UNIT III - BUILDING CONSTRUCTION

Lesson 6: Walls

Competency/Objective: Describe the purposes of walls, types of walls, supports, and siding used in agricultural buildings.

Study Questions

1. What are three purposes of walls?
2. What are different types of wall construction?
3. What are the components of stud frame walls?
4. How is a wood stud frame wall constructed?
5. What types of siding are used in agricultural structures?

References

1. *Agricultural Structures (Student Reference).* University of Missouri-Columbia: Instructional Materials Laboratory, 1999, Unit III.
2. Transparency Masters
   a) TM 6.1: Pole Frame Construction
   b) TM 6.2: Stud Frame Construction
   c) TM 6.3: Components of a Frame Wall
3. Activity Sheet
   a) AS 6.1: Wall Construction

UNIT III - BUILDING CONSTRUCTION

Lesson 6: Walls

TEACHING PROCEDURES

B. ***Review***

Lesson 5 discussed various aspects of constructing a floor for a structure. Walls are another important aspect of most construction projects. Lesson 6 describes the basic functions of walls as well as the different methods of construction and their components.

C. ***Motivation***

Make models of a post and beam wall and a wood frame wall using balsa wood, small strips of pine, or Popsicle sticks. These models should be small enough to handle easily. Pass them around and discuss the differences.

D. ***Assignment***

E. ***Supervised Study***

F. ***Discussion***

1. Ask students if they can list three purposes of walls. Discuss these purposes with the students.

   What are three purposes of walls?

   a) Support vertical loads
   b) Resist lateral loads
   c) Provide protection from the weather

2. Use TM 6.1 and 6.2 to illustrate the differences between pole and stud frame construction. Discuss the differences between the two.

   What are different types of wall construction?

   a) Pole frame construction
      1) Poles or posts form the main structural members of the wall.
      2) Horizontal pieces of dimensional lumber called laths or girts are attached to the poles.
      3) Siding is placed vertically on the structure by attaching it to the laths.
   b) Stud frame construction - Walls are built using studs, which are the vertical wall members that provide the main support for the wall.

3. Show students TM 6.3. Discuss the different components of a frame wall.

   What are the components of stud frame walls?

   a) Top plate - horizontal member at the top of the wall on which the trusses or rafters rest
   b) Sole plate - structural member forming the bottom of the wall to which the studs are nailed
   c) Stud - vertical wall member that provides the main support for the wall
   d) Diagonal brace - member that adds to the rigidity of the wall, making it stronger; used in construction to keep the walls square and vertical
   e) Header - horizontal piece found above openings for doors and windows that provides support for loads over the opening

f) Jack stud or cripple stud - stud that is shorter than full length used below windows and above windows and doors
g) Trimmer stud - vertical framing member that forms the sides of door and window openings and supports the header
h) Rough sill - horizontal framing member attached to the top of the jack studs to form a rough base for a window
i) Blocking - wooden blocks that are used to fill in the space between framing members, providing support
j) Siding - material placed on the outside of a building to seal and enclose the building
k) Interior covering - material placed on the inside of the wall

4. Ask students to describe light wood construction. Hand out AS 6.1.

How is a wood stud frame wall constructed?

a) Walls are typically constructed one wall or section of a wall at a time, with the wall laying flat on the ground.
b) Determine the length of the wall and cut the top and bottom plates to that length.
c) Nail the studs between the top and bottom plate using two nails at each end of the stud.
    1) They are spaced an equal distance apart, usually 16 inches.
    2) Buildings with less weight on the walls are sometimes constructed with the studs 24 inches apart.
d) Nail double studs side by side at the corners of a building.
e) Diagonal braces and blocking attached between the studs add to the rigidity of the wall, making it stronger.
f) When the wall is finished, stand it upright and attach it to the foundation or subfloor using nails or bolts.
g) Nail walls together at the corners.
h) Remove diagonal braces.
i) If the wall has windows or doors, they require additional components.
    1) Window framing usually requires a header as well as extra support from trimmer boards at the sides of the opening.
    2) Window openings generally also use jack studs and a rough sill.
    3) Door framing involves the use of a header, extra supports on the sides, and sometimes jack studs.

5. Showing the class some samples or pictures clipped from sales literature will help when discussing this lesson's content.

What types of siding are used in agricultural structures?

a) Dimensional lumber
    1) 1" × 12" boards or other similar sizes
    2) Accepts paint or stains readily, allowing customization
    3) Degrades due to weather, although it can be treated to be weather resistant, increasing the life of the lumber
b) Exterior plywood
    1) Sold in larger sheets, so fewer seams will exist, aiding in insulating
    2) Easier to apply than dimensional lumber
    3) Cheaper than other forms
    4) Not as attractive
c) Hardboard sheathing, or Masonite
    1) Sold in sheets that come in a number of colors
    2) Provides some insulation
    3) Relatively easy to apply
    4) Somewhat brittle and does not easily withstand stress
d) Metal siding
    1) Commonly made of galvanized steel or aluminum
    2) Sheets that are normally at least 3 feet wide and 8, 10, or 12 feet long
    3) Fewer seams, allowing for better insulation and weatherproofing
    4) Lasts for a very long time
    5) Can be painted but not stained
e) Vinyl siding

1) Consists of strips that overlap, sealing the building
2) Available in a variety of colors
3) Relatively long life
4) More expensive than other types of siding

f) Masonry products like bricks and cinder blocks
1) Decorative
2) Last for an extremely long time
3) Moderate cost
4) More difficult to apply

g) Fiberglass, glass, and plastics
1) Used in certain situations, such as a greenhouse
2) Purchased with varying levels of clarity, from totally clear to mostly opaque

G. ***Other Activities***

Ask students to identify which types of siding are commonly used in the community for different types of structures. Discuss why a particular type of siding would be used for certain applications.

H. ***Conclusion***

Wall construction is critical to a building's structural soundness and function. Walls serve three purposes: supporting vertical loads, resisting lateral loads, and providing protection from the weather. The two common types of wall construction for agricultural structures are pole frame construction and stud frame construction. Once a wall is constructed, a number of different types of siding can be used.

I. ***Answers to Activity Sheet***

1. Answers will vary, but should look something like the following image.

2. Two 2" X 4" boards, 7' long - door frame
Two 2" X 4" boards, 3' long - door frame
Twelve 2" X 4" boards, 7'9" long - studs

Two 2" x 4" boards, 12' long - top and bottom plate
Six 4" X 8" sheets of plywood - siding
Three 2" X 4" boards, 9" long - cripple studs

J. ***Answers to Evaluation***

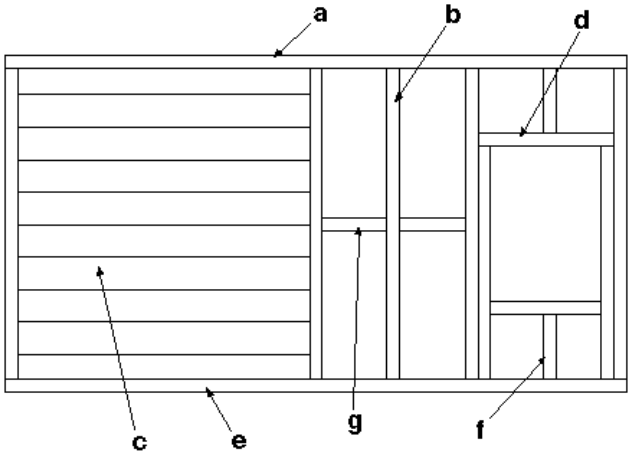
1. g
2. c
3. a
4. b
5. d
6. f
7. e
8. a
9. c
10. d
11. Pole frame and stud frame
12. To support vertical loads, resist lateral loads, and provide protection from the weather

UNIT III - BUILDING CONSTRUCTION Name _

Lesson 6: Walls Date _____

EVALUATION

Write the letter in the blank next to the name of the structural member pictured.



1. Blocking piece
2. Siding
3. Top plate
4. Stud
5. Header
6. Jack stud
7. Sole plate

Complete the following short answer questions.

8. A piece of lumber nailed temporarily on a wall to stabilize it is called a:

   a. Diagonal brace.
   b. Stud.
   c. Siding.
   d. Top plate.

9. Studs are usually placed _____ inches apart.

   a. 14
   b. 15
   c. 16
   d. 17

10. A disadvantage of metal siding is that it:

    a. Is not fireproof.
    b. Is sold in large sheets.
    c. Has more seams when applied.
    d. Cannot be stained.

Complete the following short answer questions.

11. What are two different types of wall construction?

    a.

    b.

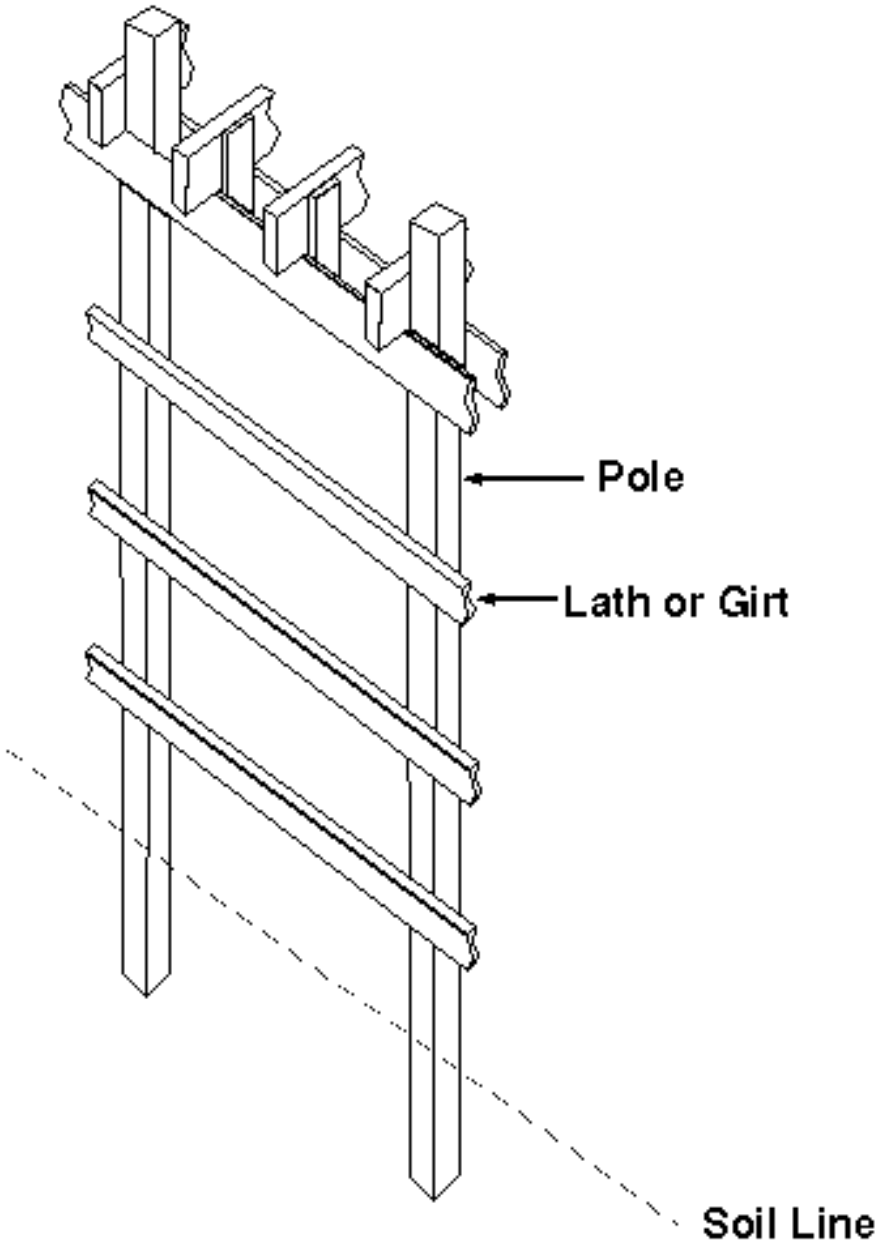
12. What are the three purposes of walls?

    a.

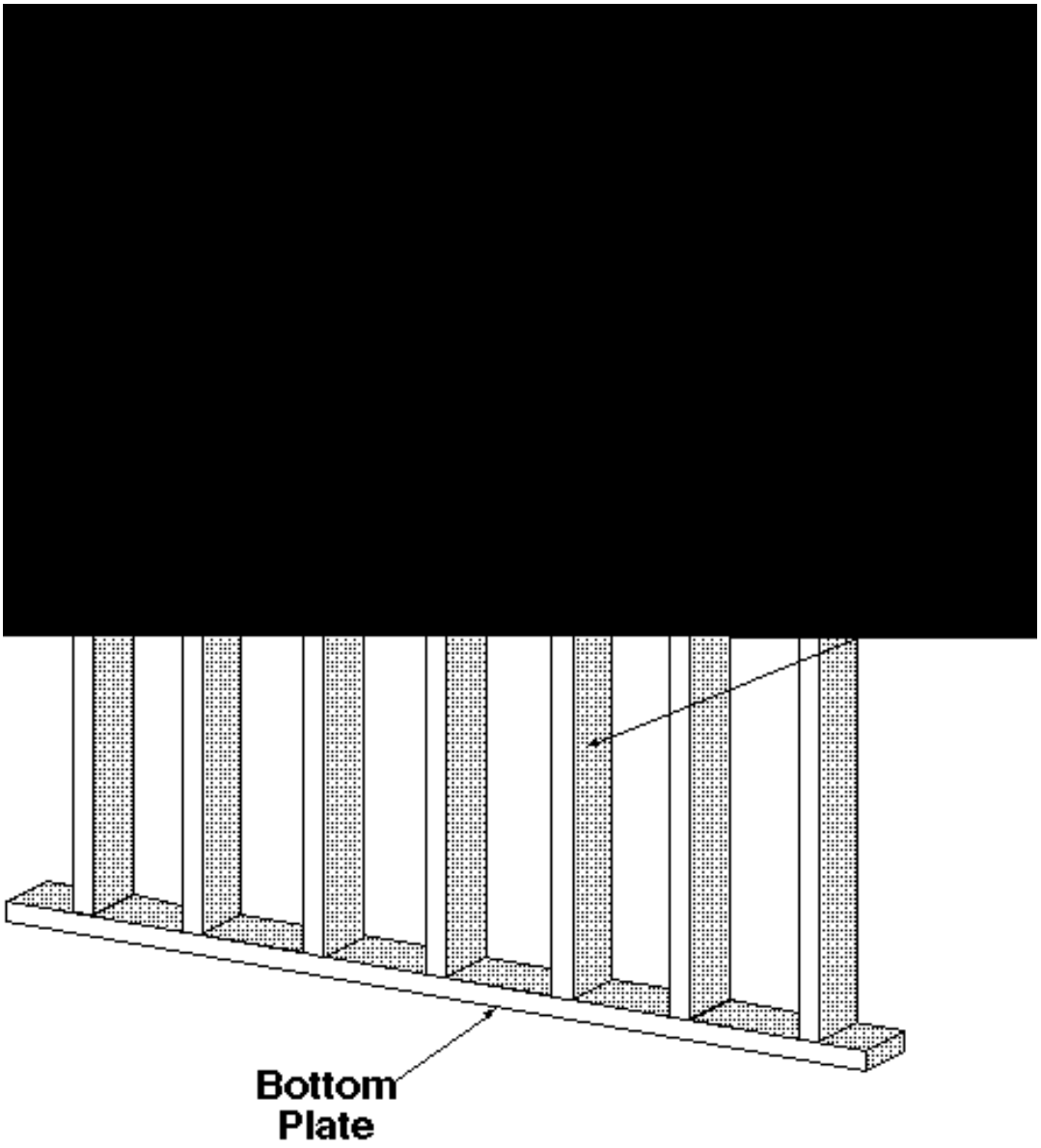
    b.

    c.

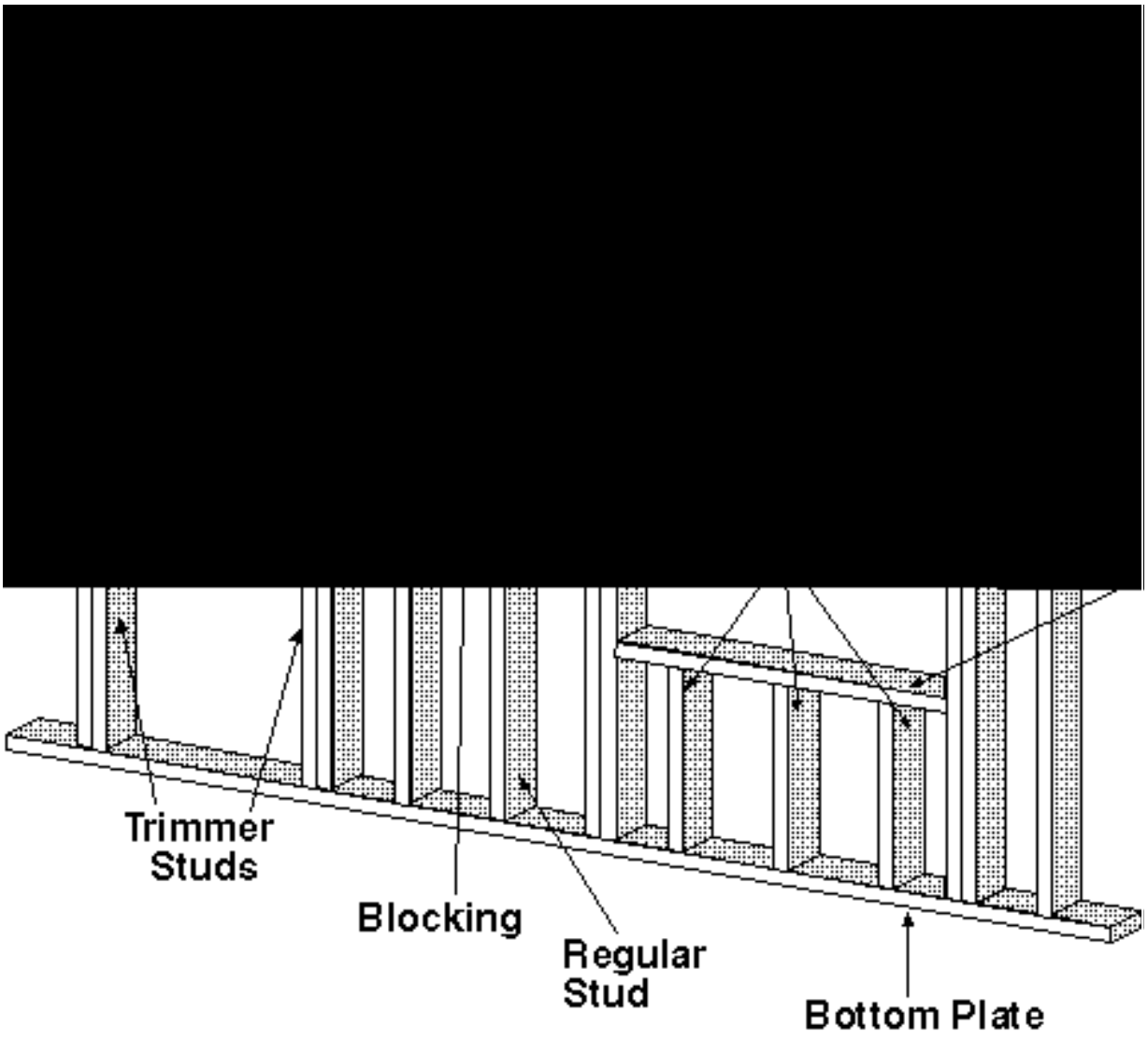
Pole Frame Construction



Stud Frame Construction



Components of a Frame Wall



Lesson 6: Walls Name _____

Wall Construction

Objective: Plan the construction of a wall.

Suppose you are constructing a wall that is 8 feet high and 12 feet long. Determine the materials required and the exact dimensions needed. The wall is to be sided on both sides with 4' × 8' plywood sheets and constructed of 2" × 4" boards. It will have a door consisting of a rough opening 3 feet by 7 feet in the exact middle of the wall. Put double studs at each end for strength.

1. First, sketch the wall as it would be constructed.

2. List the materials needed, indicating their uses.