

UNIT III - BUILDING CONSTRUCTION

Lesson 2: Building Designs

Competency/Objective: Identify types and designs of buildings and their methods of construction.

Study Questions

1. What are different designs and uses of agricultural structures?
2. What are advantages and disadvantages of different types of structures?
3. What factors should be considered when designing and constructing agricultural structures?

References

1. *Agricultural Structures (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999, Unit III.
2. Activity Sheet
 - a) AS 2.1: Identifying Building Designs

UNIT III - BUILDING CONSTRUCTION

Lesson 2: Building Designs

TEACHING PROCEDURES

B. *Review*

Lesson 1 discussed safety factors to consider when constructing agricultural structures. The designs of these structures are as varied as the enterprises for which they may be used. A few types of designs and building materials are more commonly used than others. This lesson describes some of the different designs used in agriculture.

C. *Motivation*

Discuss the diversity of agricultural structures in your area. They will most likely include pole barns, storage buildings, animal housing facilities, grain processing/storage structures, machinery sheds, workshops, etc.

D. *Assignment*

E. *Supervised Study*

F. *Discussion*

1. Ask students to describe the shapes and roof types of agricultural structures with which they are familiar and list them on the board for discussion. Discuss the different types of materials used in construction.

What are different designs and uses of agricultural structures?

- a) Basic shapes of structures
 - 1) Square
 - 2) Rectangle
 - 3) Circle
 - 4) Oval
 - 5) Some combination of these shapes
- b) Seven roof styles
 - 1) Gable
 - 2) Hip
 - 3) Mansard
 - 4) Gambrel
 - 5) Shed
 - 6) Quonset
 - 7) Gothic/arched
- c) Methods of construction
 - 1) Wood frame - Weight-bearing upright wooden members are used for the walls of the building.
 - 2) Pole - Large wooden timbers are placed in the ground and serve as the weight-bearing skeleton of the building.
 - 3) Metal - Metal is used as a primary component of the building, which is constructed by welding and bolting the materials together.
 - 4) Masonry - Concrete or masonry blocks are the primary building material; buildings are constructed by pouring concrete in forms or laying blocks.

2. Ask students to list some advantages and disadvantages associated with each type of structure. Emphasize that each situation may be different, so advantages and disadvantages must be carefully evaluated in regard to the use of a specific structure. Have students complete AS 2.1.

What are advantages and disadvantages of different types of structures?

- a) Wood frame
 - 1) Advantages
 - (a) More economical than the other types of structures
 - (b) Easy to partition or expand
 - 2) Disadvantages
 - (a) Higher maintenance requirements
 - (b) May not be durable under conditions of abusive use
 - (c) Inherent fire hazard
 - b) Pole
 - 1) Advantages
 - (a) Rapid and economical construction
 - (b) Long life span
 - (c) Partitioning or expansion usually easily accomplished
 - 2) Disadvantages
 - (a) Inferior weather protection
 - (b) Cannot be heated or cooled without modifications being made to the structure
 - c) Metal
 - 1) Advantages
 - (a) Serviceable for a long time
 - (b) Fire resistant
 - 2) Disadvantages
 - (a) Expensive
 - (b) Special equipment and considerable skill required for construction
 - (c) Can be short-lived around manure
 - d) Masonry
 - 1) Advantages
 - (a) Easily cleaned and disinfected
 - (b) Fire resistant
 - (c) Very long life span
 - (d) Minimal maintenance requirements
 - 2) Disadvantages
 - (a) Expensive
 - (b) Extensive excavation required, depending on the topography
 - (c) Requires a lot of labor to tear down masonry for expansion
3. Discuss the various factors that should be considered when designing and constructing a structure for use in an agricultural enterprise. Hand out AS 2.1.

What factors should be considered when designing and constructing agricultural structures?

- a) Identify the intended uses of the structure.
- b) Consider whether the cost of construction is reasonable enough to allow successful operation or use.
- c) Determine whether the proposed structure is appropriate for local environmental conditions.
- d) Consult codes and regulations for construction.
- e) Consider whether materials are used efficiently.

G. **Other Activities**

Have the students work in groups and build small models (birdhouse size) of some of the building styles mentioned in this lesson, such as a shed with a hip or gable roof. Small wood stock or even cardboard and glue would be suitable for materials.

H. ***Conclusion***

Selecting an appropriate design is very important when constructing an agricultural structure. Material selection, construction methods, costs, and codes all must be considered to produce a building with the desired advantages. Resources are readily available to assist in planning and producing a building that will serve its intended purpose.

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

J. ***Answers to Evaluation***

1. d
2. b
3. c
4. Poured concrete in forms or concrete blocks
5. Answers may include any three of the following.
 - Identify the intended uses of the structure.
 - Consider whether the cost of construction is reasonable enough to allow successful operation or use.
 - Determine whether the proposed structure is appropriate for local environmental conditions.
 - Consult codes and regulations for construction.
 - Consider whether materials are used efficiently.
6. Answers may include any two of the following: rectangle, square, circle, or oval.
7. In pole construction, large timbers are placed in the ground and serve as the weight-bearing skeleton of the building.

EVALUATION

Circle the letter that corresponds to the best answer.

1. Which of the following is a disadvantage of wood frame construction?

- a. Inferior weather protection
- b. Difficult to partition or expand if necessary
- c. Extensive excavation required for building
- d. Requires more maintenance

2. One of the advantages of metal designs is that structures are:

- a. Very easy to build.
- b. More fire resistant than others.
- c. Easily cleaned and disinfected.
- d. Very inexpensive to build.

3. An advantage of masonry construction is that:

- a. Structures can be rapidly constructed.
- b. Partitioning is usually easily accomplished.
- c. They have a very long life span.
- d. They do not have to be heated.

Complete the following short answer questions.

4. What are the materials used for masonry construction?

5. What are three factors that should be considered when choosing a design for an agricultural structure?

a.

b.

c.

6. What are two basic shapes used in building designs?

a.

b.

7. What is pole construction?

Name _____

Objective: Identify different types of building designs.

1. What types of enterprises are common in your area?
2. Choose one of the enterprises you listed above. What structures are used for that type of enterprise?

Agricultural Structures, III-19

