

Lesson Plan

Course Title: Building Trades

Session Title: Wall Framing, Doors

Performance Objective:

Upon completion of this assignment, the student will be able to properly identify, gather sizing data, layout, size and assemble a door-framing unit. The student will communicate using proper framing terminology.

Specific Objectives:

- 1) Define and use terminology related to wall framing.
- 2) Identify and collect materials and tools needed to complete the assignment.
- 3) Evaluate and explain areas in this assignment where safety is needed.
- 4) List the steps and procedures to be successful
 - A) Use the blue prints to locate door openings and sizing data. B) Gather materials and tools to be used. C) Work together as a group. D) Practice safety. E) Ability to Measure and Layout F) Ability to size and cut. G) Ability to assemble unit. H) Define terminology and understand what and where it is used. I) Pass a written test. Demonstrate the ability to perform the task- assignment
- 5) Demonstrate proper safety practices though out the lesson / assignment.
- 6) Participate in quality control through each step of the assignment. Clean up and
- 7) organize the materials, tools, and lab areas.
- 8)

Preparation

TEKS Correlations:

§130.54. Building Maintenance Technology

(c) Students will develop knowledge and skills pertaining to employment, safety, interpreting schematics, fuses, circuit breakers, lamps, fixtures, electrical test equipment, HVAC, copper/plastic piping and fittings, conventional and electric thermostats and landscaping.

(2) Students will understand all aspects of contract documents, including architectural, engineering and shop drawings.

(9) Students will install metal doors and related hardware in steel-framed, wood-framed, and masonry walls.

§130.51. Construction Technology

(c) Knowledge and skills.

(9) The student gains knowledge of various types of windows, skylights, and exterior doors; and

(h) install a pre-hung exterior door.

Interdisciplinary Correlations:

Accommodations for Learning Differences:

[Lesson Plan/Curriculum Modifications Checklist](#)

Guidelines and Procedures for Adapting Instructional Materials

Instructor Format for Curriculum Customization for Learning Differences

Sample Curriculum Customization for Learning Differences

Instructor/Trainer

References:

Carpentry 3RD Edition. Delmar / Thomas Learning. Floyo Vogt / Kathy Sutphin.
Carpentry. Delmar / Lewis. Timothy Lockley.
Carpentry and Building construction. Glencoe / McGraw - Hill. Feirer / Hutchings / Feirer.
Modern Carpentry. Goodheart / Willcox. Willis H. Wagner / Michael B. Kope.
Curriculum, Building Trades
East Texas State University. Commerce, Tx.
Curriculum, Building Trades. Thomas Edison Vocational Technical H.S. Elisabeth, New Jersey
Video: #3 Wood Floor Systems ? Wood Frame Walls. Thomas/Delmar Learning

Instructional Aids:

Materials Needed:

- 1) Method for 2" x 4" Thick wall
 - A) Quantity 4 2" x 4" x 8" #2 yellow pine
 - B) Quantity 24 #10 V. C. Nails
 - C) Quantity 12 #12 V. C. Nails
 - D) Quantity 1 Pre built door header from Lesson #6
- 2) Method for 2" x 6" Thick wall
 - A) Quantity 4 2" x 6" x 8" #2 yellow pine
 - B) Quantity 24 #10 V. C. Nails C)
 - Quantity 12 #12 V.C. Nails
 - D) Quantity 1 Pre built door header from Lesson #6

Equipment Needed:

- 1) Skillsaw
- 2) Extension Cord
- 3) Framing Square
- 4) 25' Tape Measure
- 5) Utility Knife
- 6) Carpentry Pencil
- 7) Speed Square 8)
- Safety Glasses
- 9) 20 oz. Straight claw hammer
- 10) Cats claw

11) Ripping Bar

Learner:

Read; Carpentry and Building Construction: Unit 30, Wall Framing
Complete Worksheet: Unit 28, Wall Framing
Students watch video on Wall Framing listed above or similar.

Introduction

Introduction (LSI Quadrant I):

- Ask: How many students have looked at a set of blueprints and are able to take blueprints information and construct a wall?
(show of hands)
- Ask; What is some of the information we find in a set of blueprints needed to build a wall section?
Example:
 - 16" on center studs
 - Wall thickness
 - Rough openings •
Intersecting walls
 - Studs line - up with floor joists
 - Studs line - up with Rafters / Ceiling Joists
- Ask; Does any one have any experiences framing a wall section?
Shed, Garage, House
- Introduction;
The door framing unit provides a type of "rough opening" found in a wall. The door rough openings are located in interior and/or exterior walls and are used to provide a passage way through a wall. Door framing units can be used with or without a door.

Outline

Outline (LSI Quadrant II):

- 1) Define the Terminology
 - Blueprints, Floor plans, Schedules
 - Lay outs
 - Sole (Bottom) plates
 - Top plates
 - Double top plates
 - On center
 - Rough opening, windows, doors, fireplaces
 - Intersecting walls
 - Corner post
 - Layout symbols, X, T, C, D, K, S,

- Cripples
- Trimmers
- Butt-walls • By-walls • Header

(Review with the students, students should have the following definitions)

- Blueprints are the plans that the Architect uses to communicate to a Builder, through lines, symbols, and dimensions, a project to be constructed.
- Layout is the process of marking the locations of framing members to be cut and assembled.
- Sole (Bottom) plate is a framing member, laid horizontally to connect and support the lower ends of the vertical-framing members. The sole plate is then secured to the floor.
- Top plate is a framing member, laid horizontally to connect and support the upper ends of the vertical-framing members.
- Double top plates lay horizontally on top of the top plate to help keep the wall straight; to tie connecting walls together, and as support strength for the rafters and/or floor joists to rest upon.
- On center is a layout that is in the middle of a framing, or sheathing, or other materials or layouts such as intersecting walls, rough opening for windows, doors, and fireplaces.
- Rough openings are areas in framing that are left open for doors, windows, and fireplaces.
- Intersecting walls, (partition walls), (king studs), are where two or more walls cross one another to form a "T" or "X" shape intersection.
- Corner post, where two walls come together to form a "L" shape corner that can be located interiorly and exteriorly on a structure.
- Layout symbols, "D" double stud, "X" stud, "C" cripple stud, "T" trimmer, "S" spacer, "K" king stud, intersecting wall.
- Cripples are short studs that are placed 16" or 24" on center where a full length stud can not be used, found mostly above headers and below sills.
- Trimmers are studs, which support the headers over a rough opening.
- Studs are slender vertical members, usually 2"x4" or 2"x6" materials that are placed 16" or 24" on center. Studs support the top plates and provide a surface for sheathing to be nailed.
- Butt-walls, are walls that fit in between By-walls.
- By-walls, are walls that run from the outside of the sub-floor to the outside edge of the opposite end of the sub-floor.
- Headers are used over door and window openings. Headers provide strength to the double top plate for floor joists, ceiling joists, and rafters.

2. The students will use the blueprints with the Instructor to obtain the following Information. (Use Handouts page 1 and 2.)

- The students will note that most doors and windows are laid-out to their centers. (middle of the door / window.)
- On the blue prints, the student should notice a door and a window schedule.

Most blue prints have these.

A) Note that, the window schedule provides the rough opening size while the door schedule provides the actual size of the door.

- Calculations for sizing.

A) At this point, the students will be using the Handout #2 sheet to view the formula for sizing the materials and collecting the quantity of materials that will be needed to complete the assignment.

- The students will be building a door framing unit for a 2" x 4" thick wall.

3. With the information obtained from step 2, the students will gather the needed Materials for the layout, sizing, and assembling of an assigned door framing unit.

- Four 2"x4"x8', #2 yellow pine are to be used to form the trimmers and precut studs that will support the header.
- Students will select materials free of the following;
 - a. Warp
 - b. Checks - Cracks
 - c. Bow
 - d. Twist
 - e. Cup
 - f. Knots
 - g. Other damages

4. Using the information handout sheet #2, "Material List", have the students square-up and cut to length the two of the 2"x4"x8' pieces of #2 yellow pine material to the proper precut stud length. Second, have the students cut the other two 2"x4"x8' #2 yellow pine to the desired trimmer stud lengths.

- Gather together the selected materials and the tools needed to complete the task. • Review with the students all areas and operations where safety practices may be required.
- Square-up one end of each board using a speed square and a skill-saw to remove about a fourth of an inch.
- Measure from the squared end the size needed for the precut stud length, 92-5/8", and cut off the waste.
- Repeat the steps above to have two exact sized pieces.
- Next, measure from the squared end of the remaining boards the size needed for the trimmer stud length, 80-3/4", and cut off the waste.
- Repeat the steps above to have two exact sized pieces.

5. Assemble the door framing unit.

- The students will place one precut stud and trimmer stud face to face on top of each other, aligning one end.
- Aligned and ready, the students will start with two #10 V. C. nails and nail through the face of the trimmer stud, at the flushed aligned end, and nail the corners together. The student will start with two nails and proceed to nail every 8 to 10 inches back and forth along the edge of the face of the trimmer stud until they finish with two nails at the other end's corners.
- The students will make two sets of Precut/trimmer studs.
- *Note, at this time if Lesson #6 on the "Header" wasn't started or completed, please complete it!

- Align the pre-assembled header on top of the trimmer stud ends where the pre-cut studs pass the header ends. The header face should align smoothly with the edge of the pre-cut stud and the trimmer stud.
 - Using six #12 V. C. nails on each side, nail six nails through each pre-cut stud face into the header end, three nails in each header 2"x6" end. *Note while nailing keep checking to make sure the edges, faces, and ends stay aligned.
6. Have students check for quality control.
- All measurements within a plus or minus of a sixteenth.
 - Layout lines are sharp and straight. Proper labeling of parts.
 -
- All students will participate in clean up. Proper
7. cleaning and storage of tools.
- Organize and store both assignment and extra materials.
 - Sweep up work areas and dispose of waste.
 -

Application

Guided Practice (LSI Quadrant III):

The students will observe, ask questions, and analyze the demonstration to be presented by the Instructor. The Instructor will use the data compiled from Handout page 1, and 2 to provide required measurements.

The Students will check-off on Handout page 2 the step of procedures as completed. Handout page 4 and 5 gives the student a view of the "big picture". Handout pages 6 shows the window heights using a story pole. Handout 7 supports some layout and assembling procedures.

Independent Practice (LSI Quadrant III):

At this phase the students will work collaboratively in small groups to start and complete the assignment. Each group will be given the Handout Packets, pages 1-7 to use to achieve the group's objective.

Summary

Review (LSI Quadrants I and IV):

Review the student's Data sheet to evaluate if the group compiled the correct data and followed the correct procedures to complete the assignment.

Evaluation

Informal Assessment (LSI Quadrant III):

The Instructor will monitor each group as they independently work to complete the assignment. If a re-teach is needed on any information or procedure, all the groups will stop and participate in the re-teach.

Formal Assessment (LSI Quadrant III, IV):

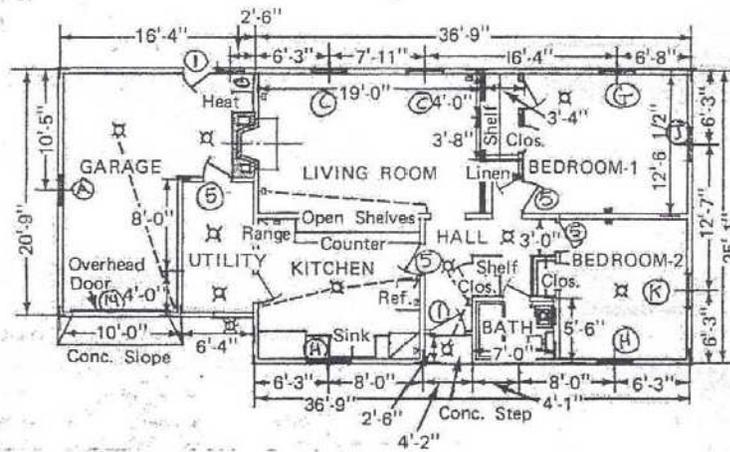
The students will be assessed by the accuracy of the completed assignment. The Instructor will be looking for correct layout measurements, sharpness of lines, proper labeling, accurate sizing, square-ness of assembly, craftsmanship, etc. 100 points will be the high and minus 5 points for each mistake found.

Extension/Enrichment (LSI Quadrant IV):

The students will use the correctly sized and assembled door-framing unit in a future lesson on wall assembly.

STUDENT BLUEPRINT

FLOOR PLAN, WINDOW SCHEDULE, AND DOOR SCHEDULE



WINDOW SCHEDULE				
SYTL	SIZE	MODEL	ROUGH OPEN	QUAN
A	1' x 5'	JOB-BUILT		2
B	8' x 5'	8445 CSM	8'-2 1/4" x 5'-5 1/4"	1
C	4' x 5'	8245 CSH	4'-2 1/4" x 5'-5 1/4"	2
D	4' x 3'	8245 CSM	4'-2 1/4" x 3'-5 1/4"	2
E	3' x 3'	240 CSM	3'-5 1/4" x 3'-5 1/4"	2
F	6' x 4'	664 SLDG	6'-0 1/2" x 4'-0 1/2"	1
G	5' x 3'	6636 SLDG	5'-0 1/2" x 3'-6 1/2"	4
H	4' x 3'	6436 SLDG	4'-0 1/2" x 3'-6 1/2"	1
J	4' x 2'	A41 AWN	4'-0 1/2" x 2'-0 1/2"	3
K	4' x 2'	647 SLDG	4'-0 1/2" x 2'-0 1/2"	3

DOOR SCHEDULE				
SYTL	SIZE	TYPE	QUAN	
1	3' x 6'	3C-RP-METAL INSULATED	1	
2	3' x 6'	3C-FLUSH-METAL INSL	2	
3	2' x 6'	3C-SELF CLOSING	2	
4	2' x 6'	H.C.	5	
5	2' x 6'	H.C.	5	
6	2' x 6'	POCKET	2	
7	2' x 6'	POCKET	1	
8	2' x 6'	H.C.	1	
9	5' x 6'	BI-PASS	2	
10	3' x 6'	BI-FOLD	1	
11	4' x 8'	BI-FOLD	1	
12	2' x 6'	SHATTER PROOF	1	
13	6' x 6'	WOOD FRAME-TEMP. BLDG. GL.	1	
14	3' x 7'	OVERHEAD GARAGE	2	

BUILDING TRADES

WALL SYSTEMS

GROUP _____

STUDENT'S NAMES

1. _____
2. _____
3. _____
4. _____

***NOTE, WALL SECTION FOR THIS GROUP TO COMPLETE WILL BE HI-LIGHTED BY THE INSTRUCTOR.**

Student Research Data Sheet, Door

Directions, research the student blueprint sheet and record the following information.

Door actual size _____"TH x _____"W x _____"H
 Door rough opening, if provided _____"x _____"x _____"

#1 Determine the height of the R.O. for a Door.

- A) A standard door height is 6' 8".
 *Note change door height, if other than 6' 8".
- B) Add 3/4" for clearance at the bottom of the door.
- C) Add 3/4" for clearance between the header and the jamb header.
- D) Add 3/4" for the jamb header thickness.
- E) Subtract the thickness of the sole plate and the result is the trimmer stud length. Example;

Step A Door height		6' 8"
Step B Bottom clearance		3/4"
Step C Header/Jamb header space		3/4"
Step D Jamb header thickness	+	3/4"
Step E Sub Total		6' 10-1/4"
Sole plate thickness	-	1-1/2"
Trimmer stud length		6' 8-3/4"

#2 Computing header length for a door.

- A) Check with the door schedule to find the actual width of the door,
Example 3' 0" width.
- B) Add 1/2" to the door width for clearance between door edges and jamb.
- C) Add 1-1/2" for side jambs.
- D) Add 1" for clearance to install jambs, shimming.
- E) Add 3" to the rough opening width for trimmer studs thickness to get the correct header length.

Example: For a 3' 0" x 6' 8" door.

Step A) Door width size		3' 0"
Step B) Door swing clearance		0-1/2"
Step C) Door side jamb		1-1/2"
Step D) Shimming Area needed	+	1"
		Rough opening 3' 3"
Step E) Trimmer thickness needed	+	3"
		Header Length 3' 6"

Material types & sizes

- Quantity 2 2" x 4" x 92 5/8" Precut studs (#2 yellow pine)
- Quantity 2 2" x 4" x _____" Trimmers (#2 yellow pine)
- Header
- Quantity 2 2" x 6" x _____" (#2 yellow pine)
- Quantity 1 1/2" x 5 1/4" x _____" Spacer, plywood/OSB.

*Note; undersize the spacer 1/4" for the width/length to help with the line-up of the 2"x6"s.

Student Research Data Sheet, Window

*Directions research the student copy of the blueprints to help compile the needed data. Check window schedule for sizes.

*Most blue prints will have a detail section with a story pole to show the lengths, top of window, location through - out the project, today we will use the length of 84" from the floor to the top of the window. Check Handout 6 for a view of a typical storypole.

Window actual size $\underline{T_h} \times \underline{W} \times \underline{H}$

Window rough opening $\underline{T_h} \times \underline{W} \times \underline{H}$

*Figuring window parts, square and rectangle shape windows.

A) Header materials that will be used for this exercise will be 2" x 6" x ____".

- 1) The window schedule will give, in most cases the rough opening size along with the actual window size, Handout 1.
- 2) The header is supported by 2 trimmers, one on each side. So we add 3" for their thickness.

Example 3' 0" x 4' 6"

Step A. Window actual size in inches is 36" x 54".

Step B. Rough opening needs to have 1/2" added to the width and height, making it 36-1/2"x 54-1/2".

Step C. Add 3" for the trimmer thickness to the width. Header Length is now 39-1/2".

1) 2 quantity 2" x 6" x 39 1/2" #2 yellow pine

2) Cut 1 piece of plywood/osb spacer for between the (2) 2" x 6" x 39-1/2" header boards, the spacer should be under sized 1/4" off the width and off the length.

Step D. The sills are next parts to be sized, because the window is a rectangle/ square the (2) 2" x 4" sills should be cut to the same length as the 2" x 6" header pieces.

1) (2) 2" x 4" x 39-1/2" #2 yellow pine.

Step E The middle trimmer should be the same length as the rough opening of the height of the window unit. Example; 36 1/2 x 54 1/2"

1) (2) 2" x 4" x 54-1/2" #2 yellow pine.

Step F To find the (upper) trimmer/ cripple use the following formula.

1) Add the bottom plate thickness of 1 1/2" to the length of a precut, 92-5/8".

$$\begin{array}{r} \text{Precut length} \quad 92-5/8" \\ \text{Bottom plate thickness} \quad + 1-1/2" \\ \hline 94-1/8" \end{array}$$

2) Minus the predetermined height of the window, which is this case is 84", from the precut/bottom plate sum of 94-1/8".

$$\begin{array}{r} \text{Precut/bottom plate sum} \quad 94-1/8" \\ \text{Window height} \quad -84" \\ \hline 10-1/8" \end{array}$$

- 3) Next, minus the height of the header material, 5-1/2", from the sum of the precut-bottom plate/window height, 10-1/8". The remaining number will be the (upper) trimmer/cripple length.

Precut-bottom plate/window height 10-1/8"
 Header height of a 2"x6" +5-1/2"
 (upper) trimmer/cripple length 4-5/8"
 4) (2) 2"x4"x4-5/8" #12 yellow pine.

Step F To figure out the length of the (lower) trimmer/cripple.

- 1) Subtract the following parts from the length of a precut stud, 92-5/8".

(upper) trimmer/cripple length 4-5/8"
 header height 5-1/2"
 (middle) trimmer length 54-1/2"
 (2) sill thickness + 3
 Total to minus from precut stud length 67-5/8"

Precut stud length 92-5/8"
 Minus total -67-5/8"
 (lower) trimmer/cripple length 25"

- 2) (2) 2"x6"x25" yellow pine.

Material types and sizes needed.

Quantity 2 2"x4"x92-5/8" Precut studs (#2 yellow pine)

Header

Quantity 2 2"x6"x__"

Quantity 1 1/2"x5-1/4"x__"

*Note, undersize the spacer of plywood/osb 1/4" to the width and to the length to make assembling easier.

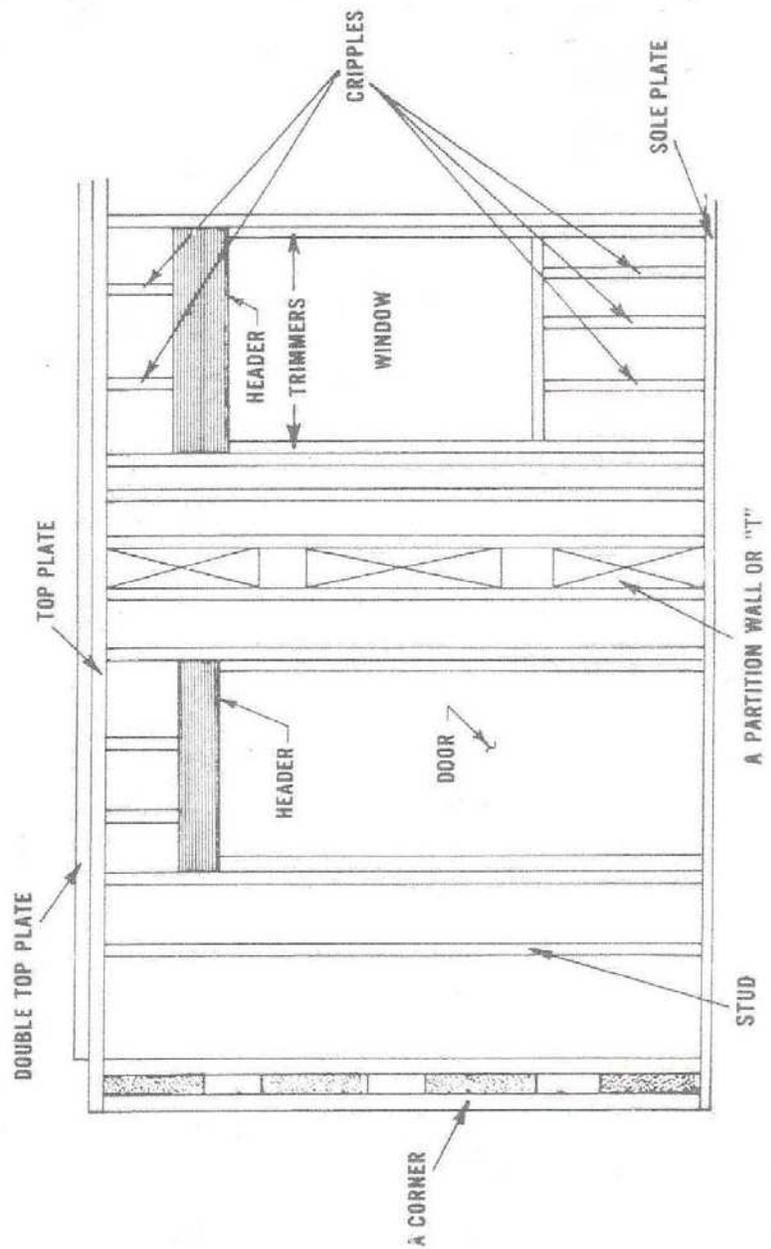
Quantity 2 2"x4"x__" Sills (#2 yellow pine)

Quantity 2 2"x4"x__" (middle) trimmers (#2 yellow pine).

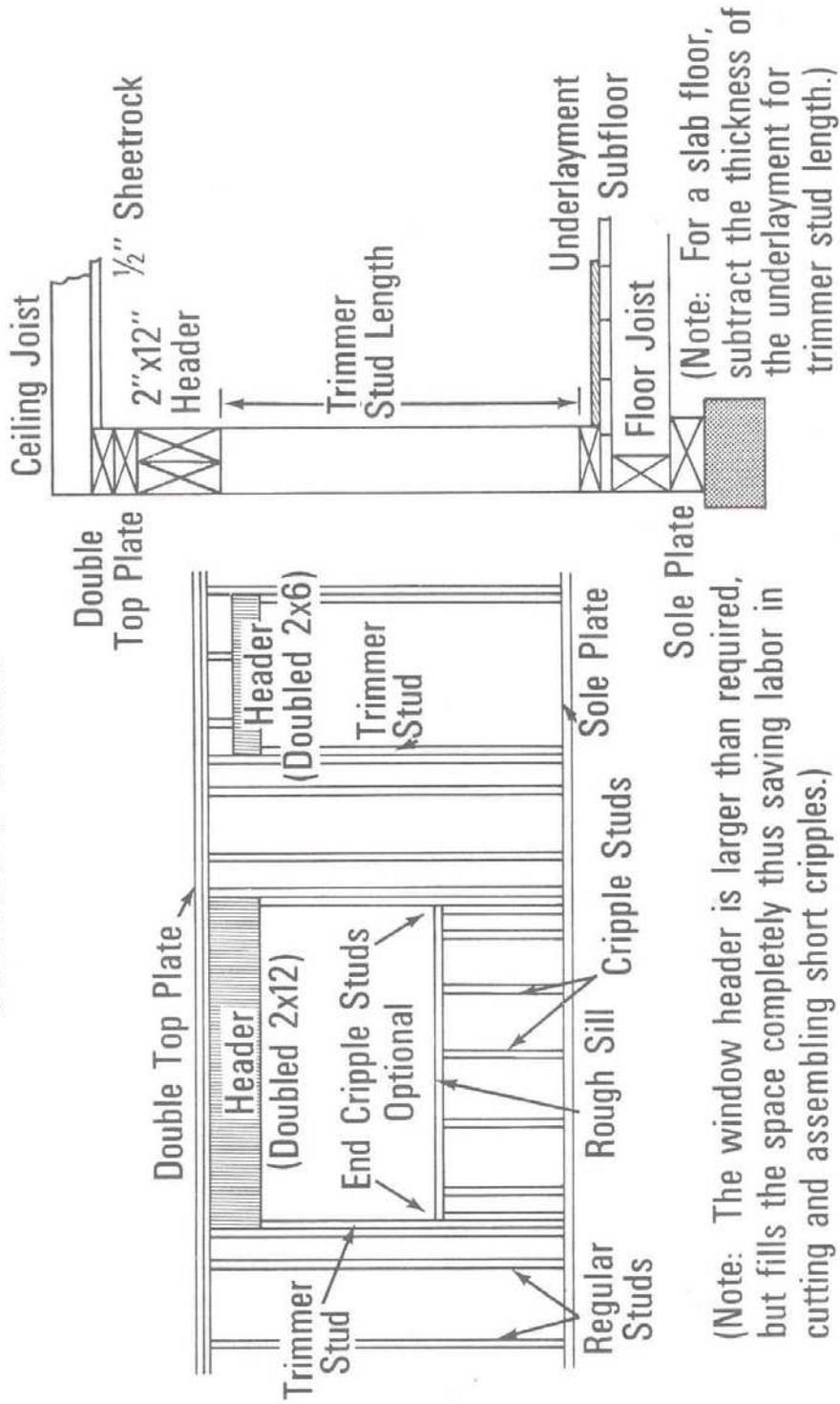
Quantity 2 2"x4"x__" (upper) trimmers/cripples
 (#2 yellow pine)

Quantity 2 2"x4"x__" (lower) trimmers/cripples
 (#2 yellow pine)

WALL FRAMING

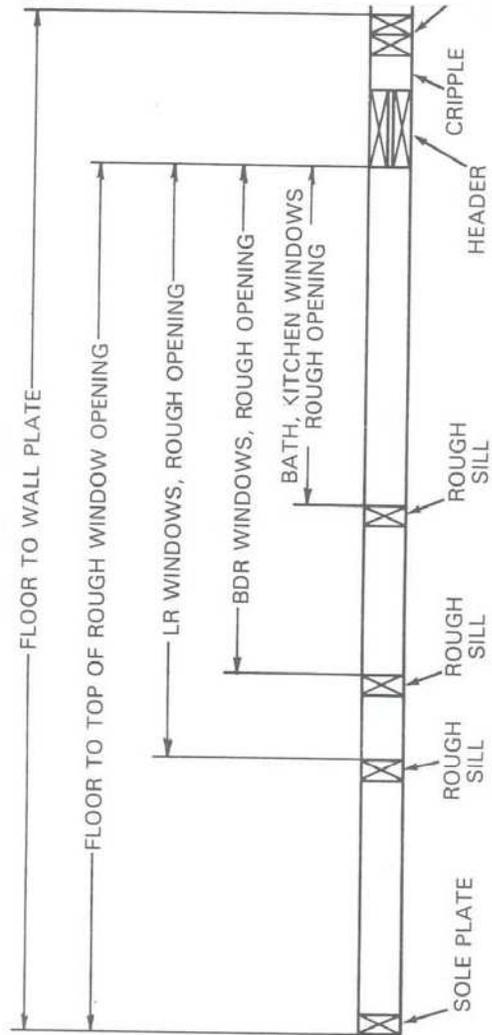
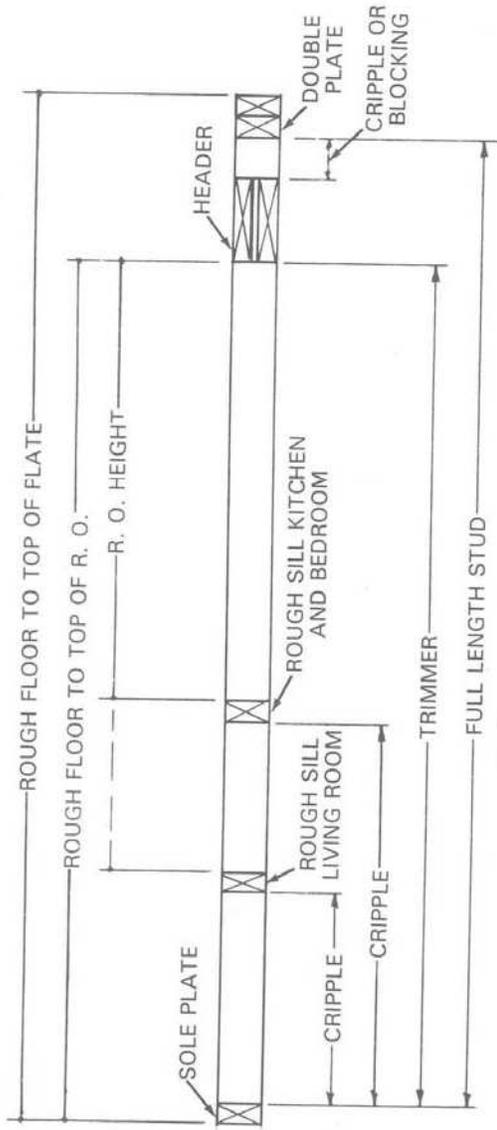


Trimmer Studs



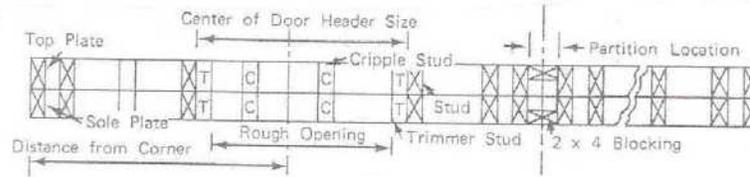
Framing With Patterns

STORY POLE

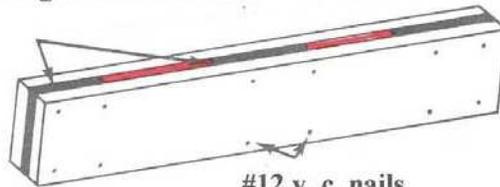


DOOR AND WINDOW HEADERS

*The headers can be found on the plate layouts between the two trimmers.



*The header is usually made out of a minimum of two 2"x6" framing materials using a 1/2" plywood/OSB material in the center for proper spacing of the thickness.



#12 v. c. nails

*Assembling patterns for the Door/Window Framing Units.

