CONSTRUCTION OF A PRECUT HOUSE

Thesis for the Degree of B. S.

MICHIGAN STATE COLLEGE

B. J. Shell

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THESIS

C.1

Construction of a Precut House

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By

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INTRODUCTION

One of the biggest problems facing the American public is the housing situation. Everywhere the cry seems to be for a greater quantity of reasonably priced houses. This is not a new problem, but rather one that has pestered our forefathers all through the growth of our city systems. While the problem today is very acute, it has never been satisfactorily conquered. Housing has always been out of the price range of the average family. Buying a house involved many hardships. Long range financing has become quite common. This feature permits a man to buy a house he can't afford and then shackles him to his job until he can erase the debt. Perhaps this situation has kept our civilization progressing as it made steady paying jobs a necessity. It created somewhat of an incentive to work.

Many men have dreamed of ways to bring housing down to where it is within the grasp of everyone without too great a hardship. Mass production houses have been turned out. Prefabricated dwellings have become quite common. Many other ideas have been tried, but the prices manage to remain high. The benefits and profits still haven't been returned to the people.

Perhaps one of the soundest theories of construction in the author's opinion is that of a precut house. A precut house can be built rapidly and very substantially in a short period of time. It produces a house which will stand years of wear. It offers flexibility in planning and speed in construction. It takes tiresome sawing tasks off the job and

puts them in the plant where they are performed with little effort. It reduces high priced labor hours and, if well planned removes delay of construction.

A precut house begins on the planning tables. Basic dimensions usually remain the same but arrangements of rooms may vary to fit the needs of the consumer. For most of the author's construction, a building of dimensions 26 x 30 ft. has been found to meet most requirements. Although there is no limit on the size of house that can be precut, the one-floor bungalow construction seems to be the most popular. Herein lies the biggest shortage of housing and it is to that field and market that this thesis is directed.

A 26 x 30 ft. bungalow may be easily arranged with one or two bedrooms, kitchen, bath and living room. All rooms can be arranged or interchanged at the discretion of the purchaser or due to the location.

The discussion of this thesis concerns the construction of a two bedroom bungalow. It was built in a large city in Michigan. Building codes were adhered to and mention of these will be made in the thesis. The entire house was precut in a southern mill and shipped to the job site by truck. While the thesis has been arranged, as far as possible, in a chronological order, it must be realized that many of the jobs are being completed at the same time. This fact depends largely on the size of the crew and the ability of its members to do any job. The crew which built this house was a picked group with a large backlog of experience. They had built and cut out many like houses.

This house was built as an experiment. It was the first

house the author built in the north. Great efforts were made to eliminate any unnecessary expense. The entire job was carefully analysed to determine the cheapest and most practical house that could be built. The basement was eliminated and a utility room added to take its place. A floor furnace was decided upon to preserve as much space as possible.

The house was designed for a young couple with one, or possibly two children. Here was the huge market created by World War II. House plans were approved by the Federal Housing Authority. While this house makes no pretense at being fancy or meticulous in construction, it does create an attractive place to live of sound construction and architecture. It helps in part to relieve a country sadly in need of adequate housing for its populace. The house was received with a good deal of enthusiasm and plans are in order to put the construction on a production basis.

B. J. Shell

CONSTRUCTION

1. The Plant. The construction of a precut house begins in the plant. To the plant is brought the raw lumber from lumber mills. It arrives in various size pieces, depending on the demand at the mills.

At the plant the raw lumber is stacked in piles with one inch air chambers between the rows. This is accomplished by laying one inch pieces at the end of members and stacking succeeding rows on these pieces.

Lumber is stacked to cure. Curing of lumber is accomplished by drying in open yards or sheds, or being placed in heated steam drying kilns. No definite time limit can be stated for curing as curing depends on the moisture content of the wood. This varies greatly with different types of wood.

When the wood is completely cured it is brought into the plant and run through the planer. Planers vary somewhat in size and shape. Most planers are adjustable to fit the size member being treated. The wood sections are fed into the planer and dressed by rotating blades turning in the same direction lumber is passing.

After lumber leaves the planer it is cut to the required size for construction. Rotating table saws are used with racks attached to keep the lumber of equal required lengths. Table saws can be adjusted to any degree cut. For the majority of timber used, planing and sawing are the only required operations. These are accomplished quickly. Finished pieces are sanded and sent through special planers to acquire the specified design.

Siding is cut by setting blades in a planer and entering

1" x 6" boards on the one inch edge. The planer cuts the board leaving two sections of 3/4" thickness tapering to a ¼" thickness. The siding is then given its primer coat of paint and allowed to dry.

Windows are made in the shop by cutting pieces and fitting glass. Any design of window can be turned out. This is a hand operation with exception of cutting pieces. Doors too are cut to any size, shape or specification. Special notching machines cut grooves for door locks.

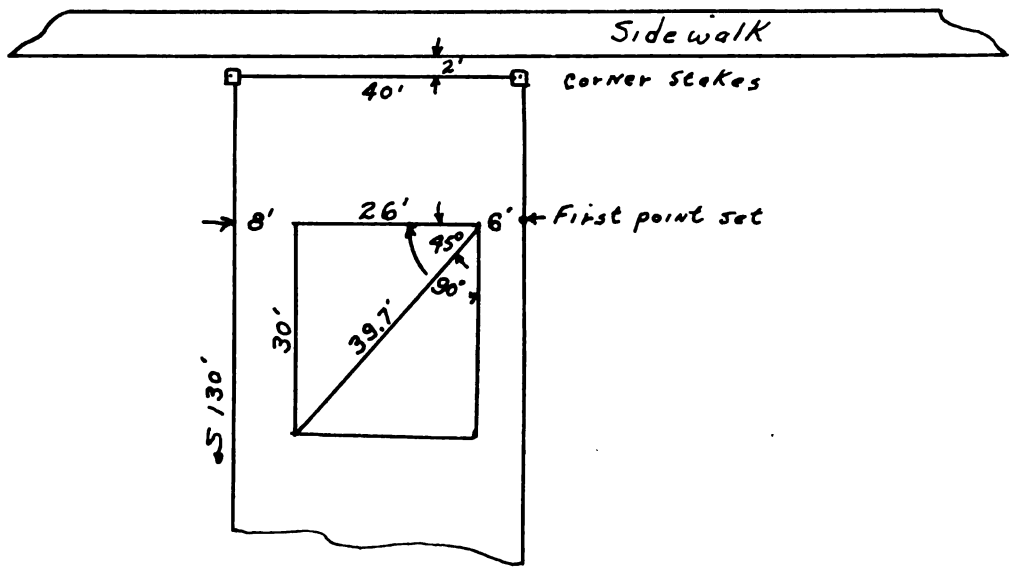
Finish pieces are primed with a coat of varnish. Windows are painted twice. Prepainting permits the finish coat to be added as soon as the pieces are in place. This eliminates a delay for painting.

As the plant is located in the south, it is found more economical to spend more time on work in the plant, due to a difference in wages and working conditions. This fact also offsets shipping costs.

The precut house is then shipped to the building site by truck or train. Where only one job is being done, the truck is the most practical means. Where a series of houses are to be constructed, train rates will be more economical. The truck, too, offers the advantage of delivering anywhere and requires only one handling of the material. Some cover to protect the lumber from forces of nature will be necessary for storage. Generally, it is good practice to have the building crew do the unloading and stacking where it is possible. Proper stacking will eliminate delays and time wasted searching for pieces. An experienced crew will unload and properly stack a load, automatically.

2. Lot. The building site picked for this house was a 40 x 130 ft. lot in a residential subdivision. On each neighboring lot another house stood, and an attempt was made to make the precut house blend with the surrounding ones. The subdivision had been recorded and corner stakes were in every lot. A check with the city plats gave exact location and identity of the lot.

3. Laying out lot. The lot was laid out for construction by means of a transit. Corner stakes had been placed on the lot boundaries when the subdivision was divided. The stakes were placed two feet inside of the sidewalk on the property lines. The deed specified a clearance of twenty feet from the front of the building to the property line. This places the building front twenty two feet from the inner edge of the sidewalk.



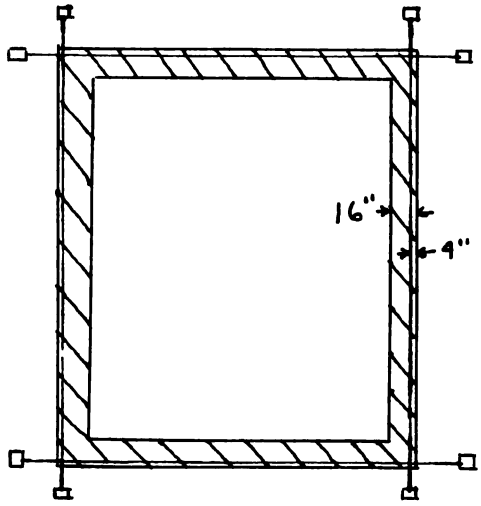
A- Diagram of Lot and Building Site.

The transit was set up over the right front corner stake and sighted along the lot line at the right rear stake. Along this line a distance of twenty feet was chained and a point set. City codes demanded a six foot clearance between the

side of the building and the property line. The transit was set on the established point and again sighted toward the right rear stake. The vernier was set at zero. An angle of 90 degrees was truned off to the right, establishing the front line of the building. Along this line a distance of six feet and thirty-two feet were chained and points set, establishing the front corners of the building.

The instrument was then set up over the six foot point and sighted at the thirty-two foot point with the vernier at zero. An angle of 90 degrees was turned off to the left and along this line a distance of thirty feet was chained. This established the right rear corner of the building. The instrument was turned back an an angle of 45 degrees and a diagonal measurement of 39.7 feet was chained. This established the fourth and final corner. All the sides were checked by chaining and diagonals rechecked to insure the building would be square.

4. Excavation. On checking with city codes, it was found that excavation had to be extended to a depth of 30 inches for buildings without basements. Due to a limited amount of excavation and the comparative ease of digging, it was decided to use hand excavation. Where a series of foundations are to be excavated, machine methods are more economical. Excavation was accomplished by means of ordinary shovels and picks. The corner points were set off and lines extended to permit excavation. Cord lines were strung between corners to insure a straight line. The trenches were carried four inches beyond limits to allow foundation concrete to extend

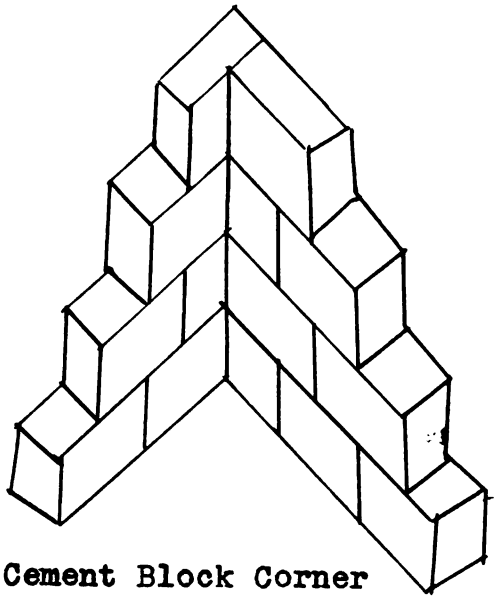


B- Shaded area denotes the area excavated. Stakes are the corners offset to allow for excavation. Where red lines (cords in practice) intersect are outer extremes of the building.

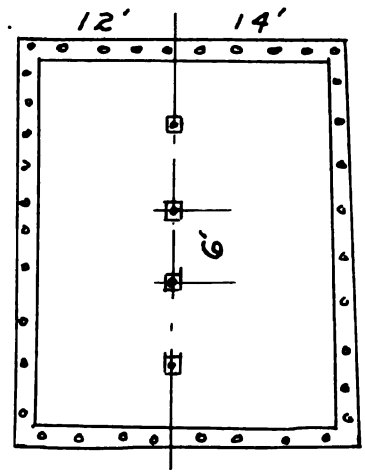
beyond the limits of the wall to provide a sounder footing. This gave the trench a width of 16 inches, as 8" blocks were to be used with 4" overlap on each side. Excavation was kept level by means of transit and a rod.

5. Foundation. For the foundation a layer of cement was poured eight inches deep in the bottom of the trench. Considering the time element and in an effort to conserve the use of any excess machinery, it was decided to use transit mix concrete.

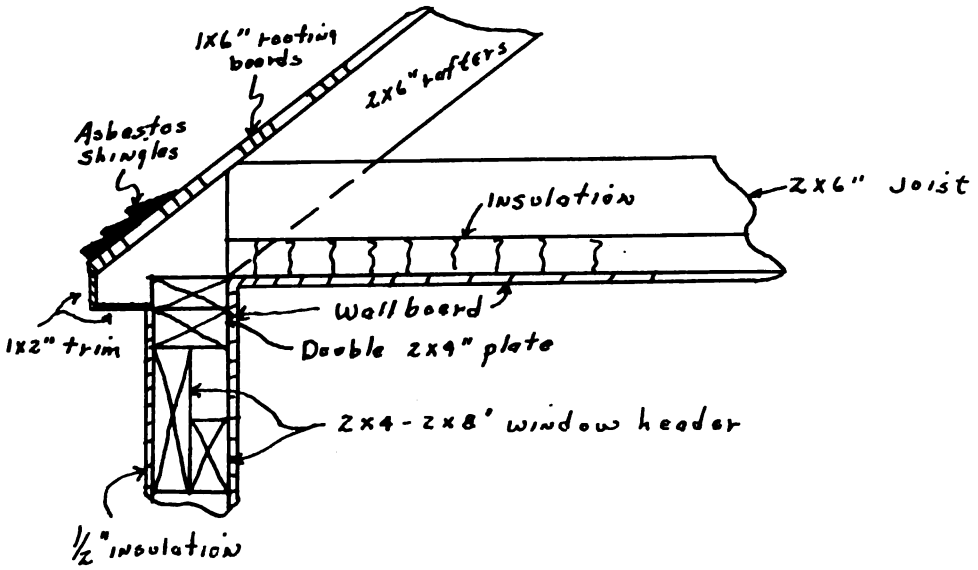
Forms were set on one side of the trench to the proper height and leveled. As the ground was a firm clay material, there was no need for forms on both sides. Forms were made of wood and were left in place. The concrete was poured into place and allowed to set. It was leveled as it was poured.



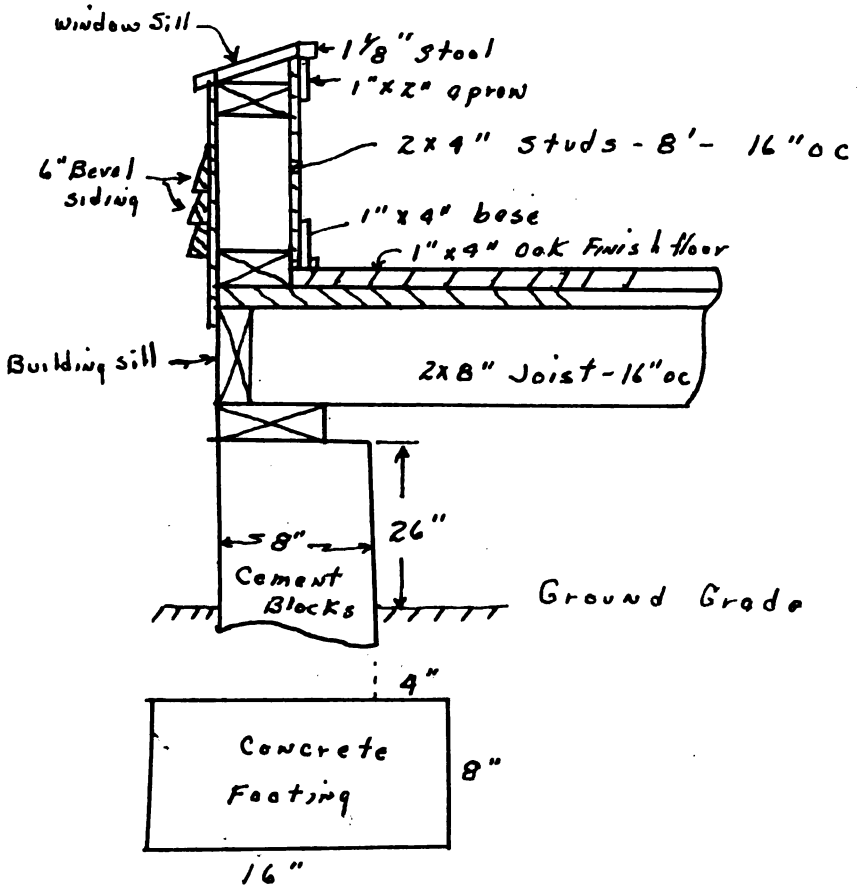
C- Cement Block Corner



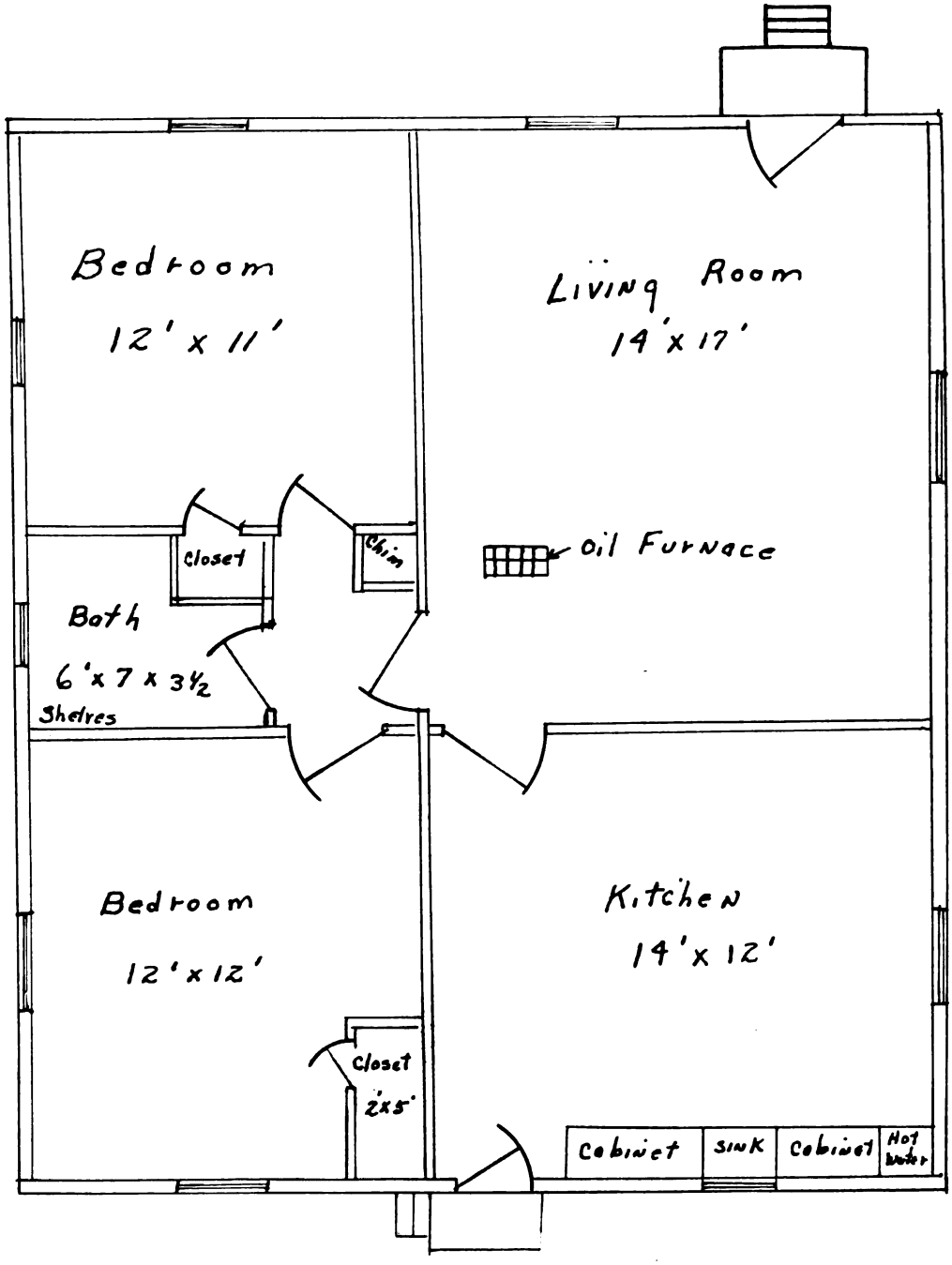
D- Top view of the foundation showing placement of center beam supports.



Window Frame



WALL SECTION----- DETAILS

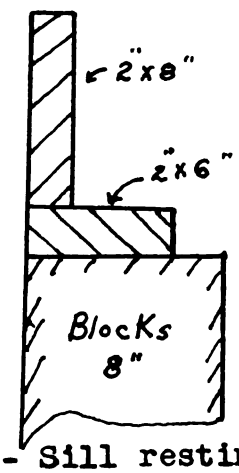


Floor plan -- without detailed dimensions.

The cement was allowed to set for two days and then cement blocks were put into place. The blocks used were 8" x 8" x 12". A 1 : 3 mortar was used for joints. The corners were set first. Six rows of blocks were set to bring foundation 26 inches above the ground. After corners were set and leveled, lines were strung along sides to keep rows level. Usually it is a practice to make the last row of blocks solid to act as a termite control. However, this is not imperative.

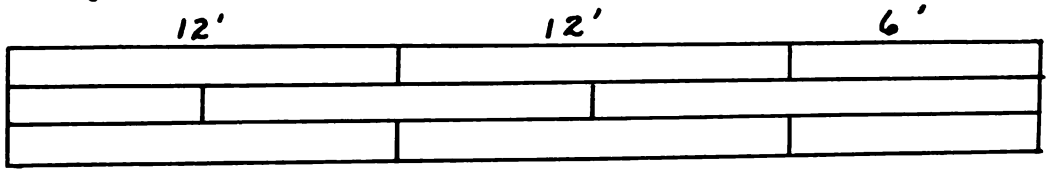
In order to support the center beam, a row of cement blocks are used. The row consists of four sections of three blocks each. As this row is within the boundaries of the house, it is not necessary to go down to a distance of 30 inches. The three blocks are set on each other and leveled with each other and the surrounding walls. By use of transit and a rod, the levels are checked at regular intervals.

6. Sill. On top of the last layer of blocks the sill is placed. The sill consists of a 2" x 6" member laying flat with a 2" x 8" member nailed into it at right angles. The sill is placed entirely around the top of the cement block foundation. It is carefully leveled by means of wooden wedges. Care must be taken in setting sill, as all other structures depend on the sill for levels. The sill is marked off into sixteen inch sections. At each of these sections a joist will be placed.



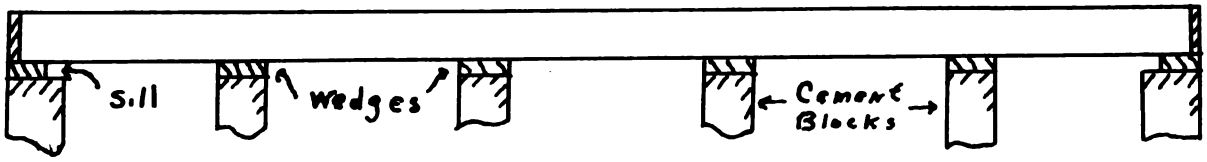
E- Sill resting on Foundation blocks

7. Center Beam. The center beam was constructed by nailing three 2 x 8's together. These were staggered to prevent any weak joints.



F- Center beam - top view showing construction

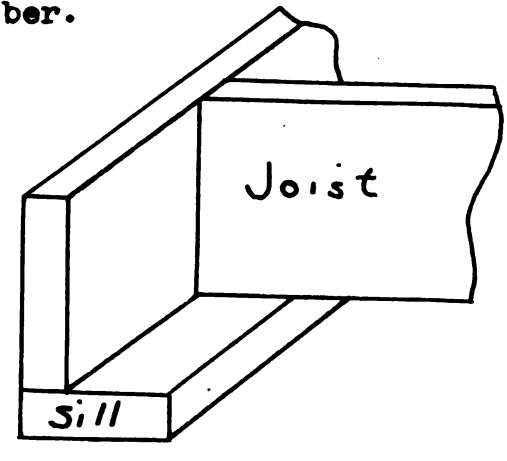
The ends of the center beam are supported by the sill. The center is supported by blocks.

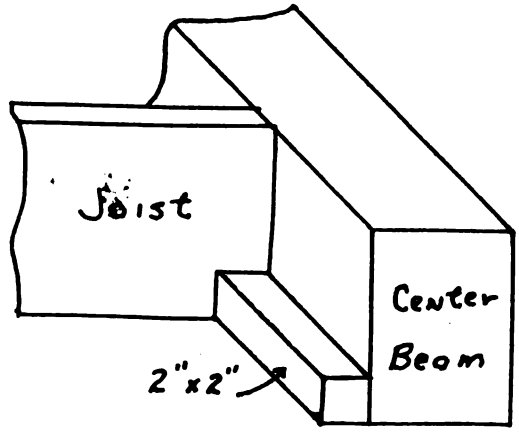


G- Center beam supports

The beam is carefully leveled by use of wooden wedges.

8. Floor joists. After center beam is in place and the sill has been placed around the building, the next step is the placing of floor joists. Floor joists are twelve and fourteen feet in length. One corner of the joist is notched. A section of 2" x 2" has been removed. The joist is a 2" x 8" member.



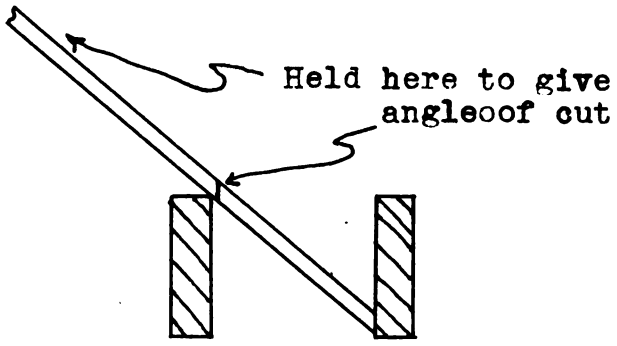


H- Diagram of supports of floor joists.

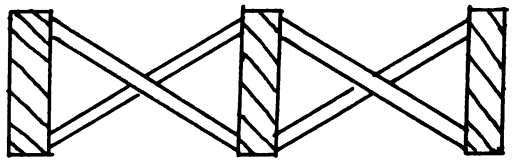
Where the joist sets against the center beam a ledge is made by a piece 2" x 2" long, nailed into bottom of the center beam. These pieces are obtained by splitting a 2" x 4". One end of the joist rests on the ledge of the center beam and is toe nailed into the beam. The other end rests on the sill and butts against the side piece, into which it is nailed. Joists are spaced sixteen inches apart.

9. Bridging. After the floor joists are in place, the bridging is put in. When bridging is first placed only the tops are nailed. After the subflooring has been laid, the bottoms of the bridging are nailed, thus insuring a rigid foundation.

In spacing bridging, two pieces are placed in an "X" design between each two joists. A nail is placed in the center of each end joist and a string is stretched between them. Along this line the bridging is placed.



I- Butting bridging

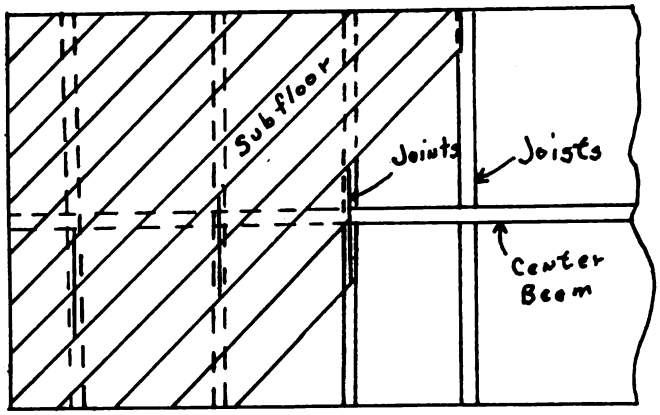


J- Bridging in place

In cutting bridging it is best to have one man hold strips in place while the other man measures and cuts the pieces. The ends of bridging are angled to provide a smooth snug fit.

Generally, one inch stock or scrap lumber is used.

10. Subflooring. After bridging is in place the subflooring is laid. The subfloor consists of 1" boards and the ones used on this job are 6" wide. The subflooring is placed at a 45 degree angle with respect to the house. Joints are staggered throughout to provide greatest strength. All overlap and joints are cut by means of a power saw. This provides continuance of the job without unnecessary delays for cutting and fitting. Boards used are about 8' in length, having one end pre-cut to a 45 degree angle in the factory before being shipped to the job. This factor speeds the process of laying.



K- Diagram showing placement of subflooring

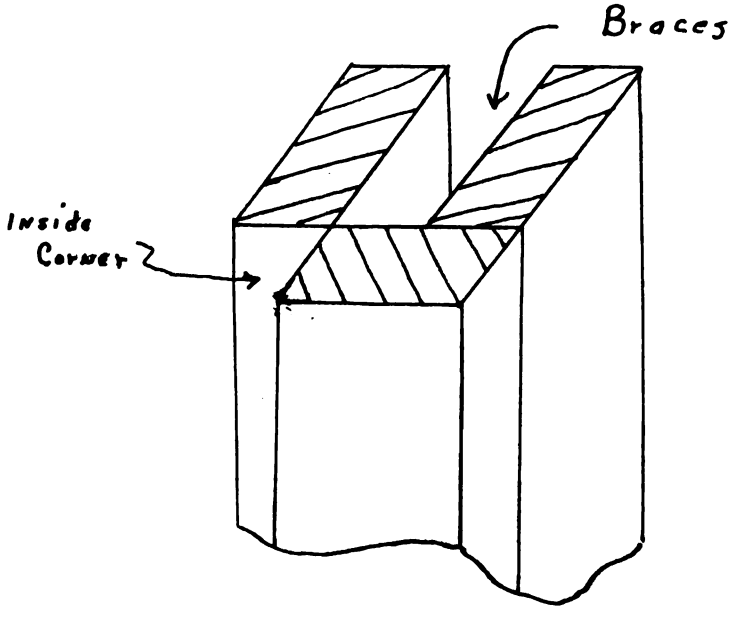
Subflooring is nailed into floor joists. Subflooring is placed acros the entire area of the house.

11. Sole. On top of the subflooring the sole is placed. This is a 2 x 4 placed flat, which outlines the subdivisions of the interior of the house. All the walls are 4" thick and this is set by the sole. The sole is laid completely around extremes of the building first to provide a footing for the outside walls. On top of the sole are placed the corners,

wall sections, and rows of studding.

12. Corners. After the sole is in place, the corners are set. Care must be taken in setting corners perfectly perpinducular. Corners consists of three 2 x 4's nailed together, allowing room for wall board to be nailed into it, for two walls to be formed.. Corners are held in place until studding is added by means of toe nailing and bracing.

In building a corner section, tow 2 x 4's are nailed together, forming an "L". Forming this "L" reduces the available width of one 2 x 4 to 2 inches. To the 2 x 4 having 4 inches available width, two short pieces of 2 x 4 are nailed flush against the face of each end. This eliminates the 2 inches left in the first 2 x 4. Now, to the two braces a 2 x 4 of standard length is added. This completes construction of corner sections. Note diagrams for illustration of building procedures. The corners are set with solid face toward outside.



L-The building corner

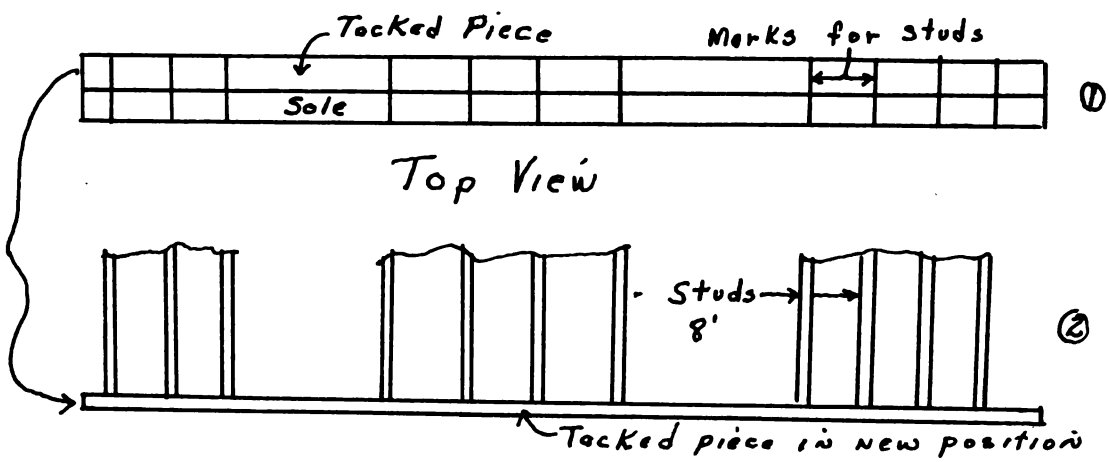
The corners are set to form a row for studding. The offset 2 x 4 provides nailing space for wall board or other inside finishing material.

13. Studs. When placing the building sole, another 2 x 2 is tacked to the side of the sole, the entire outer extent of the building. When marking the sole for studs the mark is carried on to the tacked piece.

Studs are 2 x 4's placed 16 inches apart, and are 8' long.

When marking the sole for studs, marks are made to include any feature, such as, windows, wall sections, or doors. No studs are placed in these places.

After one side has been completely marked, the tacked piece is removed and serves as the top piece, into which the studs are nailed. All the studs have been precut and are nailed on to the marked 2 x 4. After all the studs in a section or side have been nailed into the marked piece, another 2 x 4 is attached to the top. This piece projects over the



M= Diaggam of formation of a wall

side to go over the top of the corner piece. The whole side is raised at once and set into position. It is nailed in over the corners and held while it is secured. The bottoms of the studs are free, but their spacing has been previously marked. Care must be taken in nailing them in position. After all the studs have been secured, work begins on another section or side of the house.

If care is taken in placing the studs exactly on marks, they will all be perfectly perpindicular. This eliminates time spent on using level on each stud.

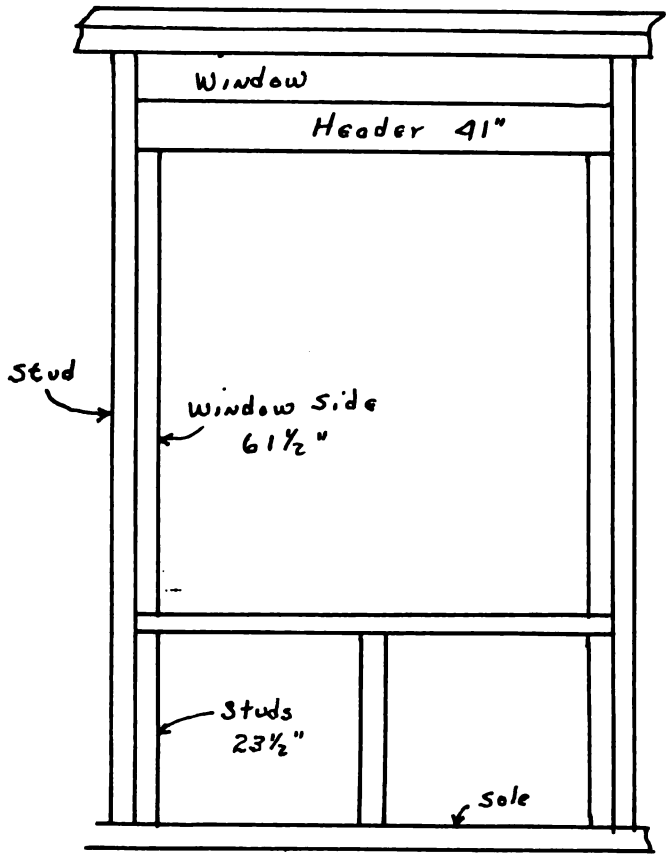
All walls inside and out are set the same way. Each time a 2 x 4 is tacked next to the sole and marked to serve as the top piece. This is a rapid accurate method which gives good results if done correctly.

14. Framing windows. When the wall sections are put in place, spaces are left out for windows and doors. After sections are placed, these spaces are framed.

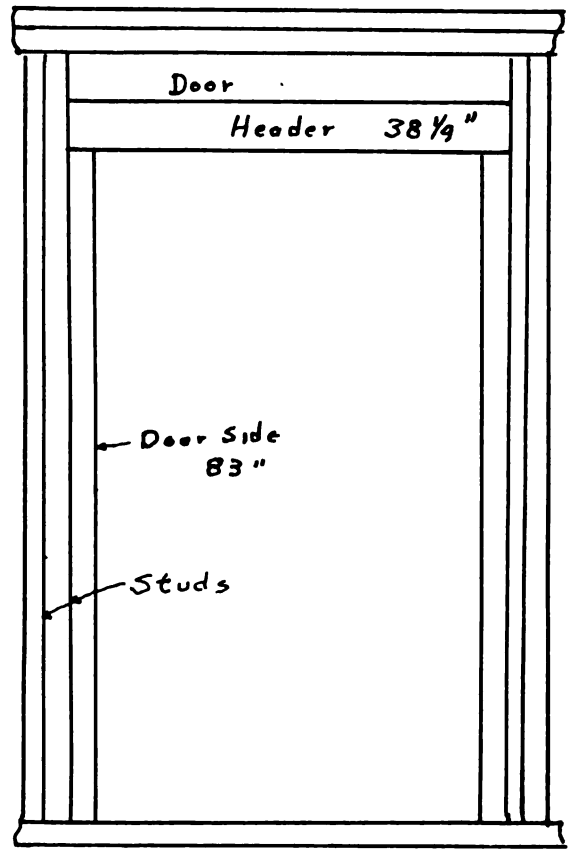
Framing for windows consist of a window header of 41 inches for average windows and 31 inches for smaller windows, such as, bathroom and kitchen windows. Also placed are two window sides of 61½" in length. At the bottom three studs are placed to support base of the window frame. Note diagram on following page for placing and size members used.

15. Framing Doors. Doors are framed much as windows are, only the framing goes completely to the floor. Care must be taken to frame the door perfectly square. The door

header is placed first and sides are added. Note diagram for sizes.



N- Inside window framing



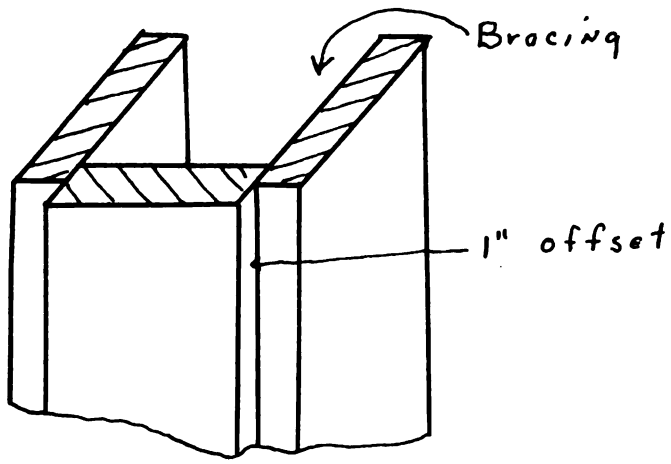
O- Door framing-outside door

16. Wall Sections. At the corners which determine the boundaries of rooms a section is placed in the wall. These junctions are laid out on the sole at the same time the marks are placed for the studing. They are nailed along with studding and set in place at the same time the section is secured.

Wall corners consist of three 2 x 4's nailed together and braced. Two of the 2 x 4's are placed in the same line as the studding. They are spaced four inches apart to allow placing another 2 x 4 to define the new row of studding for

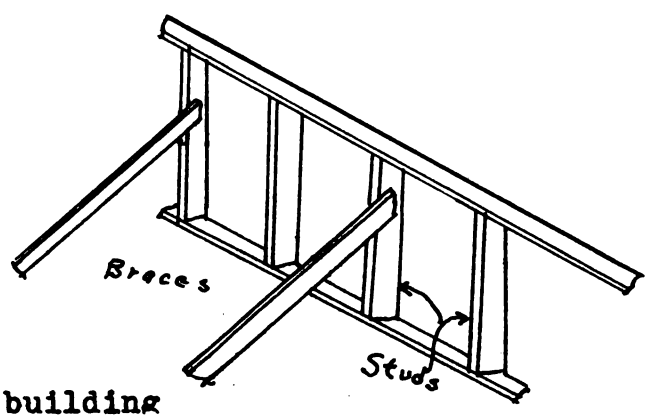
the inside wall. The inside 2 x 4 is offset 1 inch to allow room for nailing the inside partitions.

Wall sections should be built before they are placed in position. They are of a definite pattern and do not vary. When brought onto the job they should be ready to set in place. Note illustration. Offset 2 x 4 sets over the sole of the new division.



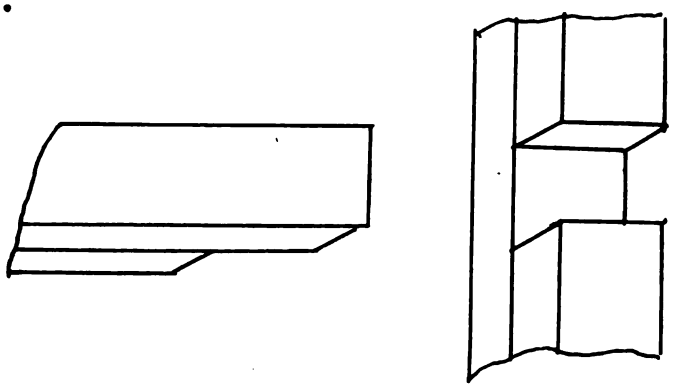
P- Wall section

17. Squaring building. After all the sections have been set in place it is good practice to check the squareness of the building. Often there will be ripples in the sides of a building which must be corrected before the ceiling joists are put in place. By sighting along the side of the 2 x 4 topping the studding, it is possible to add braces to eliminate waves in the sides. These braces are left in place until the ceiling joists are secured.



Q- Squaring the building

18. Tieing building together. The wall sections are tied to the outside walls by means of extra 2 x 4's nailed above the row of studs. This 2 x 4 overlaps the wall section. The top 2 x 4 of the wall section is notched to allow room. Also, where inside walls meet, this practice is carried out. Note illustration.

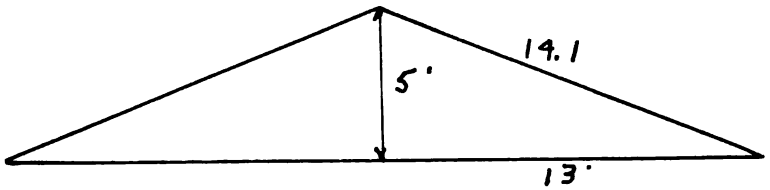


R- Tieing together the walls

At door sections, two 2 x 4's are nailed together to give stronger resistance and greater strength. This additional strength is necessary for holding doors rigid to keep them working smoothly. In some instances it is advisable to use three studs nailed together.

19. Ceiling joists. Ceiling joists are supported on the top of the stud rows. Spacing is 16 inches apart with 2 x 6's being used. As joists come in even sizes, such as 12 and 14 feet, care must be taken in spacing rooms. To keep the prices as low as possible, it is necessary to use conventional lumber sizes. Special pieces are more expensive and harder to obtain. Therefore, rooms are confined to sizes where conventional members can be used.

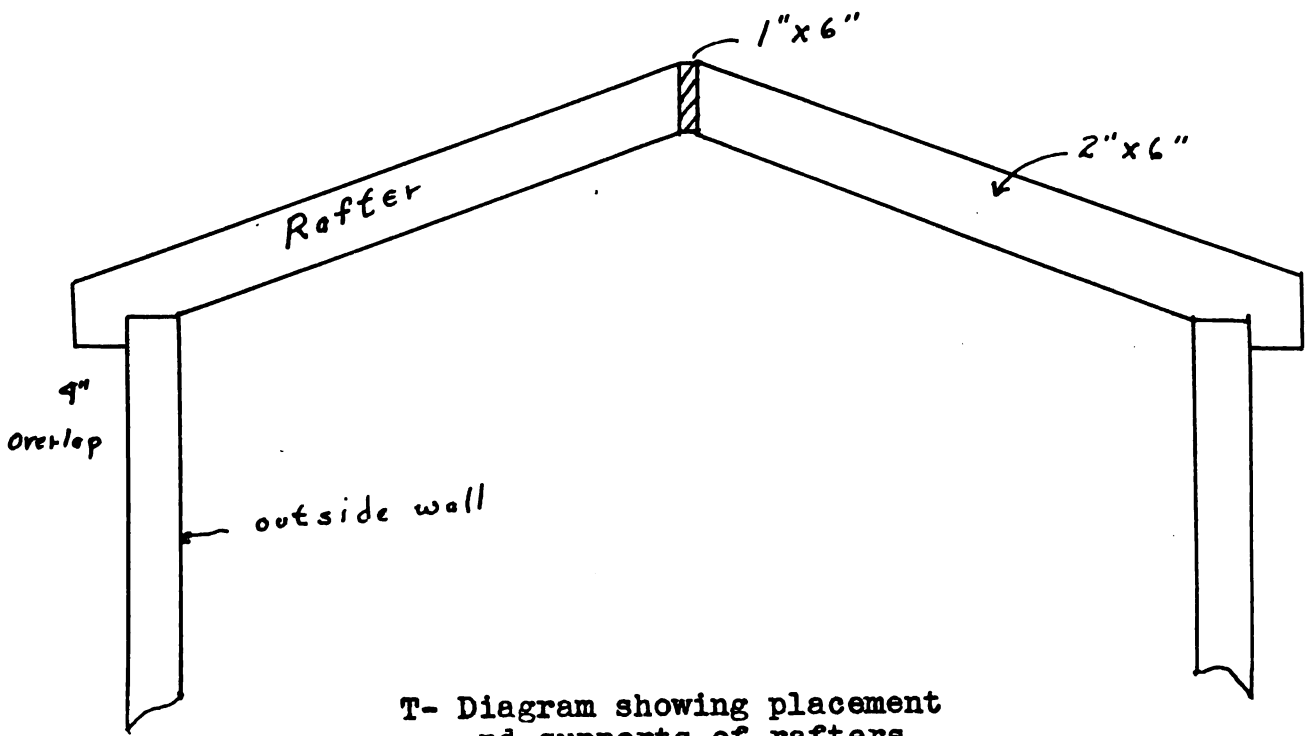
Joists are offset enough to allow them to be nailed into each other and also into the stud covers. Note diagram.



S- Schematic sketch of the roof

20. Rafters. Rafters are put in place after joists have been securely placed. 2 x 8's spaced 24 inches apart are used.

Rafters are cut in the factory before being sent to the job. A five foot rise was considered sufficient for our building and this allowed use of a fourteen foot rafter. The rafter should be allowed to overlap the building by 4



T- Diagram showing placement and supports of rafters.

inches. As a 14' board usually has a few inches to spare, it works out satisfactorily.

One end of the rafter rests on the top of the studs. The other end butts into an inch board placed at the top of the rise. The end of the rafter is cut off square to facilitate placing finishing lumber.

At the front and rear end of the building, 2 x 4's are used to connect the top of the stud rows and the rafters. These pieces allow siding and insulation to be nailed.

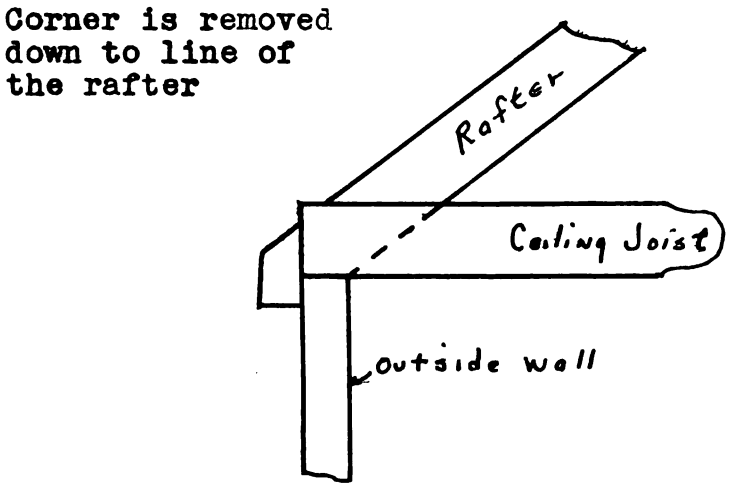
Rafters are braced by members nailed diagonally to the ceiling joists. Bracing is not too important in this roof, but enough was added to present a rigid roof.

Rafters are nailed into top of outside wall studs. They are also nailed into the ceiling joists where spacing permits.

21. Roof boards. Roof boards are nailed into the rafters. Boards used are 1" x 6" of varying lengths. These boards are laid along long axis of the building. Joints are staggered throughout the roof section.

Before placing roof boards, one board was placed along forward and rear edge of the building in same line as rafters. This board overlapped the end of the building. From this board the roofing was laid perpindicular to the axis of the rafters.

When roofing, the job is begun at the bottom and worked toward the rise. Joints must all meet at rafters. Roofing is cut by means of a power saw.

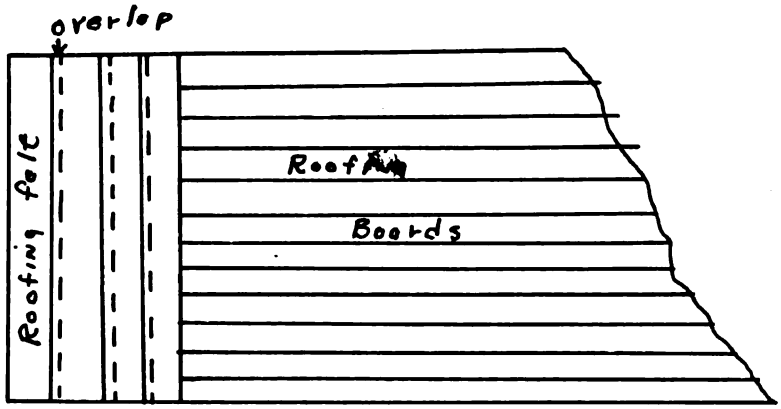


U- Section showing protruding joist corner.

Before placing the boards it is necessary to reduce protruding corners of the ceiling joists. Generally, the use of a hand axe is the quickest method of removing the protrusion. The corner is chopped away until it is in line with the angle formed by the rafters.

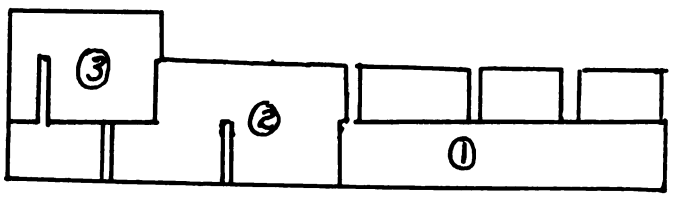
22. Roofing felt. After the roof boards are placed, roofing felt is added. The felt is a type of asbestos paper which is fireproof and comes to the job in rolls 3' wide. The felt is placed in roof in opposite direction of the axis of roof boards. This gives an airtight surface and greatly aids insulation of the house. Also, it presents a more watertight surface in the event of failure of the shingles.

Roofing felt is placed by means of large headed nails. A sufficient overlapping of strips is necessary to get the best results.



V- Roofing boards and felt

23. Shingles. Shingles vary with the job. For this job a square bottom asbestos shingle was selected. The first shingle is placed upside down on the roof. This gives a square edge along the bottom and continues the continuity of colors.



W- Placing of shingles

24. Insulation. After all the outside rows of studding have been placed, the insulation is fitted and placed. Insulation used is a fabric fireproof siding. It has a stone glazed appearance with a black fiber back. It sells under the commercial name of, "Celo-siding."

Celo-siding arrives on the job in sheets of 4' x 8' x $\frac{1}{2}$". As the studding is 8', the insulation covers fairly well. It is fitted as tightly as possible up against the

base of the rafters and the top of the row of studding. It is nailed into the studding by large headed nails.

Windows and door sections are cut out of the siding by means of knives. The material is fairly brittle and easy to cut. All joints must meet at studs to eliminate possible weak spots. All joints should be made as snug as possible to acquire greatest insulation value.

25. Siding. After all the insulation is in place, the siding is added. The siding has already been painted once and a finish coat can be applied after it is nailed.

Siding used was 6" wide and the thickness varied from ¼ to 3/4". All siding overlaps preceeding one by as least 1".

Before first row is started, a row of insulation paper is placed around the bottom of the building. On the bottom of the building the first row of siding is set. It is carefully leveled, as each succeeding row depends on first row for level. Siding progresses from the bottom to the top.

26. Chimney. The chimney is set in the corner of the hall. As the furnace is to be set in the living room, the chimney was placed as convenient as possible. An oil floor furnace is used to supply the heat and is supported by metal overlaps on the flooring.

The chimney is set on a foundation of concrete 10" deep. The chimney is 17" square with one flue. It is not attached to the house so that any settlement will not cause the failure of the building. A cheap sandstone brick is used with a 2 : 3 mortar. Where it protrudes through the roof, a tar is used to prevent any leaks.

A partition is placed around the chimney with all wood being at least one inch from contact with any of the chimney's surface.

27. Windows. Windows arrive on the job intact, but the frames must be assembled. This is accomplished very readily as they have been cut out in the plant. The frames are set and nailed in place and the windows added.

The metal slide style of window is used. In each frame there are two metallic slides which are adjustable by means of screws with springs on their shafts. The windows can be put in and taken out of the frames quite easily. All weights and balances are eliminated and windows can be easily removed for cleaning.

28. Doors. Outside doors are hung by means of hinges placed in door sides as soon as possible to facilitate

sealing the house. Inside doors are hung after flooring is laid. Before any door is hung, however, the building sole is sawed out and removed.

In setting outside doors, it is necessary to cut down through the subflooring and put in a threshold. A threshold is a heavy board designed to resist wear. It prevents undue wearing of inside floor.

28. Plumbing. After the building is roughed in, the plumbing job is begun. As most cities and townships require registered master plumbers to do this work, it will be only discussed herein as to planning and timing of plumbing work.

The plumbing for this house consisted of a three-piece bath, kitchen sink, and a hot water heater. All the piping

was put in place before the inside wall boards were set. After all inside walls were finished, the plumbing fixtures were set in place.

29. Wiring. Wiring, like plumbing, usually requires a licensed electrician. City codes prevent a contractor to do his own wiring, unless he is a registered electrician. Seldom is a contractor registered as a plumber or electricion. Frequent city inspections prevent violations of these codes.

Wiring is placed in when building is roughed in. Fixtures are added when inside wall boards are in place and finished.

Generally, city inspectors check twice. They check roughing in and the finished product.

30. Inside walls. After the house is completely sealed, the inside walls are placed. For this house a Celo-rock wall board is used. The most convenient size for our use is the 4' x 8' sections.

In placing wall board, the ceiling is put in first. The wall board is nailed to the ceiling joists. Care must be taken to have all joints meet at joists. This prevents weak spots or breaking of wall boards. Sections are cut out to allow room for electrical and plumbing fixtures.

After ceiling is in place, the walls are put on. As the height of the room is slightly over 8', the boards should be set flush against the ceiling. A small opening at the bottom will be covered by flooring and trim. Wall boards are nailed into studs. Care must be taken to secure a joint

as snug as posible. Jagged edges add to the difficulty of presenting a smooth wall when finished.

After all the wall board is in place, filler is added to fill all the cracks and smooth out any deformities. A special filler is made for such work. It comes as a flour to be mixed with water to form a paste.

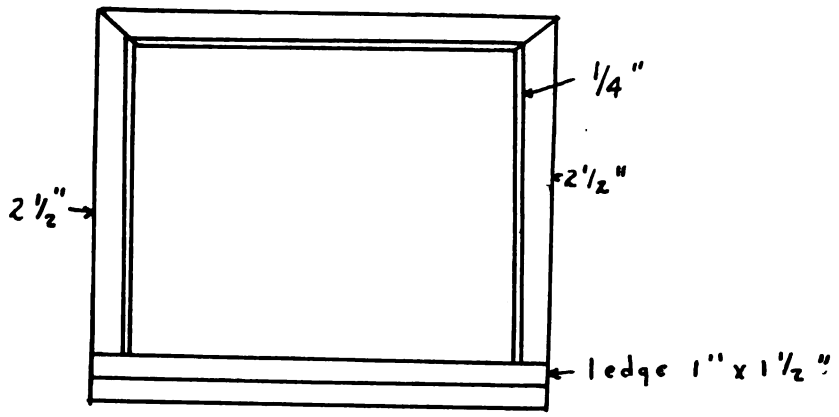
All nail heads should be covered and all cracks filled. It is then allowed to dry and finished product is sanded to remove any rough edges, as the paste hardens into a hard plastic mixture. Paste can be added by means of a putty knife. Care in applying will save time in finishing.

When filler is sanded and smoothed the walls are ready for their finish material. To simulate the finish of a rough plaster, a specially prepared paint, known as, "Broc-u-lay," was used. It contains fine grained sand held together by a binder. It is applied by means of a brush in short circular strokes. Although requiring a certain degree of patience to apply, practice produces an attractive job. Broc-u-lay paints are made in various colors and require only one application. A wall finished in this manner may be painted with a good deal of success at a later date.

The house is not plastered, as it is felt by the builders that this only adds to the expense of building. Then too, the house was built with as little time as possible. Plastering slows down the job, extends the period of construction and thereby raises the cost of the completed house. A house of this nature, built as described, can be completed

in two weeks, barring any unforseen delays.

31. Window trim. Around the outside of the window is placed a 2½" piece of finished lumber. Various designs can be cut on trim by use of blades in the planers at the shop. The trim covers part of the wall, as the wall board was brought up snug to the window frame. A quarter round is set next to metal slides on the inside of the window. All window trim is varnished. At bottom of window a small board 1" x 1¼" proturdes. Corners of trim meet at 45 degree angles and are nailed into place by finish nails.



X- Interior window trim

32. Door trim. Doors are trimed with 2½" boards finished in same design as the window trim. At the bottom of each side of the trim, a small block is added which extends to the floor. This block is 3" wide and 6" long. An inside quarter round is added on each door.

33. Base boards. Baseboards are placed along bottom of all rooms. 1" x 4" boards are used. Quarter round is then added.

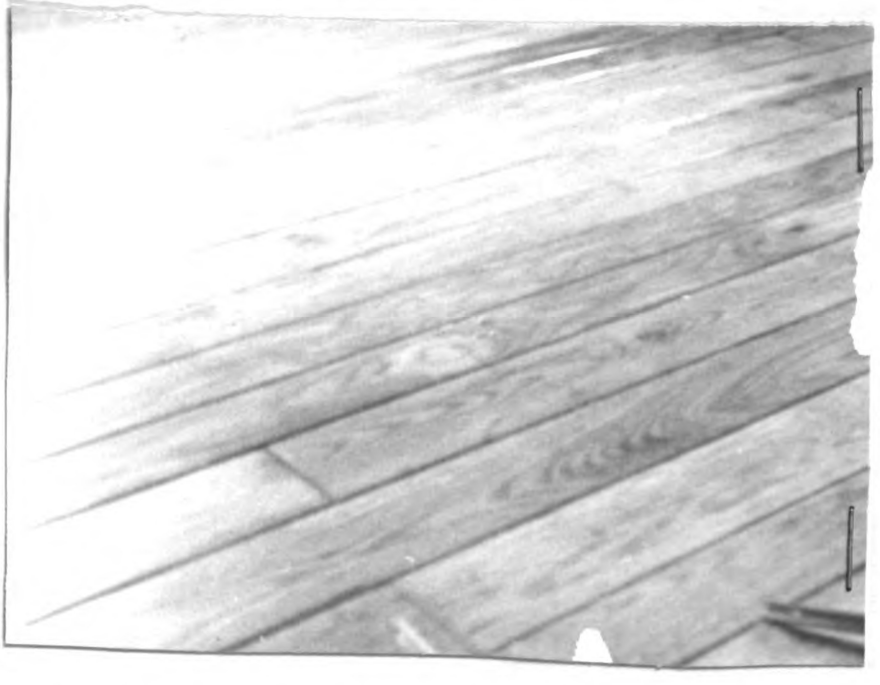
34. Flooring. The flooring is put in place after all

the inside walls are finished and painted. One inch oak flooring was used.

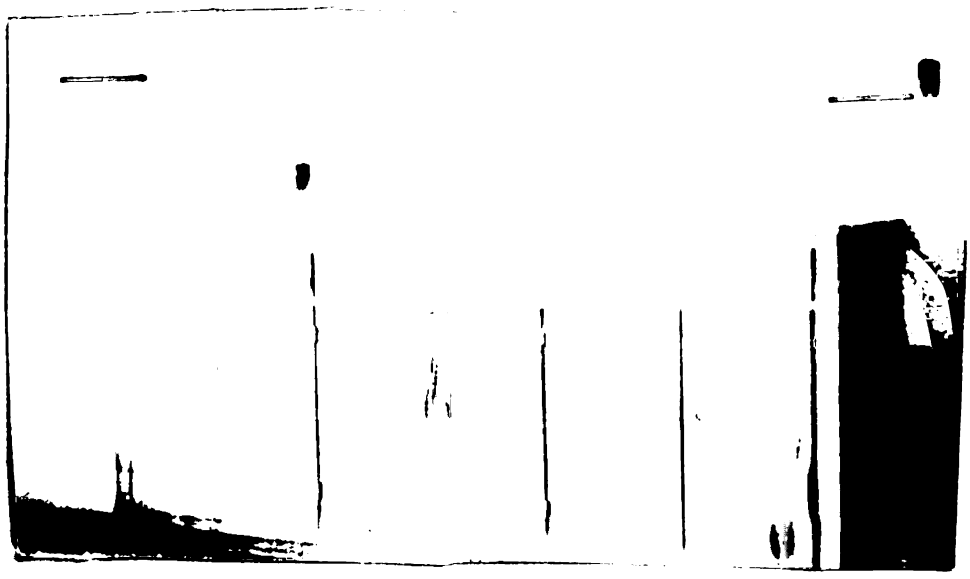
Before the flooring was laid a fireproom paper in sheets 3' wide was placed over the subfloor. The finish flooring is placed on top of this, giving the floor airtight insulation.

Oak flooring boards were made in tongue and groove joints. This provides a snug, tightfitting floor. Joints are staggered throughout the floor. Flooring is nailed into subflooring and nails are added from the sides.

After all flooring is placed, it is sanded and shellaced, giving a glossy appearance. It is good practice to wax floors after shellacing. Finishing floors is last task in building.



35. Cabinets. In the kitchen a series of cabinets are built, which center around the sink. These cabinets are precut and are put in place on the job. The electric water



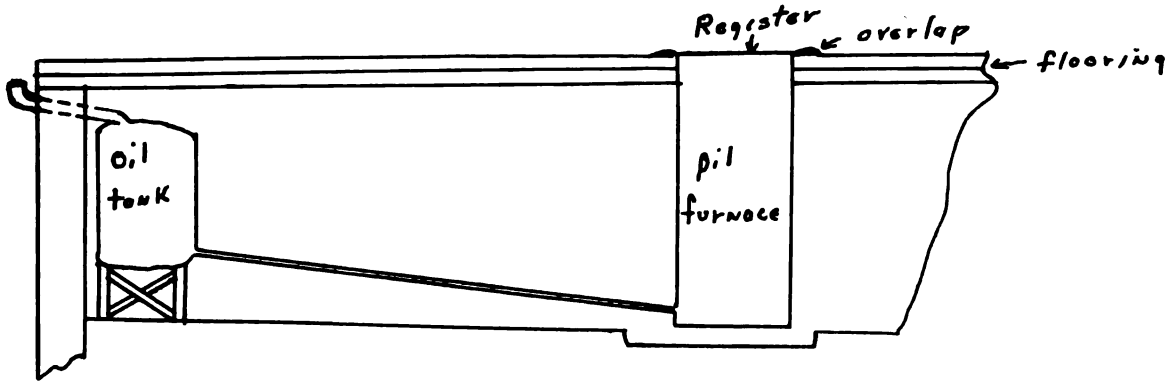
heater selected is square and is placed in the corner of the kitchen at the end of the built in cabinets. The sink is placed under the window. The cabinets are brought up to the level of the sink and covered with inlaid linoleum. Metal trim is placed around corners.

One row of shelves are placed in bathroom behind bathtub to serve as linen cabinets.

36. Heating Unit. As our building sets 30" above the ground, a floor furnace can be used satisfactorily in supplying necessary heating. The floor furnace hangs below the house by means of edges overlapping the flooring.

Spacing of the furnace in the house should be centralized as much as possible for all heat comes from the register immediately over the furnace. As the house is compact and well insulated, this is a satisfactory arrangement. The furnace is oil burning, electrically controlled, with fans

to force the heat.



Y- Diagram of the heating system

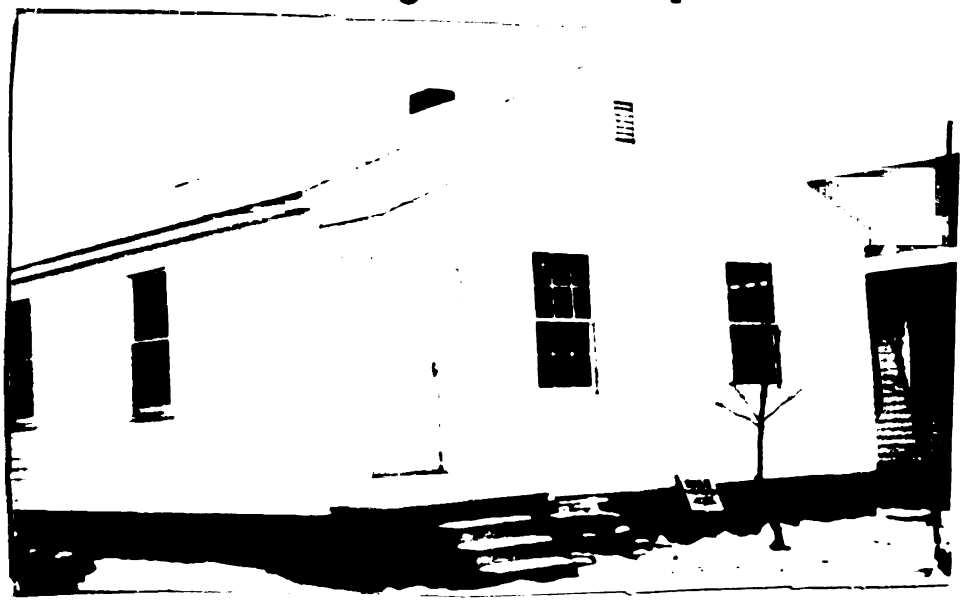
An oil tank is placed under the house near one side of the building. From the tank a pipe projects out through the side of the house to facilitate refilling. From the tank to the furnace is a 3/8" pipe line.

Roll insulation is placed over the ceiling between the joists to hold warm air and prevent its escape. This ceiling insulation greatly increases the effectiveness of the floor furnace for heating.

37. Front & Rear porches. The front and rear porches are defined by rows of cement blocks extending from the foundation. No break is made in the foundation, but blocks are merely laid out from the foundation. For a porch it is not necessary to go down 30" for the foundation. Generally, the only excavation that is necessary is the removal of the humus layer of soil.

On top of the rows of blocks a platform is added. This platform and foundation must come within 6" of the door threshold. The platform is set in mortar and nailed

into the foundation of the house. The platform must be rigid and permanent. Wooden steps are built with a 10" step and 6" rise from walk or ground to the platform.



For a more durable porch it is suggested that cement be used. A cement porch and steps give longer wear. Climatic conditions prevented the use on this job, although it is the policy of the author to use concrete porches and steps.

38. Outside trim. Protruding rafter butts and outside doors are timmed with 1"x 2" boards to provide a smooth even finish. A ledge is added over windows and doors to break the flow of water down the side of the building. Rounded quarter round is placed around the upper edges of the building. Eavestroughs are put in place.

39. Stoop. Over an outside door, particularly the front, it is necessary to have a stoop. The stoop, generally covers the front porch. Where the gable ends are on the sides of the building, it is a good practice to build the stoop in the roof design. In our building the gable

is to the front so the stoop was added on to the front end. (Note picture)

40. Painting and finishing. Before applying the finish coat of paint, all the cracks in the siding are filled with a wood filler. Wood filler gives a smooth unbroken design. Paint is applied with brushes. The entire house is painted white with the exception of the doors.

Summary. This concludes the construction of the author's model. Different designs will offer added problems. However, the steps and methods of construction are the same.

The author has used for this construction only the standard members and conventional sizes of lumber. Many special manufactured pieces can be substituted for named members. However, it is felt, and has been the experience of the author, that building with conventional lumber provides the cheapest and most effective building; that was the aim of this work.