.
9. Wind bracing shall be installed at all corners. Bracing must extend into the top and bottom plates.
10. Ceiling ties, sized according to the length of span, may be 2 x 6 or 2 x 8 nominal lumber. Maximum spacing of ceiling ties shall be 48 inches on center.
11. Roof rafters shall be spaced 16 inches on center with 1/2" sheathing. Trusses may be placed 24 inches on center with 5/8" sheathing with clips.
12. Roof sheathing shall be a minimum 1/2". Clips must be used with 5/8" sheathing.
13. Roof covering may be asphalt shingles, minimum 235 pounds in weight and must be installed over 15 pounds in weight felt paper. **NOTE:** Most common roof pitch for gable roofs is a 4/12 and 5/12.
14. Primed hardboard siding, cedar lap siding, redwood siding, aluminum or vinyl siding may be installed over sheathing. Piywood on corners with cellotex center walls or O.S.B are both acceptable wall sheathing.
15. Garages of all types shall have gutters and downspouts.
16. Downspouts are required to connect into a storm sewer.

TABLE OF CONTENTS

SECTION 1

GENERAL INFORMATION

A. HAMMERS

There are several types of hammers designed to do specific jobs. Several are pictured here. (See Fig. 1)

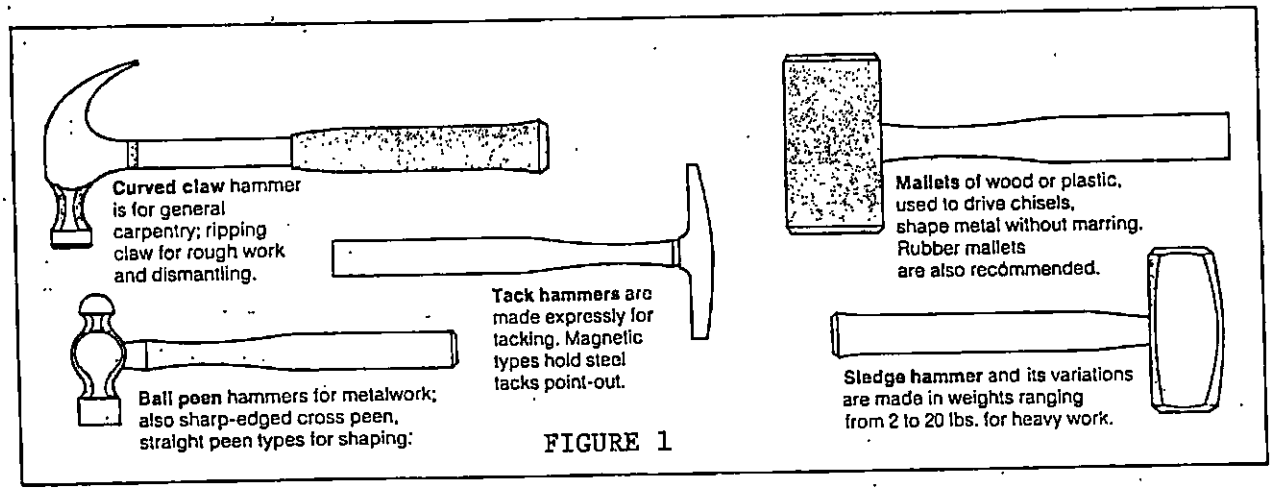


FIGURE 1

The most commonly used hammers in the ASP are the curved claw hammer and the straight claw hammer.

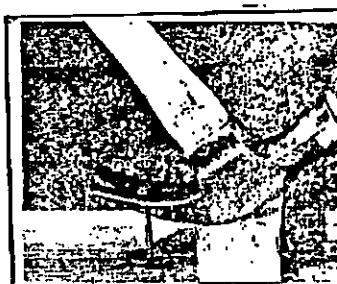
1. Curved claw hammers are the most commonly used type of hammer in the ASP. It is used for nailing and pulling small nails. The claw hammer should never be used to pull large nails due to the possibility of breaking the handle. Claw hammers range in weight from 7 ounces up to 16 or 20 ounces. Usually the heavier the hammer, the easier it is to drive a nail. The head of the hammer is slightly convex to minimize marring the wood when a nail is driven flush. However, a hammer which has been abused can have too much rounding to the head, making it easy for the head to deflect off a nail when struck. Never use a claw hammer on any surface harder than the head itself; such as steel, or concrete, or two hammers against each other.

2. Straight claw (or ripping hammer) is like the curved claw hammer in nailing. The straight claw is used for rough work such as dismantling wood work. The straight claw is usually easier to insert between two boards to wedge them apart.

USE OF A HAMMER

1. Hold the hammer near the end of the handle for maximum leverage and nail driving force.

2. When pulling a <u>smaller</u> nail with a claw hammer, a block can be placed under the hammer to increase leverage and minimize marring of wood, especially on finish surfaces such as window and door moldings. (Se Fig. 2)



Wood block under hammer head marring surface. A thicker blo better leverage on long nails.

FIGURE 2

B. NAILS AND NAILING

NAILING HINTS

(, start a larger nail, hold it between the thumb and forefinger of the left hand and tap the nail lightly until it will stand in the wood on its own. Then remove your fingers and tap a little harder until the nail is at least 1" into the wood. Heavy blows before the nail is secure in the wood can result in a glancing blow which will send the nail flying and cause injury to yourself, or more likely to those working near you.

Always hold the hammer near the end to get maximum power and leverage. For roofing nails or smaller tacks, one method to avoid smashed fingers is to hold the nail between the index finger and second finger with palm up (as shown in Fig. 3). While this doesn't prevent smashed fingers, it does minimize the pain by avoiding a strike to the finger and thumb nail, thus cutting into your fingers.

A second method is to push the nail or tack into a thin piece of cardboard, then hold the cardboard away from the nail. When the nail is halfway in and snug, rip the cardboard out and finish driving (nail. (see Fig. 4)

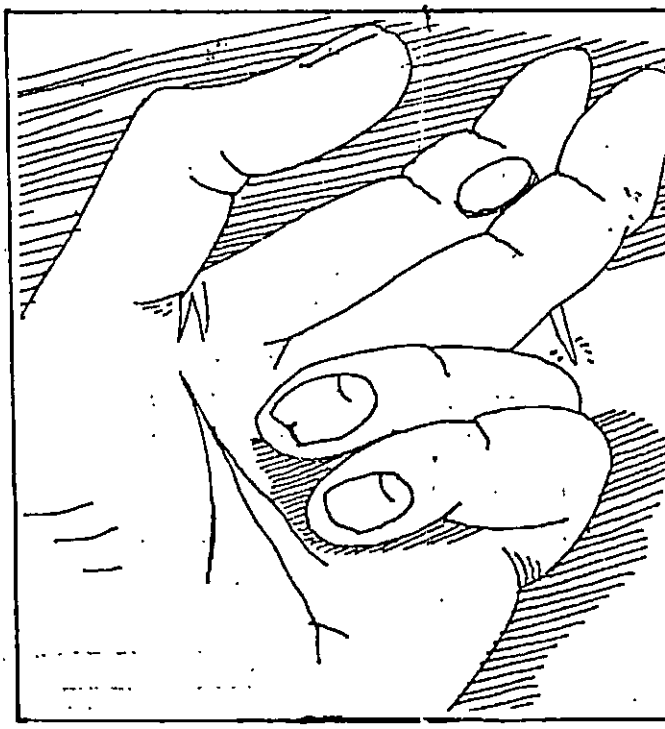
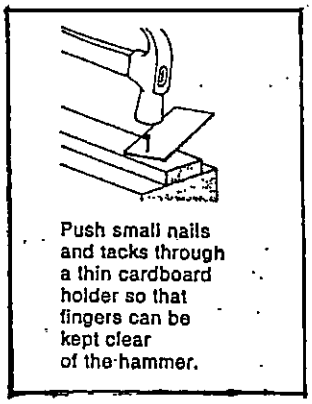
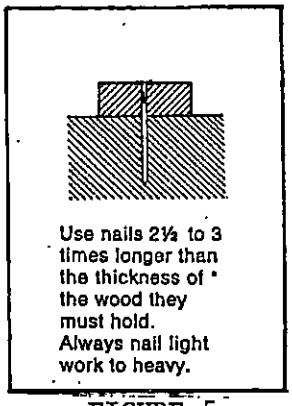


FIGURE 3



Push small nails and tacks through a thin cardboard holder so that fingers can be kept clear of the hammer.

FIGURE 4



Use nails 2½ to 3 times longer than the thickness of the wood they must hold. Always nail light work to heavy.

FIGURE 5

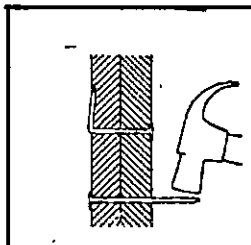
METHODS OF NAILING WOOD TO WOOD:

1. When nailing two different size pieces of wood together, nail through the smaller piece first and use a nail 2 to 3 times the thickness of the smaller wood. (see Fig. 5)

2. When connecting two equal size pieces of wood (especially 1x lumber), longer nails can be driven through both boards and clinched over to provide a stronger joint. (see Fig. 6)

3. When joining two pieces of wood where clinched nails are not desirable, avoid using nails which will go through the second piece of wood, even slightly. The suction created by the sealed hole actually creates a stronger hold. (see Fig. 7)

(4. When nailing two boards together (especially 2 - 2 x 4's), nail 16d nails in at an angle for a stronger hold. To pull two diagonally driven nails out, the nails would actually have to be bent when the vertical nail would pull straight out. (see Fig. 7)



Clinch-nail for strong joints. Drive nails from opposite directions and bend the points into the wood.

FIGURE 6

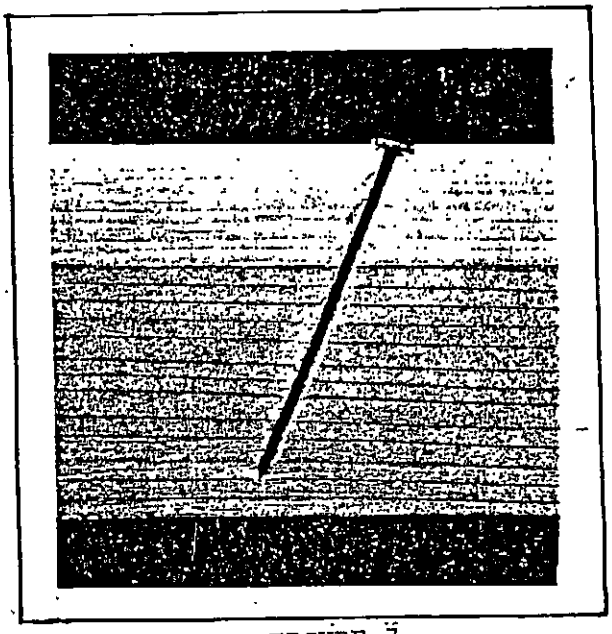


FIGURE 7

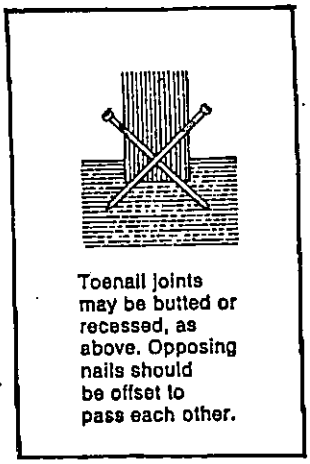
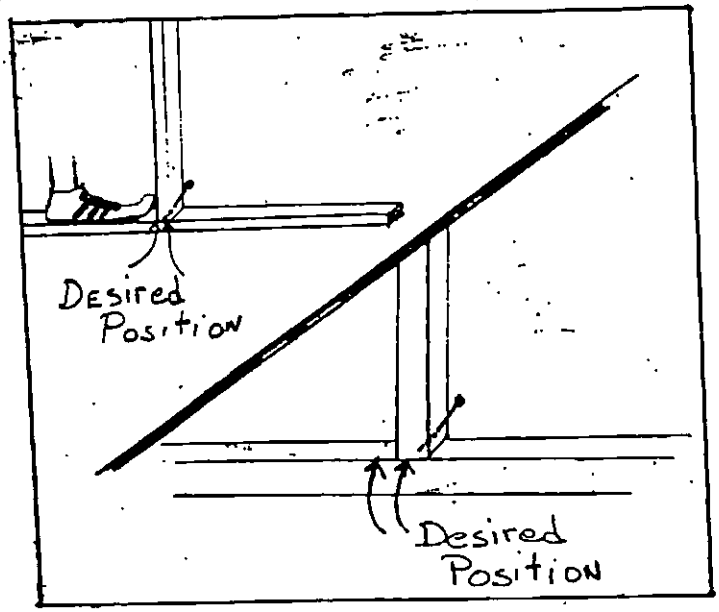


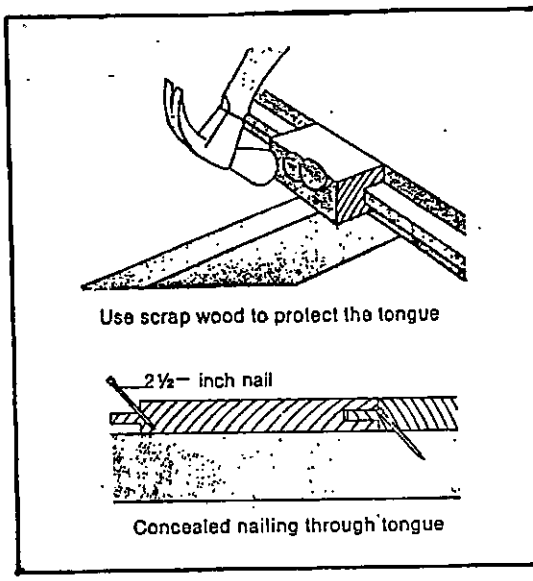
FIGURE 8

5. Toe nailing is used when one end is butted against another board. Opposite nails should be offset to avoid hitting each other or splitting the wood. When driving the first nail, the stud will tend to move before the nail enters the second piece of wood. One way to counter this is to place your foot against the opposite side of the board. Another way is to make marks at the desired position of board and then offset the board to compensate for the movement when the first nail is hammered into place. (see Figs. 8 and 9)

6. Tongue and groove flooring can be nailed in such a way as to have no nail heads showing. Drive the new piece of wood tightly into place by using a scrap piece of tongue and groove board directly with a hammer. Nail through the tongue so the groove of the next board will cover the head. Avoid marring the floor surface by striking the top side of shoulder. Drive nail in at an angle as shown. (see Fig. 10)

7. In most of our work, a basic rule to follow is to use 16-20d common nails to nail 2x to 2x lumber, and to use 8-10d common nails to nail 1x to 2x.





Nail types and uses

General-purpose and woodworking nails

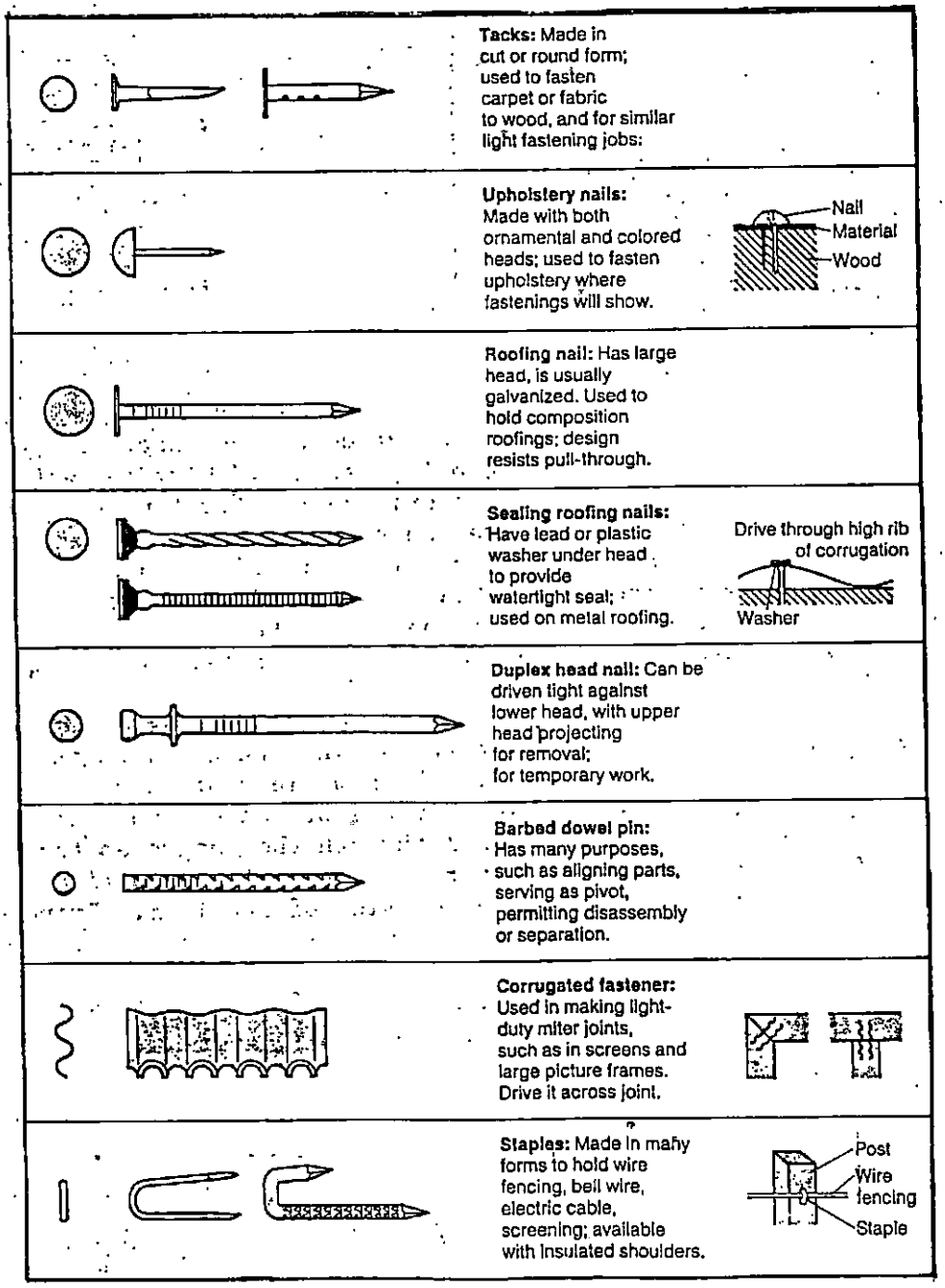
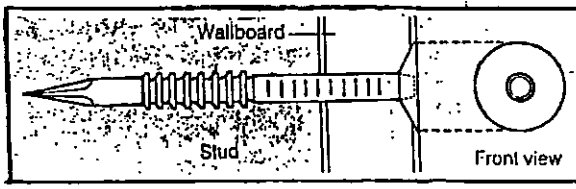


FIGURE 11



New drywall nail is especially designed to prevent popping. Shank of the nail has annular rings which bite into the wall stud. The head is dish-shaped and drives flush with the wallboard. The indentation in the middle takes the drywall finishing compound. Diameter is slightly smaller than conventional drywall nails.

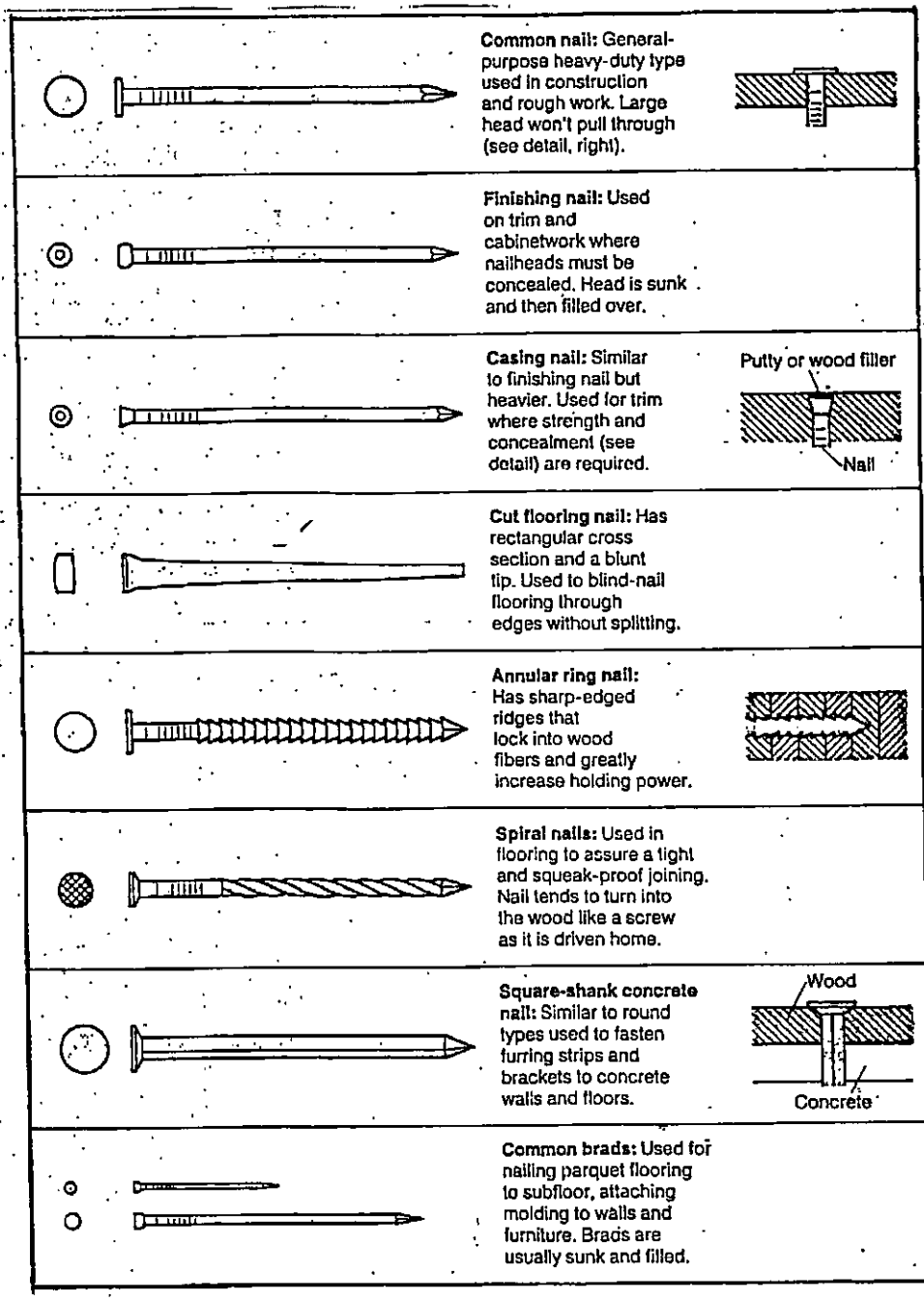
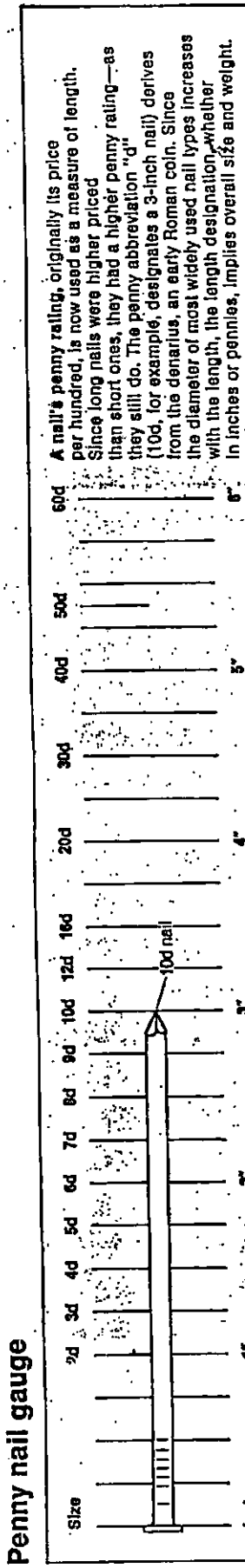

Common nail: General-purpose heavy-duty type used in construction and rough work. Large head won't pull through (see detail, right).
Finishing nail: Used on trim and cabinetwork where nailheads must be concealed. Head is sunk and then filled over.
Casing nail: Similar to finishing nail but heavier. Used for trim where strength and concealment (see detail) are required.
Putty or wood filler
Nail
Cut flooring nail: Has rectangular cross section and a blunt tip. Used to blind-nail flooring through edges without splitting.
Annular ring nail: Has sharp-edged ridges that lock into wood fibers and greatly increase holding power.
Spiral nails: Used in flooring to assure a tight and squeak-proof joining. Nail tends to turn into the wood like a screw as it is driven home.
Square-shank concrete nail: Similar to round types used to fasten furring strips and brackets to concrete walls and floors.
Wood
Concrete
Common brads: Used for nailing parquet flooring to subfloor, attaching molding to walls and furniture. Brads are usually sunk and filled.

FIGURE 12


Penny nail gauge
Size
2d
3d
4d
5d
6d
7d
8d
9d
10d
12d
16d
20d
30d
40d
50d
60d
10d nail
A nail's penny rating, originally its price per hundred, is now used as a measure of length. Since long nails were higher priced than short ones, they had a higher penny rating—as they still do. The penny abbreviation "d" (10d, for example, designates a 3-inch nail) derives from the denarius, an early Roman coin. Since the diameter of most widely used nail types increases with the length, the length designation, whether in inches or pennies, implies overall size and weight.

NAIL SETS:

Nail sets are used to drive a finishing nail below the surface of the wood without marring the wood. The nail head can then be covered with wood putty. Nail sets come with various size ends, from 1/32" diameter to 5/32" diameter.

Step 1. Drive nail with hammer until the hammer is within 1/8" of the wood, but does not make contact.

Step 2. Place the set on the head of the nail and drive nail in to a depth equal to the diameter of the nail head.

Step 3. Fill the hole with wood putty. (See Fig. 13)

Nail sets can come in very handy with window and door installation or repair, as well as, nailing in tongue and groove flooring.

When returning nails to the supply shed at your center, please do not mix nails. A job takes so much more time if you continuously have to stop and sort through your nails. When coming in from a work day, empty your nail aprons and sort your nails into the appropriate boxes. This will make it easier for the next day.

Nail sets

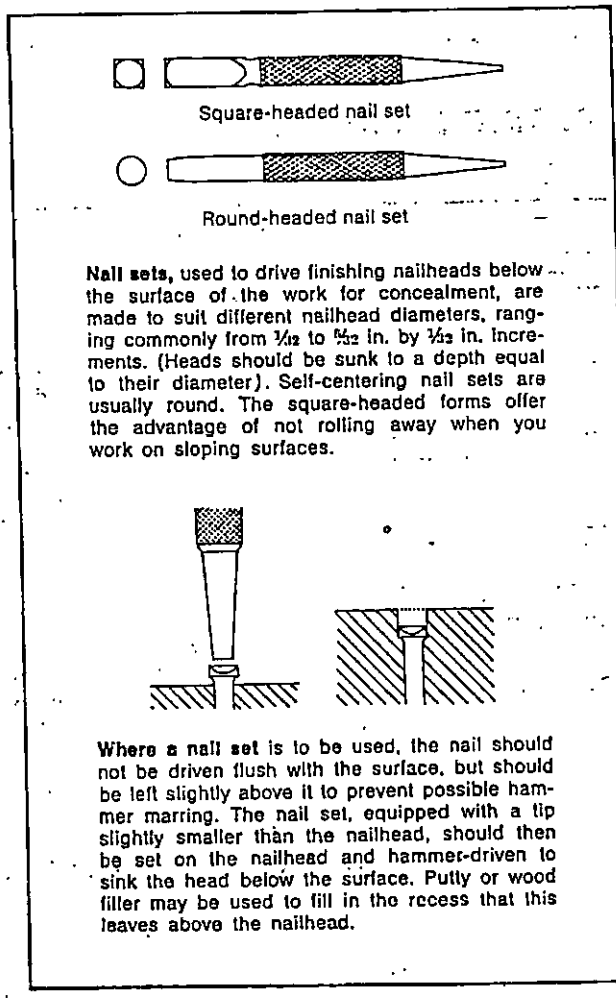


FIGURE 13

C. SAWS AND SAWING

TIPS ON SAWING:

When starting a saw groove, place the saw on the wood and using your thumb as a guide draw the saw toward you several times until the groove is deep enough to prevent the saw from sliding out of the groove. (See Fig. 16)

The easiest way to saw with a crosscut or rip saw is to not force the saw too hard, but to let the weight of the saw do most of the cutting. Use only a slight amount of downward pressure on the saw. This prevents binding and bowing the saw.

If the saw is binding up quite a bit, you might try running some motor oil or soap over the side of the saw blade to make the cutting easier. If it keeps on binding, chances are your strokes aren't even or you have a bow in your saw blade (which isn't uncommon with ASP saws).

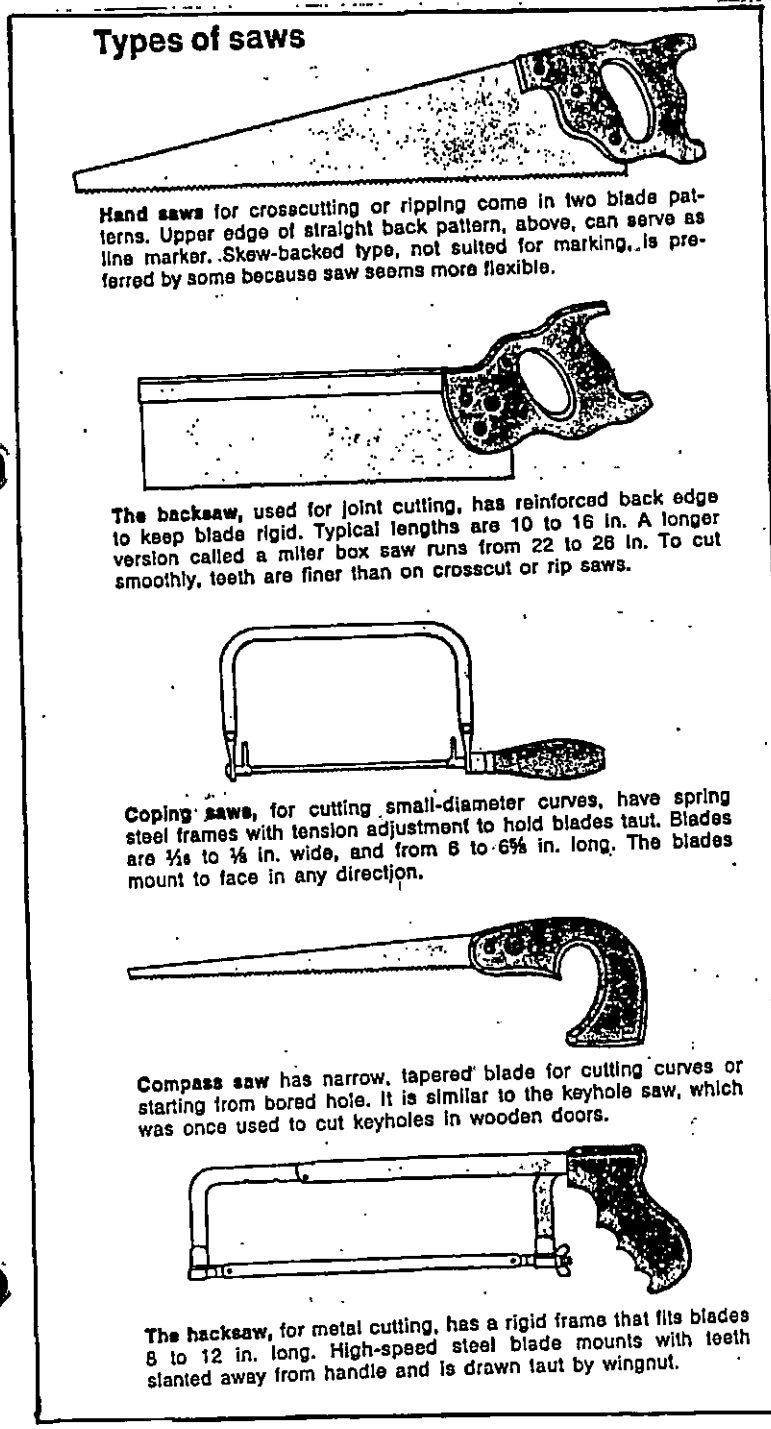


FIGURE 14

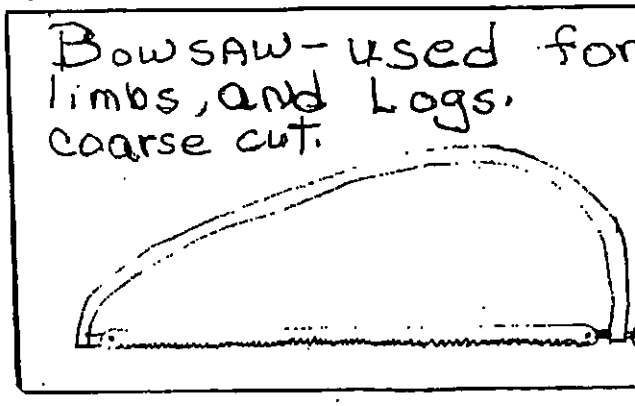


FIGURE 15

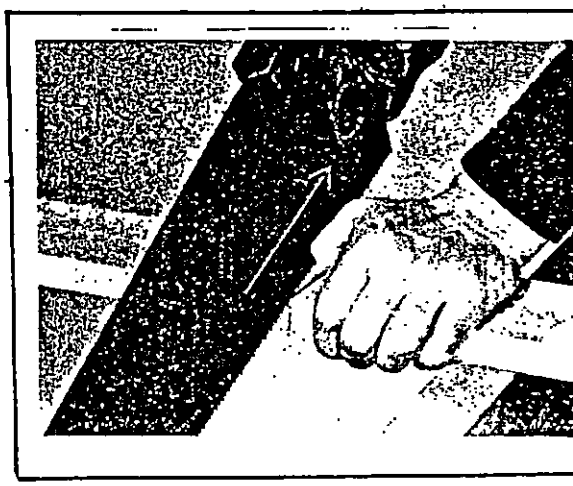


FIGURE 16

D. POWER TOOLS

When using any kind of power tools, the most important thing to remember is safety. Power tools are not toys to be played with. They should always be considered potentially dangerous, used only by those who know how to operate them properly and safely.

POWER SAWS -- CIRCULAR SAWS

Safe Operation of a Power Saw

1. Use safety glasses to avoid saw dust or splinters in your eyes.
2. A sharp blade makes the sawing easier and safer.
3. Use a grounded extension cord where possible.
4. Always be sure the wood to be sawed is properly supported and stable. Often a second person is needed to hold wood securely.
5. Always look under the cutting surface to be sure that there are no other items in the path of the blade.
6. Make sure the base plate is always flush with the wood and that the blade stays straight in the saw groove. Don't try to cut a curved line with a circular saw.
7. Start the saw before the blade enters the wood to avoid binding.
8. Let the saw move forward slowly, pushing it forward with a slight, easy pressure.
9. When not in use, unplug the saw to avoid accidents by children who might pick up the saw.

NOTE: BEFORE STARTING UP THE SAW, CHECK TO MAKE SURE THE ELECTRICAL SYSTEM CAN CARRY THE ADDITIONAL VOLTAGE.

OTHER POWER TOOLS AND THEIR USES WITH ASP

ELECTRIC DRILL--Sometimes when you've tried everything and you just can't get unbent nails into that confounded rough-cut oak board, try beginning the nail holes with a drill. Electric drills are also handy in beginning holes for screws.

SABER SAW--Useful in drilling holes in sheetrock for electrical outlets, etc.

BELT SANDER--Useful when sanding down wood.

FINISHING SANDER--Good for sanding down sheetrock.

CHAIN SAW--Useful to us in cutting down trees, or cutting out a window and and doorway through a wall (careful not to hit nails, though, or you can ruin an expensive blade). Also can be used sometimes on the job when electricity isn't available.

TYPES OF POWER SAW BLADES

COMBINATION crosscut/rip blade is suitable for most work. CROSSCUT blades have fine teeth and cut a smooth groove. They are suitable for plywood or framing lumber such as 2 x 4 studs. They are not suitable for ripping. RIP BLADE has larger teeth and is designed to cut with the grain of the wood. HOLLOW GROUND BLADE is another good all purpose blade and makes sharp cuts with little sanding required. (See Fig. 17)

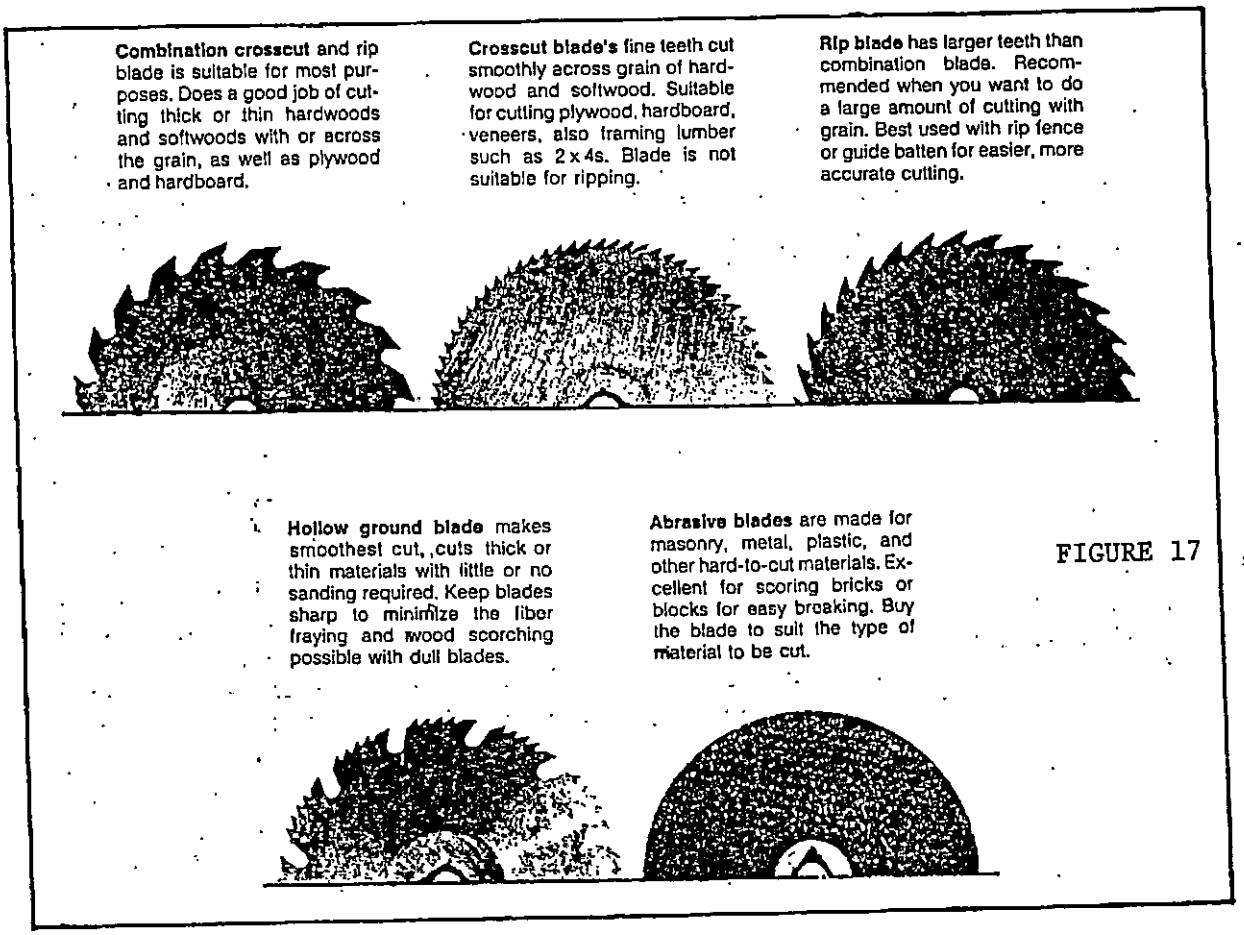


FIGURE 17

NOTE: The Appalachia Service Project must have good, dependable, clean tools with which to work, so taking care of tools is very important to our work. Well cared for tools last longer and they are easier to work with. They also make a more attractive end product.

E. ELECTRICAL HAZARDS

Safety of the families and the work groups is a priority concern of the A.S.P. Therefore, potential accidents related to electrical problems should be called to the attention of the staff. Be overly cautious when working around old, faulty, or exposed wiring or electrical equipment.

Potential dangers to look for:

--Wiring behind a ceiling or wall you're tearing out.

--Fuse boxes, receptacles, or range receptacles without a cover.

--Frayed wiring with copper showing, or damaged insulation.

--Frequently blown fuses (that means the circuits are being overloaded somewhere).

--Any blue flame or fire around electrical equipment.

--Excessive use of extension cords as branch feeder circuits (to lights, receptacles, etc.)

--Anything reported to be giving electrical shock.

--A fuse holder without a fuse and a penny inserted where the fuse should be.

If unsure about the electrical equipment you are working near, you might consider disconnecting the main circuit if it's not a big inconvenience to the family while you're working there. Anyone who does electrical work must know and have the skills to provide such services. Nobody should work on electrical equipment without the proper skills and then only after being instructed to do so by the center staff.

F. WORKING WITH LUMBER ON THE PROJECT

LUMBER - Rough cut and finished

With A.S.P., often times rough cut lumber purchased from a local sawmill is used in repair and construction. The advantages to using rough-cut lumber is that it is much cheaper (in most cases) than finished lumber, and because of its thickness it is sturdier and stronger. For example, when tearing off bad decking on a porch, you might find 2' centers between the runners. Finished 1x would not be strong enough as decking with centers that wide, but rough-cut oak 1x would be because of the full 1" thickness (finished 1x is only 3/4" thick).

Shrinkage is the biggest disadvantage to using rough-cut, and needs to be considered in some situations.

Creosote

Creosote is a wood preservative the Project uses frequently when working with wood that is or will be in contact or close contact with the ground. Painted on with a regular paint brush (though don't expect to be able to use the paint brush for anything else afterwards), creosote will preserve the wood from rotting for quite some time. But beware, cresote will burn your skin if you get some on you. Don't get creosote around your eyes, especially. Anyone with sensitive skin shouldn't work with it. Those who do work with it should wear gloves (and a long sleeve shirt would be good, too). If you

SECTION II

CARPENTRY

A. FLOORING

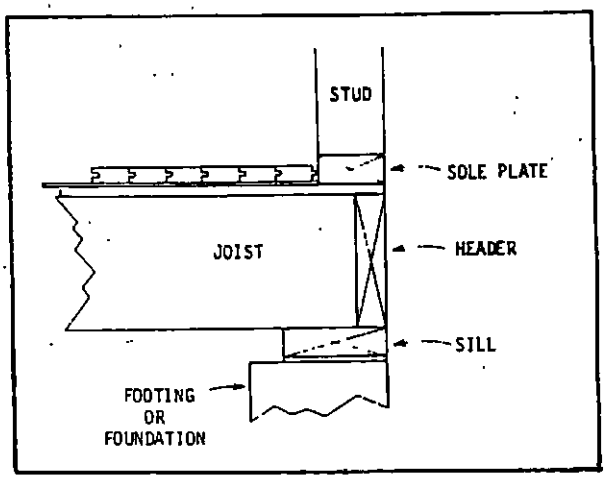


FIGURE 18

1. House Jacking and Leveling

Rotten floors and underpinning are a common problem. Water which rots floors can come from two places--inside the house or outside the house! Whatever the source of the problem, the primary consideration should be to prevent further water contact which might cause further rotting. Inside sources of water are obviously plumbing problems or leaky roofs, and will be discussed elsewhere in this manual. Outside water means that the house is probably too low and resting on the ground, or that a wooden poste resting on the ground has partially rotted away. The way to remedy this is to jack up the house and set it on a sturdy, more sound foundation.

Moving an entire structure can be dangerous and should be undertaken with extreme care.

Jacking up a house should be one of the first things done, since the structural shift can offset any work previously done. Use hydraulic jacks, the more the better.

1. If the sagging in the floor is along the outside of the structure, prepare a place for the jack to sit under the sagging header which supports interior floor joists. Nail a long rough-cut 2 x 8 (10-12') flat up under the floor joists and outside header to give even lifting (see Fig. 19). You may have to do some digging if the house is resting on a near ground level, be careful not to dig out too much of the ground the structure is resting upon!

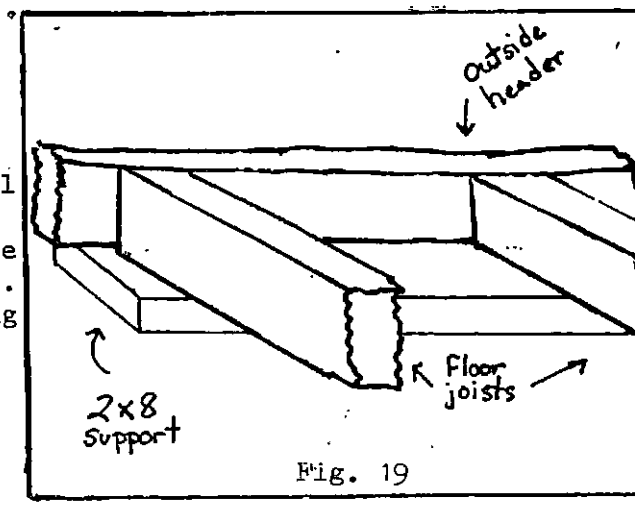


Fig. 19

2. Set a block of wood or a concrete block on good solid ground or rock under the 2 x 8 you put up (make sure it's solid--so that the jack won't settle into the ground rather than lifting the structure). Level the block, so you can build up a level and sturdy support structure for the jack to rest on. If the jack isn't level--if it is trying to lift the structure at too much of an angle--the jack could pop out when pressure is put on it.

   Build up the solid support base until the jack can fit on top of it and can be in contact with the 2 x 8 you added. When building a tall support base, cinder blocks are best (see Fig. 20). If the support base doesn't need to be more than a few inches high, blocks of wood will probably do (see Fig. 21).

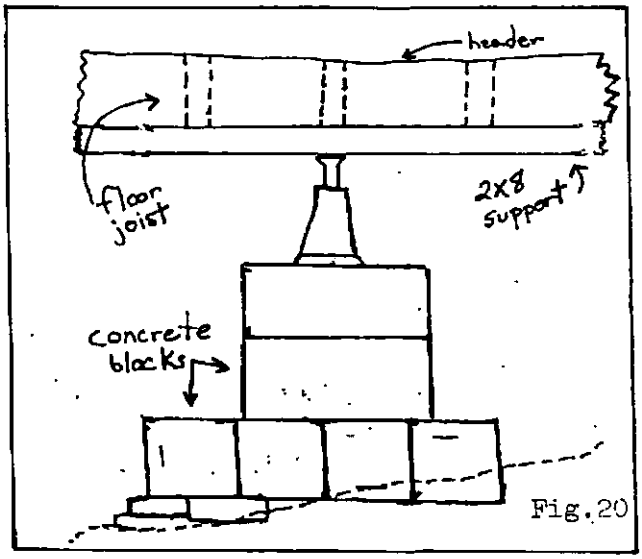


Fig. 20

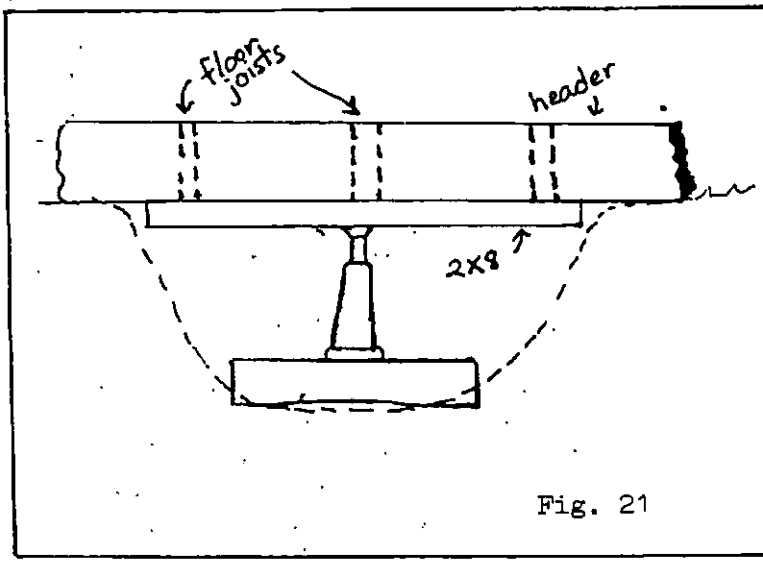


Fig. 21

3. After you have the jack(s) in place and feel ready to jack, double check everything. This is a place where a small mistake can be a big mistake!

   Never jack up a structure with anyone inside.

4. As you jack the structure, go slowly -- one easy pump at a time. Listen for any cracking noises as the structure moves upward. If you hear any, stop and check. This could mean the pressure in a certain area could be cracking a joist or runner, or that two boards nailed together somewhere are splitting apart, thus causing possible major structural damage.

   Move the structure no more than 1"-2" at a time. And never try to jack the entire side of the structure at one time. Jack one side then move to the other side. Using only one jack. After you've jacked up the structure at one end (where the deepest sag is), cut a poste to fit the area you've jacked and set it in place. (Set it on solid ground or stone as well, otherwise, when you let down the jack, the poste will settle into the ground.) Now, lower the jack slowly by slowly turning the pressure pin on the jack. Then remove the jack and move it over to the other area needing jacking and repeat the same process as outlined previously.

Using More Than One Jack:

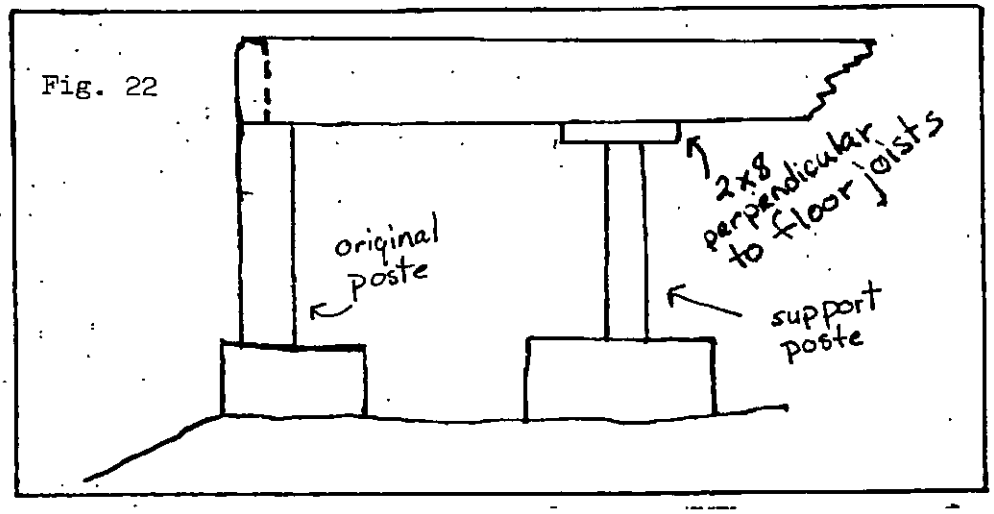
When using two or more jacks, pump one jack at a time. Maybe 3-6 pumps on one jack, then move to the next jack beside it. Continue slowly rotating jacks as you move the structure upwards.

5. Though it would be ideal to get all structures up to level, that's not always the most practical or the safest thing to do. Of course, porch floors should have a drop to them--which should be considered if jacking up a porch. As with interior floors, level if possible. If not possible, get it as level as you can.

6. Jacking up a house will have limited usefulness if the reason it was sagging in the first place isn't corrected. Usually, a rotten poste or a sliding hill is the reason. A rotten poste can easily be replaced with concrete blocks or a creosoted 4 x 4 on a rock or concrete block.

   There are two ways to <u>sturdy up a foundation on a sliding hill</u>. One is to dig down 1'-2', place concrete blocks into the hole or pour a 1'x1' footing and build up from there. If you don't feel confident that this poste won't slide down the hill, you can back up 3'-5' and connect a cross-piece (2x8x10') across several floor joists, Then run one or more postes up into this (See Fig. 22).

Fig. 22



Jacking Underneath the Structure:

When the sagging in the floor is not along the outside headers, but further in, this method of using a 2 x 8 crosspiece can be used to jack up the sagging section well underneath a structure.

2. <u>Floor Repair</u>

   a. <u>Postes, Sills, and Headers</u>

   The most common replacement problems are a rotten sill or rotten postes. POSTES can be replaced easily by slightly jacking up the house enough to remove the rotten poste. The cause of the rotting is usually the post resting directly on the ground. Place a new post on top of a concrete block or flat rock and let the house down to rest on the new post.

   <u>Sills</u> or <u>headers</u> can be difficult to replace. Floor joists must be supported underneath well enough that the floor will not move as you remove the rotten sill. Take time and care to be sure temporary supports are sturdy and sufficient. If both the sill and header must be replaced, replace sill first to insure support when the rotten header is removed and replaced.

You might need to remove a rotten header from a house built of box construction where you have the outside planking connected to the header. This is what holds the roof up, so the ceiling and roof of the home must be supported (temporary postes--see Fig. 23) before loosening and removing the planking from the header.

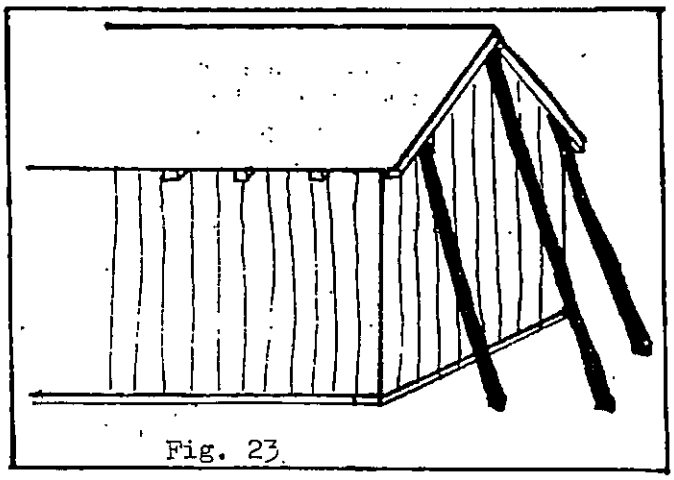


Fig. 23

b. Repairing Rotted Floor Joists

Rotting in a floor joist can be repaired by stopping the water source and cleating or splicing the rotted joist. If you can get under the house and splice in cleats from underneath, you can avoid tearing up the flooring to get to the rotted joist. However, if that's not possible, you'll have to tear up the old flooring to get to the problem. If it's possible to pull up the floor boards without having to do any cutting, wonderful. That way, you can put the flooring back the way it was. Otherwise, you must cut through portions of the flooring.

Tearing Up The Flooring: A circular saw would come in handy if you have one available. If you don't have a power saw, a compass or keyhole saw can do the trick (with a hole drilled to get it started). Find the row of nails (where they're nailed into the floor joists) and pop a chalk line parallel to the joists about 1"-1½" over to the side you feel the most rotting has occurred. Then cut the floor out along the chalk line. Repeat this on the joist next to this one, or further over if necessary to get to all of the rotting. (See Fig. 24)

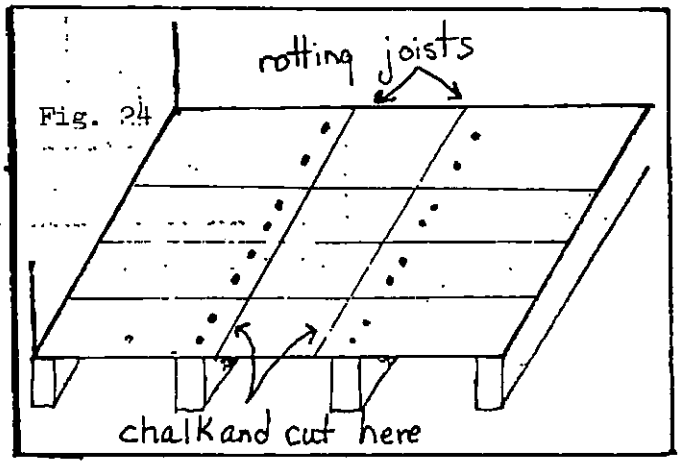


Fig. 24

Splicing Onto The Rotted Joists: After you've gotten the flooring torn up, figure out how much of the joist is rotted. Cut and creosote a board (2x) which is 2' longer than the rotted area. After the creosote has dried, place the cleat alongside the rotted floor joist and nail together--nailing into the good wooded section 1' on one end and 1' on the other. (Or, butt one end up against the header and toenail in.) (See Fig. 25)

If the rotting is occurring over a large portion of the floor joist (6' or more), the new board should be more than 2' longer than the rotted section.

Be sure to check both sides of the board for rotting before cleting into it.

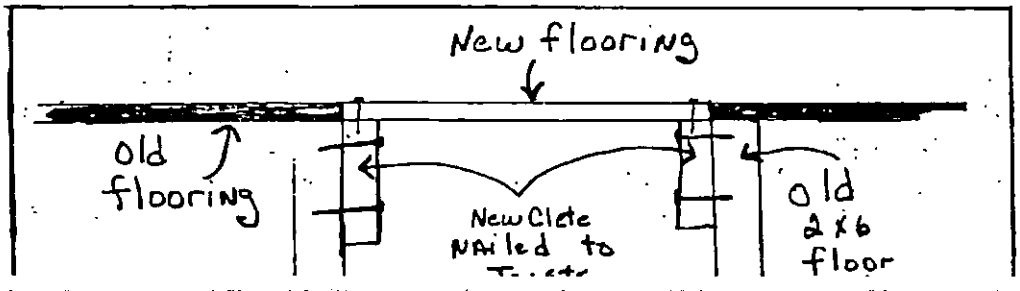


FIGURE 25

Replace Flooring--nailing to the new cleat

You might not be able to use the original flooring due to rotting. If not, use whatever materials available that will best blend in and level out with the original flooring (unless you've pulled up the entire floor!)

3. New Frame and Flooring Construction

Note: Whenever new construction is being done, such as, a room addition, the following structure should be level and square if at all possible because it will make the entire job go alot faster and easier. However, sometimes getting things square is next to impossible (remember you're more than likely tying into an unsquare house), and coming close is the best we can do.

(Use 2 x 6's for sills and 2 x 8's finished lumber/2 x 6's rought-cut for the headers and floor joists. If you're going to have an interior wall within the structure you're building, use a double 2 x 6--rough).

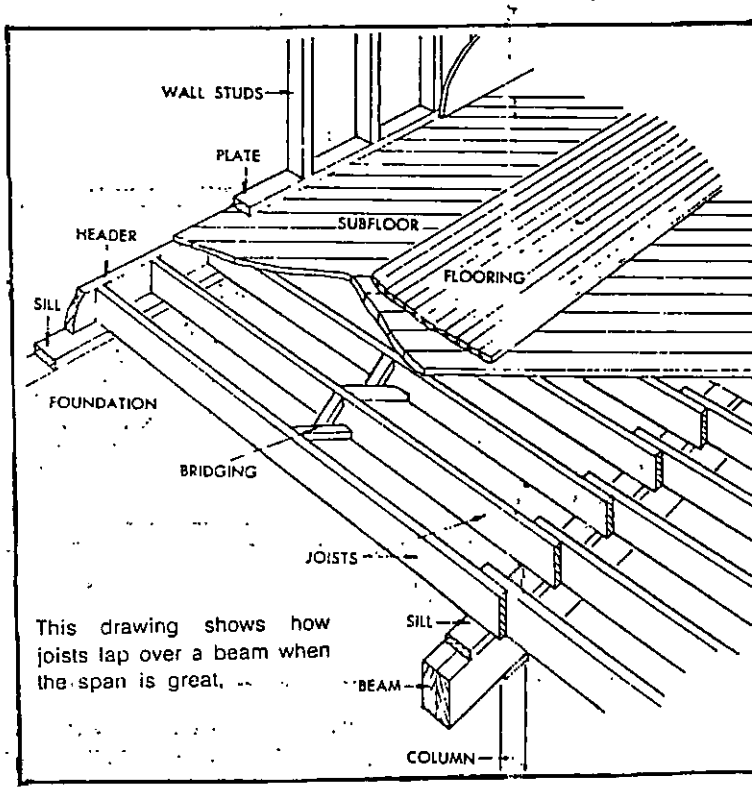


FIGURE 26

If tying onto the house:

1. Cut your first 2 x 6 the length you want the structure to be. Nail one nail into middle of 2 x 6 and connect to house's header. Play with the 2 x 6 in place until you've gotten a good compromise between what's level and the angle of the house's leader. Example: If the house's header has a 3" drop in 10' to it, it will be hard to connect your 2 x 6 to it level. If you can connect it to the house level, go ahead--but only if it's a very sturdy connection and you're still tied to the house's header. Appearance needs to be considered here too. After you have the 2 x 6 where you want it, nail it in place.

2. Using string as a guide and patience as a virtue, begin digging and laying out blocks and postes 6' to 10' apart under every load bearing wall.

When starting new construction, there are several factors to consider in deciding on the exact dimensions of a structure, besides the needed space. The dimensions of available lumber should be considered.

Firm foundation posts are essential. (Of course a solid concrete block foundation is preferable, but is not always possible. If you're attempting this, see the sections on footings and foundations.) Top soil should be removed and the ground should be leveled at the places where posts will rest. Concrete blocks are best, and if they are stacked more than three high, should be held secure with cement. The posts or blocks should be level with each other and the 2 x 6 header, so that when the sills are layed out, the flooring can be level.

3. Use 16d or 20d nails on the frame. Lay out your sills, connecting them with a toenail in each side. Then lay out and connect your headers on the outside of the sills, nail to each other and then lightly to the sills. Keep it as level and square as possible. A test to see if the frame is square is to measure diagonally from corner to corner. If all angles are square, the diagonal measurements will be exactly equal. (See Fig. 27)

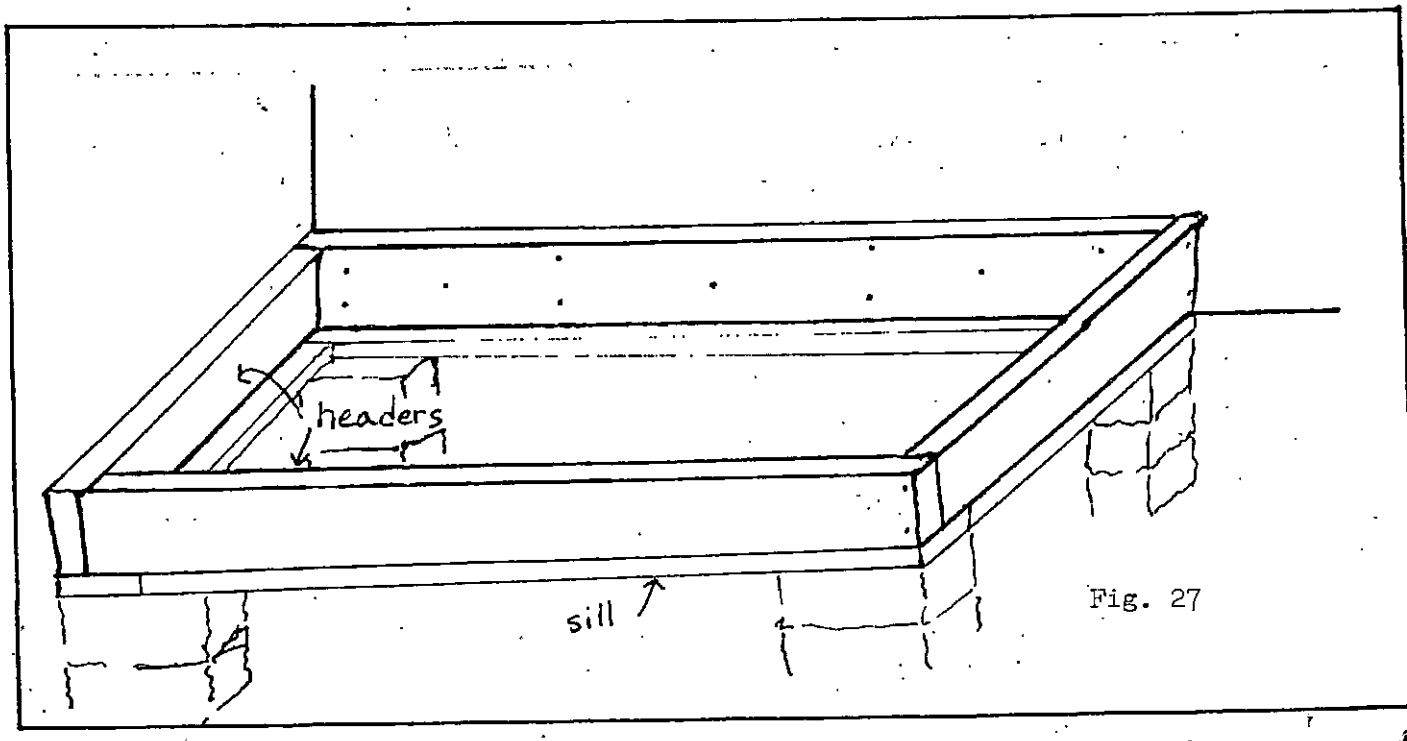


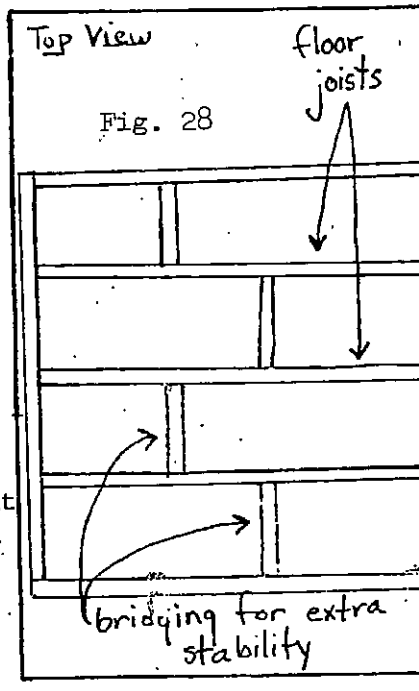
Fig. 27

4. After you have your outer frame in place, begin placing your floor joists in. Place at 24" centers if using 2 layers of flooring, 16" centers if only one layer. Use a double 2 x 6 under interior walls.

Note: Where the width of the room is more than the length of a single 2 x 6 joist, or where an excessive span makes the floor too springy, center supports should be used. Where two joists will meet in the middle, over such support, they should be long enough to pass and be nailed flush together to increase strength. Then a doubled 2 x 6 or 4 x 4 can run perpendicular to the joists under the joists and supported with blocks or posts every 4 feet.

Top View

Fig. 28



5. Bridging

After your joists are in position, you might want to add some bridging with 2 x 6 scraps inbetween joists. (See **Fig. 28**)

6. Decking

Mostly, we use rough-cut 1x planking for decking.

The most desirable flooring situation is to have a subfloor of 1x planking laid diagonally on the floor joists. Put felt paper over subfloor and finished flooring or particle board on top. However, sometimes the best we can do is one level of rough cut flooring.

weakness that proved its undoing in the long run: It was time-consuming to build a house this way. Early timbers had to be shaped with axes and other hand tools, though river-powered sawmills later prepared timbers more quickly. And you couldn't quickly slap timber joints together with nails. They had to be specially cut, fitted and fastened with wooden pegs, using hand tools like hammers, saws, chisels, planes and augers (drills). Larger and better homes required expert carpentry skills to make sure these joints were tight, strong and stayed that way. Finally, timbers were too heavy for one person to hoist and maneuver, so framing often became a group or community affair — a house or barn raising.

THE RISE OF BALLOON FRAMING

Timber frame homes, as now custom built, carry a distinct traditional flavor that's extraordinarily attractive to many modern home buyers who appreciate the massive, hand-crafted superstructure that's left exposed on the interior. Traces of the style appear in beamed ceilings you often see in recreation rooms. However, in the past, as well as now, timber framing was expensive. Wood was relatively cheap, but the skilled labor wasn't.

Three inventions lowered the cost of home-building and brought the age of timber framing to an end — the machine-cut nail, the steam-powered sawmill and balloon framing.

It's surprising that so small an item as a nail could have so much impact on building methods. But before machines began stamping out nails in 1790, nails were hand forged one at a time, a labor-intensive and therefore expensive process. By the early 1800s, machines were mass-producing nails, making them cheaper.

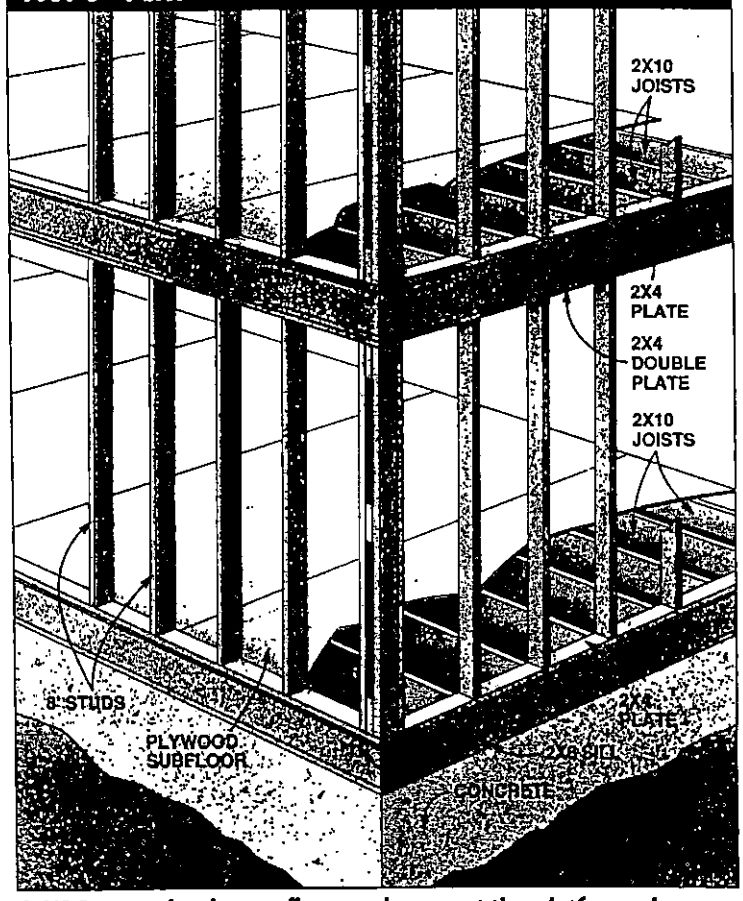
During that same period, inventors harnessed steam power to the circular saw. Steam power freed lumber mills from their dependency upon rivers for water power, so sawyers could mill their lumber just about anywhere. More standard-size lumber became readily available, if not locally, then by freight car from the expanding railway system.

Finally, in 1833, a whole new type of frame, especially suited to small buildings, appeared in Chicago — the balloon frame (Fig. B, p. 12). It's hard to overstate just how radically the balloon frame changed building practice in the U.S. and Canada. It swept away the timber frame within 50 years, so it's unlikely that you've ever lived in a timber frame house and perhaps not seen one except as a historical restoration. Timber framing survived as an architectural curiosity, a more expensive, custom-built option. (Ironically, timber framing is currently enjoying a rebirth in some building circles, prompted in part by new insulation techniques. More about this in Part 2.)

Why such a dramatic switch? Just look at the advantages. The balloon frame used light, easily handled lumber — no board was over 2 in. thick. That eliminated the heavy timbers and difficult joints, since you could quickly nail the slimmer lumber. Using standardized lumber and nails, one or two people of moderate skill could assemble the frame of an entire home with only a hammer and saw. More people could afford better homes, and what's more, they could do it themselves, maintaining a tradition of self-sufficiency, which perhaps still continues in our own enthusiasm for do-it-yourself projects.

The techniques of balloon framing were quite simple. Timber frame walls were overbuilt, that is, the frame was much stronger than it needed to be, and therefore, a waste of wood. But with

FIG. C PLATFORM FRAME CONSTRUCTION



STUDS extend only one floor and support the platform above. Plywood sheathing or steel straps (neither are shown) stiffen the wall and keep it rigid.

B. WALLS AND CEILINGS

1. Constructing Walls

Stud walls are preferable and offer better support for the roof and more insulation for the home.

Positions of windows, doors and all interior walls should be carefully planned and correct dimensions noted. Draw a floor plan and chalk line all interior walls to insure correct placement. (See Fig. 29)

Walls are usually easiest to construct on the floor and then raised into place. Start with a solid bottom plate (sole plate) and place identical length studs in place on 24" centers. Nail through plate into end of stud. Repeat the process for a top plate. To connect walls together, use a second top plate, overlapping the two levels of the top plate at all corners to strengthen walls and increase the holding power (see Fig. 30). When the length of a wall is longer than the 2 x 4 available, the double top plate can be spliced. Be sure the joint on the lower top plate is well separated from the joint on the top 2 x 4 (see Fig. 31).

Note: Always make sure there will be a stud on the edge of a wall to nail sheet rock to the outside corners. (See Figs. 32 & 33)

Windows:

The dimensions of window stud openings should be 1/2" larger on each side of opening than the window frames to be placed in the opening. Put a double 2 x 4 on both sides and the top and bottom (on end for added strength) of a window opening as shown. (Be sure to maintain 24" centers even under windows so sheet rock will fit exactly on studs.) (See Fig. 34)

Doors:

The dimensions of a door stud opening should be 1½" wider than the door frame and 2" taller than the door frame to be placed in the opening. Use a double 2 x 4 on both sides and top as shown. (See Fig. 35)

To make things go alot easier later, concentrate on 24" centers, the wall being plumb (up and down level), accurate and square measurements for any windows and doors to be installed.

2. Working With Box Construction Walls

Box construction is a very common way of building homes in Appalachia. It is basically construction without studs. The 1x planking is nailed to a floor header and sill, and a top plate holds up the roof and ceiling. (See Fig. 36)

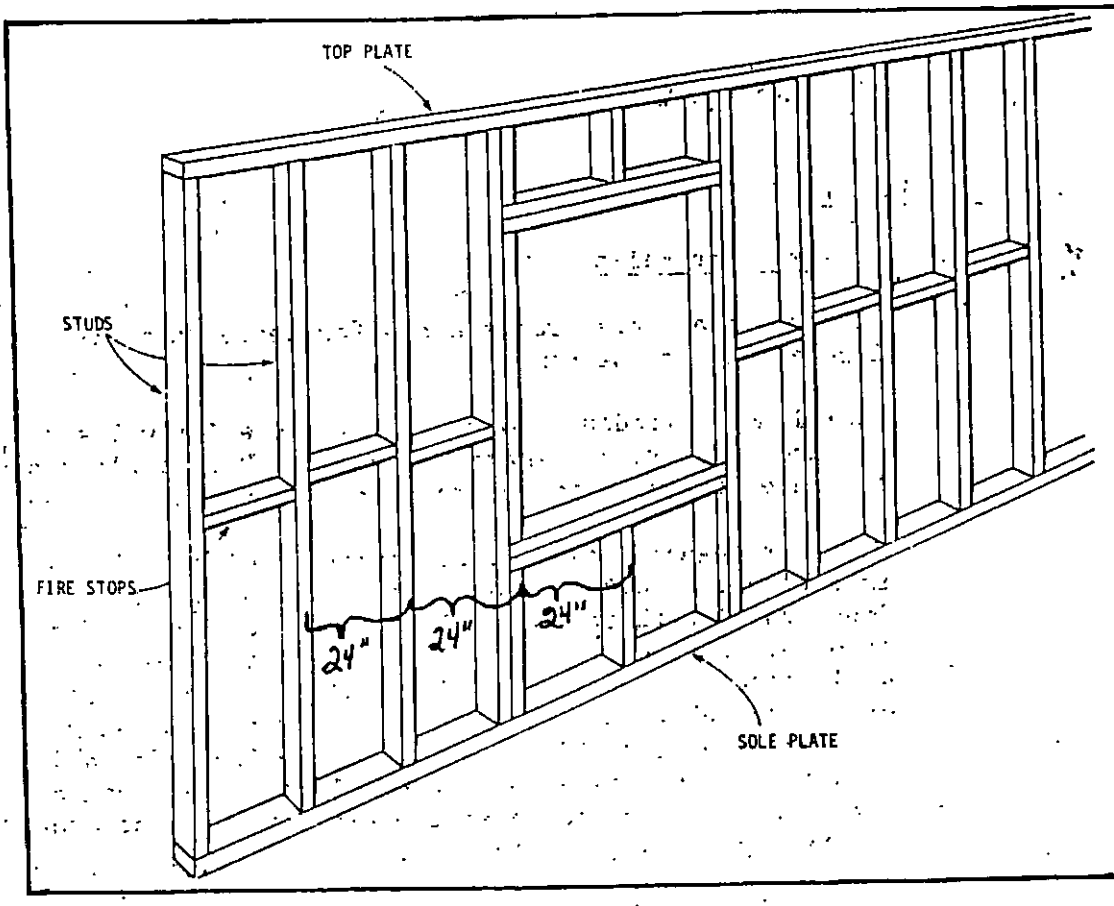


FIGURE 29

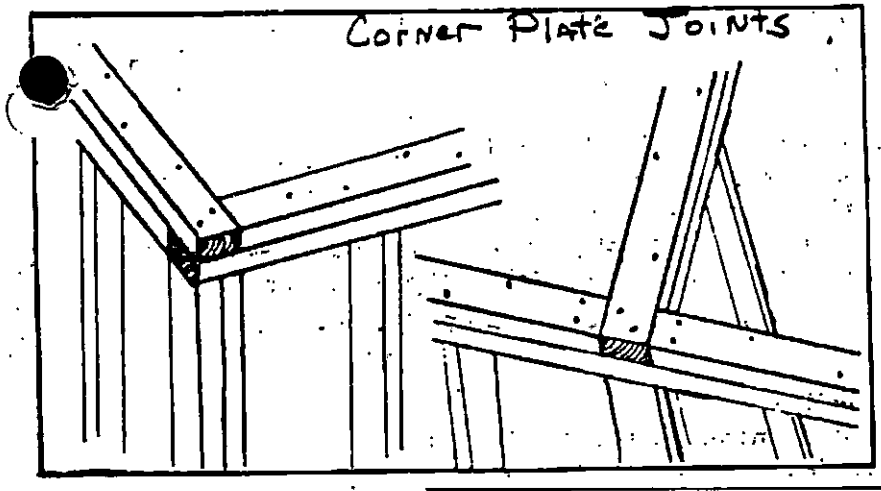


FIGURE 30

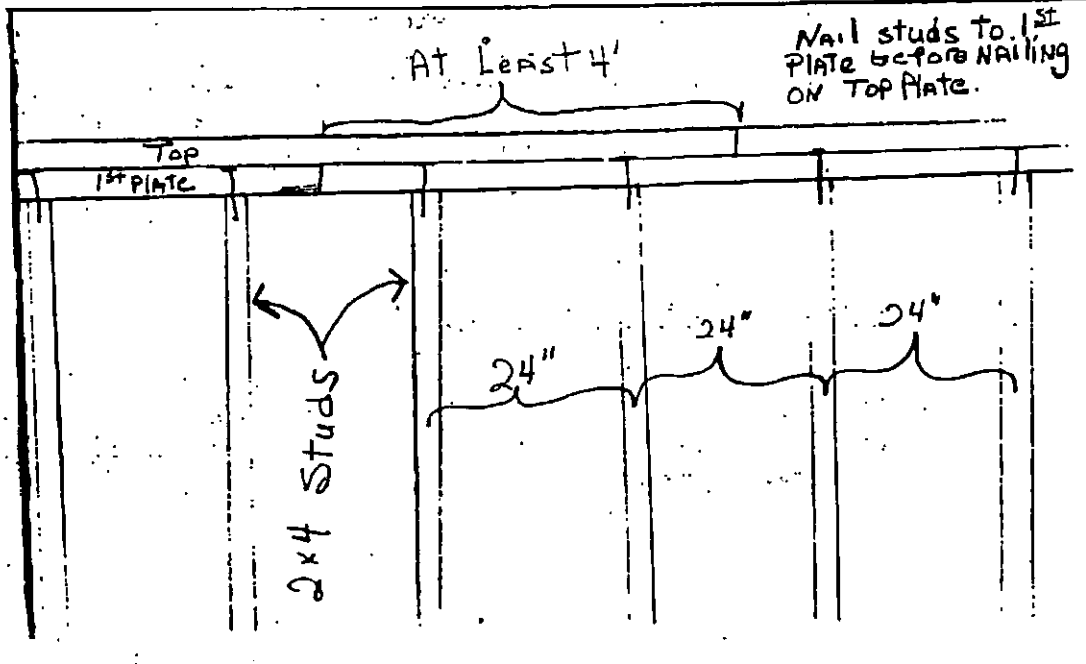
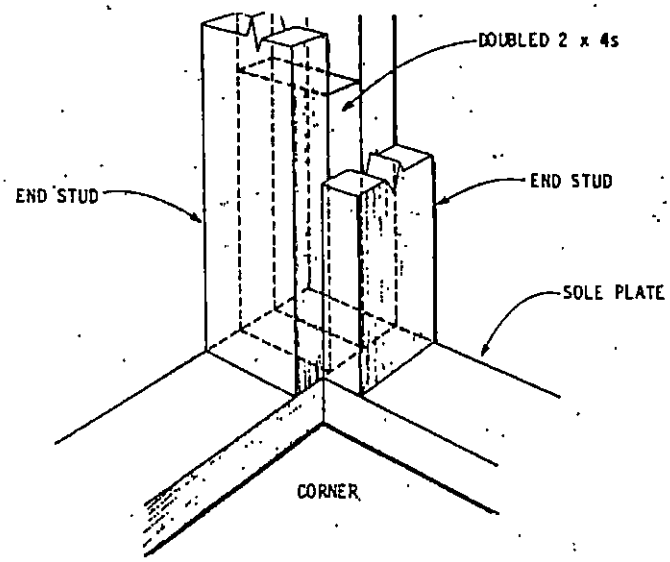


FIGURE 31



When your wall construction involves a corner, use the method shown here. The walls are constructed as usual, then spiked together with a doubled stud as joining element. The doubled stud does not need to run floor-to-ceiling; the joint is strong enough with its right-angled 2x4s. If you like, use three doubled 2x4s about 16 inches long, one at the floor, one at the ceiling, one in between

FIGURE 32

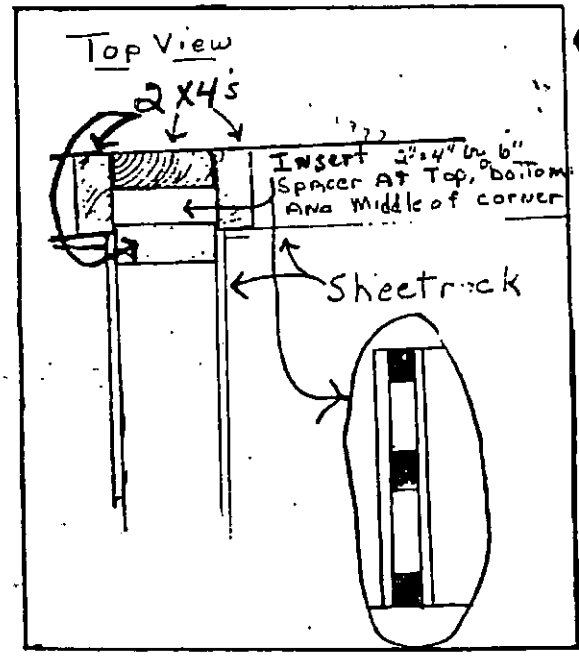
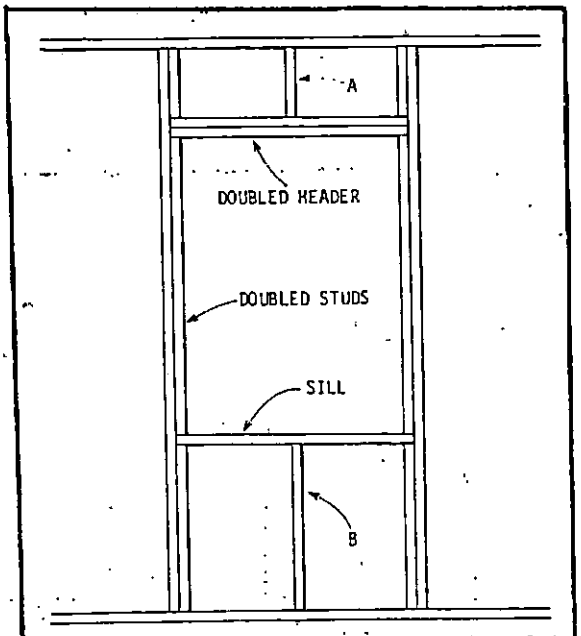
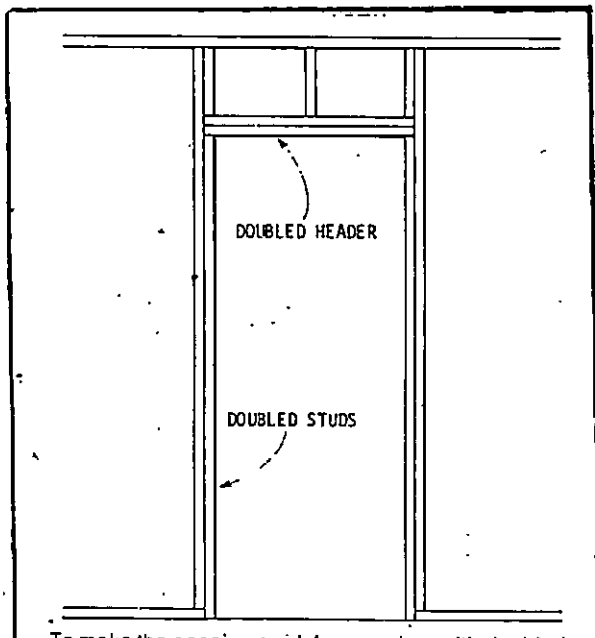


FIGURE 33



Frame windows this way. The sill can be a single 2x4 except in windows over 36 inches in width; then it should be doubled. Doubled studs flank the window. Studs *A* and *B* must be positioned to fall in with the spacing of studs in the rest of the wall.

FIGURE 34



To make the opening rigid, frame a door with doubled 2x4s on either side and overhead.

FIGURE 35

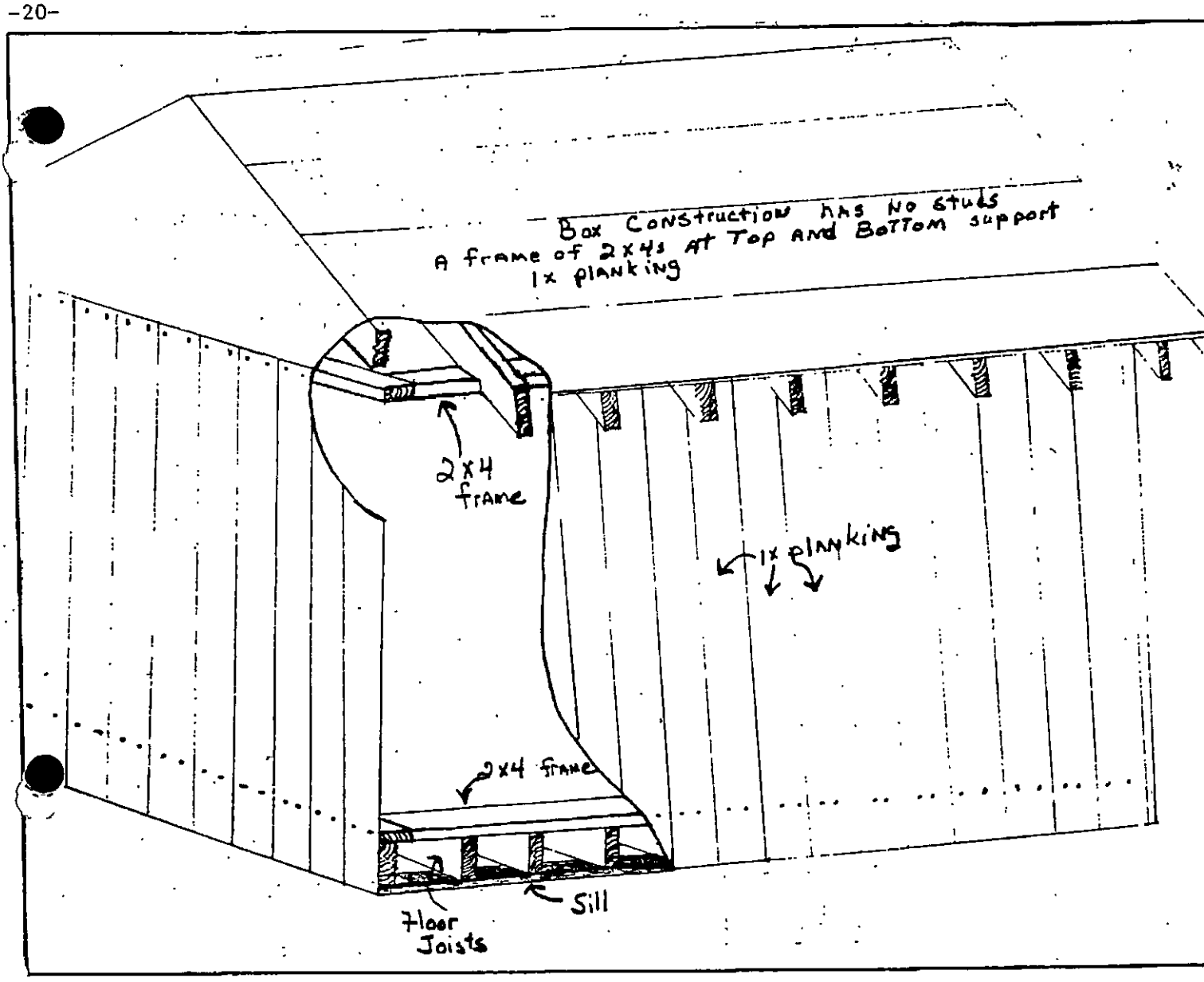


FIGURE 36

There are two basic reasons for studding walls in homes we work with. One is that sometimes the existing walls aren't strong or stable enough for sheetrock to be nailed directly to. The second reason is for insulation.

Studding In Already Existing Walls:

1. Don't assume the wall is square--it probably isn't. (That means each stud will need to be individually measured to it.) Therefore, a simplier way of studding (rather than building the wall on the floor and raising it) is to nail your sole plate to the floor, then a single top plate on the ceiling--from one end of the wall to the other.

2. Toe-nail your side studs in place (3½" from the corner if studding the other wall), then measure and cut your studs individually at 24" centers, all the way across. There's no need to connect the corners here, since each wall is nailed securely at the top and bottom.

3. Insulation

Fiber glass insulation can very easily irritate your skin, and should be worked with only with heavy clothing, gloves, a scarf over the mouth and nose, and goggles to protect the eyes.

Installation: Using 23" roll insulation, staple into place with the fiberglass facing the outside, paper facing inside the room. Two or three staples at the top, and one or two in the middle should hold it in place. Cut insulation with a utility knife.

4. Ceiling Framing

a. Constructing Ceiling Joists

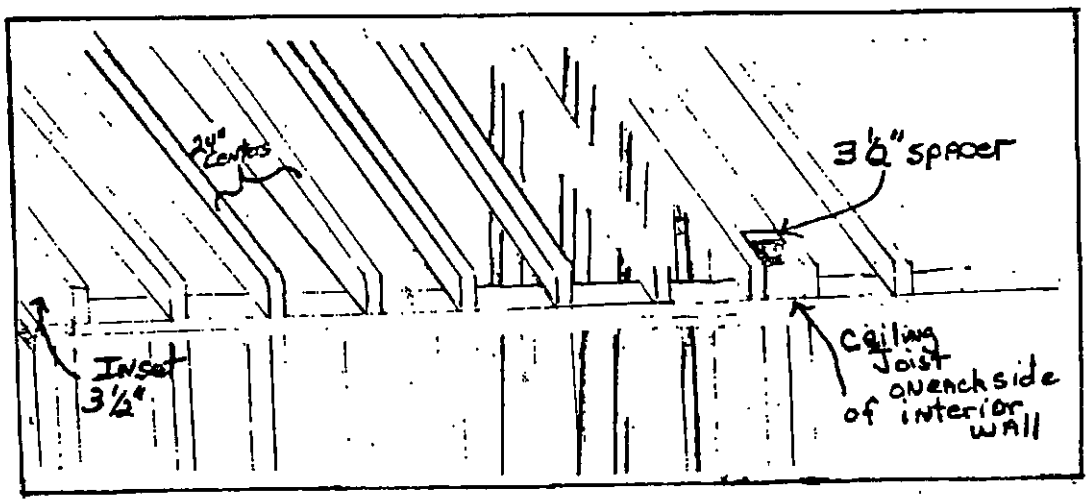
Use 2 x 4's for the ceiling joists unless the area in the loft will be used as a living area or for storage of heavy items, then use 2 x 6's.

Place the first ceiling joist the width of two 2 x 4's from the outside wall and continue the room on 24" centers (unless the loft will be used as a living area, then put 2 x 6's on 16" centers.) Place last joist the width of two 2 x 4's from outside edge of opposite wall, even if it is less than on a 24" center. In addition, place a joist on each side of all interior walls separated by 3½" spacers. If the width of the house is too wide for the length of one 2 x 4 rafter, and there is a wall in the middle, overlap the joists to increase the strength. (See Fig. 37)

b. Ceiling Frame Repair

Ceiling and rafters needing repair are either rotten due to roof leakage or there was not a sufficient quantity of rafters installed in the first place. Sometimes, you will find poles instead of 2 x 4's. In any case, the ceiling will almost surely have to be torn down before ceiling rafter repair is possible. So make sure repairs are really needed before pulling down a ceiling.

Once the ceiling is down. it is easy to measure the length of new ceiling rafters needed whether some are to be replaced or new



ones are added for additional support. Measure from the back side of the top wall plate on one side of the room to the back side of the opposite plate. If one or both walls are outside walls, the roof line may get in the way. If this is the case, cut the top corner off the joist as shown. (See Fig. 38)

Splicing in a few situations will be sufficient by nailing a good 2 x 4 alongside the rotting section of the ceiling joists. Make sure you nail into good wood on both sides of the rotting.

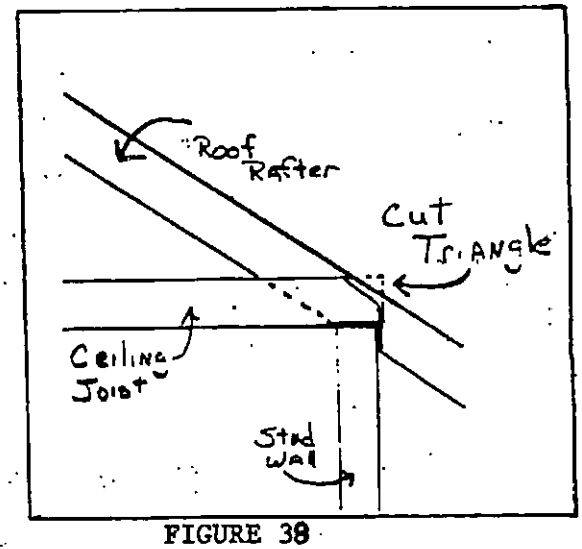


FIGURE 38

5. Lowering A Ceiling

Occasionally, in working for the A.S.P., we find a need to lower a ceiling in a room. Usually the reason is to make the room easier to heat--a lower ceiling means a warmer room.

Things to remember:

--A ceiling should be lowered and the ceiling sheetrock hung before the walls are sheetrocked.
--A light fixture will need to be lowered with ceiling. Have someone who knows electrical work do this part.
--Decide on which way to run the ceiling joists by determining which way would save the most lumber.

How to lower a ceiling:

1. Determine how much you will lower the ceiling. A good height for the ceiling would be 7½-8'. --Remember: Don't assume walls are the same height and the room is square. Make adjustments, if necessary.
2. Nail connector supports out of 2 x 4's into two parallel walls. Preplan ceiling joists centers at 24". --Remember: A ceiling joist must be along each parallel wall (see Fig. 39)
3. Construct hanging supports in middle of ceiling with a 2 x 4 block nailed to ceiling, then a 2 x 4 for the dropping support nailed into block and toenailed into ceiling. One hanging support for every 6'-8' of ceiling. (See Fig. 39)
4. Nail ceiling joists to hanging and connector supports; toenail to walls. Run at 24" centers. (Corner joists nailed directly into walls.) (See Fig. 40)

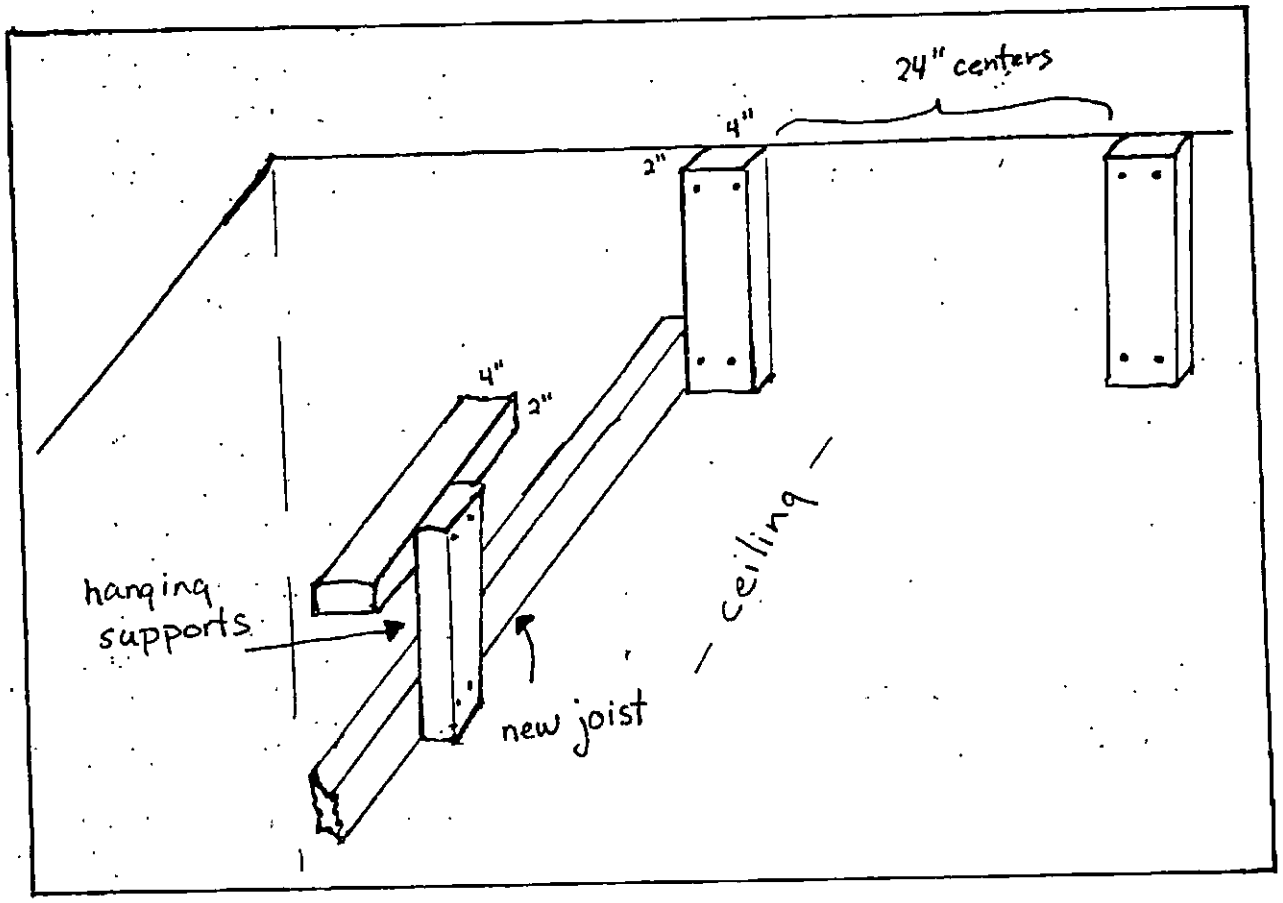


FIGURE 39

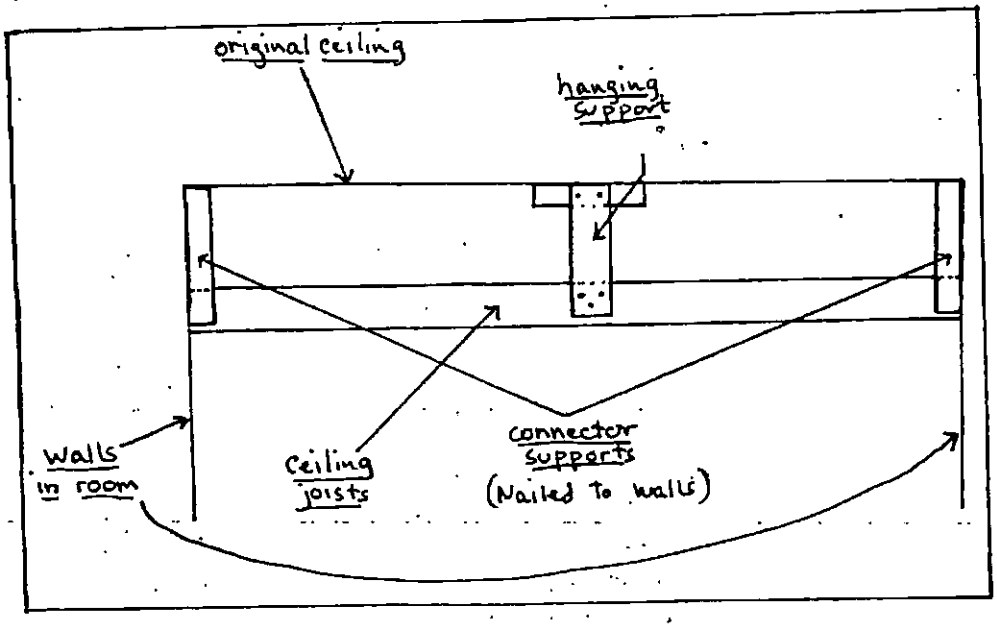


FIGURE 40

C. ROOF FRAMING

1. ROOF RAFTERS AND DECKING REPAIR

Before doing any work on a roof, read the general tips in Roofing Section. A leaky roof can cause rot in the decking or roof rafters. Before anyone gets on a roof, you should make sure it will hold a person or persons.

If the decking is rotten, it should be replaced by taking off all roofing and pulling up only the decking that is rotten. If roof rafters are only slightly rotten where the decking was, and are still basically sound, a long 2 x 4 or 2 x 6 can be nailed beside the rotting section of the rafters for strength. Any time you're splicing a board onto a rotted rafter, paint the new board with creosote. Use the same basic technique on repairing floors by splicing or cleating (as shown in section on Repairing Rotted Floor Joists.)

If the rafters are rotted all the way through, or to a point that the strength of the rafters is questionable, the rafters should be replaced. More than likely, not all rafters will be rotted. Replace only those that need to be replaced. If a rafter needs to be replaced, the chances are that the decking needs replacing as well. Rip up all rotten decking and replace rafters one at a time to avoid weakening the roof.

2. NEW ROOF CONSTRUCTION

a. Determining Length and Angles of Rafters

There should be one (1) rafter every two feet, and can be one on each overhang. To determine the length and angles of rafters:

Step 1. Decide what pitch you want on the roof.

Step 2. Measure the inside wall to wall width of the house at the top plate.

Step 3. Subtract the width of the ridge plate from the measurement in Step 2 and then divide by 2. This is length "R". (From this point on, measurements can be made manually by following Steps 4 through 9, or on paper by following steps 4A through 6A.)

Step 4. Mark a mark 16" from the end of a 2 x 6 rafter.

Step 5. Place a framing square on the rafter so that the 12" and the 4" (or whatever rise is desired--we will use a rise of 4" in this example) line up with the rafter as shown. Draw line "W" 3½" long. (See Fig.41)

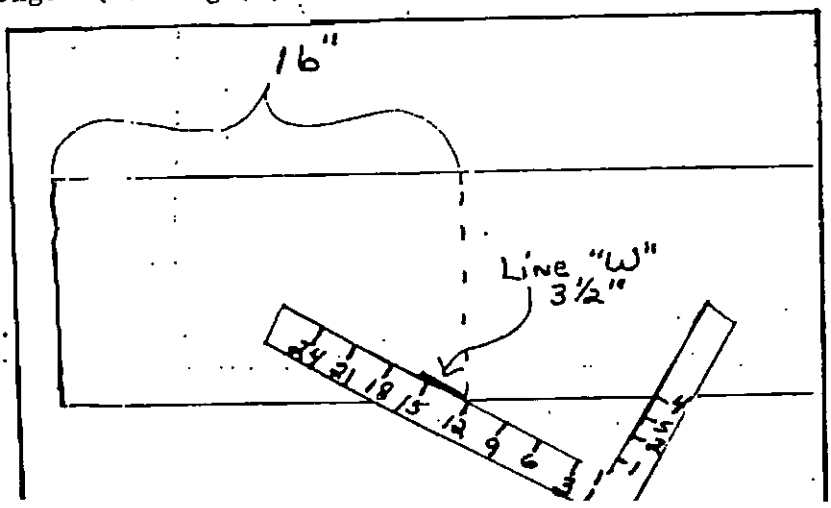


FIGURE 41

Step 6. Place plank "A" directly in line with the long arm of the framing square. (See Fig. 42)

Step 7. Measure the length of "R" on plank "A" starting where rafter intersects and mark.

Step 8. Using a framing square, place plank "B" at a right angle to plank "A" at mark and draw line x on rafter. Cut along line x and save scrap. (See Fig. 43)

Step 9. Using the scrap from Step 8, draw on identical angle (line Y) at other end of rafter. Using a framing square, draw line "Z" at a right angle to line "W" as shown. Cut off end at line "Y" and cut out notch at lines "W" and "Z". (See Fig. 44)

Step 10. Use the first rafter you cut (whether by manual or mathematic method) as a pattern for all the rest of the rafters. Cut two from the pattern and try them out to be sure they fit before you cut the rest!

Step 4A. Using the ratio of rise over run from the pitch chart (e.g. 4"/12" compute the length of X (Use the formula 4/12 = X/R or x = 4 x R/12). (See Fig. 45)

Step 5A. Compute the length of P by using the Pythagorean Therom ($A^2 + B^2 = C^2$ or $R^2 + X^2 = P^2$).

Step 6A. Using a framing square, mark the rafter for the desired pitch (here using 4" rise/12" run as the example). When using a framing square, use the outside scales on both arms or inside scales on both arms but never mix the two. (See Fig. 46)

Finish this process by following Step 10 in the previous method.

b. Construction of Rafters for a Gable Roof

1. To give an overhang on each end of the roof, cut a 1 x 6 board 1½-2 feet longer than the overall length of the walls to be roofed. (See Fig. 47)

2. Nail two outside rafters, one at each mark, to the same side of the 1 x 6 ridge plate and running flush with outside of the top plate.

3. Cut two 2 x 4's the length of X°(from steps 7 or 4A). Place the two rafters nailed to the ridge plate in place, using the two 2 x 4's for temporary braces as a vertical support nailed into ridge plate and ceiling. (See Fig. 47 & 48)

4. Nail opposite rafters to ridge plate to support weight.

5. Nail in alternating rafters down the line on 24" centers running next to ceiling joists. Nail into ridge plate at the peak and to the ceiling joists and top plate at other end.

c. Construction of Single Sloped Roof for Room Additions

Probably the more common form of roof construction with the Project is in building single sloped roofs--for room additions especially. Sometime you can tie new rafters directly into already existing rafters. (See Fig If you're not that fortunate and you must tie into the side of the home,

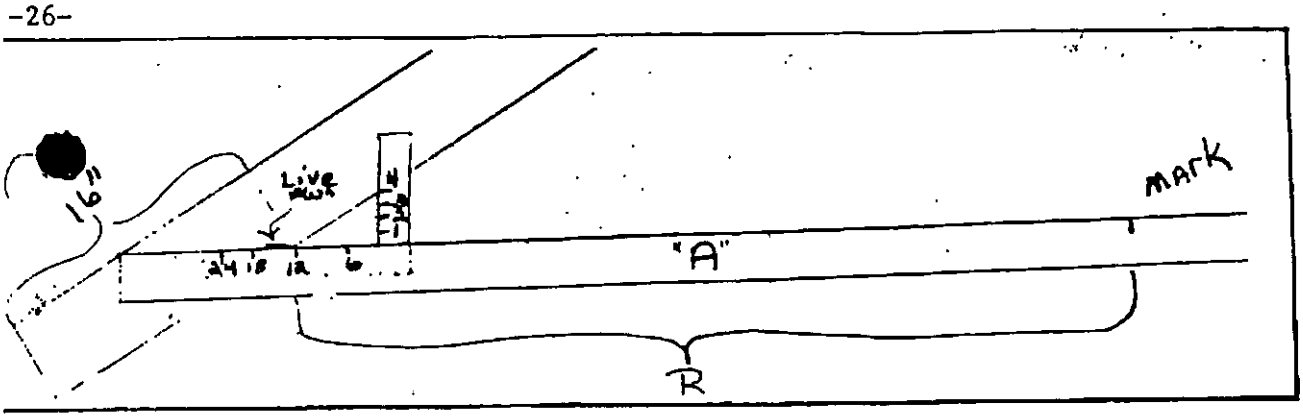


FIGURE 42

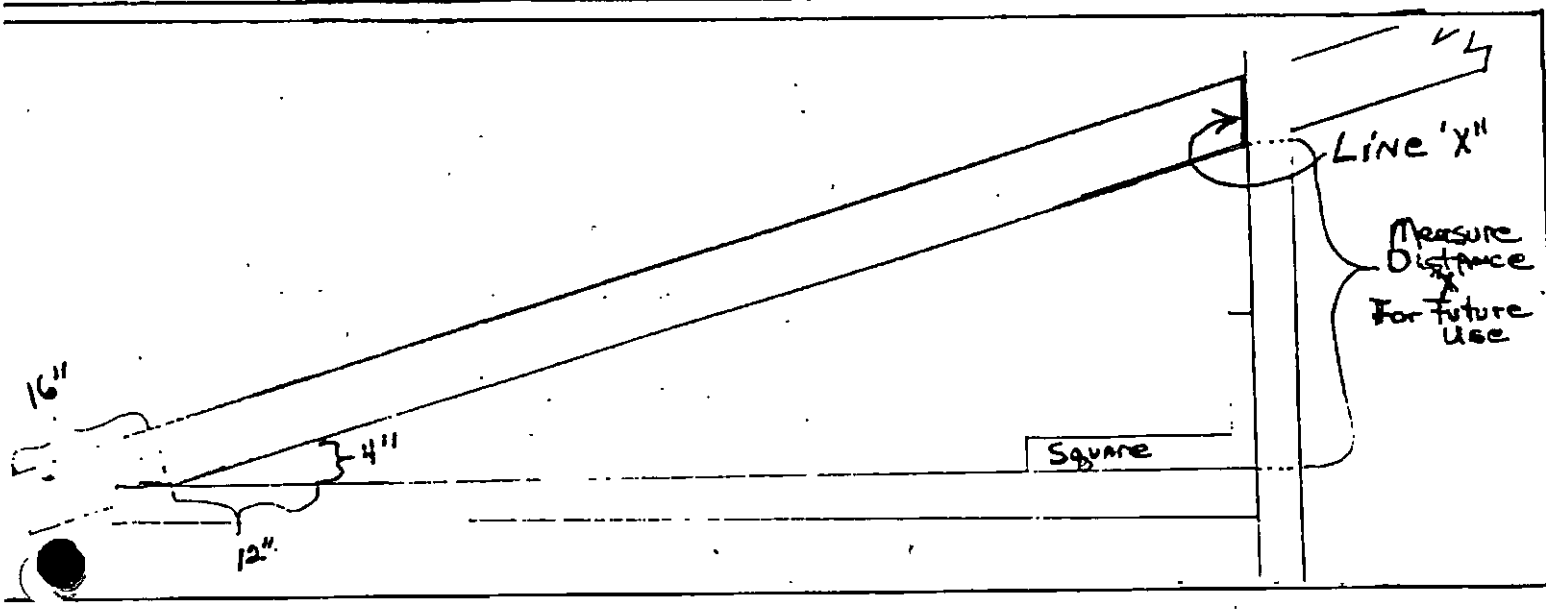


FIGURE 43

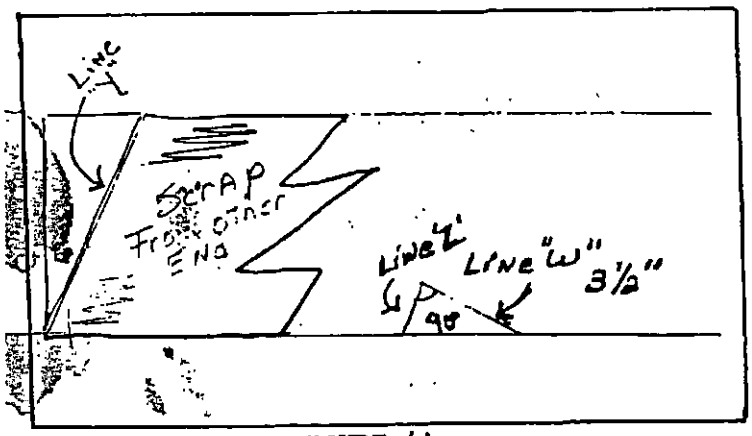


FIGURE 44

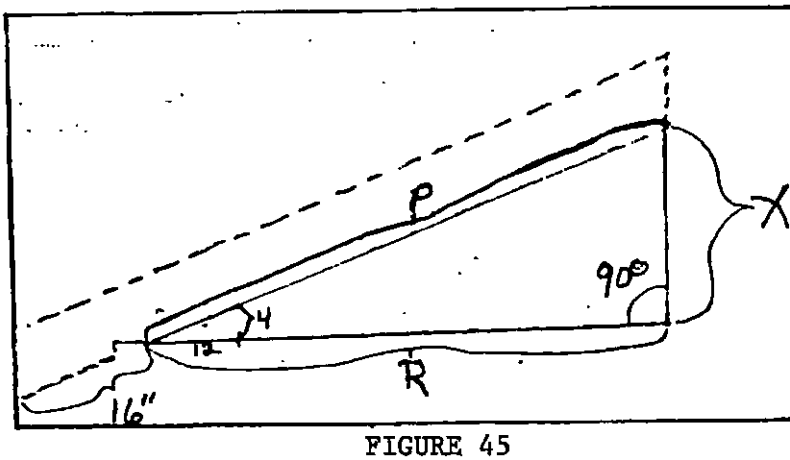


FIGURE 45

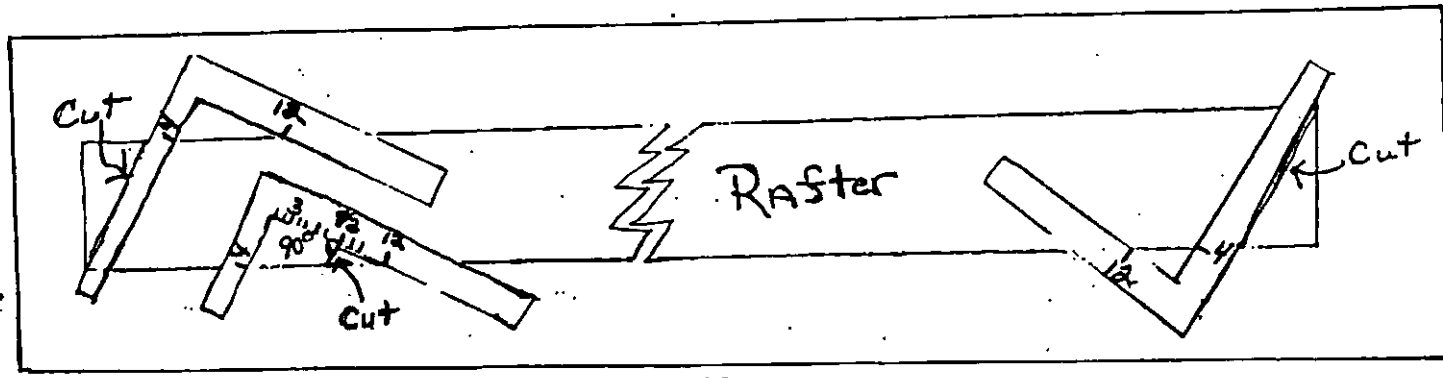


FIGURE 46

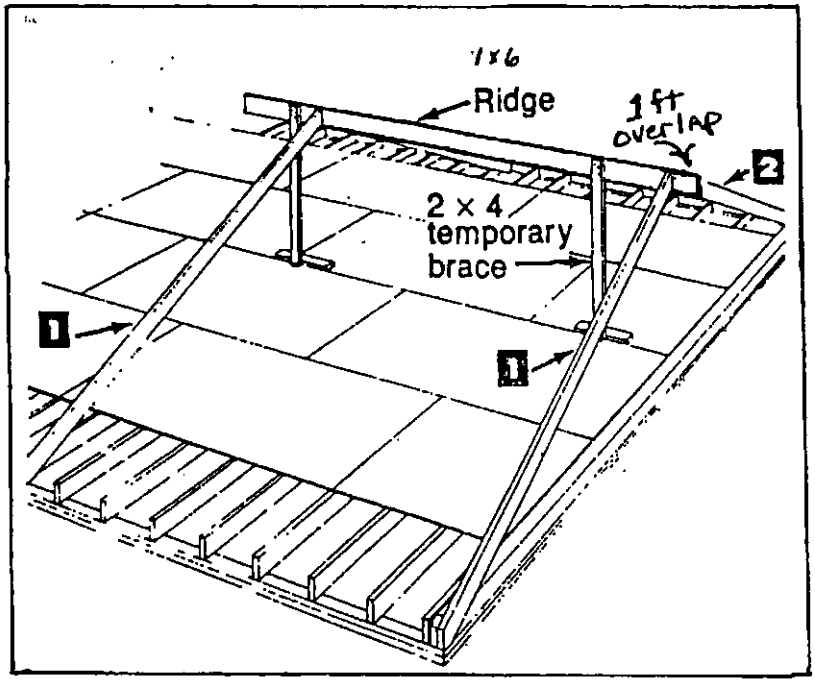


FIGURE 47

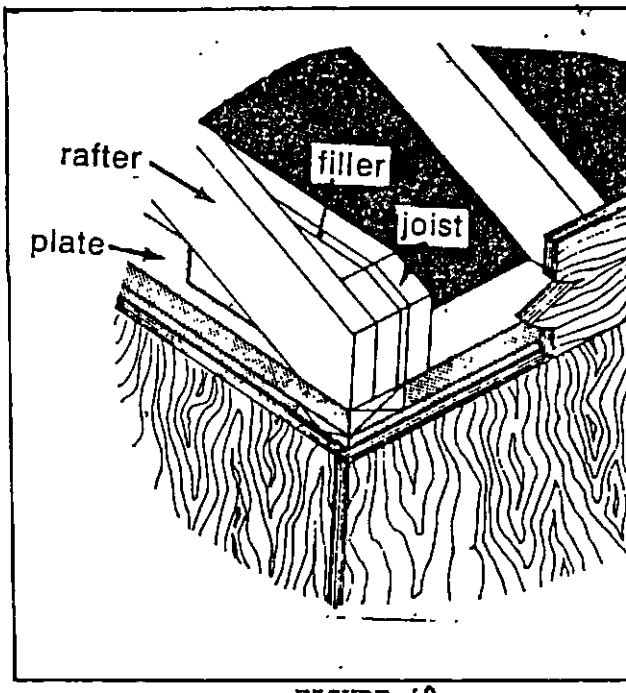


FIGURE 48

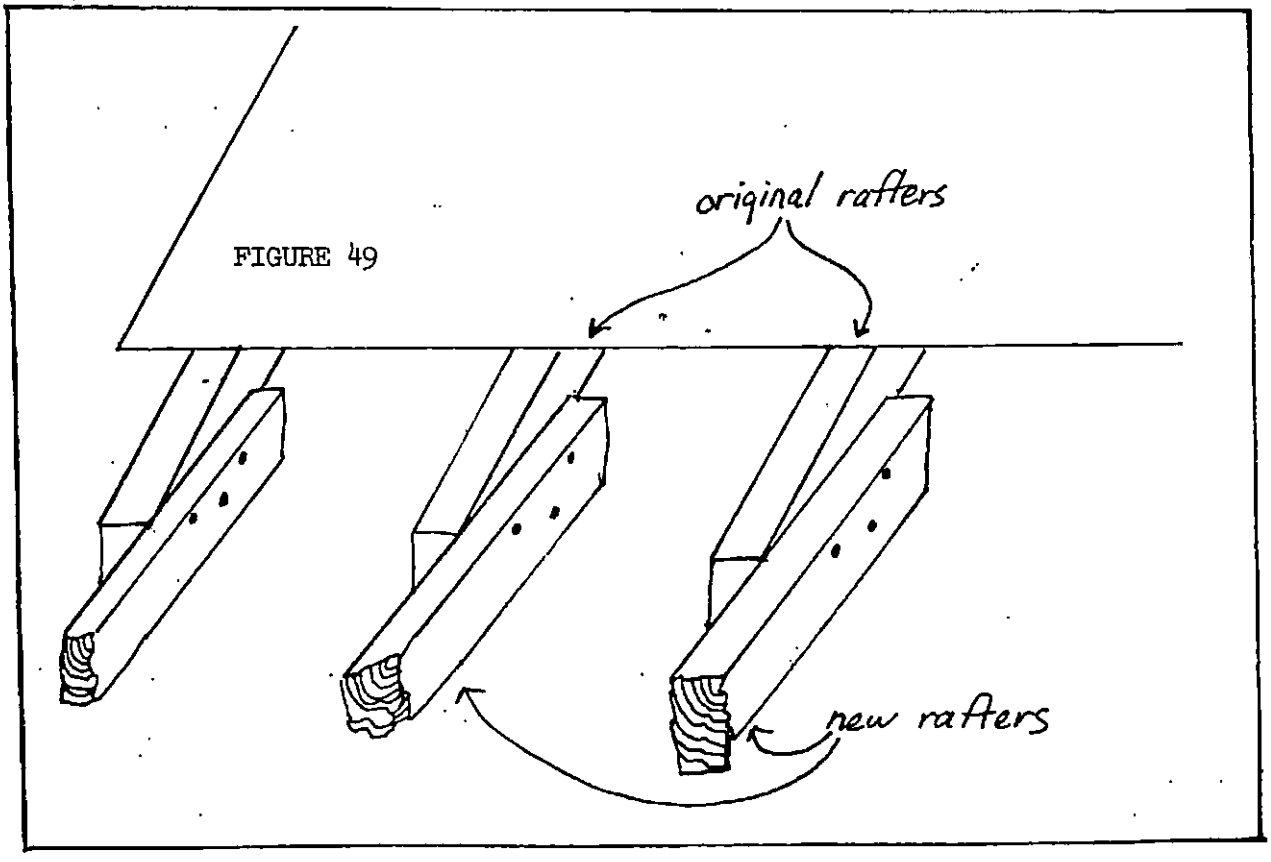


FIGURE 49

you'll have to run your rafters either perpendicular to the roof of the home, or run them parallel to the roof. In order for you to run the rafters out perpendicular to the roof, you must have a very strong wall to be tying into, and enough room to pitch your roof adequately without the roof rafters already there being in the way. Before you use this method, Be Sure you have a strong 2 x 8 nailed sturdily against the wall. The rafter should then be connected securely to the 2 x 8 and the wall of the home.

Probably the more practical method of building a single sloped roof is running the rafters for the room addition parallel to the rafters of the home. To do this, you'll have to construct a bracing frame to support the rafters.

Constructing a bracing frame:

The bracing frame will consist of 2 x 4 extensions, 2 x 4 braces (on each extension) and a 2 x 4 (or rough-cut 1 x 6) cross-piece.

See Figure 50 for illustration of a bracing frame.

The length of the 2 x 4 extensions will be determined by the pitch you want the roof to be. Stand the extensions on end on the side of the ceiling joists farthest from the home, and nail. Nail into side of ceiling joists and toenail into the top plate. On the outside end, nail a 2 x 4 block onto the top plate and onto the extension. Place on the opposite side of the extension that the ceiling joist is on as shown in Figure 50. (Should be on the outside of ceiling joist.)

To secure the extensions, you'll need to nail braces into each individual extension, running from the extension to the ceiling joist.* The brace for the outside extension should be longer and more stable than the others. Then nail a 2 x 4 cross-piece running from the outside wall extension to the wall of the home. For placement of cross-piece, measure from the top of the extension ½" less than the width of the rafters. (Example: 3½" down from the top of extension if using rough cut 2 x 4 rafters.) Butt the cross-piece up against the home's wall, nail a block up against the wall and nail the cross-piece into the block. (See Figure 51) Nail the cross-piece to all the extensions. Now the bracing frame should look similar to what is shown in Figure 50.

Now go to the outside end of the ceiling joists and connect a 2 x 4 flat on top of the ceiling joists, as shown in Figure 52. Nail to all ceiling joists.

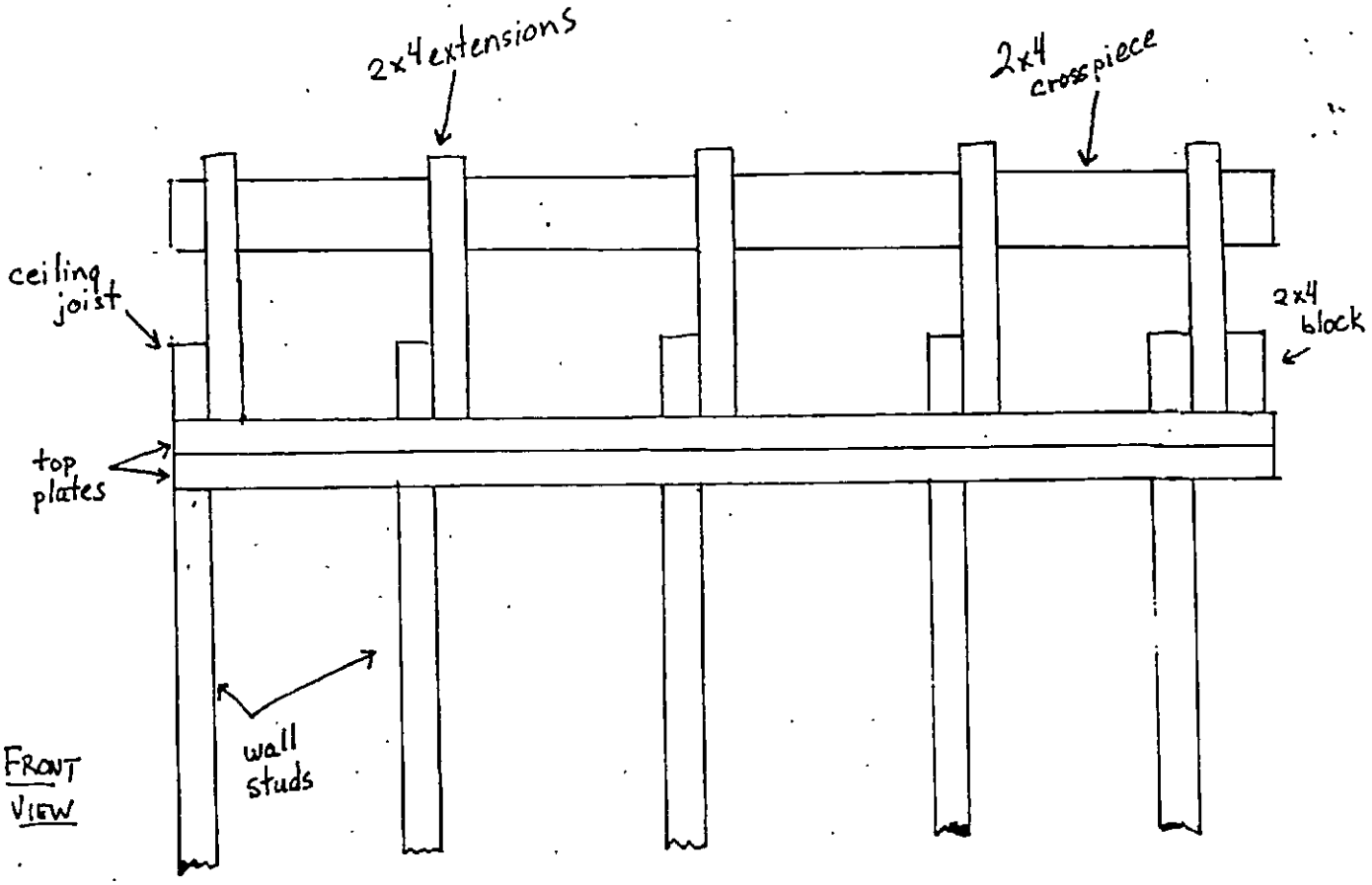
Connecting the rafters:

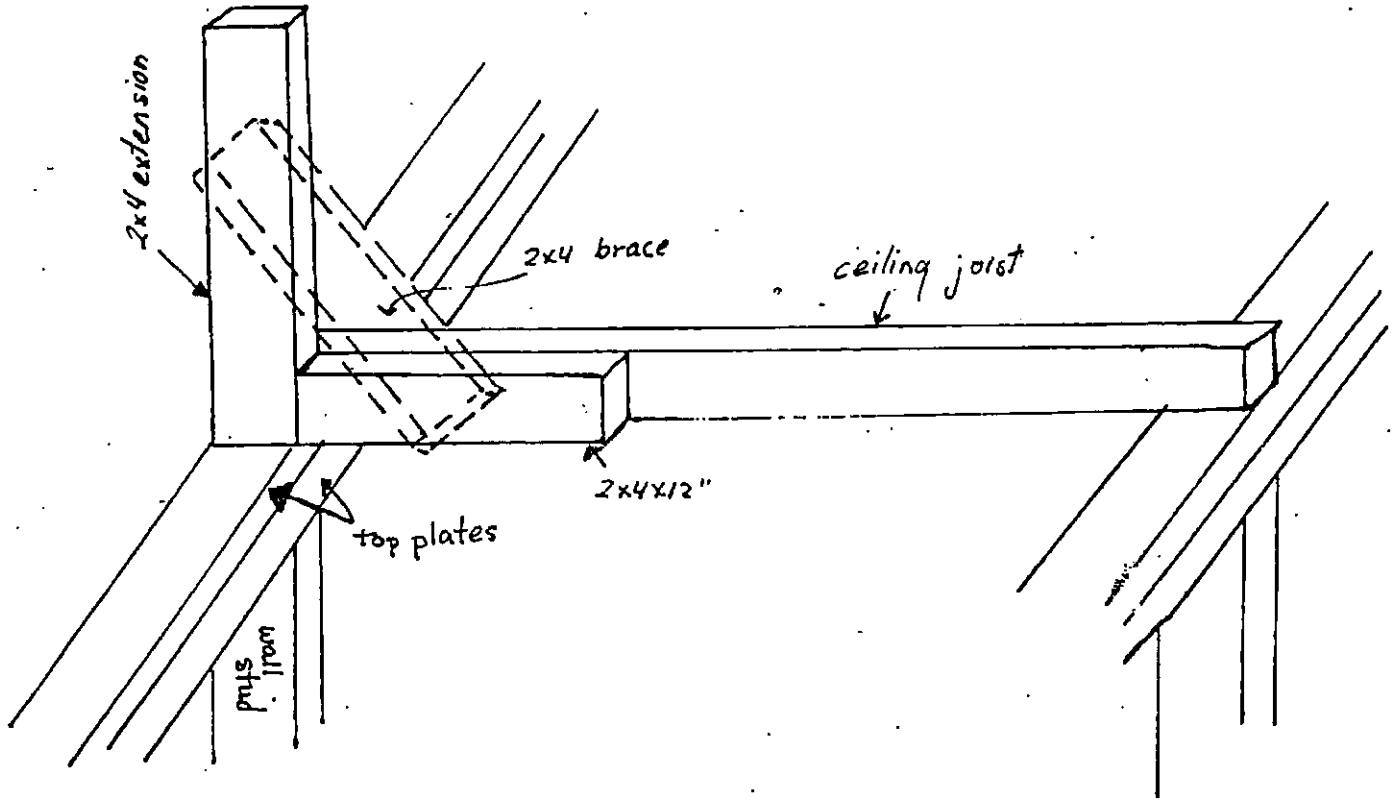
Assuming you've figured out the length and angle of the rafters (see previous section), nail the rafters to the same side of the extension as the ceiling joists. On the other end, using a 10"-12" overhang on each end, cut your notch for the rafters to fit over the 2 x 4 riding on the ceiling joists and toenail into that 2 x 4 and to the ceiling joists. On the end, to put a rafter flush with (or close to) the outside of the studded walls, run a rafter on both sides of the extension (the one you braced so well) and nail into place. Nail rafter on the other end directly into the wall of the home.

D. DECKING

Because of cost, we almost always use rough cut 1X planking for the decking.

* A 2 x 4 x 1' will need to be nailed flush to the ceiling joist for [illegible] to nail up against.


2x4 extensions
2x4 crosspiece
ceiling joist
2x4 block
top plates
wall studs
FRONT VIEW


2x4 extension
2x4 brace
ceiling joist
2x4x12"
top plates
wall stud

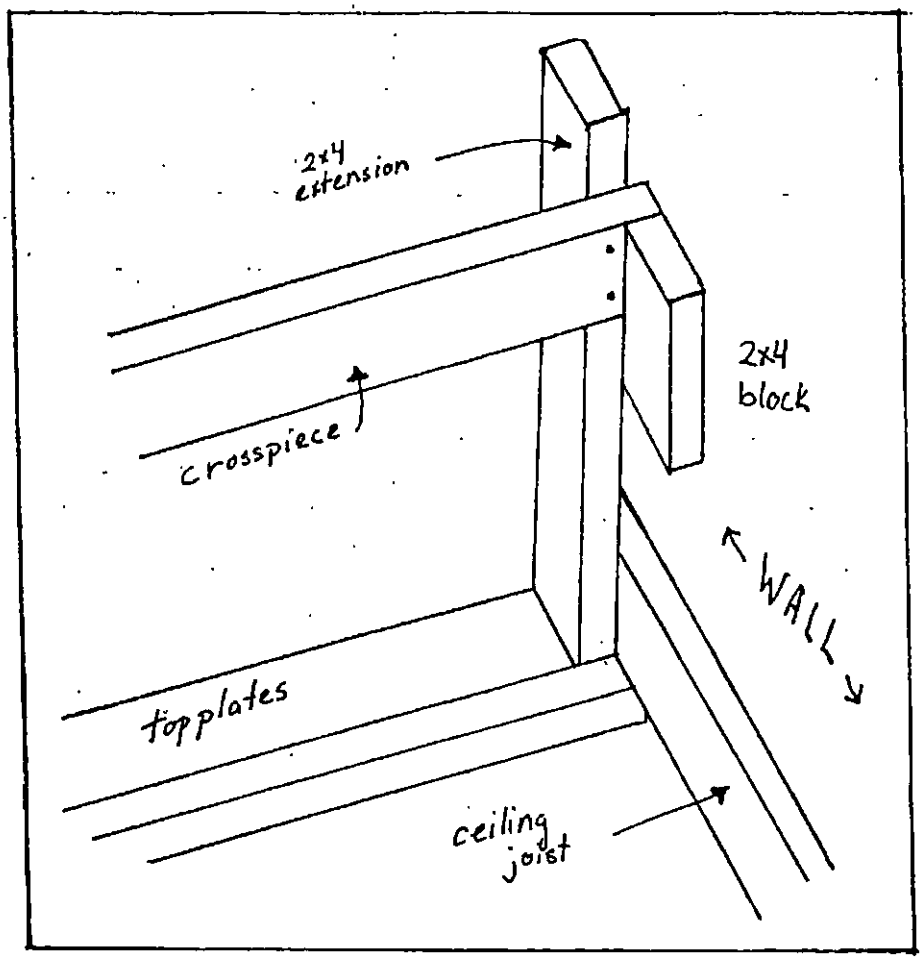


FIGURE 51

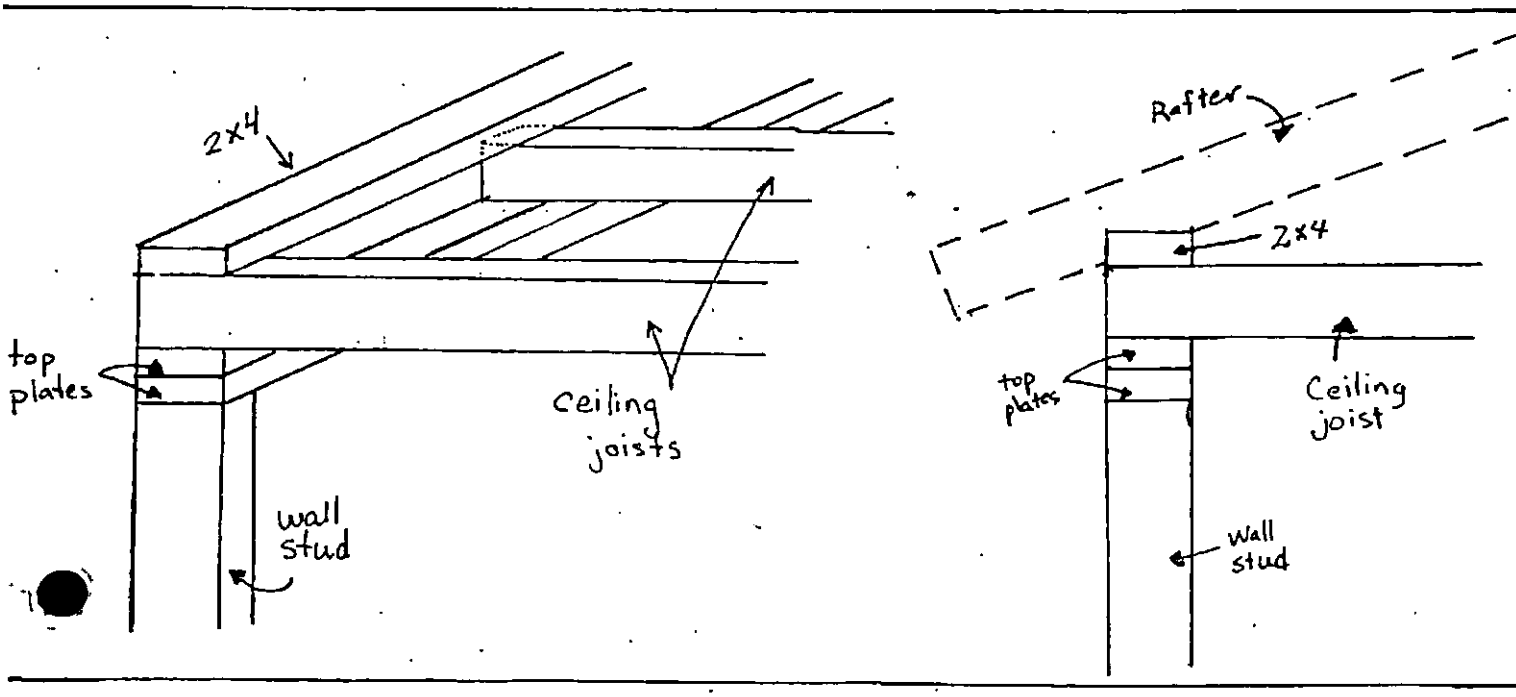


FIGURE 52

Occasionally, we use plywood. (If this is the case, make sure it's exterior plywood.)

--The decking should overhang 6"-10" beyond the sides of the rafters unless you have constructed rafters to overhang the walls. (In this case, 1".) Decking should overhang 1" beyond the end of the rafters. (See Fig.53)

--Always stagger joints of the planking for maximum strength. (See Fig.54)

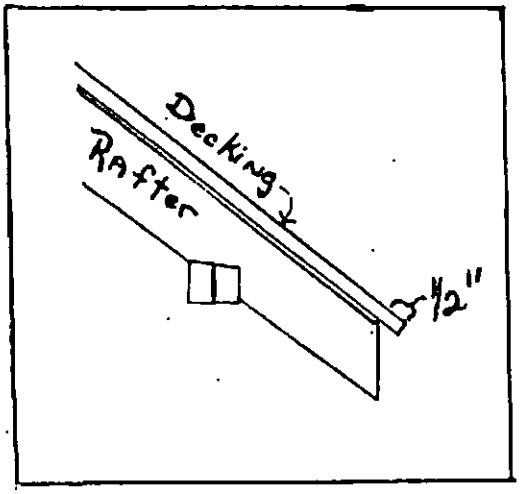


FIGURE 53

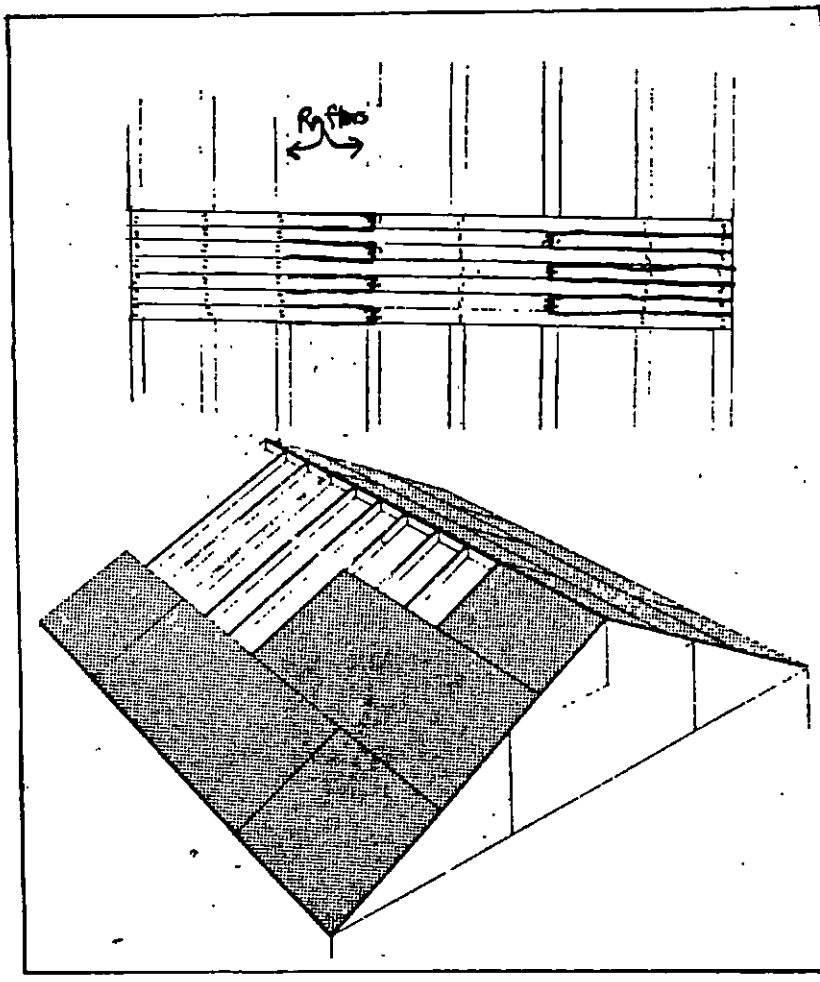


FIGURE 54

D. CONSTRUCTING STEPS

Since most accidents occur on stairs, it is important to build safe and usable steps.

Use the following guidelines (refer to FIGURE 55):

1. Support the bottom of the runners on a rock or brick to avoid rot. Plan to have runners parallel and level to each other.

2. Use 2 x 8's (2 x 10's for larger stairs) for runners, 2 x 6's, 2 x 4's, or 2 x 8's for treads (what your feet go on) and 2 x 2's (or 2 x 4 scraps) for cleats.

3. Minimum stairway width should be 3 feet. Measure at top and bottom of runners to make sure the distance between the runners from top to bottom is consistent.

4. Maximum height of risers (i.e. from top of one step to top of next) is 8" (7½" is best).

5. Minimum tread (or steps) width should be 9" (9½" is best). Cut treads larger for nosing (½" out from runner). There should be a very slight forward pitch to the steps to allow water to run off--but very slight.

6. All treads should be the same sizes, as with all risers.

7. The hand rail should be 36" above the middle of each tread.

8. To cut bottom of the runners, draw a line 6" long at right angle to the last tread (the side of the tread facing the outside). Next draw a line at a right angle to the 6" line started at the bottom end of the line. Then cut along the lines.

9. Make sure runners are connected firmly to the house or porch. If you're not confident that they are connected firmly, take a 2 x 6 and cut to the length that the treads will be. Nail the 2 x 6 into the house or porch header--level--and then nail two or three nails from runners into sides of the 2 x 6 (See Fig.56)

E. DOORS AND WINDOWS

1. FRAMING FOR AND HANGING A DOOR

1. Framing for the Door:

The framing for the door should not interupt the 24" centers in the wall.

The door framing and casing must be square. The frame should consist of 2 x 4's put together in the fashion shown in Figure 57

Example:

Say we are fitting the door to the 2 x 4 framing. We have a door of 69 x 34½. The opening you should use would be a 36 x 70. Add the following for the correct measurements.

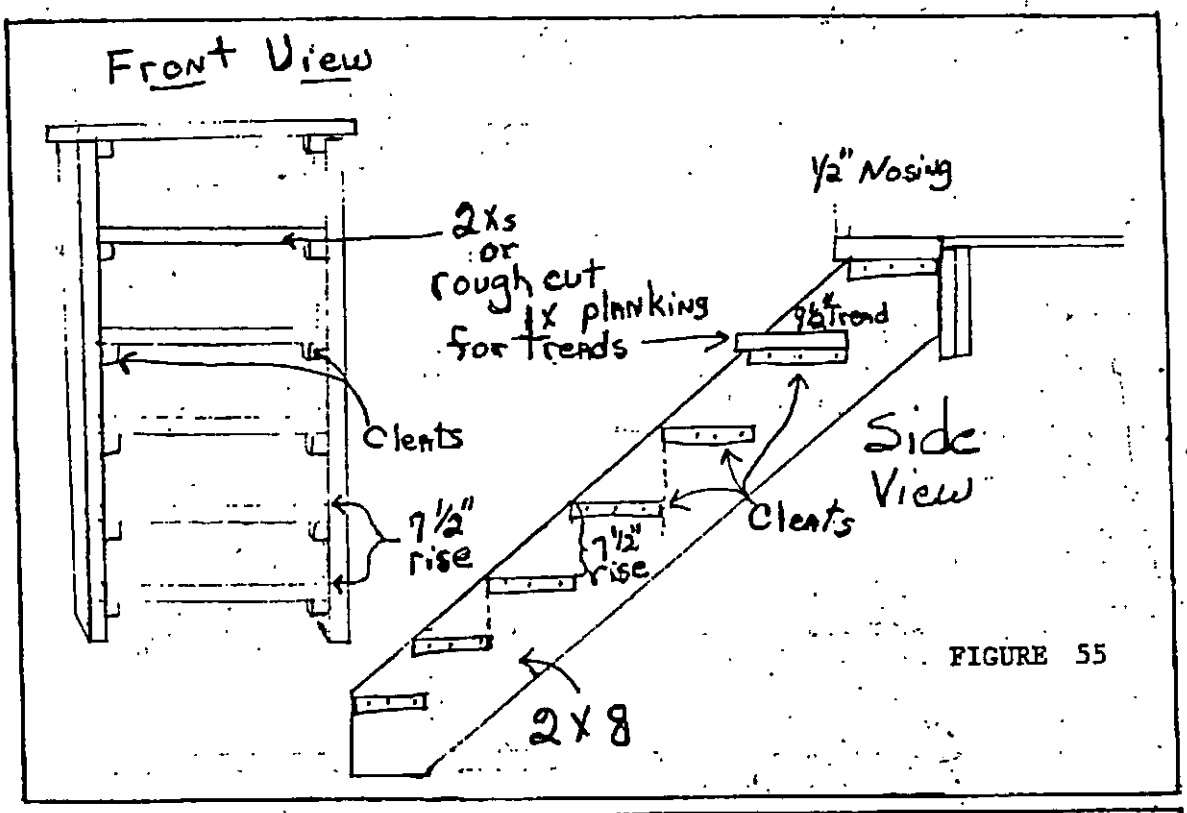


FIGURE 55

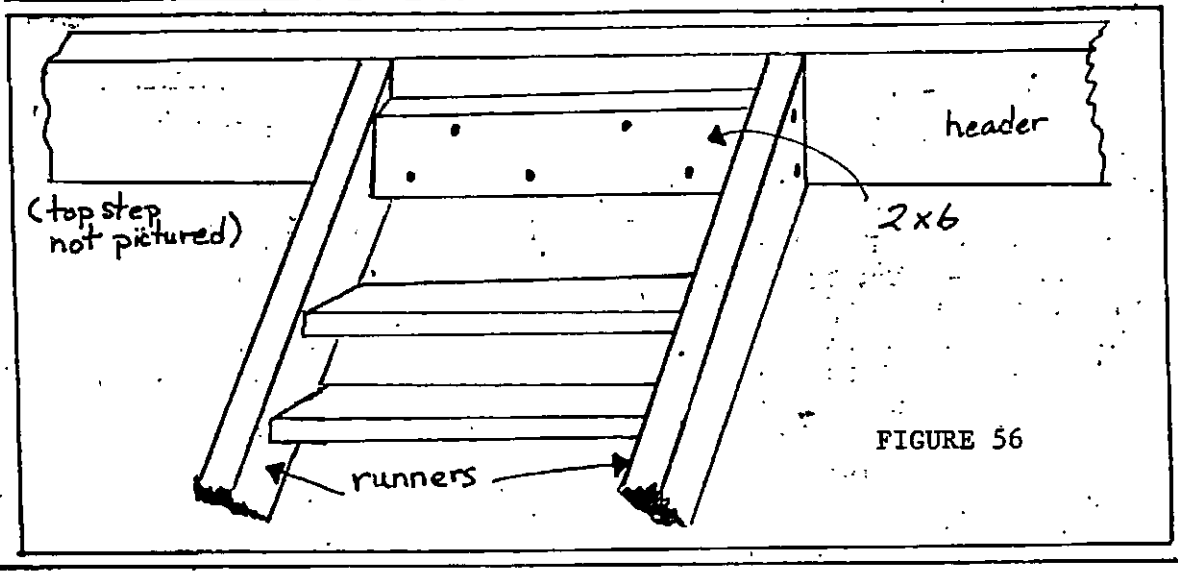


FIGURE 56

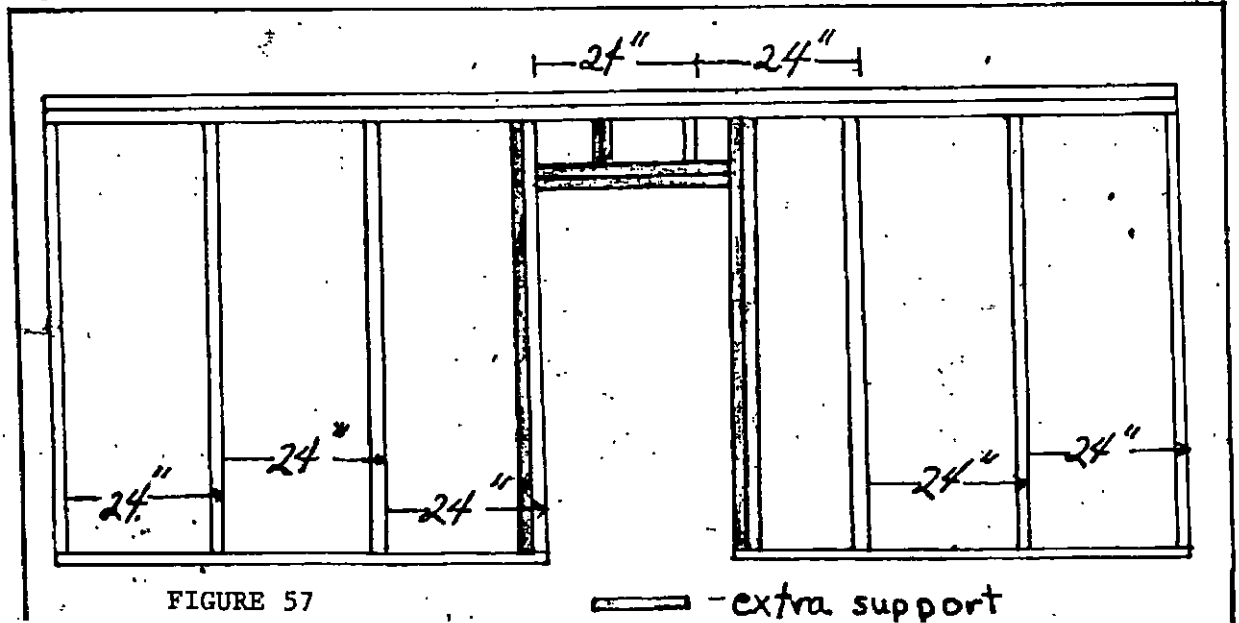


FIGURE 57

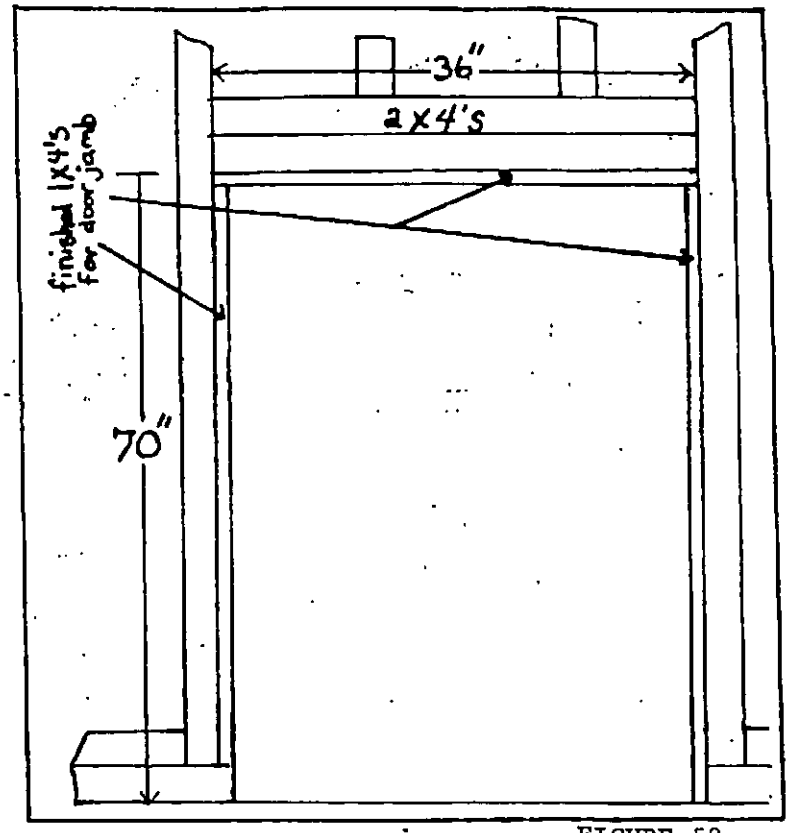


FIGURE 58

length
69" - length of door
+ 5/8 1 x 4 door jamb at top
+ 1/8 gap at top
+ 1/8 gap at bottom
69 7/8"--70"

width
34½" - width of door
+ 5/8 1X door jamb at right
+ 5/8 1X door jamb at left
+ 1/8 gap at right
+ 1/8 gap at left
36"

(See Fig. 58)

2. If you have a door smaller than the opening, use blocks to wedge in and bring the opening to where it should be. Don't bring it in more than 4". When placing blocks, put them approximately where the hinges will swing. So, 3/4" on the right and 3/4" on the left...Now the door will look like this. (See Fig. 59)

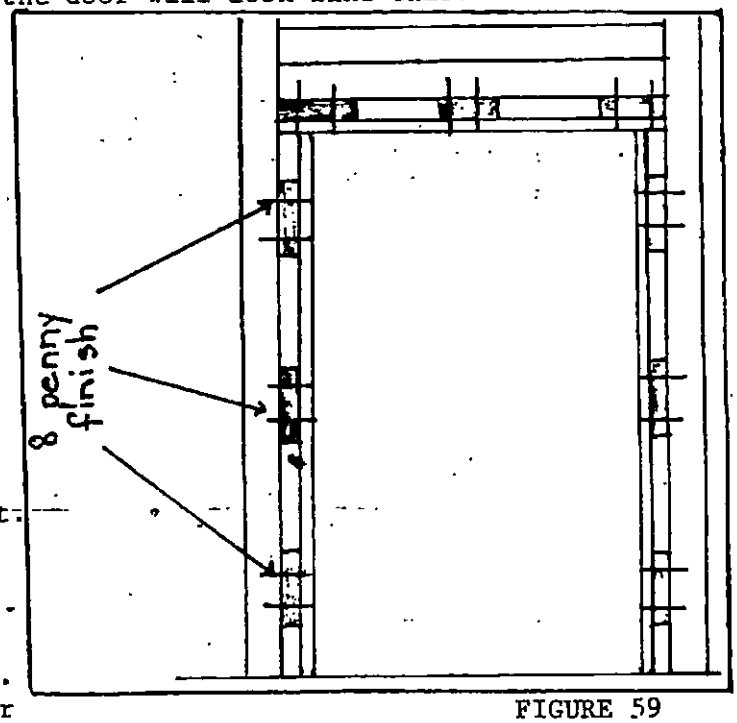


FIGURE 59

3. Use 8 penny finish nails, if available, to fasten the finished 1X into the 2 x 4 framing. When using blocks, nail only at the blocks. (See Fig. 59) Take care that 1 x 4 and 2 x 4 framing are flush with each other and the outer edge of wall to make nailing in the trim easier.

4. The next step is to see if the door fits.
   (a) Place the door in the position that it will be when it is shut. If it is too small, readjust the door jamb by using blocks for wedging. If it is still too large, mark it with a pencil where it is too large. Next, cut the line with a power saw. Now fit the door again. If it is still too large, repeat the above steps until it fits. A hand plane and then sanding makes a good finish on the sawed cuts.

   Mark the door in the fashion shown in Fig. 60.

5. Placing the hinges on the door. (See Fig. 61)

   One in middle--dead center
   One on top--12" from top edge
   One on bottom--12" from bottom edge

   ... side that the door swings toward. (See Fig. 62)

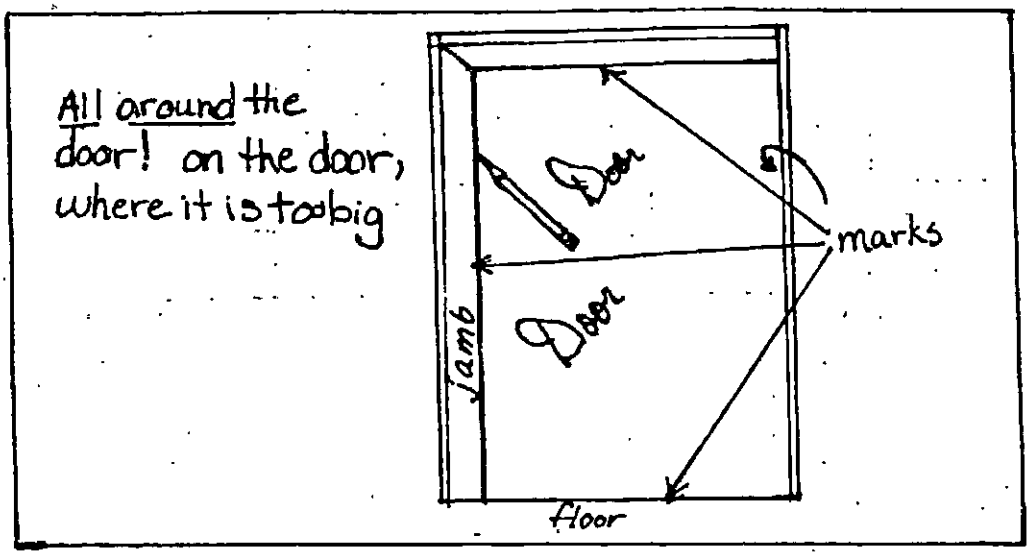


FIGURE 60

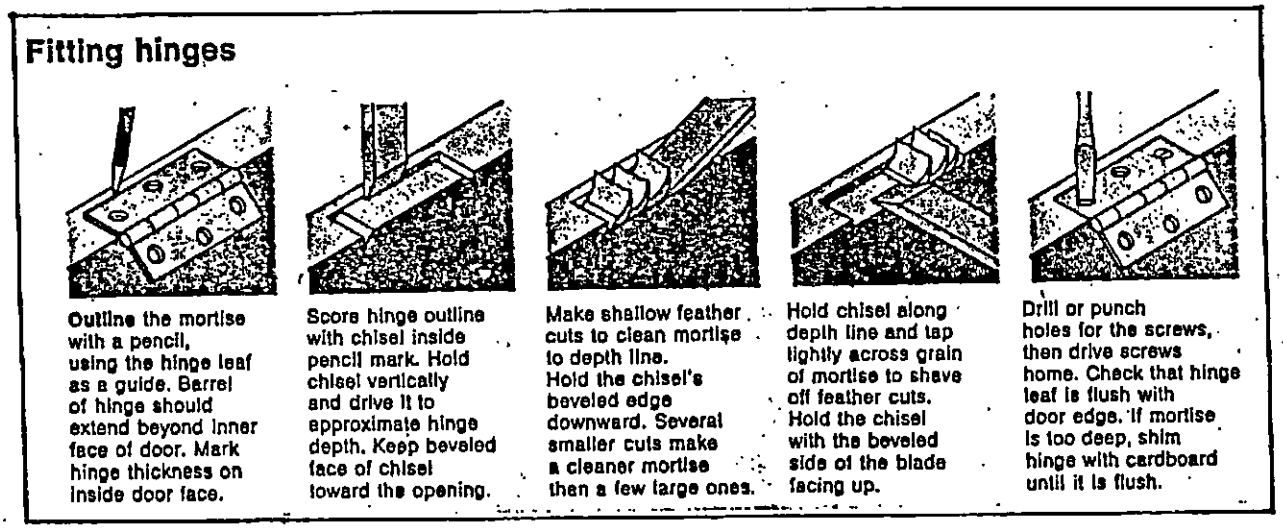


FIGURE 61

Placing the hinges on the jamb.

Bottom 12 1/8" from the floor. (1/8" space at bottom)

Middle-exactly the same distance between the bottom hinge and the middle hinge on the door!!!

Top-exactly the same distance between the middle hinge and top hinge on the door!!!
--Outline, chisel, and place the screws in the same manner outlined in Fig.61.

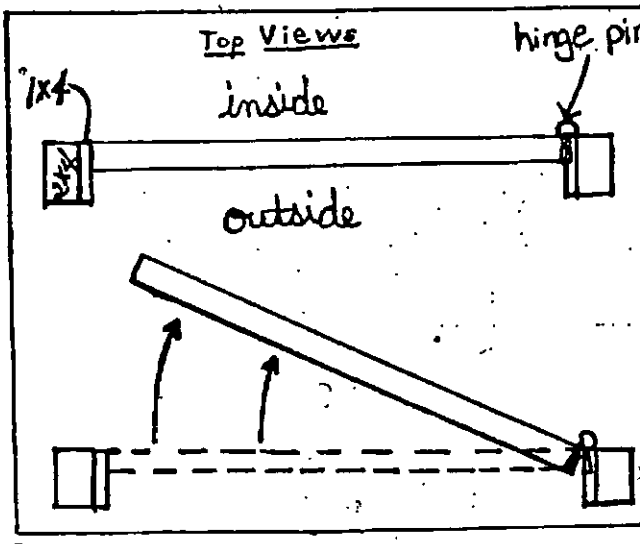


FIGURE 62

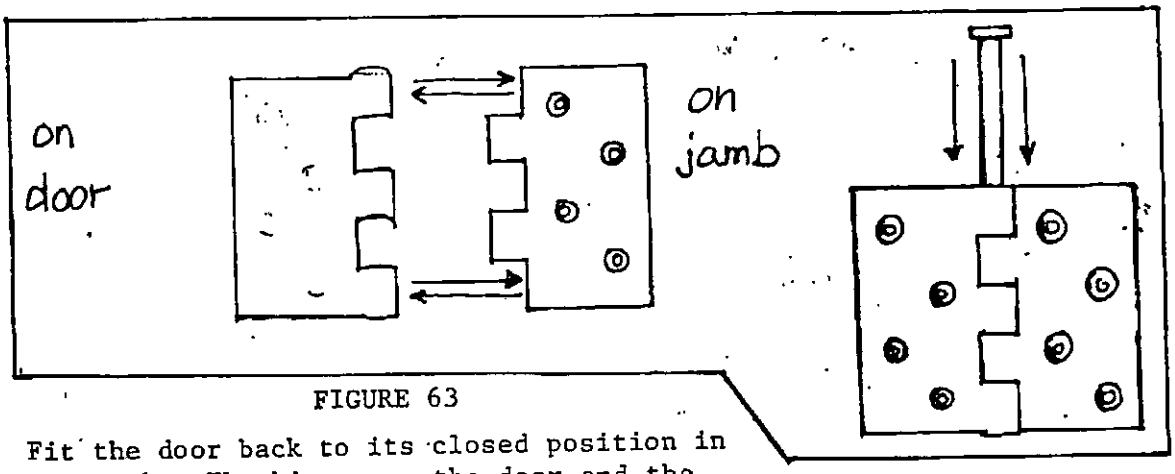


FIGURE 63

Fit the door back to its closed position in the jamb. The hinges on the door and the jamb should slip right together. While the hinges are lined up, slide the pins into their respective holes. If the hinges don't line up, drive the hinge either up or down with a hammer until they line up. (Fig.63)

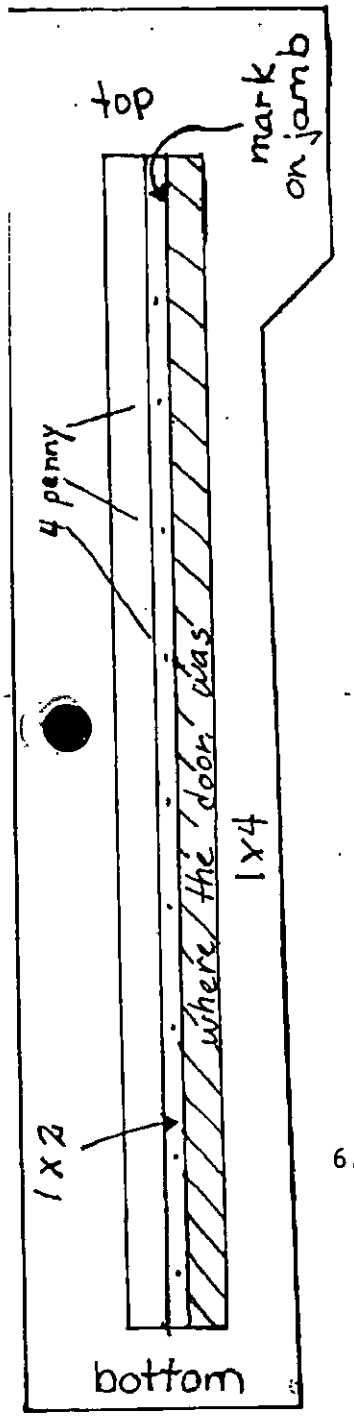
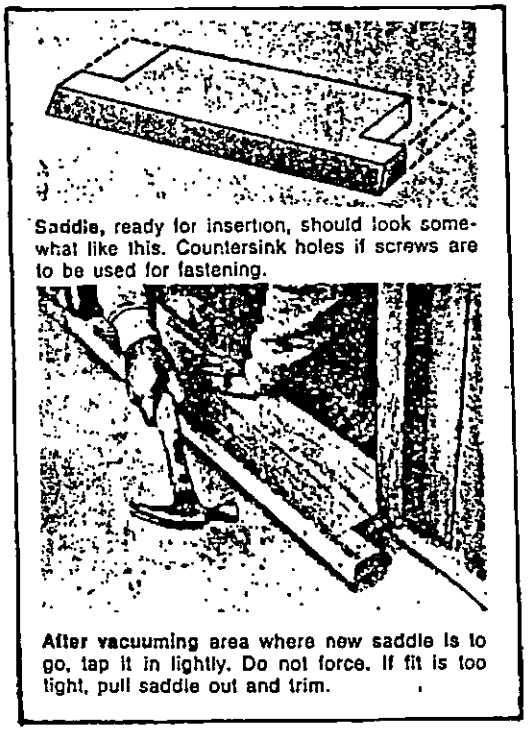


FIGURE 64



Saddle, ready for insertion, should look somewhat like this. Countersink holes if screws are to be used for fastening.

After vacuuming area where new saddle is to go, tap it in lightly. Do not force. If fit is too tight, pull saddle out and trim.

FIGURE 65

6. Door stops.
   (a) Place the door in its closed position.
   (b) Now mark with a pencil on the door jamb where the door meets the jamb on the outside. All around the sides, the top and the bottom.
   (c) Take 1 x 2 and run them along these marks. Use 4 penny finish nails if available. (See Fig. 64.)
   (d) At the bottom, use an oak 1X so it will fit as shown in Fig. 65

7. Use finished 1 x 4 or 1 x 6's for casing around the door.

8. Weatherstripping - Use weatherstripping all the way around the door to reduce the amount of cold air coming in around the door.

NOTE: Before cutting any door to size, make sure door is solid all the way through--not hollow--with 2 x 2 outlining it. Don't use interior doors as exterior doors.

2. WINDOWS

a. Replacing Rotten Sashes

To remove a rotten sash, remove inside window stops and lift out sash. Remember, top sash should always be outside of bottom sash. If you have a new sash the same size, the new sash can easily be put into place. Otherwise, try to get a sash slightly larger and trim down to size by planning. Replace window stops. (See Fig. 66)

b. Installing Window Frames

New window frames can be set directly into 2 x 4 studding in the same way as new door frames. (See section on doors.) Get the measurements of the window frame to be installed and build your 2 x 4 framing to suit the window. Nail in finishing nails, if available, and make sure front and back of frame is flush with inside and outside walls. (See Figs.66 & 67)

c. Installing Window Sashes

The A.S.P. has few window frames already put together, so rather than spend the time, effort, and money building frames, here is a simple yet very useful way to install a window sash without the frame.

1. The 2 x 4 framing for the window shouldn't interrupt the 24" center wall studs. Take the measurements of your window sash and build your frame 1/4" wider and 1/4" larger than the window. See Fig. 68.

   Use good looking 2 x 4's for framing directly around the window sash, since those 2 x 4's will be showing. One of the side 2 x 4's of the frame should be a wall stud. The other side should be supported with a 2 x 4 running from the top plate to the sole plate of the wall framing.

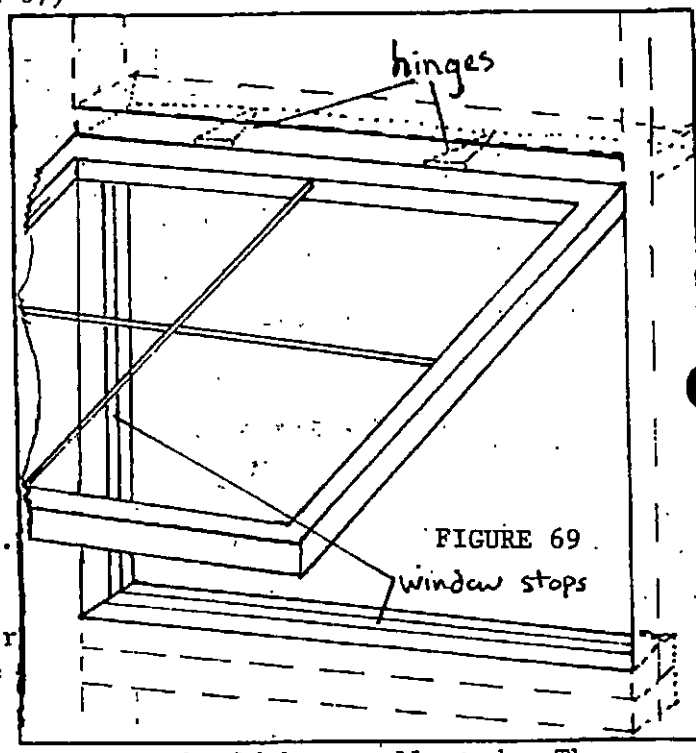


FIGURE 69

2. Fit two small hinges (two should be enough unless it's an unusually large window) onto the window and on the top plate (or one of the side plates if window should open out sideways) exactly in the same place as the window sash. (See Fig. 61 for fitting hinges)

3. Staple or tack some 1" screen molding or 1 x 2 along the plates as a window stop. Use a hook and latch to secure the window in place when closed. A small stick will keep it open. (See Fig. 69)

4. Weatherstrip around the window sash.

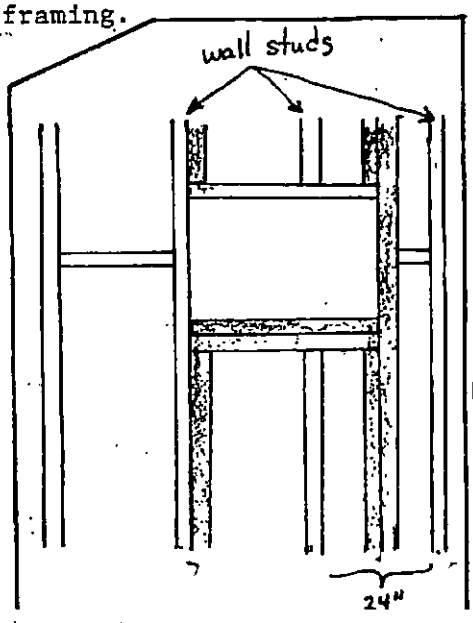


FIGURE 68

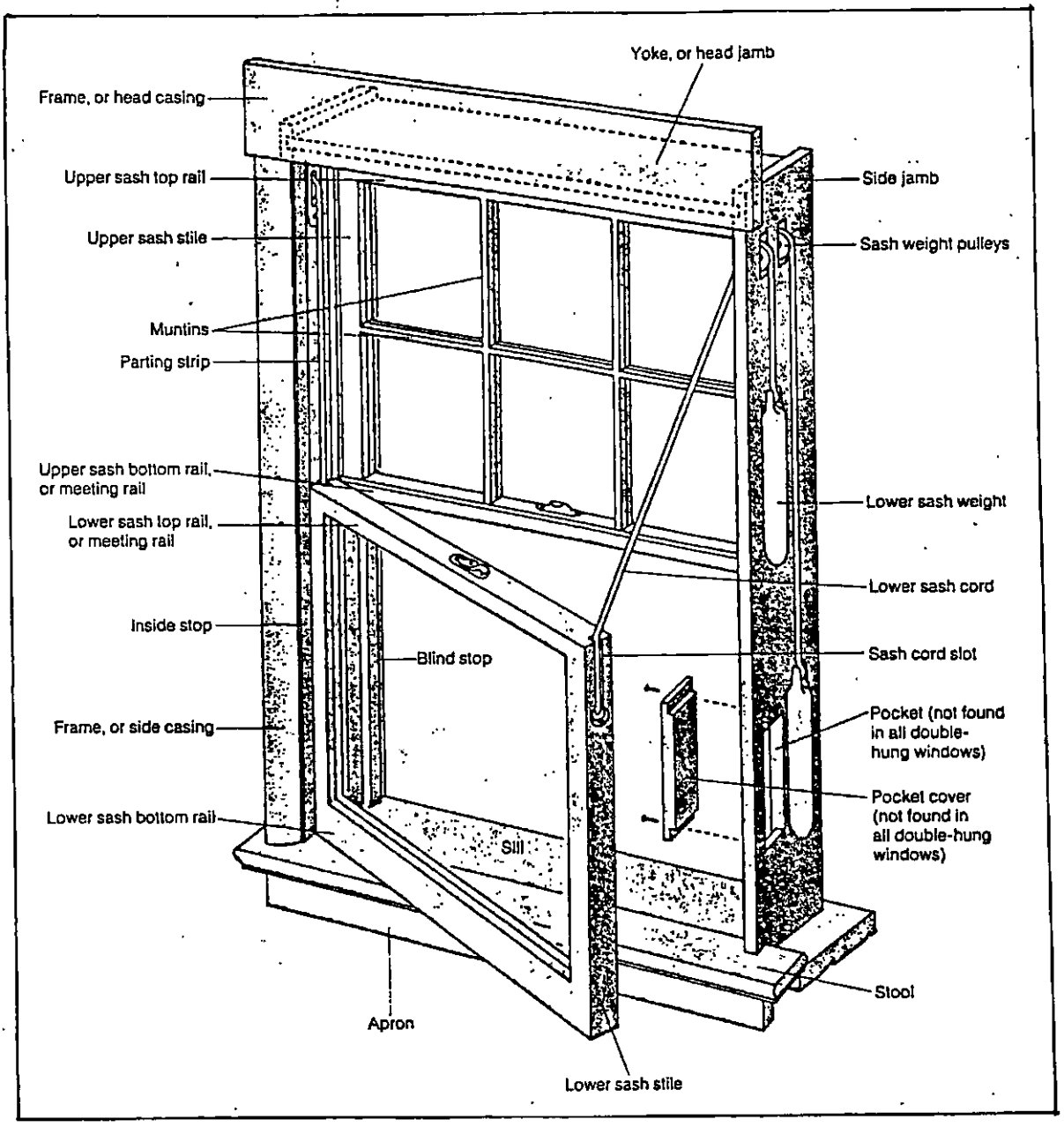


FIGURE 66

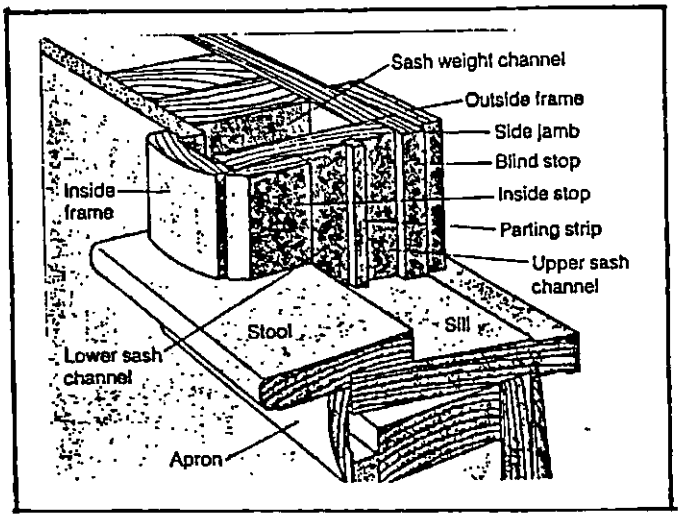


FIGURE 67

G. PORCHES

1. PORCH REPAIR

Repairs to be done on a porch--floor repair, replacing foundation posts, replacing posts supporting the roof, or roof repair can be done, in most cases, with the same techniques as outlined in other sections of this manual.

Often times,we find a need to tear down and rebuild a porch floor. In order for this to be done, the roof will need to be supported with temporary posts--care must be taken to guarantee support of the roof. (See Fig. 23. in Floor Repair section.)

2. PORCH CONSTRUCTION

Planning:

--a porch should be 1"-2" below the floor level of the doorway and adjacent room. This prevents rain water from running into the house, and also gives easy clearance for a screen door or house door which opens onto the porch.

--There should be a slight slope away from the house so rain water will not stand and rot the porch floor. A slope of 1" in 6' is sufficient.

--The supports for a porch can be 4 x 4's or concrete blocks. Concrete blocks can be used when the height of the porch is smaller. Higher porches need the stability of solid 4 x 4's. Or, if using concrete blocks, they should be cemented together. When 4 x 4's are used, they should not be placed directly on the ground but on a flat rock or concrete block to prevent rot. Supports should be placed on each outside corner, and every 4-5 feet along each edge. Also one to two supports should be placed under the center of the porch, depending on the size of the porch.

Construction:

--Dig down 3 to 4 inches where posts will rest and level off. This will prevent settling through softer top soil. Place a flat rock or concrete block in the hole so that it will stand another 3 to 4 inches above the ground. Place temporary supports beside where the permanent supports will rest.

--Build a frame of rough cut 2 x 6's or 2 x 8's if using finished lumber. Runners should be on 16' centers to insure a stable base. Runners should be laid parallel to the house. The rectangular frame should be placed on temporary supports and nailed securely to the house. (Be sure there is a solid floor joist to nail the frame to.) Nail the frame such that the top of the floor boards will be 1" to 2" below the room level. See section on Frame and Floor Construction for more details on floor framing.

--Place 4 x 4's or concrete blocks on base blocks to build up under the frame. The frame should slant slightly away from the house to provide for water run off. A six foot wide porch should be 1 to 1½ inches lower on the outer edge.

--Nail flooring perpendicular to the house and leave a 1 to 2 inch overhang on the three outside edges to protect outer joists. Rough cut 1X planking is best for our use; and should be used where possible. (In the event finished lumber is used, either place joists on 10" or 12" centers or use subfloor under regular flooring to strengthen floor.) (See Fig. 70)

3. PORCH ROOF CONSTRUCTION

Planning:

A porch roof should be in character with the rest of the house. Most houses

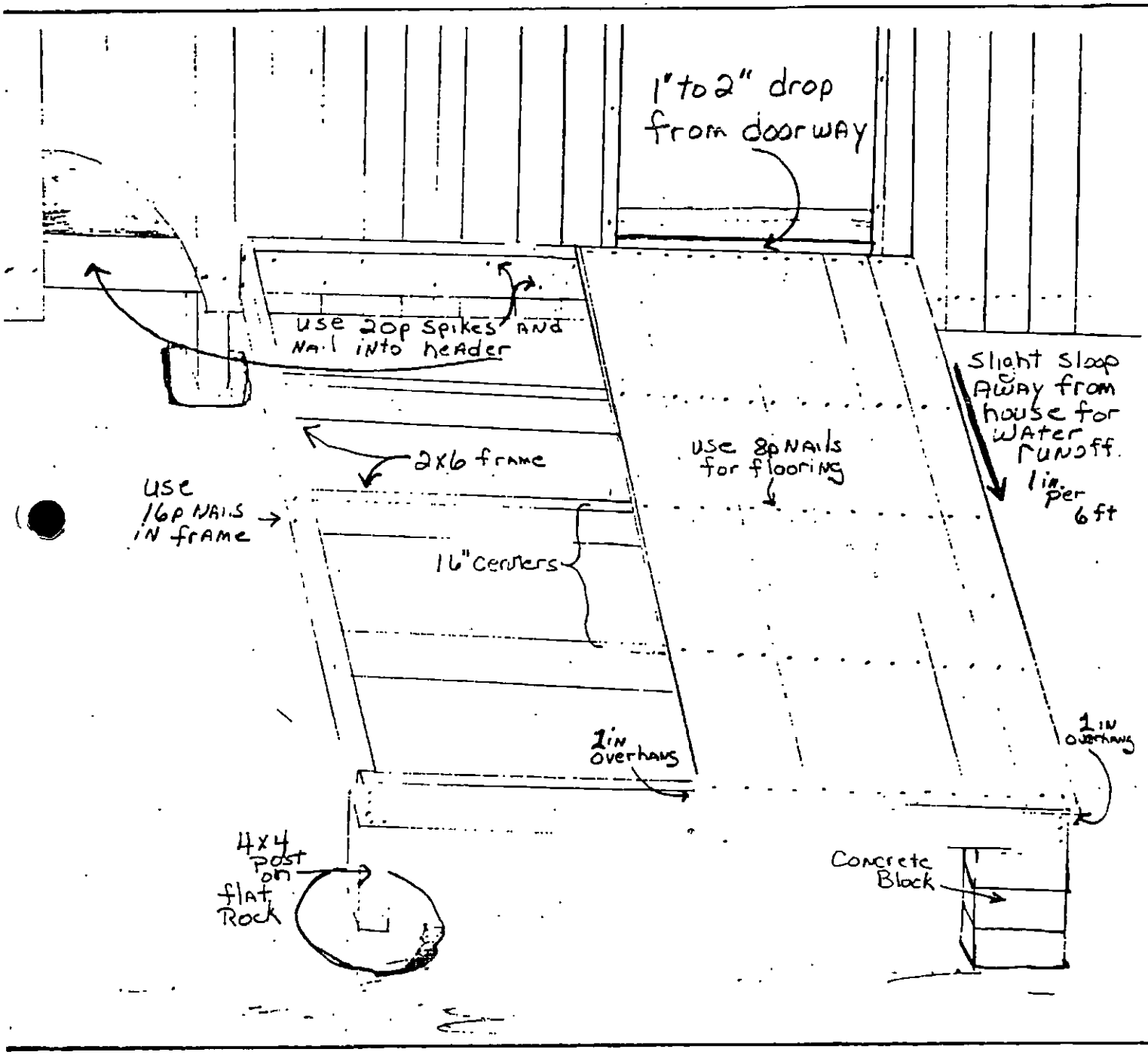

1" to 2" drop from doorway
use 20p spikes and nail into header
2x6 frame
use 16p nails in frame
16" centers
use 8p nails for flooring
Slight slope away from house for water runoff.
1 in. per 6 ft
1 in overhang
1 in overhang
4x4 post on flat Rock
Concrete Block

FIGURE 70

have a peak roof with gables on each end, or a single sloped roof. Therefore, most of our porch roofs are single sloped roofs. The porch roof should overhang the porch floor by one foot on all sides. Plan for at least a 2" rise per 12" run (see section on roofing). Be sure to plan so the outer edge of the roof is high enough to avoid hitting your head as you step off the porch.

Construction:

1. Use 4 x 4 posts (or 2 - 2 x 4's nailed together) on each corner and each 6' along front edge as needed. Place post directly over front and outside edges of the outside headers for maximum support. Also place ground supports under all posts (or place posts only over ground supports.)

2. Run a double 2 x 4 on top of 4 x 4 posts and extending a foot beyond each end of the porch floor.

3. Cut roof rafters (rough cut 2 x 4's or finished 2 x 6's) of identical length to rest on the house roof and runners on 24" centers Measure the 24" centers at top and bottom of the runners to make sure they're running exactly parallel to each other. Sometimes house roof rafters are high enough and stick out far enough to tie directly into them.

4. Once the rafters are nailed in place, nail down decking of 1X planking or plywood. (See Roofing Section for roofing information.) (See Fig. 71)

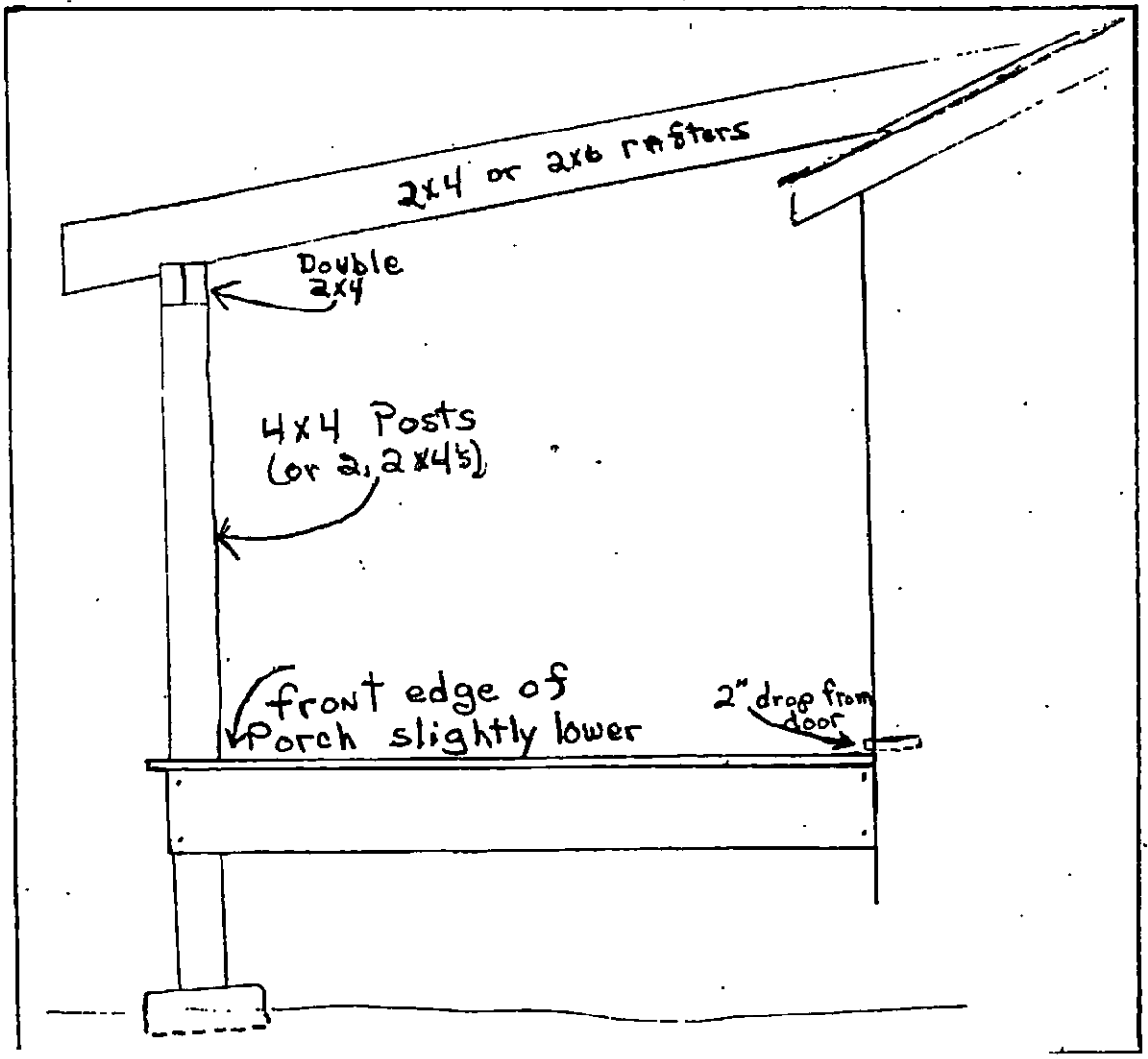


FIGURE 71

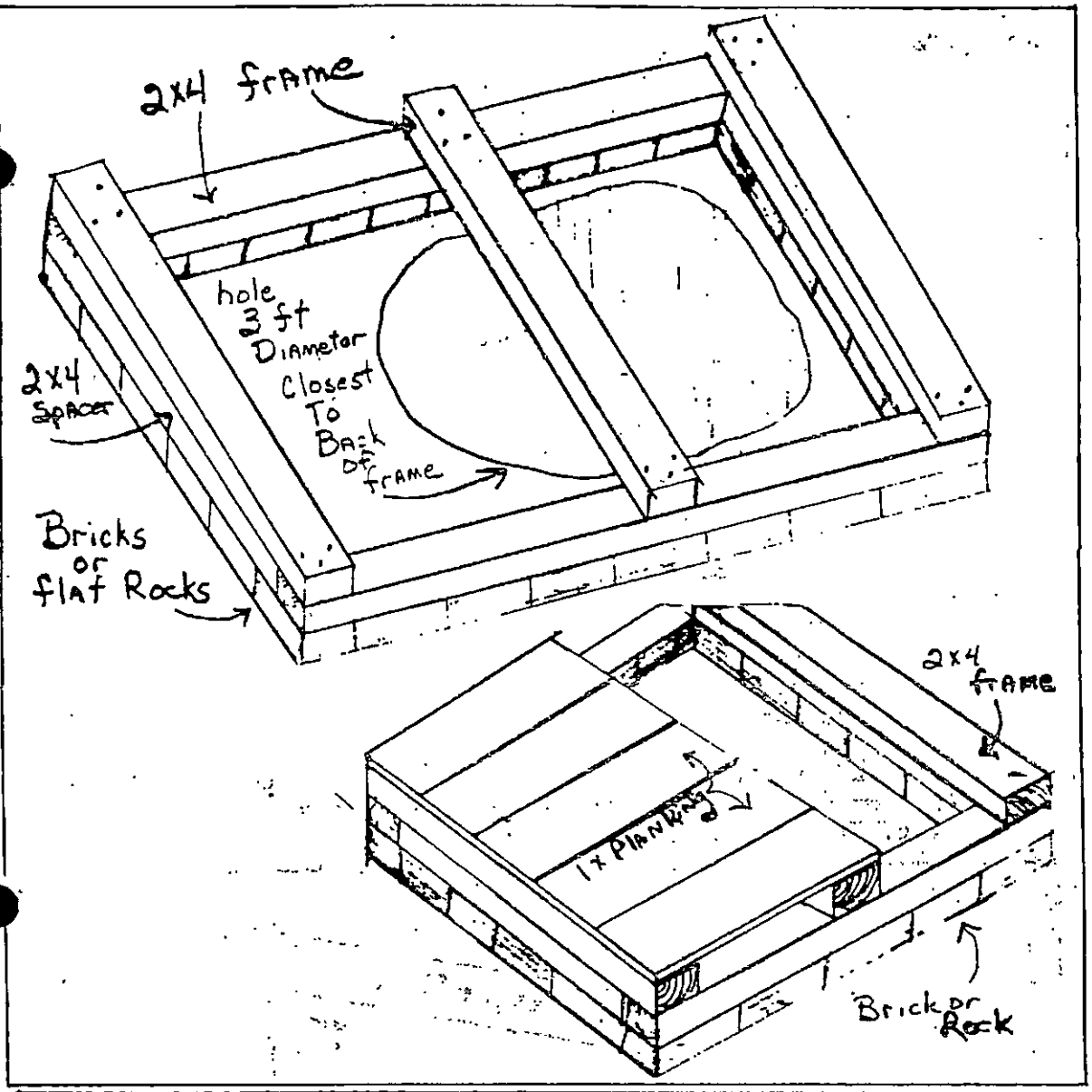


FIGURE 72

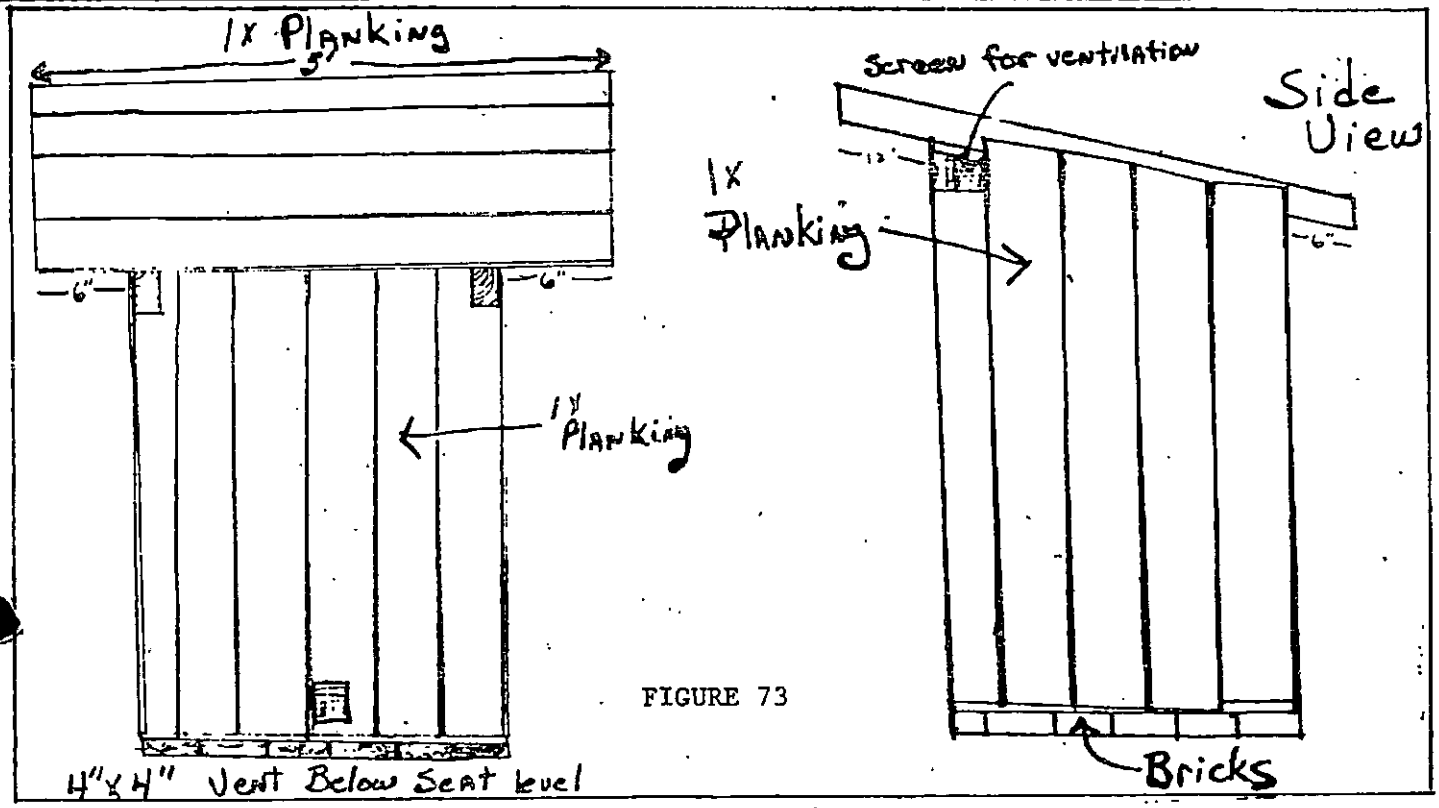


FIGURE 73

H. CONSTRUCTING AN OUTDOOR TOILET

The pit should be 3 ' by 3' by 4' to 6' deep. The location of the pit is important both from the point of view of its accessibility to the family and for sanitary reasons. Locate outhouse well away from any streams, wells or other water sources.

Step 1. Construct a 2 x 4 frame 4' by 4' with a 2 x 4 in the middle. Creosote or paint with deck paint. (See Fig. 72)

Step 2. Place bricks or flat river rocks in a 4' square around the pit with the back side closest to the hole. (See Fig. 73)

Step 3. Floor front half of frame with rough cut 1 X planking. Place on rocks. (See Fig. 72)

Step 4. Build 2 x 4 frame as shown in sketch. (See Fig. 76)

Step 5. Install planking on backside of 2 x 4 seat support to floor joist. Then install seat planking. (Cut seat hole as shown in Fig. 74) Front of hole should be 1/2" back from inside planking.

Step 6. Cover outside and roof with 1 X planking. Allow for 1' overhang of roof in front and 6" overhang on each side. Leave a small triangle uncovered at the top of each side and cover with screen wire. (See Fig. 73)

Cut a 3" hole in the back of the wall below seat level as a vent for the pit, and cover with screen wire. (See Fig. 73)

Step 7. Build door of 1 X planking using a double Z frame. (See Fig. 75)

Step 8. Roof with rolled roofing. Paint outhouse.

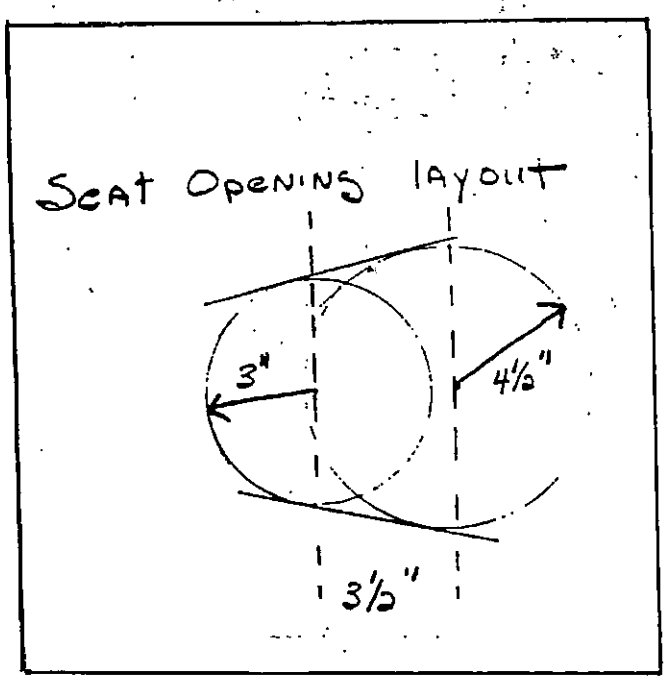


FIGURE 74

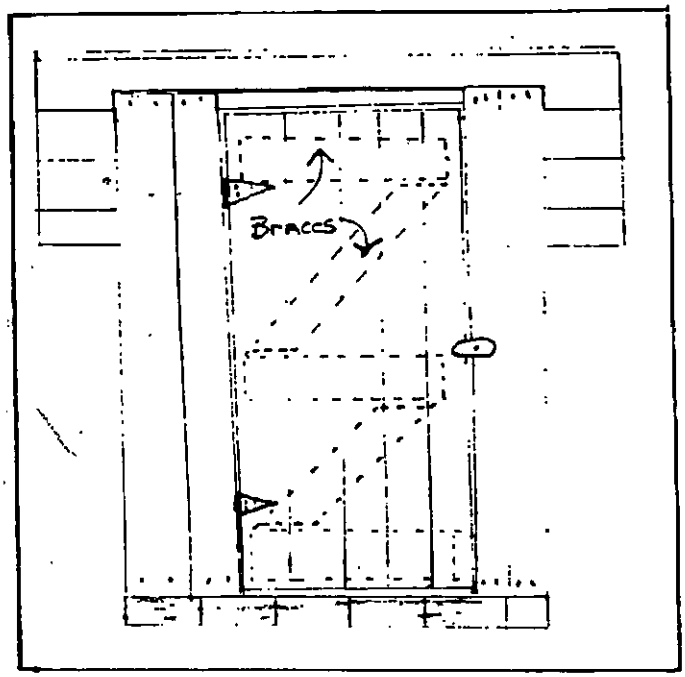


FIGURE 75

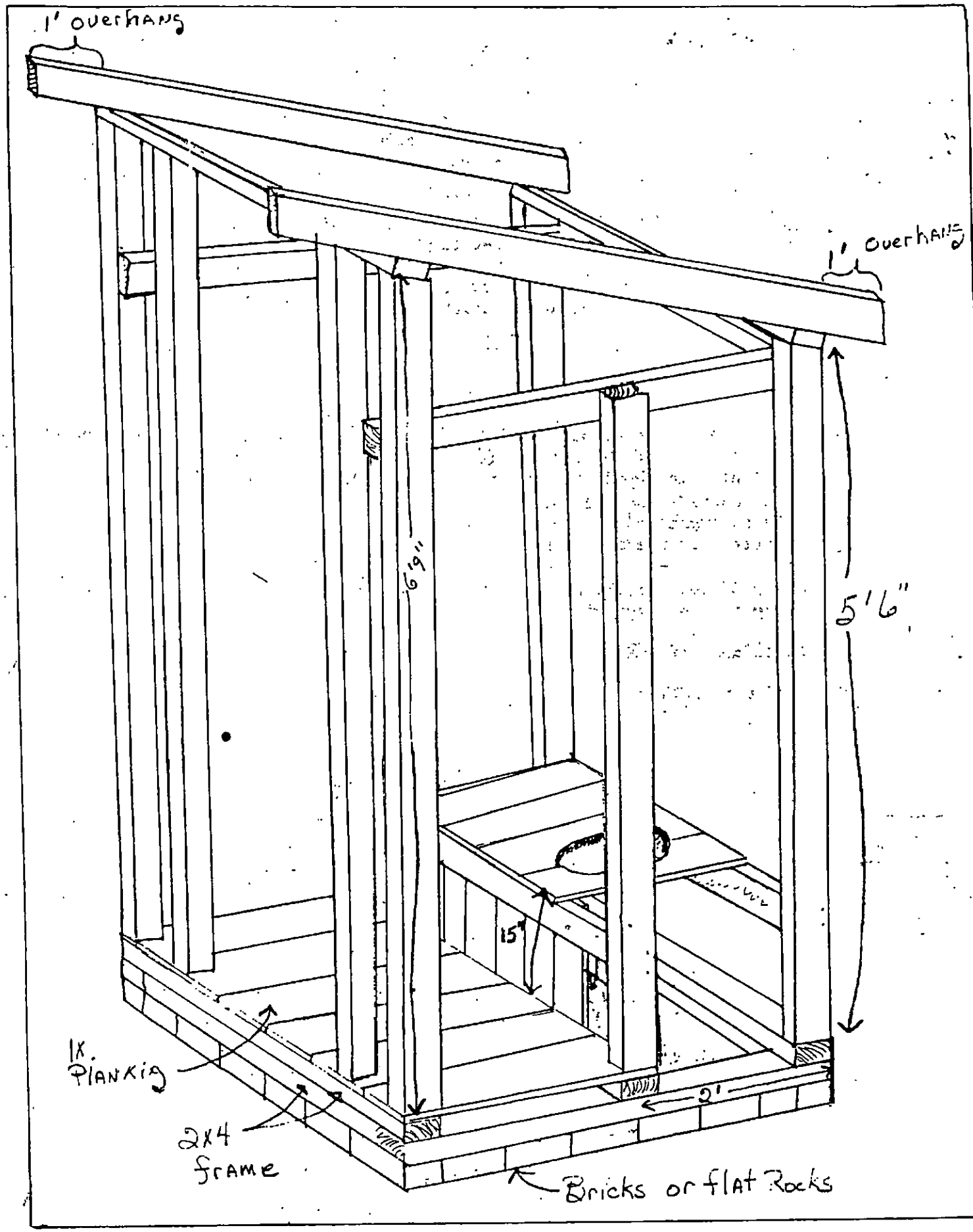

1' overhang
1' overhang
6'9"
5'6"
15"
2'
1x
Planking
2x4
frame
Bricks or flat Rocks

FIGURE 76

SECTION III

ROOFING

A. GENERAL INFORMATION

1. GENERAL TIPS

1. FIRST be sure a roof will support the weight of a person before you climb up the ladder. To do so, check inside the rafter for signs of rot.

2. Don't send more than <u>three</u> people on a roof at any one time.

3. <u>Never</u> put more than three layers of roofing on a roof. If there have already been three layers put on in previous years, tear them all off back to the wood and start over. More than three layers of roofing can cause rotting underneath.

4. Always make provision for the safety of your roof workers. On steep roofs, a 2 x 4 nailed near the edge of the roof is a safeguard against someone slipping off. Also, do not intentionally pile lumber or other objects where someone might land if they did slip off the roof.

5. To keep from causing more leaks than are already there, always wear rubber soled boots or tennis shoes on a roof -- NEVER LEATHER SOLED SHOES!

6. Walk on a roof as little as possible -- NEVER STEP ON A CAP OR IN A VALLEY WHERE LEAKS MIGHT OCCUR!

7. To avoid smashed thumbs, hold roofing nails with palm up, between index and middle fingers. Even if you do miss, it wouldn't hurt as much!

8. On a steep roof, a ladder can be anchored in place with framework as shown in Figure 77.

2. ROOFING MATERIALS

Choose roof material by the slope of the roof as indicated in the chart. (See Fig. 78)

In estimating materials, measure the area to be roofed and determine the square feet of area to be covered. Remember to measure along all edges of a roof line and not along the side of the house. Example: (See Fig. 79) In the house shown here, there are 480 square feet of area to cover. (12' x 20' for side A plus 12' x 20' for side B). Round off to 500 square feet.

<u>Shingles</u> come in bundles. There are about 26 shingles in a bundle. Three bundles make a square. A square of shingles will cover 100 square feet of roof area when properly applied.

If using <u>rolled roofing</u>, determine the amount of area one roll will cover. Usually 3' by 33', 100 sq. ft. Always use 90 lb. rolled roofing for roof work. Divide the area one roll will cover into total area to be covered to get the number of rolls needed.

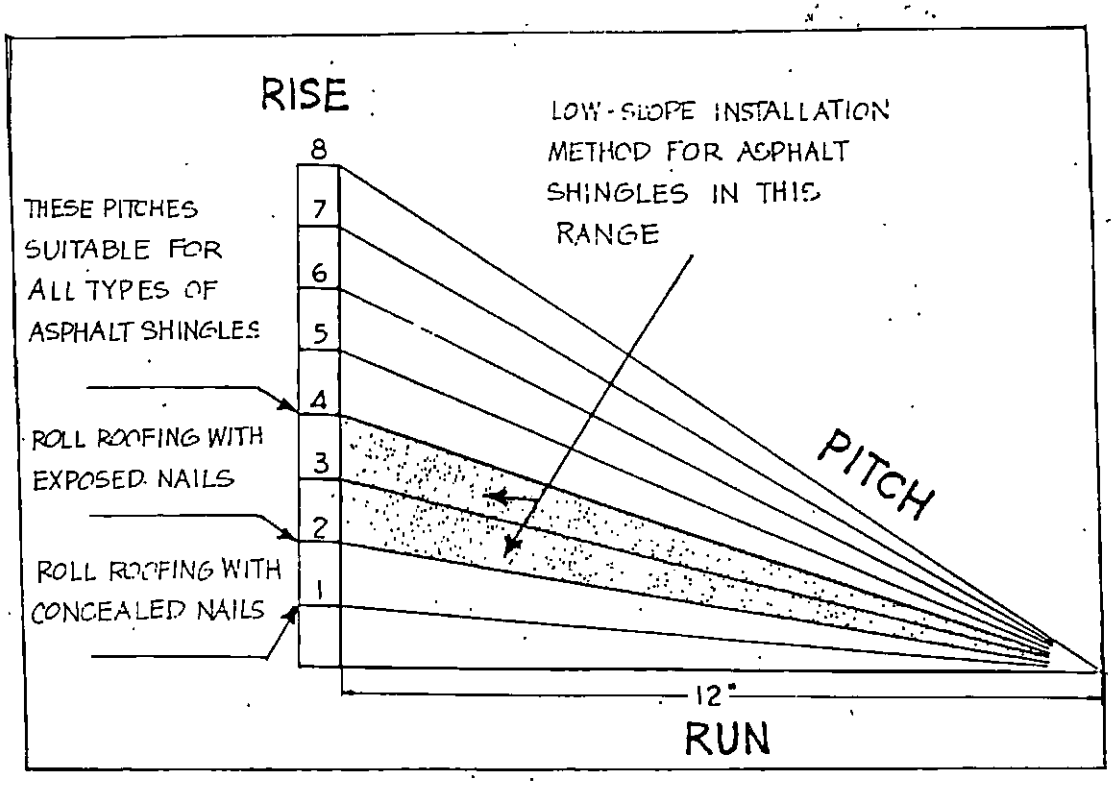
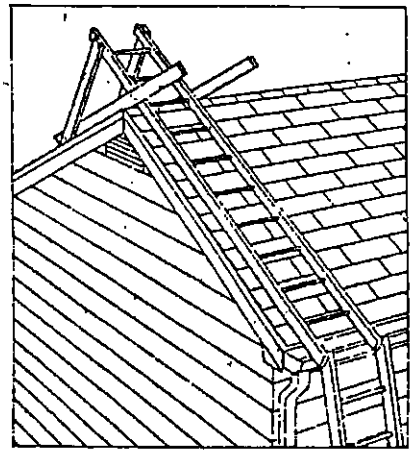


FIGURE 78



On steep roof, ladder should be anchored in place with framework as shown.

FIGURE 77

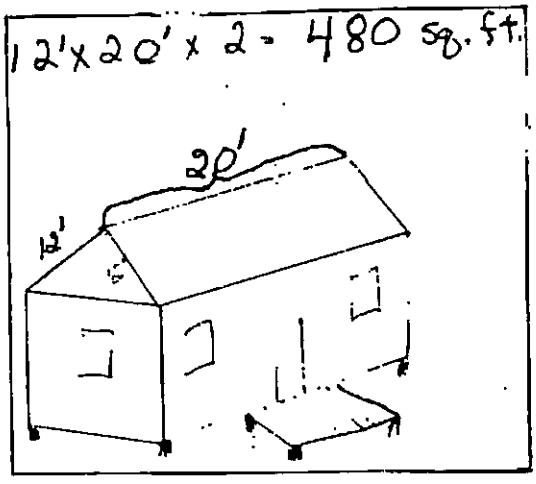


FIGURE 79

Tin roofs come in two types--corrugated and 5 points--and require lead headed or rubber washer nails. (Or, long roofing nails if you plan to tar the heads.) Tin roofs are repaired in our work quite a bit, but because of costs, we seldom buy tin to roof a home.

Felt paper should be used on newly constructed roofs or where old roof materials have been removed back to the wood. One roll of #15 felt covers 400 sq. ft.

B. FELT PAPER

Felt need not be nailed as securely as rolled roofing for the nails holding the roofing down will also hold the felt paper. Make sure felt is straight and nail or staple every two feet along top side (and bottom side for first run), overlap 2" to 3" to the top run, felt over the top and overlap other side of cap area by 3" to 4".

C. SHINGLES

1. APPLYING SHINGLES

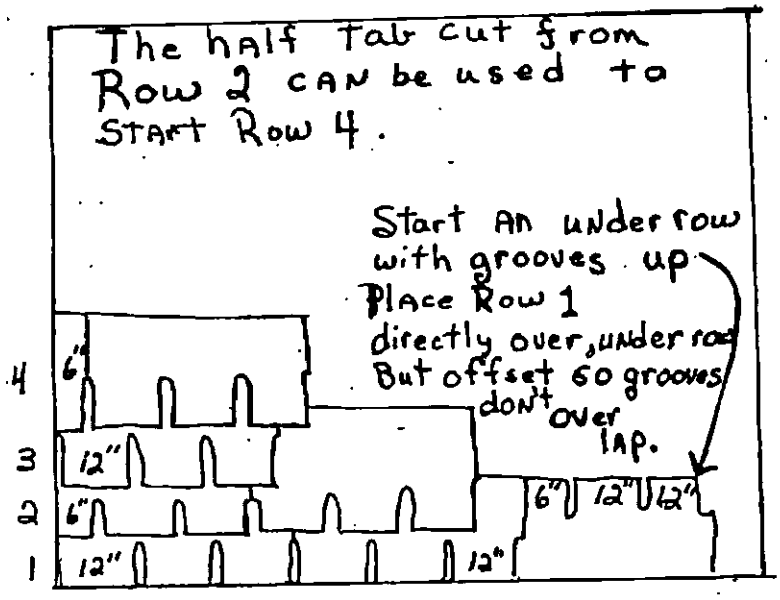
1. Starting at the bottom edge of the roof, nail a row of shingles turned so grooves point up and there is a 1" overhang to the wood sheeting on bottom and edge. (See. Fig. 80) Nail at the top of the shingle.

NOTE: Don't assume the side of the roof you're working on is square. You may have to adjust the row of shingles to take up the difference between one side of the roof and the other. Make sure, though, that the grooves aren't too far off the tabs on the shingles in the lower row. They need to be as straight as possible.

Keeping rows straight can be achieved by the following method:

Use a chalkline to keep rows straight. Place one shingle in line with the grooves of the bottom shingle. Then measure the distance above the first shingle to the top of the 2nd shingle. Mark a chalkline that distance above the last run of shingles, using each end as reference points.

FIGURE 80



2. Next, cut 6" (or 1/2 tab) off a shingle so the grooves will be offset. Nail the shingle into place at the edge of the roof directly over upside down row. Nail shingles across row to end. Use four nails in the top of the shingle (nail in black tar strip on self-sealing shingles).

3. 2nd row - Using a full shingle, start the second row so that the groove comes exactly in the middle of the tab on the row below.

4. 3rd row - Next using the 6" half tab, start the third row, then continue with full shingles.

5. 4th row - Use full shingle to start.

6. 5th row - Cut 6" off another shingle and use it to start the 5th row. (Use the 6" half tab to start 7th row.)

7. And so on.

2. CAPS

Shingle up to the ridge so that the tabs will be all that show if the top six inches of the roof are covered. (See Fig. 81.)

--Use 1½" to 2" roofing nails for capping.
--Take scrap shingles which have full tabs or new shingles and cut out single tabs. Be sure to cut from the edge of the groove to insure a smooth cap line.
--Using a chalk line, mark a line 6" from the peak on one side and use this as a reference line to keep cap shingles straight. Nail two nails in each cap shingle and cover with next cap shingle.

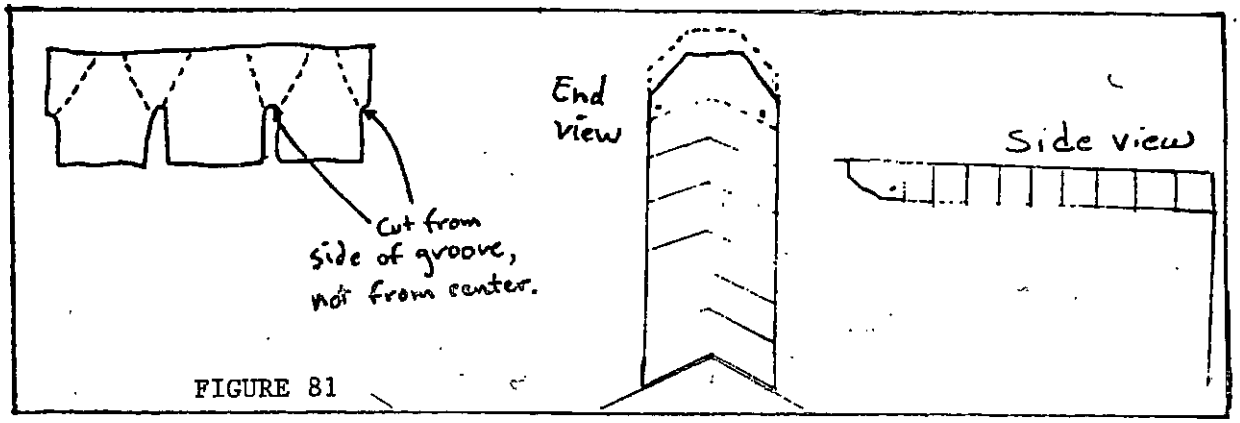


FIGURE 81

3. VALLEYS (for Shingled or Rolled Roofs)

Use a roll of roofing 18" wide (half the width of a roll) and the length of the valley, using roofing tar or cement underneath. Cut shingles or rolled roofing to be laid so the valley is about 6" wide and sides are straight and parallel. (A chalk line can help give you a straight line to cut.) (See Fig. 82.)

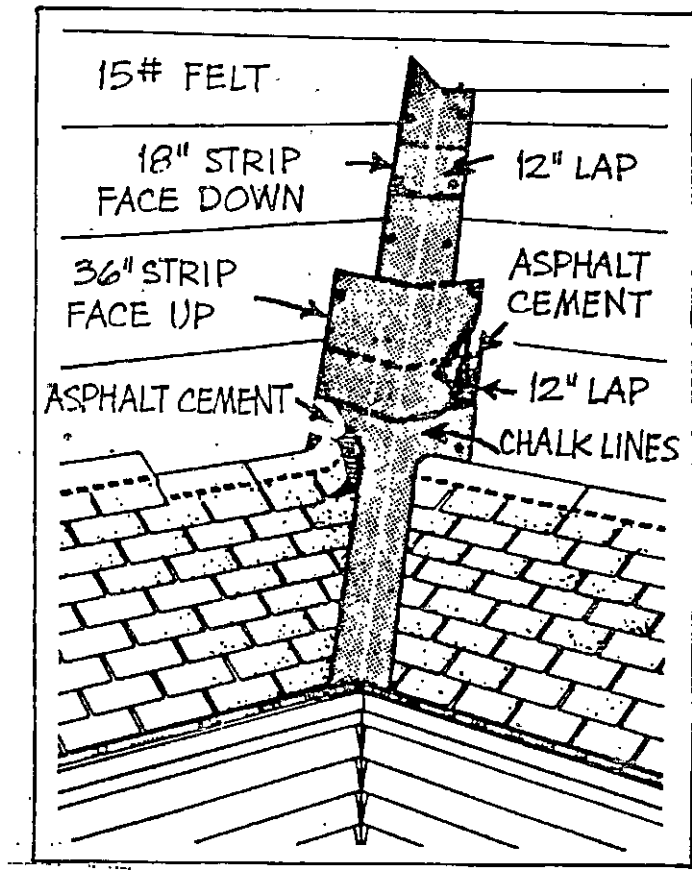


FIGURE 82

D. ROLLED ROOFING

Measure out enough rolled roofing to give 1" to 2" overhang on each edge of the roof. Roll roofing into place. Nail one nail at the bottom, and one at the top in the middle of the roll to hold in place. Then roll back up from each end.

Exposed Nail Method:

On steeper roofs, you can use the exposed nail method. With roofing rolled to center, tar with roof cement (not roof coating) a 2" strip along where the edge of the roofing will lay. This can be done as roofing is unrolled. Then nail every 3"-6" along the bottom and sides and every 12" along the top edge (1" to 1½" from edge).

Roll out the next roll and nail in the middle as before. There should be 2" to 4" overlap. Roll to the middle. Repeat nailing process as with first roll. Make sure the rows are as straight as possible as you lay out your rolls.

When all roofing has been laid up to ridge, use a roll of roofing 18" wide as a cap over the ridge or cap with shingles. If capping with rolled roofing, nail every 3".

Go back and daub roof cement on all exposed nails or nail holes. (See Fig. 83)

Concealed Nail Method:

Roll roofing to middle as in exposed nail method. Instead of covering just a 2" strip with roof cement, cover the entire area to be covered by this roll of roofing. Be careful not to get roof cement on roofing roll (See Fig. 84), overlapping each roll 4"-6".

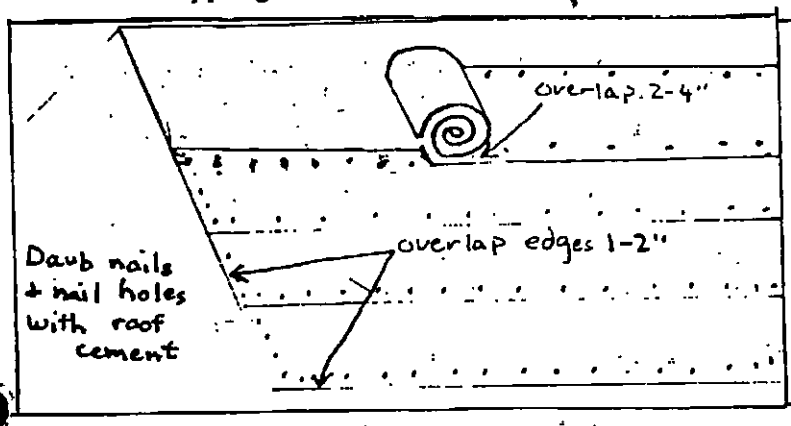


FIGURE 83

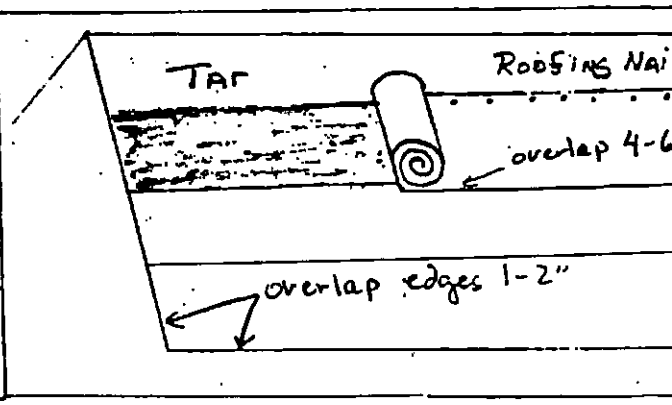


FIGURE 84

After the roofing is in place, go along the side and cut off any excess roofing hanging over the sides. (But remember the 1"-2" overhang.)

Sealing roofing nails: Have lead or plastic washer under head to provide watertight seal; used on metal roofing.

FIG

E. TIN ROOFS (Actually galvanized steel or aluminum)

1. Always overlap one full valley.

2. Lead head or rubber washer head nails are best for tin roofing, but long roofing nails will do if they are tarred.

3. Nail only at the high rib on corrugated or 5 point tin. (See Fig. 85)

4. Nail every foot along the high ribs.

5. Specially designed cap tin is best for the job of capping.

F. PATCHING

1. GENERAL INFORMATION

If the roof appears to be in good shape but has a small leak or two, it can be patched instead of replacing it. First, you must locate as closely as possible the leak, then you must patch the leak properly.

Tips: Don't depend on chimneys for support. Most are pretty old and fragile and you might end up pushing part of them over if you decide to lean on one.

Unlike roofs with shingles or rolled roofing, tin roofs usually will not have a solid wood covering the entire surface area of the roof. More likely, the tin roofs will have only rafters (often spaced or centered erratically across the house--one cannot depend on 2' centers) and the tin nailed directly on the rafters. The roof will support weight only directly above the rafters. Rusted tin will not hold people by itself. Be exactly certain to walk only where there is underlying rafters (walk only where there are nails through the tin.)

Frequently horizontal slatboard will be nailed across the vertical rafters and the tin will be nailed directly to the slatboards in horizontal rows instead of the rafters. Once again, be careful to walk only where there are nails through the tin.

2. LOCATING LEAKS AND PATCHING

Locating leaks can be a difficult job because quite often the leak is not where you'd think it would be. Often times water will run down a rafter or across the roof decking before coming through the ceiling. If the home has an attic you can get into, finding the leak will be alot easier. Take a flashlight with you as you go under the rafters and examine the rafters in the vicinity of the leaks for water stains, and light shining through holes in the roofing. If you need to, you can get someone to take a bucket of water up on the roof and pour the water over the suspected area of leakage while watching with a flashlight under the roof rafters to see where the water seeps through. (Or, do the same while it's raining!) If you think you've found a leak, push a nail through the roofing from the inside of the roof to show the location of the leak from on top of the roof.

If you can't climb up under the rafters, or if you tried that and couldn't find anything, you'll have to try to locate the leaks from on top of the roof.

Locating Leaks From On Top Of The Roof: (For Shingles, Rolled or Tin Roofs)

--Look for cracking in the roofing or areas previously patched.
--Check for empty nail holes or nails that might be coming back up.
--Check along the seams and for places that the wind might have blown up the roofing.
--Check around flues and chimneys--a very common place for leakage.
--With tin roofs, look over rusting areas.

Patching:

Plastic roof cement is basically what we use to patch a roof. Plastic roof cement can be applied with a stick, an old paint brush you'll never use again, or an old pair of gloves. It can only be removed with gas, paint thinner, etc.

The ideal way to patch is to cover the area with a thin coat of plastic roof cement, then apply nylon netting over the cemented area, and cover netting completely with roof cement. Apply the cement as smoothly as possible, so as not to create pockets of water by building the patch up too high.

All loose nails should be hammered down or pulled out (if hammering them back in doesn't secure them firmly in place), and covered smoothly with

roof cement, nylon netting, and another coat of cement. Run roof cement along all cracks and seams.

When there are several leaks throughout the roof, dab all nails, nail holes, cracks, and seams across the roof. But be easy about walking, because you could create more leaks than you patch!

Tin roofs often times need to be painted with Aluminum Roof Coating or paint, and can be mopped on with a cheap mop. Make sure you stir the paint before applying to surface. This is particularly useful with trailer roofs.

3. FLASHING

Around chimneys and flues is a common place for leaks, and flashing is a common way to patch the leaks.

Flashing should also be used when tying a newly built roof into the existing home's roof or wall. Remember to bend, not crease, the tin into position and waterproof the seams with plastic roof cement. If tying into a trailer, use metal screws to secure the flashing in place.

Some type of flashing (galvanized or aluminum) should be used for gaps around chimneys or flues. The flashing should be bent, not creased, in the middle. The top edge should be butted snugly against the chimney or flue and the bottom edge should lay smoothly onto the roofing. Around flue pipes the flashing should be bent and manipulated to form a tight fit all the way around the flue. Around square chimneys, the flashing can be cut into four pieces--one for each side of the chimney. The back side (uphill side) should be flashed first, overlapped 3" and bent around the edge joining on each side. In turn, the other three sides should be overlapped 3" by the front piece of flashing. Caulk the seams where the chimney and the flashing join.

The flashing can be secured to the roof by using a pop rivet gun, using metal screws (if a tin roof), or it can be nailed into the roof if there is an underlying rafter or plank. The flashing need not be secured to the chimney or flue, just fit up against it tightly.

After all the flashing has been tightened and is securely in place, waterpro all the seams of the flashing.

If nylon netting is available, use plastic roof cement, nylon netting on top of the cement and another layer of cement completely covering the netting.

SECTION IV

SHEETROCKING

A. FIRMING UP THE WALLS

Often times we find walls not strong enough for hanging sheetrock on them, in which case you will need to firm them up before sheetrocking. Sometimes all that's needed is to tear down whatever is already on the walls (cardboard, loose wallpaper, damaged sheetrock), and then hang your sheetrock on bear planking. Rip the walls back to planking only if necessary. Otherwise, leave on for added insulation. Sometimes larger nails will do the trick, or in a few cases, nails with a larger head (like roofing nails).

In the case of loose planking, you will need to either nail in furring strips to strengthen the wall or stud the wall. See section on Walls and Ceilings: Working With Box Construction for how to stud in already existing walls.

B. ESTIMATING MATERIALS

We usually use 3/8" thick 4'x 8' sheets of sheetrock.

Sheetrock can be easily measured by estimating 1 sheet per 4' of wall length.

For each 20 sheets of sheetrock, you will need about 4 lbs. of 1 5/8" drywall nails, 5 gal. of ready mix sheetrock compound and 1 roll of sheetrock tape.

C. CUTTING OR HANGING SHEETROCK

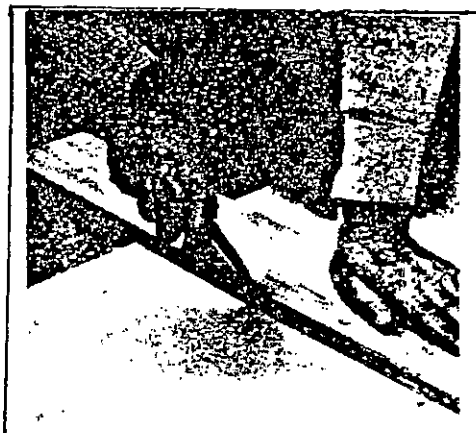
Note: Remember that the room you're working on probably isn't square, so all four corners must be measured.

Cutting:

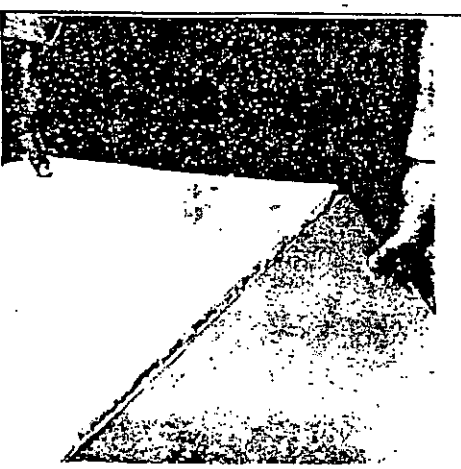
Using a T-square or straight edge, score with a utility knife about 1/8" into the finish side of the board. Support the board at the side of the cut and break. Cut backing paper. (See Figure 86)

To cut holes for utility outlets, measure in from sides and outline hole to be cut out. Score outlined area and score (more deeply if possible) with an X across opening. Hit middle of X with a hammer. Cut backing paper.

LGURE 86



First score the wallboard through the face paper and into the core, using trimming knife and cutting along a heavy straightedge.



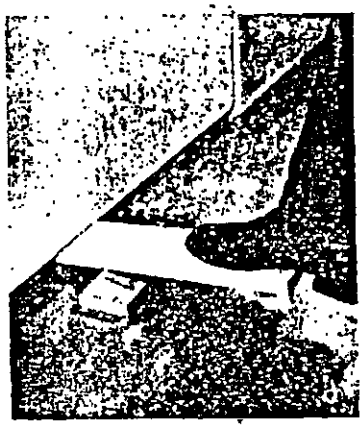
Next, break the core of the wallboard by bending or snapping the sides away from the scored (face paper) si

With the partially broken portion folded back, cut the exposed backing paper from above or by an upward stroke from below.

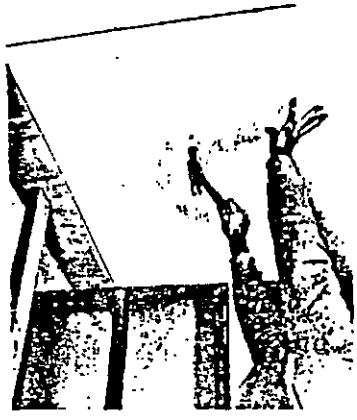
Hanging:

Put up ceiling sheetrock first so it will rest on wall sheetrock. Use T-Braces to help hold sheetrock to ceiling and nail every 6" along studs. Nail wall sheetrock every 10" to 12" along studs. Make sure that all edges are securely nailed to a stud. Do not have any sheetrock edges not on a stud. Drive nails in so they form a depression which can be filled with joint compound. (See Fig. 87)

FIGURE 87



Make foot lever of two pieces of wood; position one end under panel; raise panel into position for nailing.



Use one or two T braces (or shores) to force a ceiling board against joists for nailing.

D. FINISHING WORK (See Figure 88.)

How the end product looks, as well as how it will last, depends directly on the finishing work. So, this is a very important part of sheetrocking.

--A minimum of two coats of joint compound is necessary, though three coats is best. Cover all nails, nail holes, joints, holes, and indentions in the sheetroc

--Apply the first coat. Along all seams, apply a light layer of joint compound (mud), then seam tape, and another layer of mud. Total application on first coat along the joints should be around 4" wide with the tape well covered. Smooth out where mud has been applied and let dry. On the first coat use a 4"-6" sheetrock knife.

--Dampening the seam tape lightly in water before applying to seam will help in application of the tape.

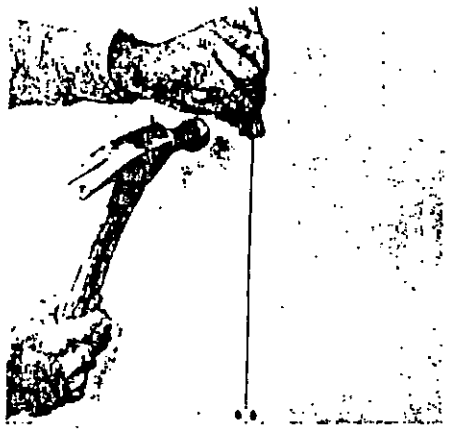
--When applying the second coat, make sure tape is totally covered with mud and yet is as smooth as possible. Use a 6"-10" knife to widen the seam to 6"-8". Let dry overnight (longer if necessary), and sand. If the second coat is the last coat, widen the seam to 10"-12" and sand well.

--Apply third coat with application on seams 10"-14" wide and as smooth and even as possible before sanding. If available, use 10"-12" knives for the final coat.

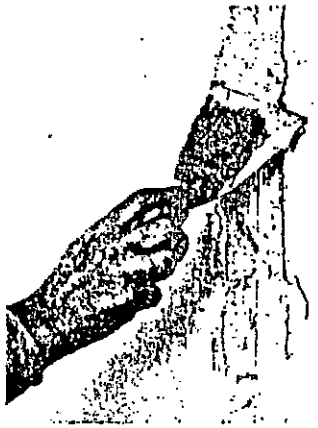
--To apply seam tape along the corners; fold the seam tape in the middle and fit into the corner.

--Wait at least overnight (longer if necessary) before sanding and painting. Sand to a smooth surface.

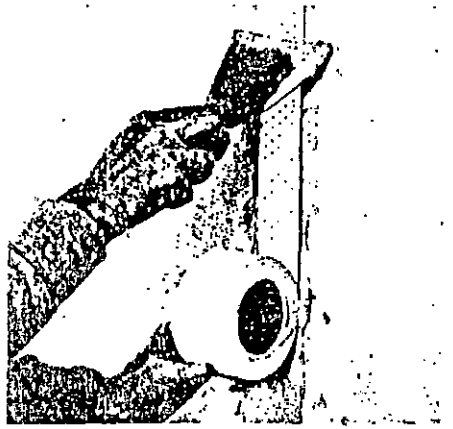
--Whenever large amounts of mud are applied to a certain area--to patch a hole, smooth out a seam slope, etc.--seam tape should be applied with it to prevent



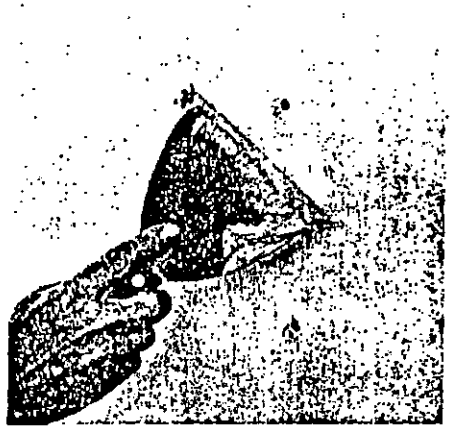
Space nails every 7 in. vertically, at least ⅜ in. in from edges of adjoining panels, and approximately opposite one another.



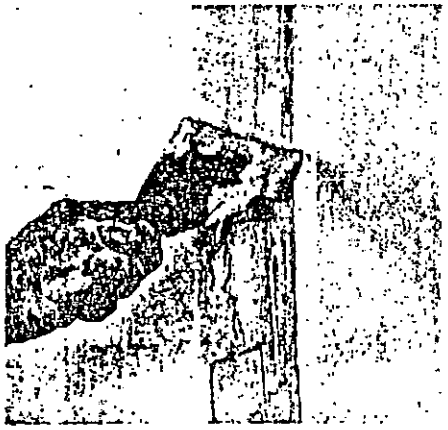
Apply a thick layer of joint compound to completely fill the channel formed by the tapered edges of the wallboard panels.



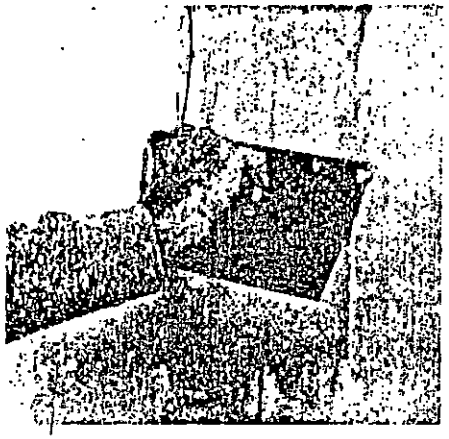
Center perforated tape over the length of the seam and press it firmly into the compound. Use a wallboard knife held at a 45° angle.



While the first coat of compound dries, use a putty knife to apply first coat of compound over any extra nails between joints.



When first coat is dry, apply a thin second coat, feathering it out 6 or 8 in. Apply second coat to nailheads between joints as well.



Add a third coat, making it thin and feathering it out 12 to 14 in. Apply third coat of compound to any extra nailheads between joints.

Wait until compound is thoroughly dry, then sand surface lightly with a medium sandpaper to make it smooth and even.

FIGURE 88

SECTION V

PAINTING

A. TYPES OF PAINT

Interior and exterior. Exterior paint (often labeled "House Paint") can be used, though not recommended, on interior walls. However, interior paint will not hold up to weather on outdoor surfaces. Interior is often labeled "wall" or "ceiling" paint.

Oil-based and water-based paints. Oil-base and water-base paints should never be mixed together, nor should one kind be applied as a second coating over the other kind. Oil-base paint should be used on trim work and masonite siding, while latex should be used on most woodwork and sheetrock. Decking should be painted with a floor and deck paint--or if necessary, a strong exterior oil-base. Unpainted wood should have a first coat of primer if possible, then painted with either oil or latex.

To find the difference between oil and latex paints; latex will wash off a stick with water, oil-base will not.

B. PREPARING THE SURFACE, PAINTING, and CLEAN-UP

1. PREPARING THE SURFACE

There's a certain degree of preparation that must go on before painting a surface, otherwise, the paint will end up cracking or peeling off. Great care should be given in preparation for those reasons.

This may mean scraping off old paint thoroughly, as well as, dusting or washing the surface with a rag. Sometimes you might need to fill holes in the walls with plaster, wood putty, or whatever.

2. PAINTING

--Use a drop cloth to protect floors and furniture.

--Use masking tape to cover electrical outlets, window panes, baseboards, and anything else paint shouldn't be applied to.

--Mix paint thoroughly before using. If paint is still lumpy after stirring, use screen wire to strain out lumps.

--Keep lids securely closed on paint cans.

--When painting, don't overload a brush or roller with paint so as to drip or spray surroundings.

3. CLEAN-UP

--Clean up is a very important part of the job and should be done as soon after the painting as possible.

--If brushes cannot be cleaned at the site, wrap them in plastic to keep them wet until you return to the center.

--Clean up of latex is simply accomplished with water.

--Be sure not to contaminate a stream or creek when washing paint brushes. Also, be sure not to dump paint filled H_2O on someone's garden or lawn.

--Clean up for oil based paints is done by washing in kerosene (which is much less expensive than mineral spirits.) Have two buckets of kerosene for a first wash and final rinse.

SECTION VI

OTHER EXTERIOR WORK

A. SIDING AND UNDERPINNING

A substantial loss of heat for a house can occur when the home is not weatherized with some kind of siding and underpinning. Because of this, we often times put up siding and underpinning around a home, but don't always have the best materials to use. Therefore, we use what materials are available and do the best job we can with them.

1. SIDING WITH THE PROJECT

Several different kinds of materials are used in the siding for a home or room addition:

Cellutex:

Usually comes in 4 x 8 x 3/4" sheets. Can be cut with a saw. Use roofing nails.

Should be covered with another kind of siding.

Planking: (1X rough-cut lumber)

Box construction homes have vertical planking or siding. Planking can be put up vertically or horizontally as siding.

To put it up vertically on a studded wall, nail bridging between the studs and nail planks to the bridging, studs, and top and bottom plates. To put up horizontally on a studded wall, nail across onto each stud, with the bottom and top planks secured to the sole and top plates.

Planking should be covered with another layer of planking or some other kind of siding. Planking is especially a good "first layer" to flexible kinds of siding--such as, vinyl or aluminum siding.

If the second layer of siding is another layer of planking, make sure second layer planking is over the cracks in the first layer planking.

Roll Siding:

65 lb. roll roofing is best, 100 sq. ft. to a roll. Cut with a utility knife. Use roofing nails.

Roll siding is most often used as a cover for planking--to cover the cracks in between planks. Sometimes it will be necessary to protect sheetrock inside the home from the wind and rain that might come through the cracks between the boards.

In putting up roll siding, work from the ground up. Always hang the roll siding horizontally (straight across as opposed to up and down.) Be sure to keep your rows straight and fitting securely to the side of the house without pockets of air bowing the siding outward.

Use diamond-tacking to nail up the roll of siding. (See Fig. 99)

Remember to overlap each row of siding 4"-6". Overlap around window and door frames if possible. Overlap corners and nail along the outside edges and the bottom every 3".

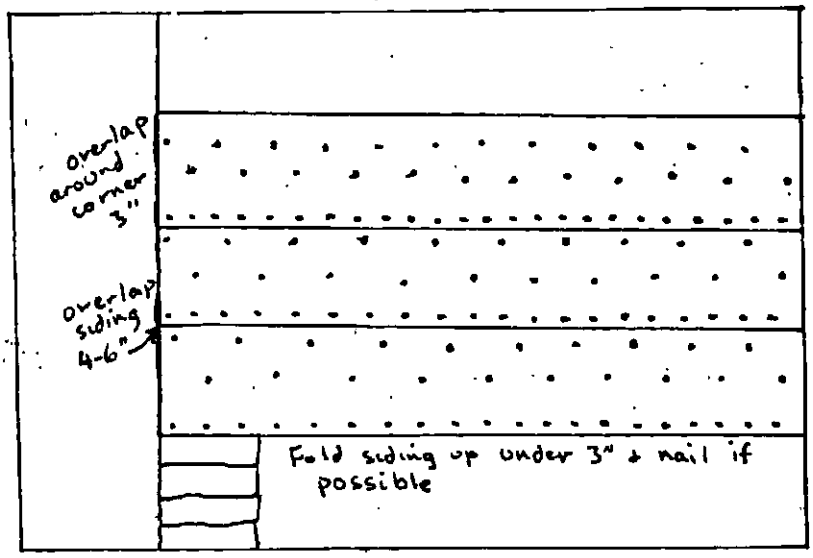


FIGURE 89

Masonite Siding and Weatherboard:

Either masonite or weatherboard is good over cellutex or planking. Use 8d or smaller common nails. Start at bottom and work up, overlapping ½"-1" depending on material being used.

Masonite siding should be painted with oil-base paint only.

For the corners, individual corner pieces are available (though expensive), or you can use finished 1X nailed along the corners vertically.

Caulk where the two 1X boards butt together.

To repair rotted weatherboard, cut the rotted boards back to the studding. (You can tell where the studding is by where the line of nails is--that's where the stud is.) Replace with good weatherboard that, hopefully, looks same as the original board.

Caulking should be used to fill in all cracks and seams that might let cold air in through the siding. Cut the top of the caulking tube at an angle for caulking to flow out easily and consistently.

2. UNDERPINNING

There are several different ways of underpinning a home. Two main ways are used with the Project:

Tin:

Tin can be nailed into the home's header. (You can use metal screws to connect the sheets of tin together at the bottom.) Overla: each sheet of tin 1"-2".

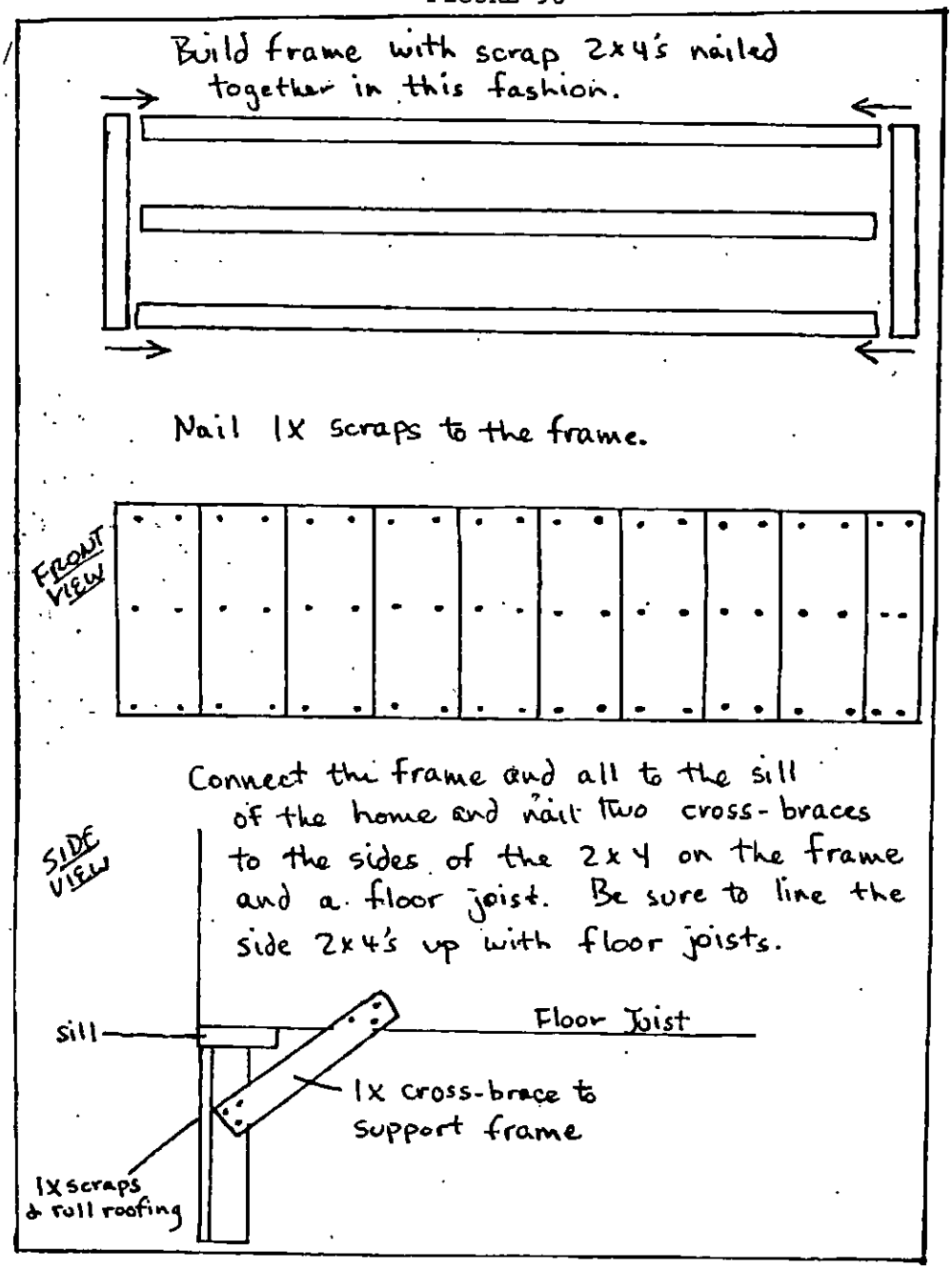
Roll Siding:

65 lb. roll roofing is best. One roll is 3' x 33'. Cut with a utility knife and use roofing nails.

In order to use roll roofing or siding as your underpinning material, most of the time, you must build a frame for the roll to be nailed to. Build the frame with 2 x 4's connected to the home's sill and braces connecting the frame to the floor joists to steady the frame. See Figure 90 for an illustration of a frame that can be used.

Overlap each roll seam 2"-3". Bring seams together on boards of the frame. Nail every 6"-8".

FIGURE 90



B. REPLACING GLASS AND SCREENING

Glass Installation and Puttying:

When measuring for new glass, be exact.

To install a new pane of glass, make sure the glass fits into the frame from the outside. If it bends, DON'T FORCE IT! Take a pocket knife or utility knife and trim old putty and, if necessary, small amount of wood frame until it fits. If glass is more than 1/16" too large, have it recut. Place glass in frame and use a putty knife to secure with glasier points every 6" or so. (See Fig. 91.)

If using a can of dap, take a ball of putty and roll it into a snake, then press into corners of the frame. Using a putty knife, smooth the putty into the corner as shown. When putty is completely smooth with knife, lightly run your finger over the putty to smooth it even more and make sure it is pressed firmly against wood and glass. This will make a better seal. (See Fig. 92.)

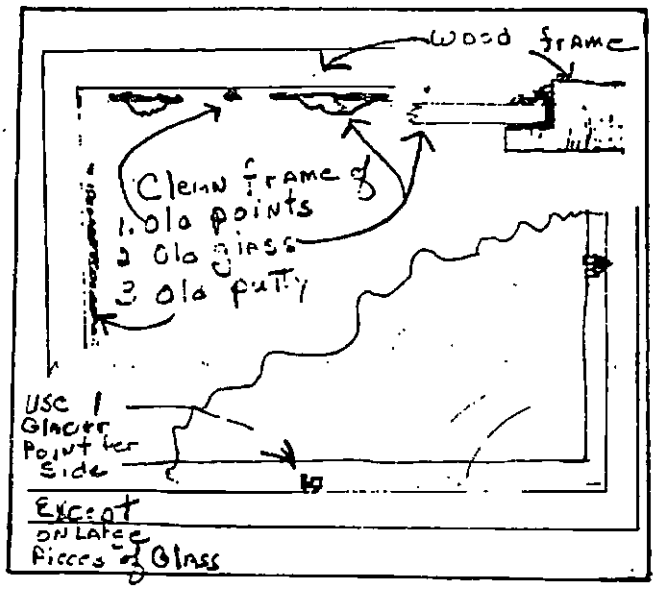


FIGURE 91

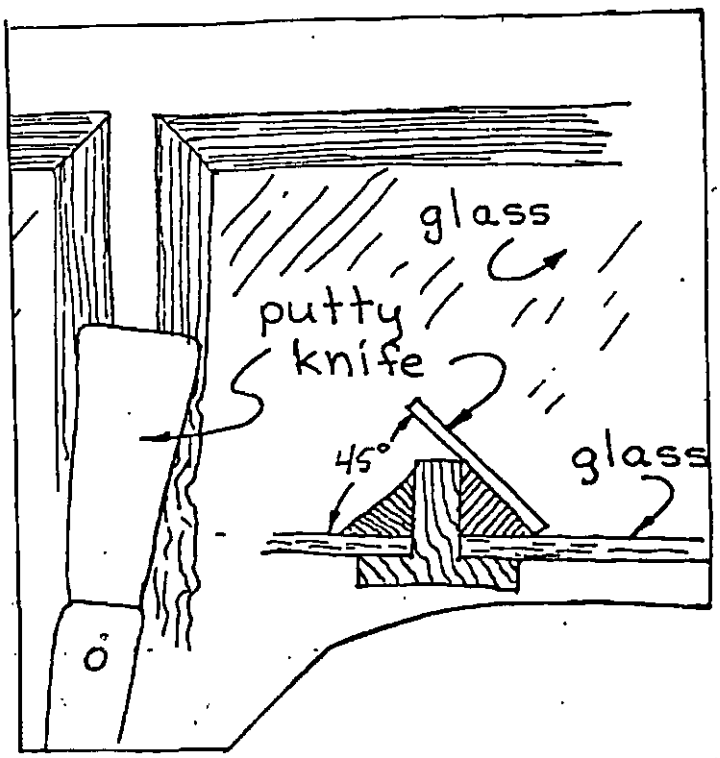


FIGURE 92

Screening:

Usually, we will apply screening to a window by stapling the screen against the outside casing of the window. Measure the outer window dimensions and cut the screen 2"-2½" longer and wider than the casing. Use a utility knife to cut, then staple the screen to the casing. Staple every 8"-10". Next, staple or tack 1" screen molding over the four edges of the screening for protection.

If you need to install a removable screen, a frame should be built and set on hinges or hooks of some sort.

C. MASONARY WORK

1. LAYING BLOCK/POURING FOOTERS FOR FOUNDATION SUPPORTS

Anytime concrete blocks are stacked more than three high, they should be secured with mortar. Mix the mortar with sand on a ratio of 3 parts sand to 1 part mortar mix. Add water so that the mixture will easily slide off the trowel and thick enough to remain on the concrete blocks.

Remember to dig down below the top soil to place first block. Lay block so that the inner cores are facing upward. Apply the mortar mix on top of the block in a 1" thickness. Lay the next block on top, then scrape the excess mortar off the side. Make sure the blocks are level and plumb as you build them up.

In some cases, a small footer may need to be poured to stack the blocks on top of. Build the form 1' x 1' and however deep you might need it. (Use the same guidelines as outlined in the next section.)

2. FOOTINGS AND FOUNDATIONS

Sometimes, we find a need to pour a footing and lay a foundation for a room addition, a home to be built, or a home already there. Homes or room additions on steep slopes will, in most cases, need a footing and foundation under it.

Footings should be dug through the topsoil to firm ground. Normal footings should be at least 14" wide and 6"-8" in depth (depending on firmness of the soil.) The bottom should be flat and square so that the weight will be distributed evenly over the bottom. (See Fig. 93)

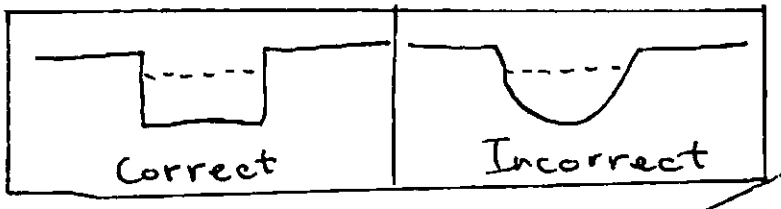
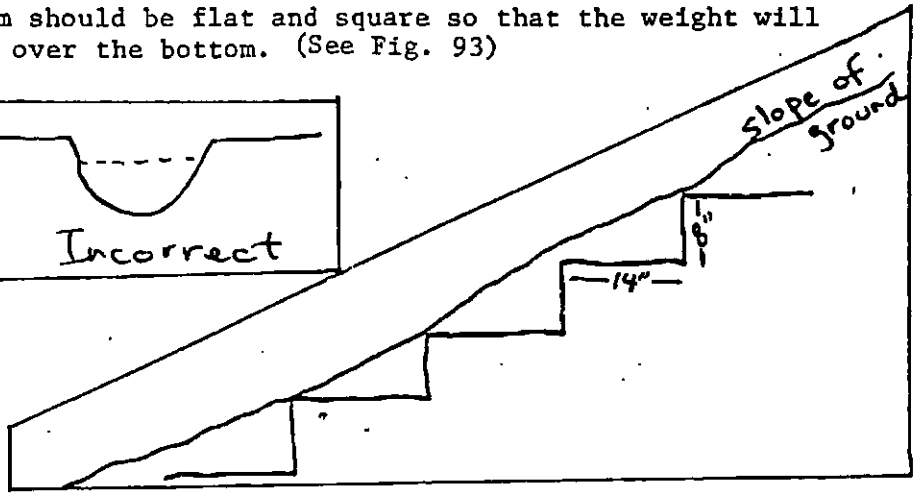


FIGURE 93



If the ground is sloped, the footings should be stepped down in steps of 8" , (this corresponds to the height of one block) and level inbetween steps. (See Fig. 94)

To insure that the footings are level, grade stakes should be driven into the bottom of the trench 3 to 4 ft. apart at the desired thickness. (See Fig.

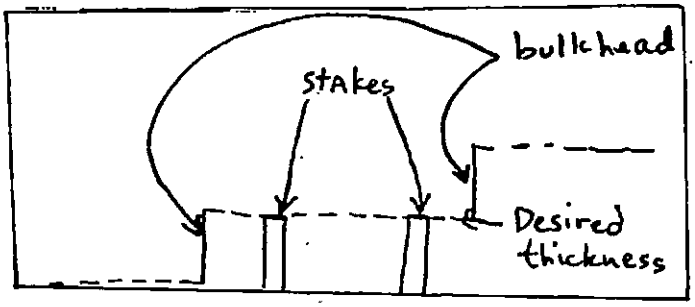


FIGURE 95

It is important on room additions to make sure that the top of the footings are in measurements of 8", 16", 24", 32", etc. below the bottom of the floor joists of the existing structure. This is to insure that when the foundation is built, out of 8" concrete blocks, they will come out at the right height.

Once the footings are poured level, the foundation can be put in with the following steps:

1. Measure the desired length from each corner and mark on the footings.

2. If possible, stretch string along the side of the existing house so that it extends to the point previously marked on the footing. This is to insure that the addition will be square with the existing house.

3. Start the block on each corner making sure the corner block is plumb and level.

4. Once the corner blocks are laid a string can be stretched between them. The block now can be put in, between the corner blocks, keeping the edge of the block even with the string. The blocks will then be straight and level.

5. The top course should be a solid block if possible. If none are available, at least every third void space should be filled with mortar so that something is solid to secure the wood to the foundation.

Porches

When they're in good repair, porches provide convenient access to and from a house. On warm summer evenings, porches often become social centers—places where neighbors and friends sit and chat. Some porches protect an entrance from rain, snow, and cold winds, while other porches store household items.

Not all porches are inviting or safe. Unstable steps or broken boards can injure your resident. Exposure to sun, rain, snow, and wind takes its toll on porches and steps. They're especially vulnerable to rot-producing moisture, which weakens porches and steps and makes them unsafe.

Tools You May Need

(Read your work description carefully before requesting tools from the tool room.)

- Caulking gun
- Circular saw
- Clamp
- Electric drill and bits
- Extension cord
- Hammer
- Hand saw
- Level
- Pencil
- Posthole digger or shovel
- Pry bar
- Square
- Tape measure

Materials You May Need

- Carriage bolts, washers and nuts
- Caulk
- Gravel
- Joist and beam hangers
- Lumber
- Nails
- Paint

Unless otherwise specified, 4×4 corner support posts should be pressure treated lumber.

Repairing Porches

Never remove an old porch unless specifically directed to do so in your work description.

Whenever possible, repair an existing porch rather than build a new one.

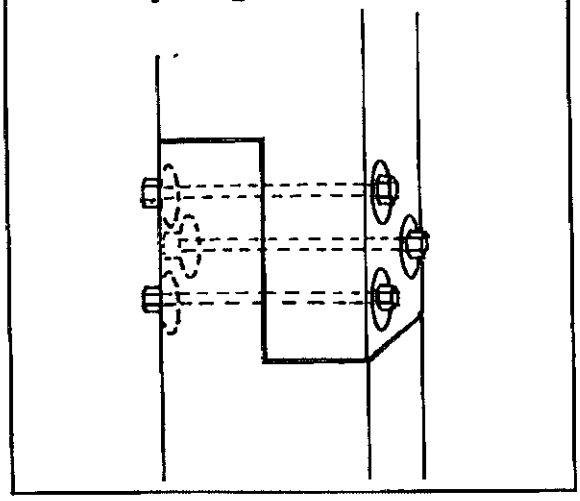
To Repair a Porch Deck

1. Remove the damaged boards using a pry bar. Try not to damage the good boards next to the boards you're replacing.
2. Determine if the joists underneath the deck are damaged. Remove and replace any damaged joists with the same-size boards. Often a section of the joist simply needs reinforcement. To reinforce a joist, place a board the same size next to the damaged section, then nail the two boards together.
3. Paint the porch. See the section on painting for instructions.

To Repair a Weak Post

1. Brace the underside of the porch with a piece of 4×4 or 2×4.
2. Cut the post just above the damaged area and remove it from the footing. If you need to cut the post from the footing, cut as close to the footing as possible.
3. Cut a replacement section 6 inches longer than the damaged piece you removed. Cut out an L-shape piece half the thickness of the post and 6 inches long in one end of the replacement piece. Cut out a matching piece in the end of the undamaged section of post.

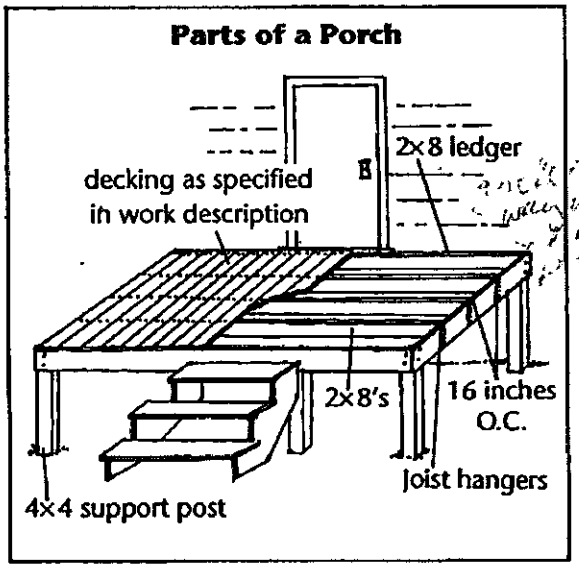
Splicing a Weak Post



4. Clamp the notched pieces together and drill holes through both pieces. Fasten the pieces together with carriage bolts.
5. If necessary, place the bottom end in a hole partially filled with gravel or concrete as specified in the site work description.
6. Paint the repaired post.

Building Porches

Sometimes a porch is so badly damaged that you'll need to tear it down and build a new one. Most of these porches will be small 4×4-foot or 4×6-foot porches.

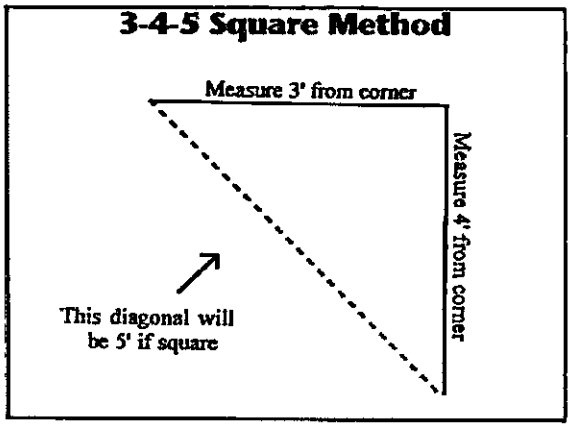


1. Determine the porch's measurements. Cut a 2×8 board 3 inches shorter than the porch's outside width. Nail this board (ledger) to the house in a position that will **allow enough room for decking material to be added** as specified by the work description.
2. Next, determine support post positions. Measure carefully since it is very important to have posts in correct positions for later steps. Dig footing holes approximately 24 inches deep.
3. Cut 4×4 corner support posts. The length for these posts will depend on whether a handrail will be built. Posts can be either even with the top of the ledger if no handrail is to be included, or 36 inches higher than the ledger if a handrail is to be built.

Note: One method of ensuring that posts are all at the same height:

a. Leave all posts slightly higher than needed.
b. After posts are secured in footing holes, determine exact height of one post (nearest to the house or ledger) and mark this measurement.
c. Use this first post to level around to remaining posts and mark them accordingly.
d. Cut all posts at marks you have just determined by leveling around.

4. After posts are cut (slightly longer than needed), place one in each hole. Add rock, gravel, dirt or concrete post mix as specified in the work description. Be sure to use a level to plumb the posts. Mark and cut posts as described above.
5. Cut two 2×8 side joists to fit from each end of the ledger to the outside edges of the posts that are away from the house. Nail these in place.
6. Cut one 2×8 board to fit from the outside edge of one side joist to the outside edge of the other side joist. Nail this in place.
7. Square the frame. With the help of at least one other person, measure the diagonal formed by two corners and compare to the diagonal measurement formed by the other two corners. Shift the frame until the measurements are equal—the frame will then be square. Or use the 3-4-5 method illustrated below. If necessary to hold the frame in a square position, nail a brace diagonally across the top of the front board and a side joist.

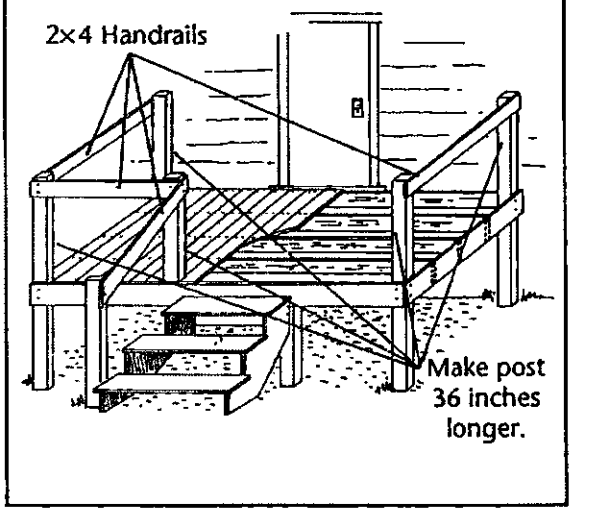


8. Cut the remaining joists to fit inside the frame from side to side, parallel to the house. If joist hangers are called for in the work description, use them to secure the joists to the frame. Otherwise use large nails. Place the joists 16 inches apart, center to center.
9. Cut ¾×6 deck boards to lay at right angles to the joists. They should butt up against the house and extend 2 inches beyond the front of the porch frame. Space the boards ¼ inch apart for drainage. Nail the deck boards to the joists driving two nails at each joist. Caulk where necessary. Or, if called for in your work description, use 2×4, 2×6, or plywood instead of ¾×4 deck boards. Plan to lay the plywood so that the edge runs along the center of a joist, rather than falling between 2 joists.
10. Build steps following the instructions given in the "Steps" skillsheet.
11. Paint the porch and steps, or treat them with wood preservative.

Handrails

If handrails are desired, make 4×4 posts 36 inches longer as described in step 3 of **Building Porches.** Nail 2×4s to the posts as shown.

Porch With Handrails



Drywalling

Some workcamp projects require the installation of drywall. You'll replace damaged drywall or install new sections of drywall.

Guidelines

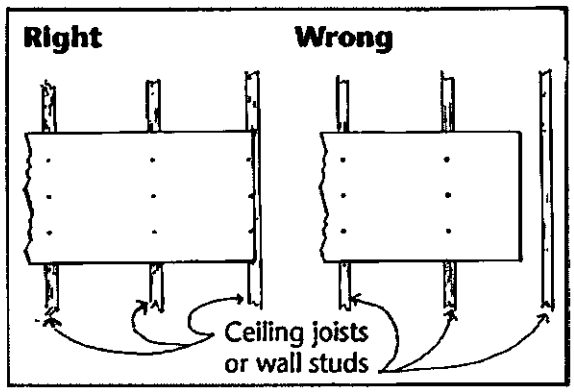
- Work in a team of two or three people.
- Always carry drywall carefully. To prevent damage to the edges, don't drag or slide the drywall.
- Insulate walls and ceilings before securing the drywall in place.
- Drywall the ceiling first and then the walls. (This allows the ceiling to rest on the walls.)
- Nails or screws should be no less than ⅜ inch from the edge of the studs.
- The edge of a piece of drywall should run along the center of a wall stud or ceiling joist. There are 3 exceptions to this rule:

1. Where the ceiling meets the wall. Here, the edge of the drywall should be loosely flush with the wall studs.
2. Where two walls meet in an inside corner. Here, the edge of the drywall should be loosely flush with a stud on the joining wall–or a previously hung piece of drywall.
3. Where two walls meet in an outside corner. Here, the two pieces of drywall should butt together to create a neat corner that can be finished with corner bead and joint compound.

Tools You May Need

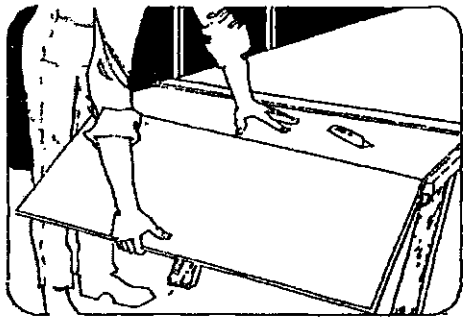
(Read your work description carefully before requesting tools from the tool room.)

Bucket	Rags or Sponges
Chalkline	Sanding block
Hammer	Sandpaper
Keyhole saw	Saw
Level	Square
Large putty knife	Straightedge
Pencil	Tape measure
Plumb	Utility knife

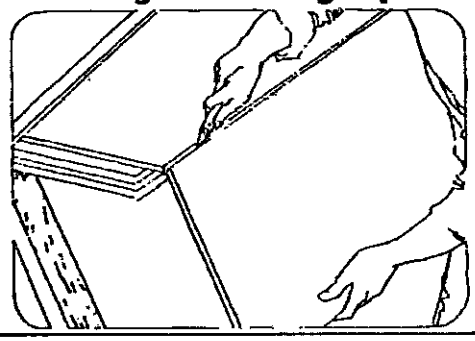


Scoring Drywall

Snap the core over a solid surface.



Cutting the Backing Paper



Materials You May Need

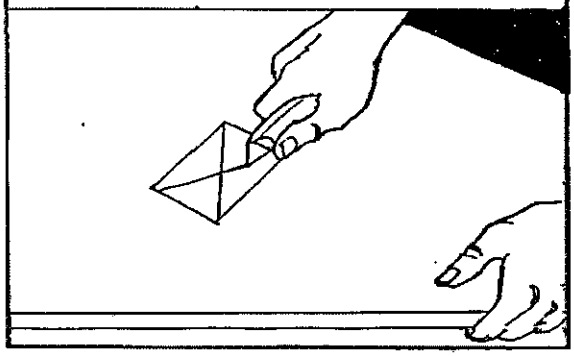
Joint compound (mud)
Joint tape
Lumber
Nails or drywall screws
Drywall
Spackling compound
Water

Note: Remember that joint compound often takes overnight to dry. You'll need to apply at least 2 coats of compound before you can paint your drywall. So plan carefully and start your drywall project early in the week in order to finish by Friday.

Cutting Drywall

1. Measure the area to be drywalled, then measure and mark the drywall.
2. Score the drywall. Use a utility knife and straightedge to cut the drywall about ⅛ inch deep.
3. Break the drywall core over the edge of a large surface such as a sawhorse.
4. Cut the backing paper and smooth any rough edges.
5. Measure the positions of windows, doors, electrical outlets, switches and other objects. Then mark the positions on the drywall. Cut the openings carefully with a keyhole saw if one is available—or use your utility knife if you don't have a keyhole saw.

Mark outlets and switches.



Installing Drywall

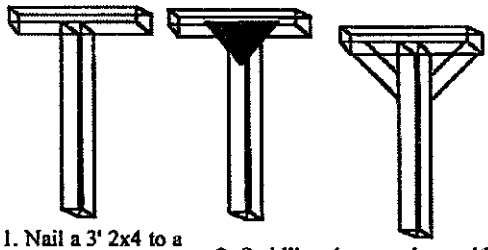
Ceilings

Install drywall on the ceiling first. Then install drywall on the walls. (This allows the ceiling to rest on the walls.)

- Place drywall lengthwise at a right angle to the ceiling joists.
- Place each sheet so the edges cover no more than one-half the outer joist.

1. Measure and cut the drywall to fit the opening. Cut holes for lights or other objects.
2. Place the first piece of drywall square with the ceiling joists. It's better to start right than try to correct alignment problems later.
3. If necessary, use a T-brace to help hold the drywall against the ceiling joists while you secure it in place. (Make a T-brace from a 3-foot-long piece of 2×4 nailed to a 2×4 about 1 inch longer than the ceiling is high.)

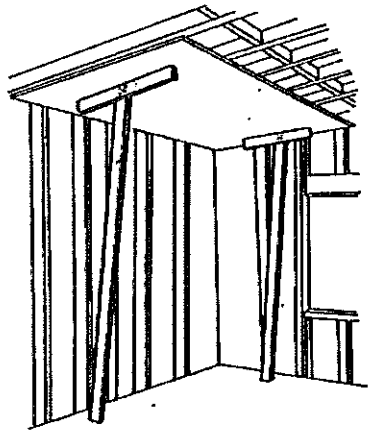
Making a T-Brace



1. Nail a 3' 2x4 to a 2x4 about 1" longer than the ceiling is high

2. Stabilize the top piece with a triangular piece of plywood (about 16x16) on 1 side, or scrap 2x4 braces on both sides

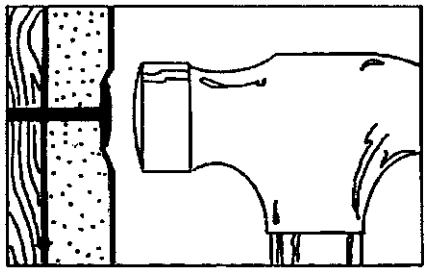
Using a T-Brace



4. Snap chalk lines across the drywall at the center of each joist. Use these lines as guides for nails or screws.

5. Secure the drywall into position. Start at the center joist and work outward. Space nails or screws 5 to 7 inches apart and no less than ¾ inch from the edge of the studs.
6. Hammer each nail or turn each screw far enough into the drywall to make a dimple, but do not break the drywall paper.

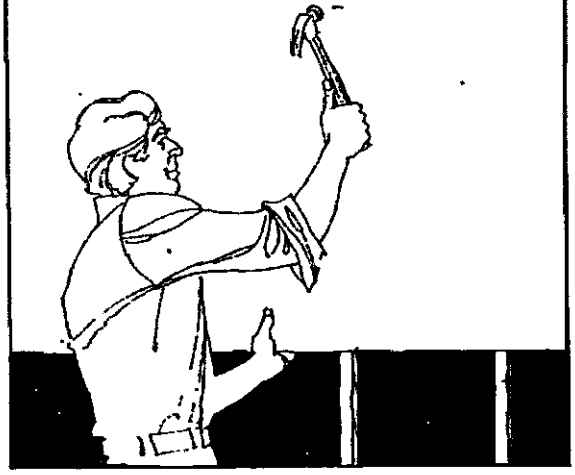
Proper Dimpling



Walls

- If the wall is more than 8 feet 2 inches high, hang the long edge of the drywall parallel to the studs. If the wall is shorter, hang the long edge of the drywall perpendicular to the studs.
- Start at the top of the wall and work down.
- Each sheet should cover no more than one-half of the outer studs.

Begin at the top and work down.

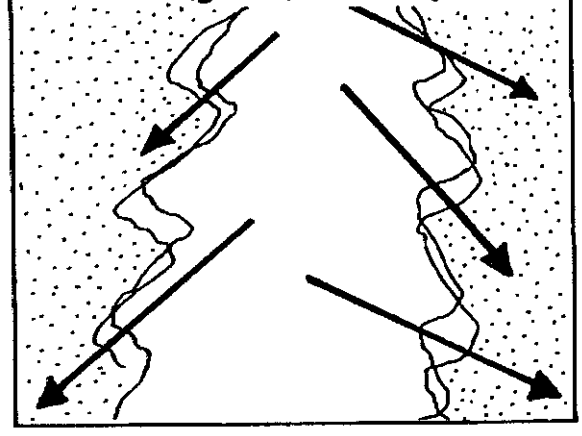


1. Measure and cut the drywall to fit the opening. Cut holes for outlets or other objects.
2. Make sure the first sheet is plumb.
3. Secure the drywall into place. Space the nails or screws approximately 12 inches apart and no less than ¾ inch from the edge of the studs.
4. Hammer each nail or turn each screw far enough into the drywall to make a dimple, but do not break the drywall paper.

Applying Joint Compound and Tape

- Use a wide, flexible putty knife to spread the joint compound.
- Use the putty knife to embed drywall tape in the joint compound.
- Make the compound smooth by "feathering" it. *(Using a wide putty knife, smooth the compound from the center of the joint or patch to the edges. Gradually thin out the layer of compound as you move away from the center.)*

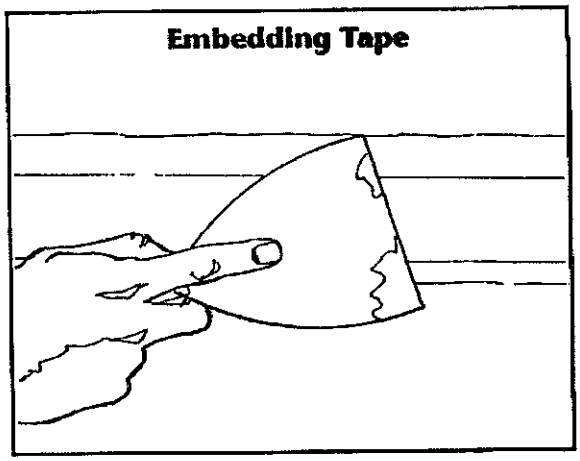
Feathering Out Joint Compound



- Drying time for the compound depends upon the type of compound used, the thickness of each layer or patch, and drying conditions such as heat and humidity. Check the manufacturer's directions to estimate the drying time.

Flat Joints

1. Spread joint compound over a 4- to 8-foot section of the joint.
2. Use a putty knife to embed a piece of joint tape into the fresh compound.
3. Cover the tape with a thin layer of compound. Feather out the compound 4 inches on both sides of the joint. Repeat this process for all the joints.



Inside Corners

1. Apply joint compound to both sides of the corner joint.
2. Crease a piece of drywall tape down the center before placing it in the corner.
3. Embed the tape in the fresh compound using a putty knife.
4. Cover the tape with joint compound. Feather out the compound 4 inches on both sides of the corner. Repeat this process for all the inside corners.

Outside Corners

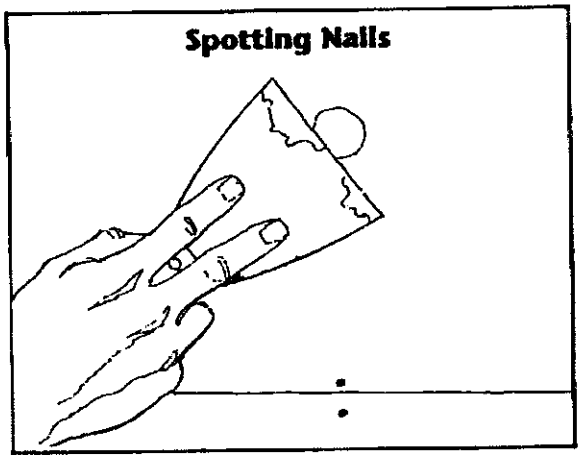
1. If you have a metal corner bead, nail it to the corner, then go to step 5. If not, go to step 2.
2. Apply compound to the corner joint.
3. Crease a piece of drywall tape down the center before placing it on the corner.
4. Embed the tape in the fresh compound using a putty knife.
5. Cover the tape or metal strip with compound. Feather out the compound four inches on both sides of the corner. Repeat this process for all the outside corners.

Covering Nail or Screw Dimples

Apply compound to all nail or screw dimples. Smooth the compound by scraping it with a putty knife until it's even with the surrounding surface. Let the compound dry.

Applying Finish Coats

- Apply a second thin layer of compound after the first layer has dried. Feather out the compound 4 inches on both sides of the joint or patch. Let the compound dry.
- If necessary, apply a third finish coat. Feather out the compound 6 to 7 inches on both sides of the joint or patch. Let the compound dry.



For a Smooth Finish

- Wait until the compound is nearly dry—firm to the touch, but with some moisture still visible. Then, wet-sand it with a damp rag. Rinse the rag out frequently in a pail of water (change the water often).
- You may also dry-sand the compound with a piece of sandpaper or wire screen. Do this after the compound has dried completely. Clean up the compound dust and further smooth the compound with a damp sponge or rag. Be sure the drywall is completely smooth before applying paint.

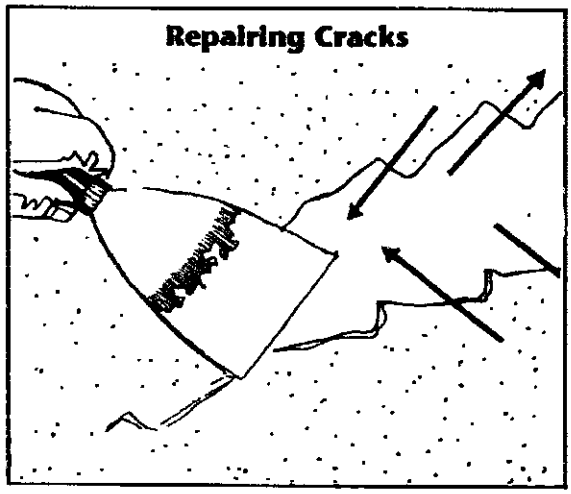
Repairing Drywall

Small Dents

1. If necessary, sand the surface carefully.
2. Fill dents with spackle or joint compound. Let the compound dry overnight. If necessary, apply a second coat and allow it to dry.
3. Use a sanding block to sand the surface and remove high spots.
4. Paint the patch to match the surrounding area.

Cracks

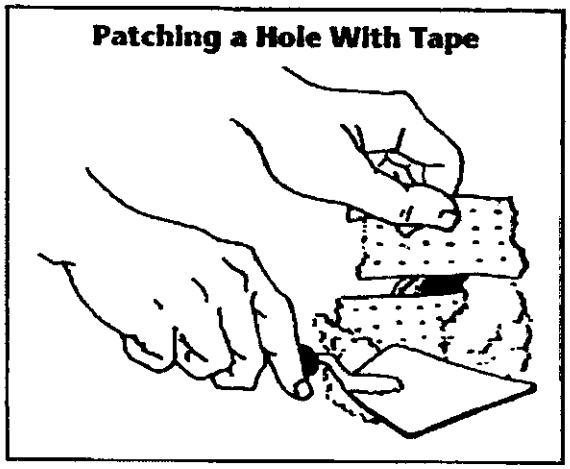
1. Clean the area around the crack and sand it carefully.
2. Apply spackle or joint compound. Force the compound into the crack. Work the compound across the crack in both directions.



3. Scrape away any surplus compound with the putty knife.
4. Let the compound dry overnight. If necessary, apply a second coat and allow it to dry.
5. Use a sanding block to sand the surface and remove high spots.
6. Paint the patch to match the surrounding area.

Small Holes

1. Cut or tear pieces of drywall tape to cover the hole.
2. Spread compound in and around the hole, then press the tape into it.



3. Spread a layer of compound over the entire patch feathering it away from the hole.
4. Let the compound dry overnight. If necessary, apply a second coat and allow it to dry.
5. Use a sanding block to sand the surface and remove high spots.
6. Paint the patch to match the surrounding area.

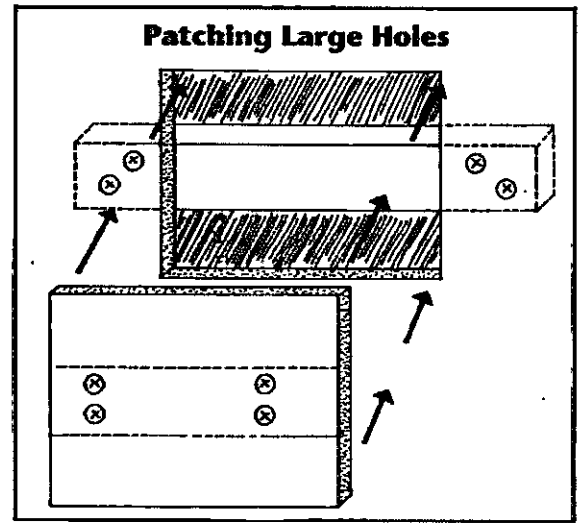
Large Holes

1. Cut a triangular or square piece of drywall larger than the hole.
2. Place the piece over the hole and trace it on the wall. Cut a hole in the wall the same size as the patch.
3. Position a small piece of 1×2 or 1×4 inside the hole behind the existing drywall. Use drywall screws to secure the board in place.
4. Position the drywall in the hole. Use drywall screws to fasten it in place.
5. Tape and finish the patch as described above.

Very Large Holes

1. Cut a rectangular hole from stud to stud around the existing hole.
2. Cut a new piece of drywall to fit this hole. Use nails or screws to secure it in place.
3. Tape and finish the patch as described above.

Clean up your work area. Throw away small pieces of drywall.



Wheelchair Ramp

Materials (per 24-foot section)

6–2×12-inch×12-foot construction grade lumber
6–4×4-inch×8-foot pressure treated fir, redwood or cedar
4–2×4-inch×12-foot construction grade lumber
27–2×4-inch×10-foot construction grade lumber
8–1×4-inch×12-foot construction grade lumber
2–7½×⅜-inch carriage bolts
16–5×⅜-inch carriage bolts
4–6×⅜-inch carriage bolts
*–all carriage bolts need nuts and washers
6 to 8#–10d hot galvanized nails
1 gallon exterior paint
6 bags of concrete mix

Tools

4–Claw hammers
1–Crosscut or electric saw
1–Drill, 7/16-inch bit
1–Measuring tape or carpenter's rule
2–Shovels
1–Pick (if rocky ground)
1–Adjustable wrench
4–Paint brushes
1–Level
1–Chisel

General tips:
Where space and terrain permit, the ideal slope for a wheelchair ramp is 12 feet horizontal for every 1 foot vertical. The ramp should be 40 inches wide. Plan the wheelchair ramp carefully with your crew. To make the work go smoothly, work together. Some crew members can be cutting the lumber while others are putting already-cut pieces together.

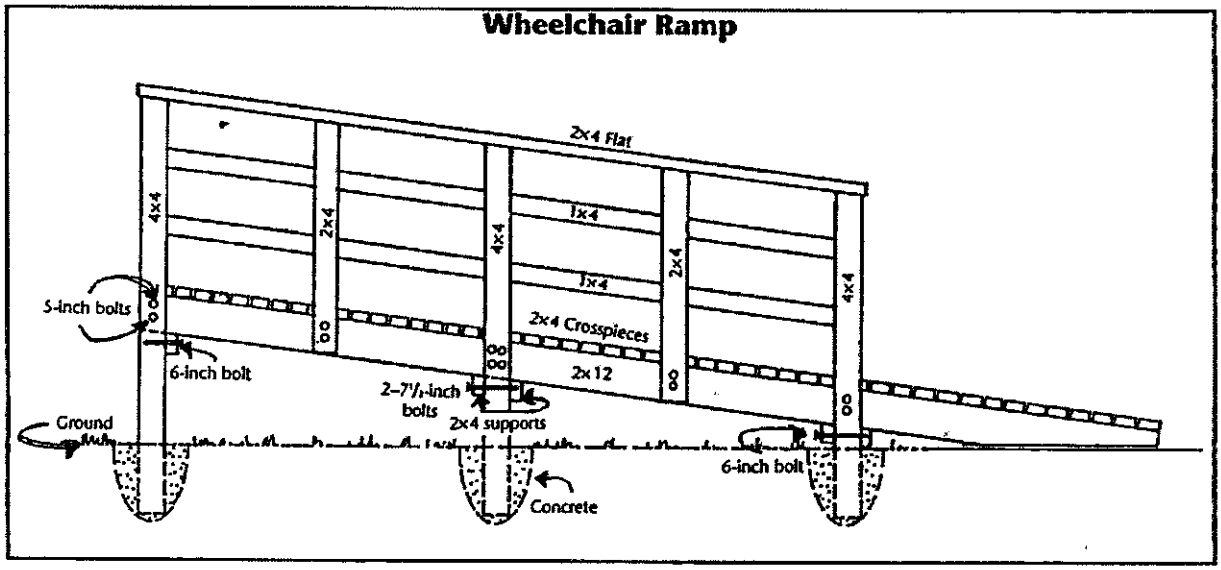
Directions:

1. Mark the locations of the post holes you will need to dig. Remember 4×4 posts will be 40 inches apart widthwise, with a post every 12 feet along the length of the ramp. Where two 12-foot sections of the ramp join together, one post should connect both sections.
2. Dig post holes, 12 to 18 inches deep. (Tip: For a neat, professional-looking job, plan so that the tops of the posts will rise along with the deck of the ramp.)
3. Set the 4×4 posts in the holes and fill with cement, if called for in your work description. You will need to secure the posts perfectly vertical (check with level). Allow cement to set up completely, probably overnight.
4. Notch the 4×4-inch×8-foot posts ¾ inch deep by 13 inches high for the 2×12-inch×12-foot joist and the 2×4×40-inch support to fit into. Secure the 2×12 joists to the 4×4 posts each with two 5-inch carriage bolts.
5. Attach a 2×4×40-inch crosspiece (support) on each side of the connecting 4×4 post underneath the 2×12s. Secure with a 7½-inch carriage bolt through the two 2×4s and the 4×4 post. Also attach a 2×4×40-inch crosspiece at the higher support post of the ramp. Secure with a 6-inch carriage bolt through the 2×4 crosspiece and the 4×4 post.
6. Toenail a 2×12-inch×12-foot joist down the center of the 2×4 crosspieces. This will be the center support for the deck of the ramp.
7. Attach vertical hand rail supports to the 2×12 joists at 6-foot intervals on both sides of the ramp using 2×4 by 50-inch studs. Notch the 2×4 bottom ¾ inch deep by 13 inches high. Attach to the 2×12 joist with two 5-inch carriage bolts each.
8. Place 2×4s, 40 inches in length, across the top of the 2×12s to form the deck. Leave a ¼-inch space between them. Then nail them securely in place with two nails at each end and two into the middle deck joist.

9. Nail the hand rail made of 2×4-inch×12-foot lumber to the inside or top of the 4×4 posts 36 inches from the deck of the ramp. Then nail the 1×4-inch×12-foot lumber to the 4×4 posts 12 inches from the deck of the ramp and another at 24 inches, on both sides of the ramp.

10. Attach the ramp securely to the porch or stoop of the house.

11. Paint with exterior paint.

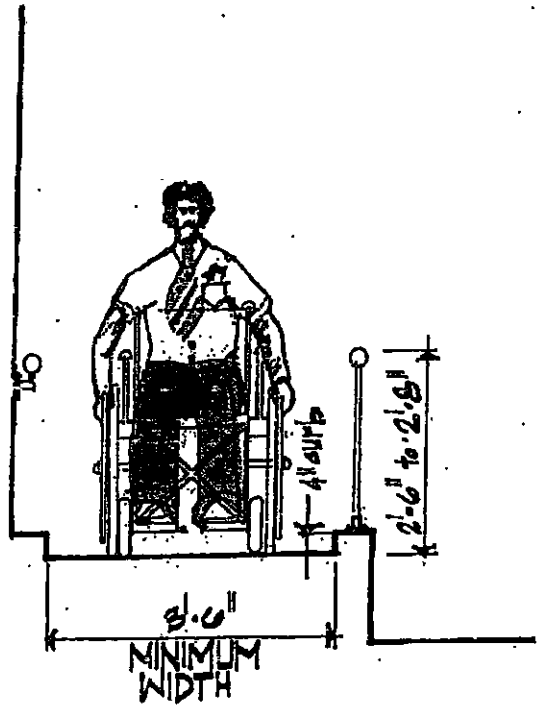


2.2 WALKS and RAMPS

THE SPECIALLY ADAPTED HOME SHOULD BE SITED TO MINIMIZE THE NECESSITY FOR EXTENSIVE RAMPS OR STAIRS. AMBULANT INDIVIDUALS OFTEN PREFER STAIRS TO RAMPS. FOR THE WHEELCHAIR USER, RAMPS OR SLOPED WALKS MUST BE PROVIDED TO ACCOMMODATE ANY LEVEL CHANGE. THE WHEELCHAIR USER CAN USUALLY NEGOTIATE RAMPS OR WALKS WITH A SLOPE OF 8%. IF THE SLOPE EXCEEDS 5%, HOWEVER, IT MAY BE NECESSARY FOR THE INDIVIDUAL TO PROPEL HIMSELF OR HERSELF BY MEANS OF HANDRAILS ON BOTH SIDES. REGARDLESS OF SLOPE, RAMPS MAY REQUIRE HANDRAILS FOR SAFETY (SEE HANDRAILS, 2.3). WALKS (WHERE SURFACE IS LEVEL WITH GRADE) DO NOT REQUIRE HANDRAILS IF SLOPE DOES NOT EXCEED 5%.

2.21 Walks or ramps must be a minimum of 3'-6" wide. A width of 5'-0" is preferred for walks to accommodate the wheelchair turning radius.

2.22 Walks or ramps must be of a nonslip material and yet, the finish should not be so rough as to make wheelchair travel difficult or unpleasant. The number and size of expansion joints should be minimized.



2.23 For long, continuously sloped walks or ramps, a level rest platform should be provided every 30'-0". This platform should be a minimum of 5'-0" by 5'-0". A similar level platform should also be provided at any point where a sloped walk or ramp changes direction. A level area 5'-0" in length should precede any sloped walk or ramp.

2.24 For walks or ramps with a slope between 5% and 8%, the recommended width is 3'-6" with handrails on both sides. This width will allow the simultaneous use of both handrails. Ramps must not exceed 8% slope.

2.25 Ramps typically constitute a means of emergency exit and therefore must be of fire-retardant construction.

2.26 Where ramps are exposed to inclement weather, a canopy should be provided for protection. In cold climates, built-in electric heating coils are often installed.

2.27 A low curb (approximately 4" high) on one or both sides of a ramp or walk will serve as a guardrail for wheelchair and prevent the user from scraping his or her knuckles on a parallel wall.

2.28 Where stairs are provided, all risers should be slanted or beveled. Open risers or risers with protrusions or overhanging nosings are unacceptable. An individual wearing leg braces can trip on stairs of this type because he or she cannot manipulate the toe to clear the nosing.

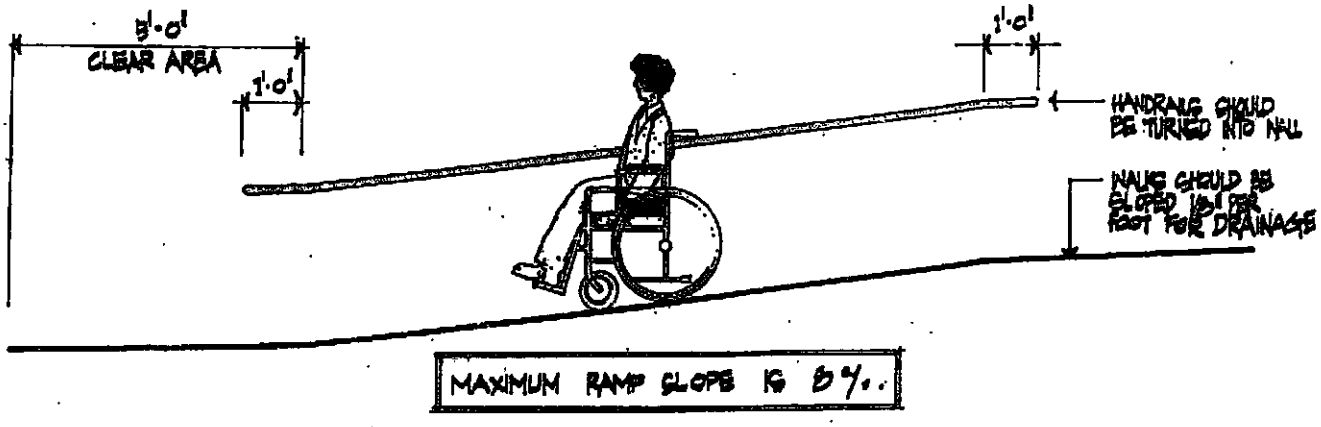


FIG. 2.22 RAMPS

2.3 HANDRAILS

HANDRAILS SERVE THREE PRIMARY FUNCTIONS: *(1) TO ACT AS A SAFETY BARRIER TO PROTECT THE USER FROM A FALL, (2) AS AN AID TO BALANCE, AND (3) AS A MEANS OF PROPULSION FOR THE WHEELCHAIR USER.* THE LOCATION, HEIGHT AND SHAPE OF ANY HANDRAIL IS THEREFORE IMPORTANT. HANDRAILS SHOULD BE LOCATED AT ALL STAIRS AND AT ANY RAMP OR PLATFORM OF SUFFICIENT HEIGHT TO POSE A POTENTIAL DANGER TO THE USER. MANY INDIVIDUALS PREFER RELATIVELY NARROW STAIRS WHICH ALLOW SIMULTANEOUS USE OF HANDRAILS ON EACH SIDE. HANDRAILS SHOULD ALSO BE PROVIDED ON BOTH SIDES OF ANY RAMP WITH A SLOPE GREATER THAN 5%. (SEE WALKS & RAMPS, 2.2).

2.31 A handrail with a 1-1/2" diameter provides the user the most satisfactory grip. Where a larger handrail is desired, a similar shape can be achieved by grooves cut in the larger section (see Fig. 2.31).

2.32 Handrails should be mounted to provide 1-1/2" clearance from the adjacent wall. A larger clearance will allow the arm to become wedged between the wall and the handrail. To prevent scraped knuckles, the wall surface behind a handrail should not be rough or highly textured.

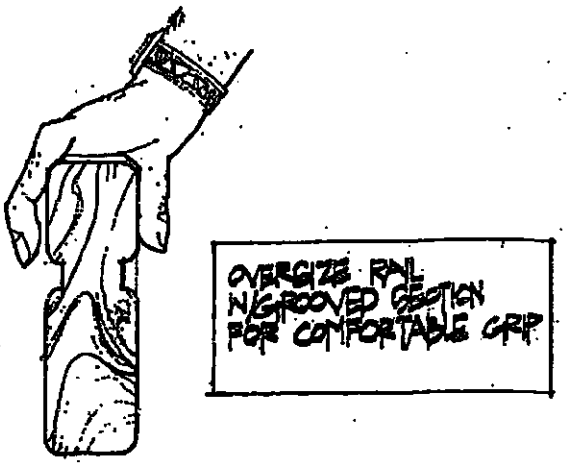


FIG. 2.31 HANDRAIL GRIPS

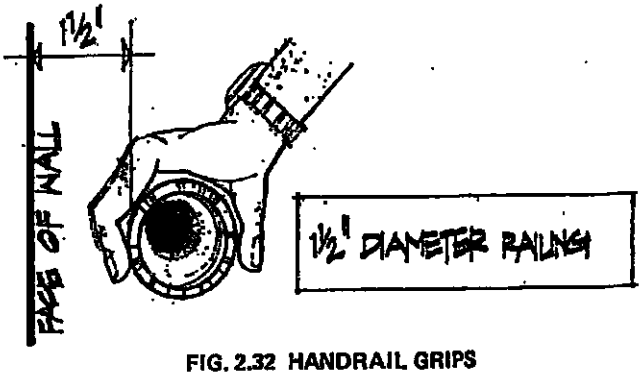


FIG. 2.32 HANDRAIL GRIPS

2.4 ENTRANCES

A LEVEL PLATFORM MUST BE PROVIDED AT THE ENTRANCE TO ANY RESIDENCE. THIS PLATFORM MUST BE LARGE ENOUGH TO ACCOMMODATE WHEELCHAIR MANEUVERING. THE PLATFORM SHOULD BE UNOBSTRUCTED BY DOOR MATS OR DRAINAGE GRATES. DOOR LOCKS SHOULD BE AT A CONVENIENT HEIGHT AND EASY TO OPERATE. THE FRONT DOOR SHOULD BE WELL-INSULATED AND OPEN WITH EASY OPERATION. STORM AND SCREEN DOORS SHOULD BE AVOIDED SINCE TWO CONSECUTIVE DOORS ARE EXTREMELY CUMBERSOME TO OPERATE. THE DOOR AND FRAME SHOULD HAVE ADEQUATE WEATHERSTRIPPING TO PREVENT DRAFTS. SIDELIGHTS ARE OFTEN INCORPORATED AT THE FRONT DOOR TO ALLOW THE WHEELCHAIR USER TO PREVIEW VISITORS.

2.41 A level platform must be provided at any entrance. For the wheelchair user, this platform should have a minimum size of 5'-0" by 5'-0". The platform should include a clear area 1'-6" in width beside the door on the side opposite the hinges (See DOOR OPERATION, 4.1). The platform may be sloped 1/8" per foot to provide drainage.

2.42 The entrance platform should be protected from inclement weather by a canopy or overhang. The platform surface must be of a nonslip material.

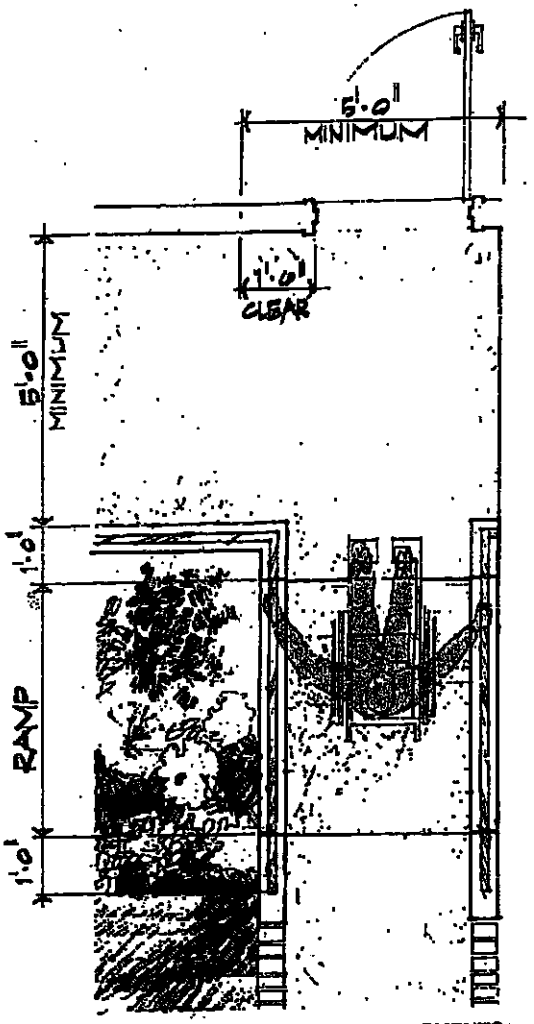
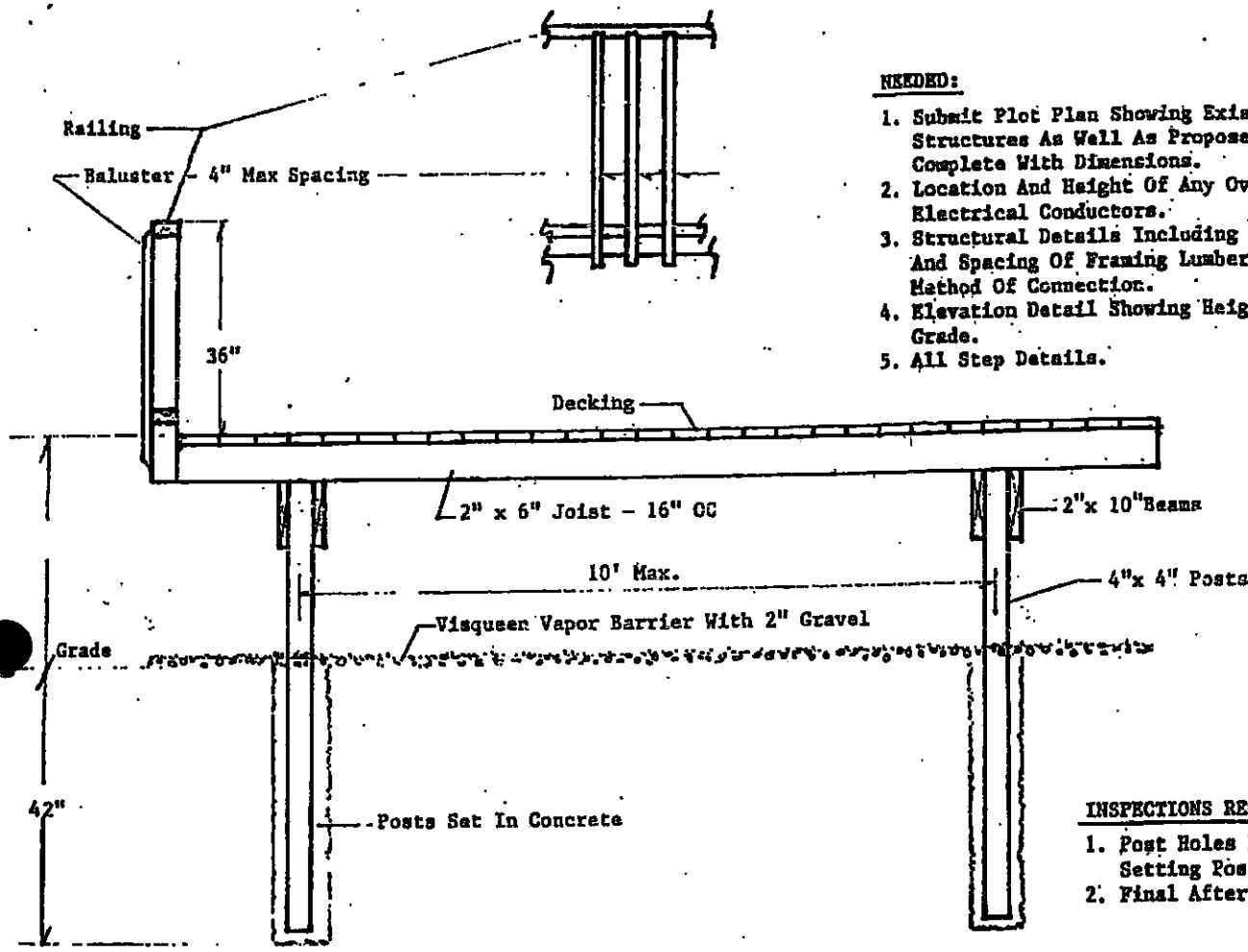


FIG. 2.41 MINIMUM ENTRANCE REQUIREMENTS



NEEDED:

1. Submit Plot Plan Showing Existing Structures As Well As Proposed Deck Complete With Dimensions.
2. Location And Height Of Any Overhead Electrical Conductors.
3. Structural Details Including Size And Spacing Of Framing Lumber And Method Of Connection.
4. Elevation Detail Showing Height From Grade.
5. All Step Details.

INSPECTIONS REQUIRED:

1. Post Holes Before Setting Posts.
2. Final After Completion.

MISCELLANEOUS SAFETY TIPS:

A. If you are unsure of your ability to perform a job, say so! Never attempt a job that you are unable to do or for which you do not have the proper skills.

B. If the family you are serving has small children, know where they are at all times. Children are naturally curious and will explore tools and things you are doing. If you can't keep up with them, have each work crew member take a turn playing with the children. At least the other crew members will be able to work safely and the children will be safe too. (Plus that may be a real fun and rewarding break.)

C. Keep your worksite clear and free of debris. Keep scrap materials in one area; keep your tools in a specified area. Inspect the worksite at the end of each workday, making sure that all debris is discarded and all tools are collected.

D. Keep a current fire extingusher in your vehicle. Teach all members of your work crew how to use it.

E. Snakes, ticks, spiders, rodents, etc. are a reality. When looking around a woodpile or in dark, damp areas, use extreme caution. When lifting boards or debris from the ground, first kick the object to be moved. When picking up the object, keep it between you and the ground. Stacked wood and building materials which have been sitting on the ground for a while are excellent hiding places for black widow spiders. Avoid them — if you are bitten, **seek medical attention immediately.** Copperheads and rattlers also will enjoy the refuge of stacked supplies. Again, use caution. Ticks are common too — so check your hair and in other warm body spots. Also watch out for bees and wasps. If you require special medication for stings, please always keep it in your vehicle. Alert the other members of the crew as to what they should do if you are stung.

F. Most snakes in Central Appalachia are non-poisonous. (In the areas served by ASP, there are only 2 kinds of poisonous snakes — copperheads and eastern timber rattlesnakes.) If you are bitten, wash the wound with soap and water. Do not suck the wound. Be sure to pour peroxide liberally into the wound. If you are not sure that the snake was non-poisonous, seek medical

attention immediately. (Ask your center director at the beginning of your week where medical facilities are.)

NOTE: While the garter snake (which is very common to Central Appalachia) is a non-poisonous snake, a minority of people will have a reaction to its bite that will duplicate a poisonous bite minus the venom, of course. Medical treatment for this allergic type of reaction is required.

G. Carry a well supplied first aid kit (and your medical forms) in your vehicle at all times. Some things to include are:

peroxide	bee sting kit
aspirin/pain reliever	bandages
gauze; tape	First aid or hydrocortisone cream
sunscreen or block	calamine/caladryl lotion

Check with your favorite doctor or nurse about other items that should be included in your first aid kit. First-hand knowledge of first aid by someone in your group is recommended. While still at home, check to be sure that tetanus shots in your group are current in the event of an accident.

H. Be aware of any special medical needs within your work crew. Make sure that if somebody may need special attention, that all in the crew are told what to do in case of an emergency.

I. If you are doing a job in which sparks, dust, or debris will be flying, wear GOGGLES and a HARDHAT.

J. Use your tools only for their intended use.

K. Concentrate on what you are doing — it only takes a second to lose a finger to a power saw or to hammer your thumb.

L. Absolutely NO HORSEPLAY at a worksite! ! ! We have limited resources (use good stewardship), and accidents can happen when people are "fooling around." Remember that the safety of all must be a prime consideration at the worksite.

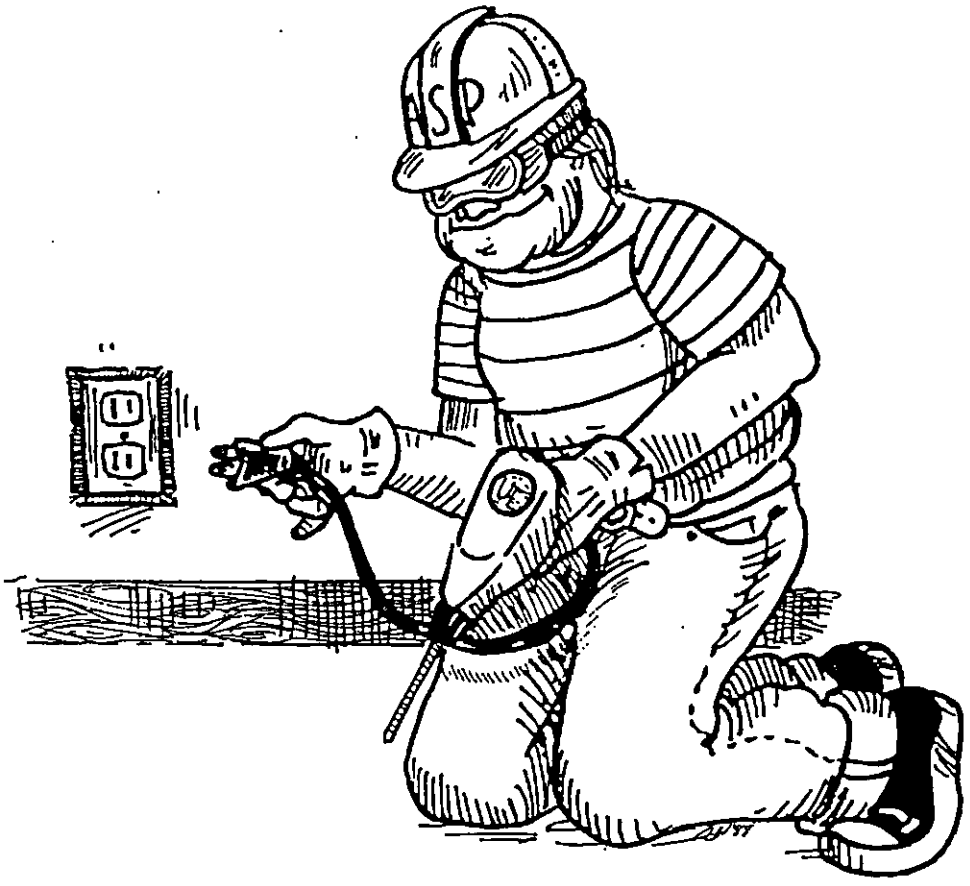
M. Adult volunteers: NEVER leave youth workers unattended at the worksite. Wait for ASP staff for additional supplies, travel as a group, or leave at least one adult in charge of supervision.

N. In case of emergency, always have at least one operating vehicle at the worksite.

O. Never ride in the open part of a pickup truck when transporting supplies.

P. People working with insulation should plan their activities for the coolest part of the day, particularly crawling in attics. Also watch for allergic reactions to insulation. When working under a house on insulation, cover the ground with heavy plastic.

Q. To avoid debilitating sunburn, wear plenty of sunscreen on exposed body parts and wear a shirt at all times.



ELECTRICAL HAND TOOLS:

A. Before plugging in the cord, make sure the tool is in good, clean condition and that all blades, drill bits, etc. are properly inserted and tightening screws or bolts are snug. Make sure that all safety features are in working order and in proper position.
B. Be sure that your hand-held power tools have a constant pressure switch that will shut off the power when that pressure is released.
C. Make sure that you are using power tools in a situation where there are no explosive or flammable materials. NO SMOKING at the worksite.
D. Keep the worksite free from debris — you will lessen a fire hazard as well as heighten personal safety.
E. If an extension cord is necessary, use a heavy duty cord, **never** a household extension cord.
F. Do not plug a heavy-duty tool into a circuit on which another appliance is operating and do not replace a fuse with a higher amperage to carry a heavier load. **This is a serious fire hazard.** Tools drawing 8 to 10 amps can be operated on a household circuit if **no** other major appliances are on the same circuit. Tools using lower amps may be plugged into a household circuit not overloaded with several small appliances in operation. (NOTE: This is especially important in the sub-standard housing where you are working due to old or improper wiring.)
G. Inspect your heavy duty extension cords for breaks or cracks in the insulation. Do not use a cord in bad condition. NEVER use adapters that allow for several items to be plugged in at the same time. These are dangerous fire hazards, and will blow fuses in the home.
H. Unless the cord of a power tool is double insulated, it should be plugged into a 3-hole grounded outlet. Don't use an adapter plug to connect a 3-prong plug into a 2-hole outlet.
I. Make sure your cord is on dry ground at all times, never on damp ground or in water.
J. Don't carry a power tool by its cord, and **never** jerk the cord to remove it from the outlet.
K. REPLACE (not repair) a damaged cord immediately.
L. If your power tool overheats, shut it off and allow it to cool completely before using.

M. Look for the "UL" symbol on power tools. This means it has met safety standards, has been inspected under power in the factory, and the directions for safe operating are enclosed with the tool.
N. ALWAYS unplug power tools when not using, even if you think it is o.k. plugged in. Many homes have small children who move quickly as all children do. Keep their safety in mind also. BOTTOM LINE: Never leave a power tool unsupervised.
O. If you have trouble with a power tool and must inspect or clean it, TURN IT OFF and UNPLUG IT.
P. NEVER allow someone to work a power tool unless he/she is sufficiently trained.
Q. Clean your tools well; make sure that the tools are in good working order for the next day.
R. When cutting with a saw, make sure that you are cutting on a firm flat surface and that you are not balancing the piece being cut, but that a proper brace (i.e. saw horse) is used.
T. If a power saw stalls, back if slightly out of the cut. Keep your finger on the trigger. When proper speed is resumed, advance saw. When you finish, make sure the tool has stopped before setting it down.
U. Always keep the saw's cord behind you away from the blade when cutting.
V. Keep your hands and body parts away from blades, etc. Never put your hand in front of the saw in the direction of the cut. Cut away from yourself, and concentrate on the task at hand.
W. Make sure that your clothing is away from the tool (open jacket, unbuttoned shirt sleeve, etc.).
X. Never allow your saw to come in contact with stone, metal, or concrete.
Y. Keep bystanders far away from the work area.
Z. Always wear protective eye goggles when using power tools. Regular eye glasses are not a substitute for protective goggles. ASP has goggles for your use; however, if you need to wear your corrective glasses, it would be a good idea to buy protective glasses at home that will fit over your eye glasses, and mark them with your name.

HAND TOOLS:

A. NEVER toss nails, pencils, tools, or ANYTHING around the worksite. You or a work crew member or a family member might suffer a punctured foot through someone's carelessness. Remember that the family you serve may have small children.
B. NEVER run with tools in your hand or attached to your belt.
C. Be careful when using tools with sharp edges or points; make sure that other body parts are not in the "line of fire" should you slip with the tool (Putting in screws, hammering in nails, cutting wire, etc.)
D. Handle tools in a safe and respectful manner — be sure you know how to use them before you leave home.
E. The wooden handles of your tools should be free of splinters and cracks and should be tight in the tool.
F. Keep your hand tools free of dirt and grass.
G. Never use damaged tools.
H. When using hand tools, never hold your work in your hands.
I. When using a vise, make sure it is firmly attached and supported.
J. Keep your cutting tools sharpened.

LADDERS:

A. Place ladders only on firm, flat surfaces.
B. Place extension ladder so that the distance from its feet to the surface it leans on (house, barn, wall, etc.) is only one-quarter the length of the ladder. Never extend an extension ladder so that the hooks that join the two parts are connected to the last rung. This causes the ladder to have too much flexibility.
C. Check your ladder for flaws and damage; make sure hardware is secure.
D. Always wear shoes when climbing a ladder; make sure they are free from dirt and mud. Climb with both hands holding the side rails. It is best to always have a partner hold the ladder securely against the object it is leaning against. This will insure additional stability.
E. As you stand on a ladder, keep your hips between the rails. Never reach more than an arm's length in any direction. When distances beyond your arm's length are needed (as in painting a wall), move the ladder.
F. Do not stand or sit on the shelf of a stepladder or climb its back section.
G. Always face the rungs as you climb or descend.
H. Never climb beyond the second from the top rung on a step ladder.
I. When using an aluminum ladder, be sure not to touch electrical wires or poorly grounded power tools.
J. When you finish with a ladder, take it down and put it out of the reach of children.

ROOFING:

A. Before stepping on a roof, visually inspect the rafters for strength. This can be done by looking at the ends of the rafters at the overhangs and in the attics.
B. No more than 3 or 4 people on a roof at one time, and they should be spread out — NOT IN ONE AREA.
C. Roofing is very hot work! plan to do whatever roofing is needed during the cooler part of the day — the morning. Don't take chances with scalding temperatures on the roof and the possibility of heat strokes.
D. Keep the roof cleared of debris and watch out for loose shingles. moss, and wet leaves.
E. On high pitched roofs, use ropes for support. On very steep roofs, build a form of scaffolding. Nailing a board to the roof for a foot support is a way for firmer footing.
F. Wear tennis shoes (especially on tin roofs) when roofing.
G. Walk at an angle on a roof with a steep pitch, never straight up or down.
H. Be very cautious when nearing the edge of a roof and avoid stepping on eaves, as they will give with your weight.
I. Make sure that extension ladders rest firmly against the roof with the ladder extended well above roof so that you do not step off the top rung onto the roof.
J. Use work gloves for handling the tin for roofs. Tin is sharp and gets very hot to the touch. Again, plan your roofing for the cooler part of the day; those on the roof need to frequently replace their lost body fluids by drinking lots of water.
K. Try not to drop things from the roof; but if you must, loudly warn those below of what is coming

and where. Try to rope off the area when you will be dropping debris from the roof.

L. Wear a carpenter's apron with tools and supplies that you will need while on the roof. This will minimize trips up and down the ladder.
M. If you are afraid of heights, roofing is **not** your job. Let someone else do the roofing and you find a "land" job.
N. Never get on a roof when: it is raining, the roof is wet, or a storm is imminent.
O. If you accidentally drop something from the roof, don't run after it.
P. Unless you are on the ground, don't step back to admire your work.
Q. When working on a tin roof, "walk on the nails." There are wooden rafters at those places to support your weight.

DECKING/FLOORING/STEPS (Safety in replacing)

A. Do not step on rotten boards or flooring, or boards that may be loose on an end.
B. Look for nails that may remain in floor joists. Remove all nails as you find them, and discard them into a container that will be removed from the worksite.
C. When removing old boards to be thrown away, either remove all nails or discard the wood properly. Do not leave old boards with nails sticking out lying around the worksite.
D. Warn co-workers when you work with a crowbar.
E. Be conscious of the possibility of termites or carpenter ants as you rempve old boards. Carry appropriate insecticide with you in your vehicle's first aid kit or tool chest.

GLASS:

A. Handle glass slowly and very carefully.
B. Always use gloves when carrying glass.
C. Carry glass only out to your side, never over your head or against your body.
D. When replacing or framing windows, hammer cautiously so that you do not break the glass.
E. Make sure no one is working under you when you are working on a window.
F. Wear eye goggles at all times when working with glass.

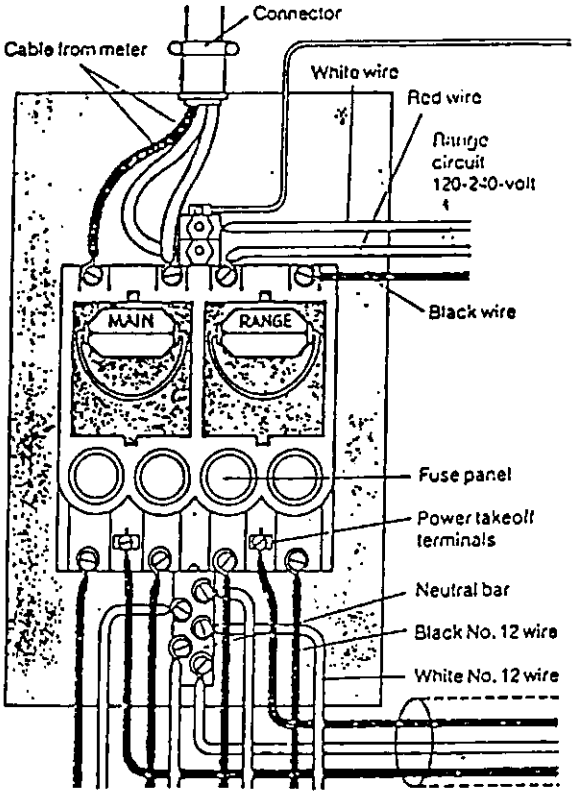


Figure 1. Fuse box without cover.

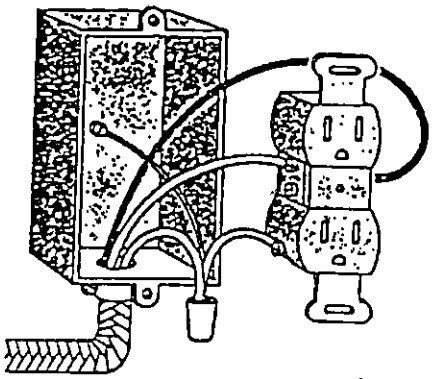


Figure 2. Receptacle without cover.

ELECTRICAL:

A. Only attempt electrical repairs and improvements if you are a licensed electrician or have extensive experience in working with electricity.
B. Check with the ASP staff before beginning any electrical work.
C. Be on the watch for loose wires, bare wires, frayed wires, hanging wires. Report these to the ASP staff.
D. Below are electrical hazards, which are potentially very dangerous. Please report any of these abnormalities to the staff.
   1. Exposed fuse box; one without a cover. See figure 1.
   2. Exposed receptacles hanging out of box without a face plate. See figure 2.
   3. Exposed range receptacle without a cover.
   4. Frayed wiring with copper showing, or damaged insulation.
   5. Fuse holder without fuse and a penny in the place where the fuse should be.
   6. Any blue flame or fire around electrical equipment.
   7. Refrigerator which blows fuse when it kicks on.
   8. Extensive use of extension cords as branch feeder circuits (to lights, receptacles, etc.)
   9. Anything that is reported to give an electrical shock.

and where. Try to rope off the area when you will be dropping debris from the roof.

L. Wear a carpenter's apron with tools and supplies that you will need while on the roof. This will minimize trips up and down the ladder.
M. If you are afraid of heights, roofing is **not** your job. Let someone else do the roofing and you find a "land" job.
N. Never get on a roof when: it is raining, the roof is wet, or a storm is imminent.
O. If you accidentally drop something from the roof, don't run after it.
P. Unless you are on the ground, don't step back to admire your work.
Q. When working on a tin roof, "walk on the nails." There are wooden rafters at those places to support your weight.

DECKING/FLOORING/STEPS (Safety in replacing)

A. Do not step on rotten boards or flooring, or boards that may be loose on an end.
B. Look for nails that may remain in floor joists. Remove all nails as you find them, and discard them into a container that will be removed from the worksite.
C. When removing old boards to be thrown away, either remove all nails or discard the wood properly. Do not leave old boards with nails sticking out lying around the worksite.
D. Warn co-workers when you work with a crowbar.
E. Be conscious of the possibility of termites or carpenter ants as you rempve old boards. Carry appropriate insecticide with you in your vehicle's first aid kit or tool chest.

GLASS:

A. Handle glass slowly and very carefully.
B. Always use gloves when carrying glass.
C. Carry glass only out to your side, never over your head or against your body.
D. When replacing or framing windows, hammer cautiously so that you do not break the glass.
E. Make sure no one is working under you when you are working on a window.
F. Wear eye goggles at all times when working with glass.