

# Terminology and Symbols: Construction

**Unit:** Graphic Agility

**Problem Area:** Industrial Applications—Terminology Symbols

**Lesson:** Terminology and Symbols: Construction

- **Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

- 1 Review basic construction plans and elevation drawings.**
- 2 Interpret construction terminology and symbols.**

- **Resources.** The following resources may be useful in teaching this lesson:

“Engineering Symbology, Prints, and Drawings,” *Scribd*. Accessed Aug. 26, 2012. <http://www.scribd.com/doc/7711916/Engineering-Symbols>.

“How to Read Construction Documents,” *Sound & Video Contractor*. Accessed Aug. 26, 2012. <http://proavmagazine.com/construction-contracts/how-to-read-construction-documents.aspx>.

Kubba, Sam. *Blueprint Reading: Construction Drawings for the Building Trades*. McGraw-Hill, 2009.

Traister, John E. *Blueprint Reading for the Building Trades*. Craftsman, 2004.



## ■ **Equipment, Tools, Supplies, and Facilities**

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

## ■ **Key Terms.** The following terms are presented in this lesson (shown in bold italics):

- ▶ backfill
- ▶ building section view
- ▶ elevation
- ▶ girder
- ▶ joist
- ▶ joist hangers
- ▶ rafter
- ▶ shear panel
- ▶ shear wall
- ▶ sheathing
- ▶ sill plate
- ▶ structural members
- ▶ stud
- ▶ symbol
- ▶ terminology
- ▶ tie
- ▶ top plate
- ▶ topographical plan
- ▶ truss
- ▶ truss plan
- ▶ typical detail
- ▶ valley
- ▶ vapor barrier

## ■ **Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

*Construction terms and symbols are a whole new language for many people. Explain to your class that learning the symbols and terminology allows people to understand how contractors, engineers, drafters, architects, and manufacturers communicate vital information. Misreading of a term or a symbol could have*

series consequences, such as loss of valuable materials and time and/or the potential of creating a safety hazard. The goal of using basic construction terminology and symbols is to enhance the communication between all construction site groups: architects, manufacturers, drafters, designers, contractors, carpenters, and engineers.

## CONTENT SUMMARY AND TEACHING STRATEGIES

**Objective 1:** Review basic construction plans and elevation drawings.

**Anticipated Problem:** What is shown on construction plans and elevations drawings?

- I. Construction plans and elevations drawings
  - A. Trade and professional organizations have developed standard terminology and symbols used in construction. A **symbol** is a graphic figure or mark that represents a particular item on the construction documents. **Terminology** is the technical or special words used in business, art, and science as well as more specialized fields. The drafter, architect, and engineer use symbols and terminology to communicate the design to the manufacturer, contractor, and carpenter. Construction documents have a range of information that must be clearly communicated and organized. In addition to graphic drawings, notes and symbols are used to clarify and represent information.
    1. Notes must be precise and standard. The notes include the specific terminology used to describe or explain a design feature or a part. The symbols and notes are logically placed on the drawing and point to the location they reference. A construction note uses a leader that extends directly from the note to the object where it applies.
    2. Symbols and abbreviations are used to save space. The drafter is then able to include all the necessary information on the construction documents.
  - B. Symbols used in construction are numerous. Mechanical and electrical symbols are used in elevation, plan, or section drawings to communicate design and construction information. Most symbols used in elevation drawings are placed there to communicate design direction and are representational in appearance, much like the actual material or object. Symbols on a section drawing show the object as if it were sliced vertically and represents the composition of the object. Symbols used to represent an object on a plan usually look like the object; most construction information is represented graphically.
    1. Section drawing symbols are usually representative of the actual material makeup, and others are standard graphic representations.

2. Material symbols are used to fill in the outline of a shape or object on the drawing. The symbol represents the material for each object. For example, repetitive diagonal lines represent brick; the symbol for concrete is small dots; and medium to large polygons represent sand and gravel.
  3. A material's symbol (or object's symbol) may be different in an elevation or plan drawing than in a section drawing. In cases in which a large area is covered with the same material, the symbol may be used in a small portion of the drawing.
  4. Material symbols are shown in a material legend located at the beginning of the construction documents. The legend includes all the materials used in the drawing. The symbol for the material is located in a small rectangle next to the material name.
- C. Equipment and fixture symbols are present on construction drawings—plans and elevations. Many symbols use an abbreviation (or number) located within a square, circle, or other basic geometry to communicate the specific type. A series of schedules are included in the construction drawings. Schedules show the symbol and list all the important information about the equipment and/or fixtures.
1. A door symbol (tag) is next to the door on the plan drawing. A door schedule (next to the door symbol) is also present to show the door as it looks in the elevation plan. It may be assigned a number or an abbreviation. Windows, room finishes, electrical equipment, mechanical equipment, and other plan elements have schedules that include the related symbols and/or abbreviations.
  2. A separate symbol schedule may be generated for use on large construction sites or when some non-standard symbols are in use.

**Teaching Strategy:** Plan a field trip to a construction site for students to see the actual construction environment and how important it is to use clear and accurate symbols and terminology. Use VM–A to review.

## **Objective 2:** Interpret construction terminology and symbols.

**Anticipated Problem:** What are basic construction terms and symbols?

### II. Construction terminology and symbols

- A. Construction terminology and symbols have developed over many years due, in large part, to the influx of technology applications in building construction. Although there is no specific set of standard terms and symbols for every architect, contractor, engineer, builder, and installer, the following are common.
1. **Backfill** is the process of refilling an excavation, usually with excavated material that has been compacted and/or replaced with aggregate. The replacement of the earth (or other material) is often associated with a trench or pier excavation around and against a basement foundation, with the use of a form, the construction of a retaining wall, or a bulkhead.

2. A **building section view** is a drawing that shows a view along an imaginary “cut-through” of a building, indicating structural and construction elements.
3. An **elevation** is a drawing that shows vertical dimensions and the exterior appearance of the materials of a structure. An elevation is how the structure looks perpendicular to its surface.
4. A **girder** is a beam that supports floor joists.
5. A **joist** is one in a series of parallel framing members (horizontal) that supports a floor or ceiling load; it is a structural member that spans from wall to wall, wall to beam, or beam to beam. A joist is supported by beams or bearing walls.
6. **Joist hangers** are metal devices, shaped like a “U,” used to connect two joists (or a joist and a beam) at right angles to each other. Joist hangers are nailed on the side of girders or other beams to support ceiling or floor joists.
7. A **rafter** is one in a series of structural members of a roof designed to support roof loads. It is an internal vertical beam that holds up the roof load and is part of the roof’s framework. (The rafters of a flat roof are sometimes called roof joists.)
8. A **shear wall** is a structure composed of braced panels to counter the effects of lateral loads acting on a structure. It is also called a **shear panel**.
9. **Sheathing** is a layer of boards, plywood, gypsum board, or other wood or fiber materials nailed to the outside face of studs for exterior siding. It may be nailed to joists and rafters of a building to strengthen the structure.
10. A **sill plate** is the bottom horizontal framing member of a wall or building to which vertical members are attached. The sill comes in contact with masonry or concrete foundations.
11. **Structural members** are the components that frame and support a building. For strength in a structure, lumber that is 2 inches or more in thickness and 4 inches or more in width is used.
12. A **stud** is the vertical structural member of a frame wall (wood or metal) to which interior and exterior wall coverings are applied. Most wall studs are placed 16 inches on center.
13. A **tie** is a horizontal beam used to prevent two other structural members from spreading apart or separating. It is a structural component used to resist tension.
14. A **top plate** is the horizontal member on top of a wall section. It is a piece of lumber laid horizontally on top of the studs to tie them together and form a base for the framing above (a floor or a roof).
15. A **topographical plan** is a drawing that shows the various elevations used on the construction site as well as the main physical features (e.g., buildings, fences, rivers, roads, trees, and lakes).
16. A **truss** is a prefabricated, triangulated timber or metal structure used to support a roof. A truss is formed of one triangle or a series of triangles in a single plane. More than one truss is needed to support a load over a long span and transmit all of the weight to the exterior walls. As a result, none of the interior

walls are “load-bearing.” A truss goes up quickly and is incredibly strong. Configurations are:

- a. W truss
  - b. M truss
  - c. Scissor truss
  - d. Gable truss
17. A **truss plan** is a drawing that shows every truss in a roof system.
18. A **typical detail** is a drawing that shows the standard method of construction for a specific material joint or connection.
- a. Streets—curb and gutter, cul-de-sac, concrete sidewalk, driveway apron, and wheelchair ramp
  - b. Sanitary sewer—precast concrete person hole, bedding for PVC sanitary sewer pipe, and service cleanout cover assembly in traffic areas
  - c. Greenway construction—10-foot greenway trail, wooden safety railing, split-rail fence, metal gate, bench, and trash receptacle
19. A **valley** is the inside corner formed by intersecting roofs. It is the “lowest” point of a roof—where rafters from different angles come together.
20. A **vapor barrier** is a sheeting material (usually polyethylene film, roofing paper, or foil) applied to the warm side of a wall or floor (wood and concrete) to prevent the absorption and condensation of moisture. Without a vapor barrier, moisture can pass through a building’s envelope, penetrate, collect, and cause damage, including the formation of molds and fungi. Without a vapor barrier, water travels from the ground through the concrete and may cause the loss of bond or destruction of the floor covering.
- B. Construction symbols are defined in a schedule, such as a structural schedule, or in a legend.
1. Architectural symbols include building materials.
  2. Structural symbols include steel beams, columns, and lintels.
  3. Wall symbols include those for exterior and interior walls.
  4. Door and window symbols are more defined in the schedule.
  5. Miscellaneous graphic symbols and tags are used to reference other information that may be found on schedules or on additional drawings.

**Teaching Strategy:** a set of construction documents to class. Show students each plan, schedule, and legend. Point out the terms, symbols, and abbreviations on or associated with the construction plan, elevation, and section drawings. Use VM–B through VM–F. Assign LS–A.

**Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may be used in the Review/Summary.



- **Application.** Use the included visual master(s) and lab sheet(s) to apply the information presented in the lesson.
- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.
- **Answers to Sample Test:**

#### Part One: Matching

1. b
2. d
3. e
4. f
5. c
6. a

#### Part Two: True/False

1. T
2. F
3. T
4. T
5. F
6. T
7. T

#### Part Three: Short Answer

Answers will vary but should include four of the following symbols: architectural, symbols, structural symbols, walls, doors, windows, and miscellaneous graphic symbols and tags.

# Terminology and Symbols: Construction

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## ► Part One: Matching

**Instructions:** Match the term with the correct definition.

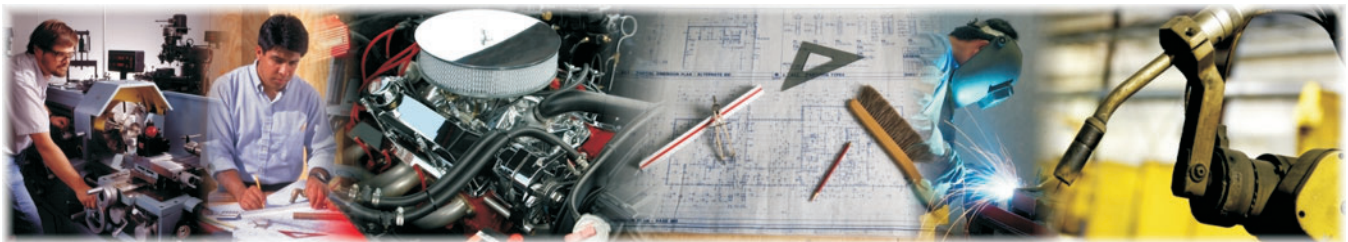
- |                          |                  |
|--------------------------|------------------|
| a. top plate             | d. sheathing     |
| b. building section view | e. vapor barrier |
| c. girder                | f. stud          |

- \_\_\_\_\_ 1. An imaginary “cut-through” of a building indicating structural and construction elements
- \_\_\_\_\_ 2. A layer of boards, plywood, gypsum board, or other wood or fiber materials nailed to the outside face of studs for exterior siding
- \_\_\_\_\_ 3. A sheeting material applied to the warm side of a wall or floor to prevent the absorption and condensation of moisture
- \_\_\_\_\_ 4. The vertical structural member of a frame wall (wood or metal) to which interior and exterior wall coverings are applied
- \_\_\_\_\_ 5. A beam that supports floor joists
- \_\_\_\_\_ 6. The horizontal member on top of a wall section

## ► Part Two: True/False

**Instructions:** Write *T* for true or *F* for false.

- \_\_\_\_\_ 1. Material symbols are shown in a legend located at the beginning of the construction documents.
- \_\_\_\_\_ 2. A joist is one in a series of structural members of a roof designed to support roof loads.





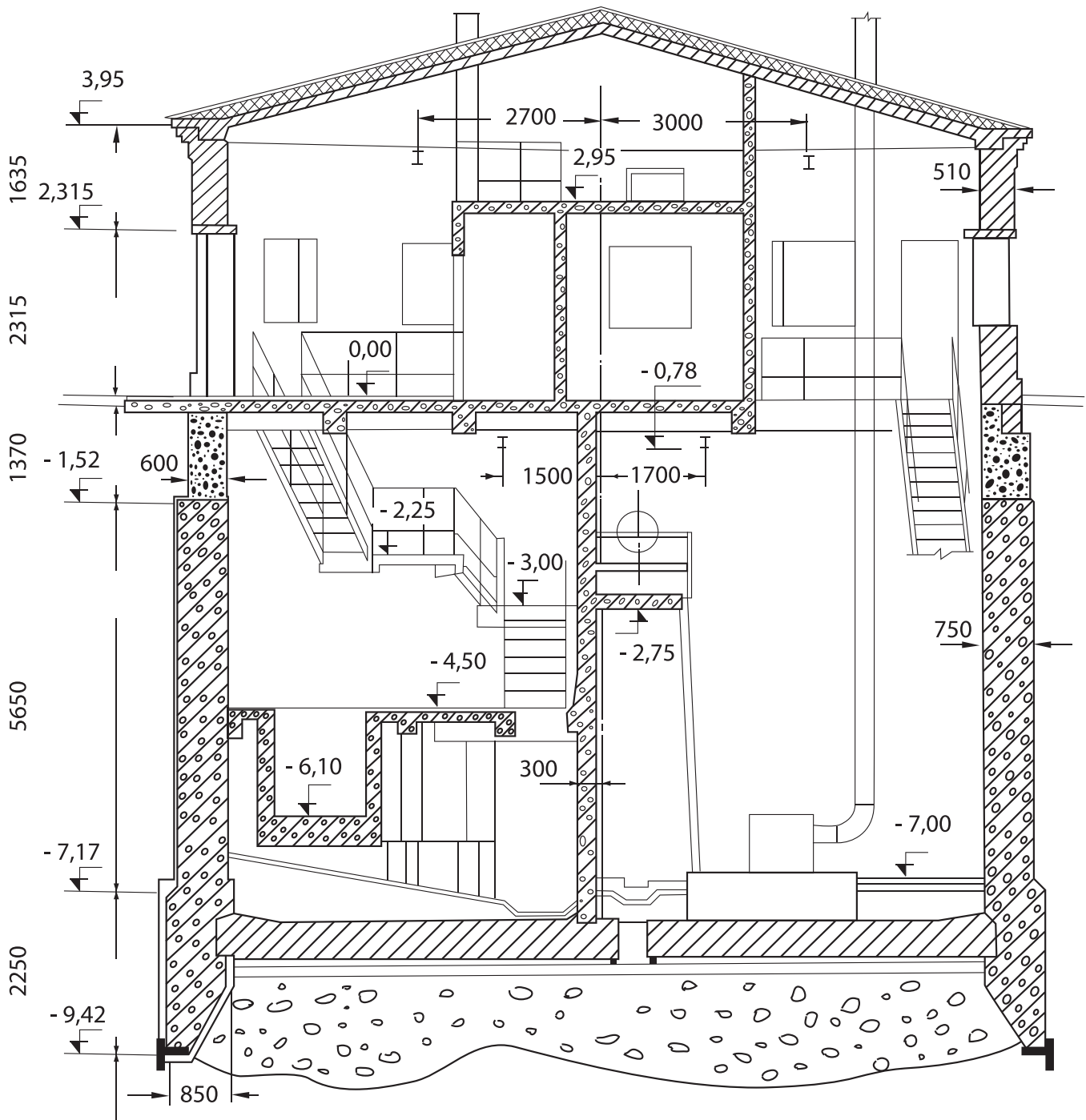
- \_\_\_\_\_ 3. A sill plate is the bottom horizontal member of a wall or building to which vertical members are attached.
- \_\_\_\_\_ 4. Joist hangers are metal devices that are nailed on the side of girders or other beams to support ceiling joists or floor joists.
- \_\_\_\_\_ 5. A building section view is a drawing that shows the standard way of construction for specific material joint or connection.
- \_\_\_\_\_ 6. A truss is a timber or metal structural member formed of one triangle or a series of triangles in a single plane.
- \_\_\_\_\_ 7. An elevation is a drawing that shows vertical dimensions and the exterior appearance of the materials of a structure.

### ► **Part Three: Short Answer**

**Instructions:** Answer the following.

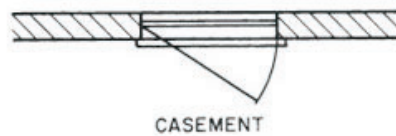
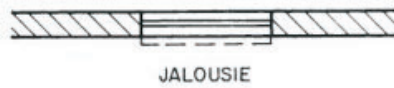
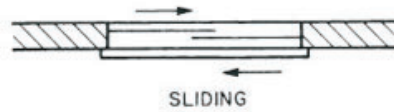
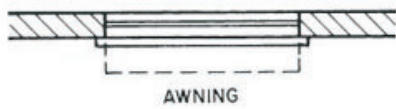
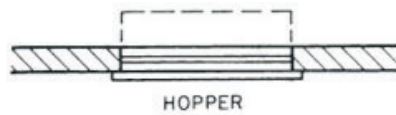
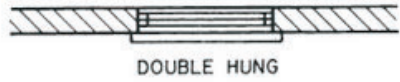
List four categories of symbols used on construction documents.

# CONSTRUCTION DRAWING

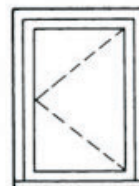
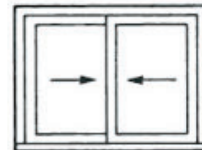
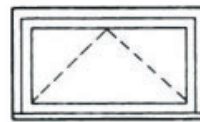
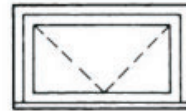
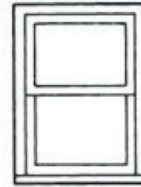


# WINDOW SYMBOLS







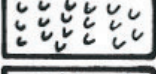


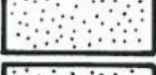




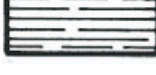

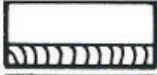










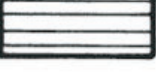



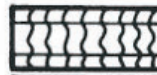






plan



elevation

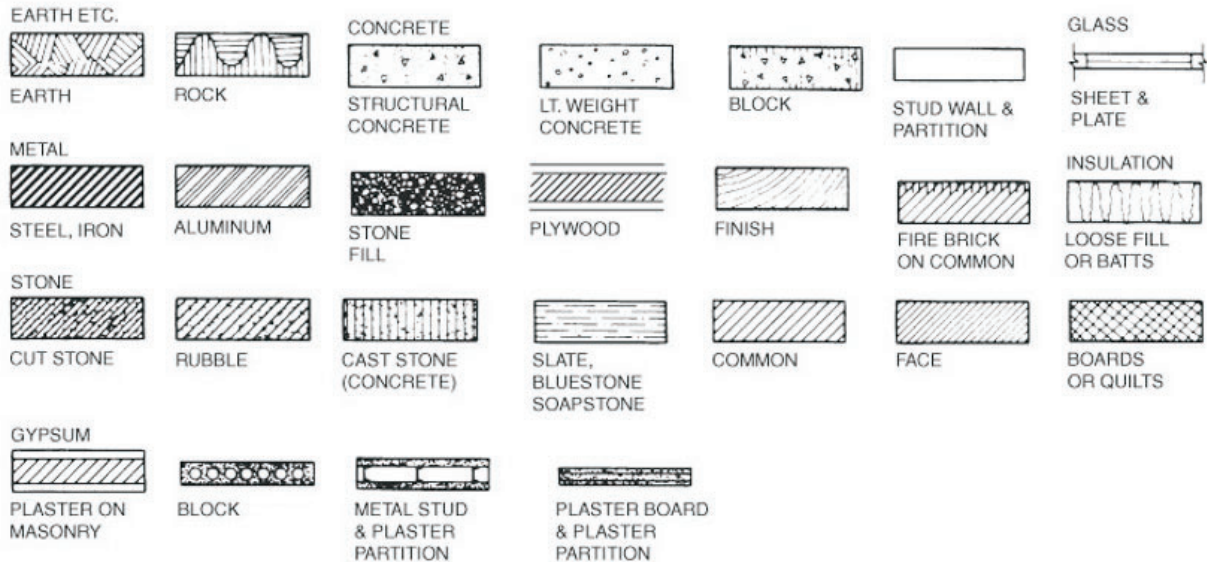


# BUILDING MATERIAL SYMBOLS

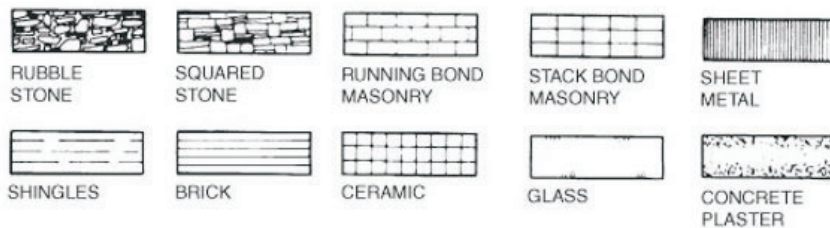
	EARTH		CONCRETE (CINDERS)		CUT STONE
	STONE		CONCRETE		RUBBLE STONE
	CINDERS		CONC. BLOCK		CAST STONE
	SAND		MARBLE ON CONCRETE		MARBLE
	CONCRETE (STONE)		TILE ON CONCRETE		SLATE
	STEEL		WOOD FINISH ON STUD		PLYWOOD
	CAST IRON		FINISHED WOOD		PLASTER
	BRASS		ROUGH WOOD		BLOCK PLASTER
	ALUMINUM		PLASTIC ON PLYWOOD		PLANK PLASTER
	COMMON BRICK		STUD WALL (PLAN)		GLASS
	FACE BRICK		FACING TILE		GLASS BLOCK
	FACE BRICK WITH COMMON BRICK		FACE TILE		STRUCTURAL GLASS
	CLAY TILE		CLAY TILE FLOOR UNITS		

# CONSTRUCTION AND BUILDING MATERIAL SYMBOLS

## symbols - plan and section


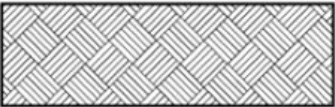
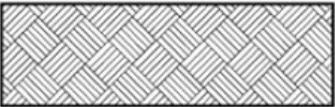
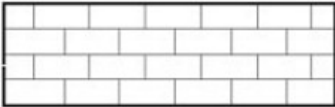



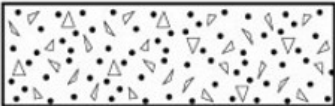
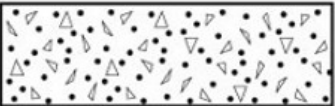
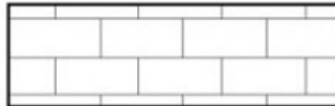
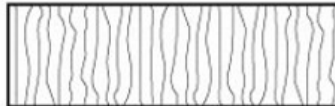


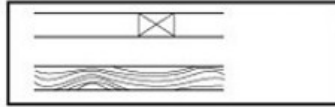




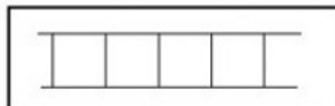
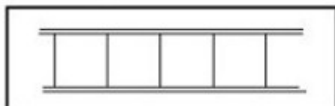
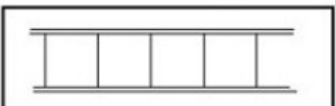





## symbols - elevation



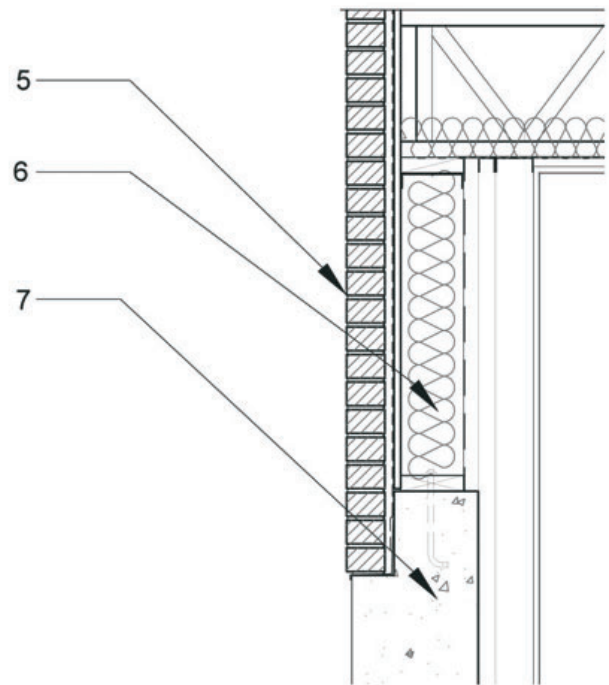
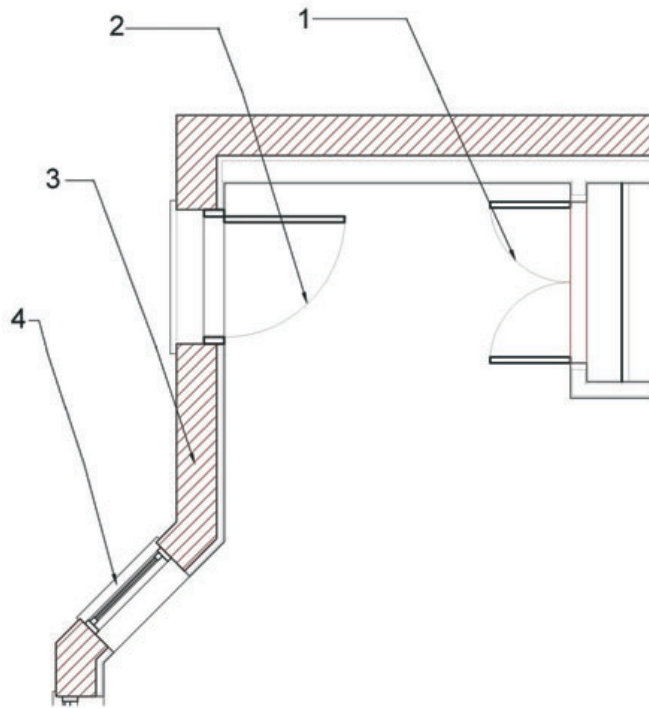


# ARCHITECTURAL AND BUILDING SYMBOLS: ELEVATION, PLAN, AND SECTION

	Elevation	Plan	Section
EARTH			
BRICK			
CONCRETE			
CONCRETE BLOCK			
WOOD			
GLASS			
GLASS BLOCK			
INSULATION			



# CONSTRUCTION PLAN



# Construction Symbols

## Purpose

The purpose of this activity is to interpret symbols on a construction plan.

## Objectives

1. Read a construction plan.
2. Identify symbols on a construction plan.

## Materials

- ◆ VM-F (one copy per student or a projected image)
- ◆ writing utensil

## Procedure

1. Work independently to complete this lab sheet.
2. The construction plan (VM-F) includes seven symbols for you to identify. An arrow and a leader line (a line with a letter at the end) indicate which symbols you need to identify and/or define.
3. List the meaning of each construction symbol in the spaces provided.
  - a.
  - b.
  - c.
  - d.
  - e.
  - f.
  - g.
4. Optional: Label other symbols shown on the construction plan using a leader line.
5. Turn in your completed lab sheet to your instructor.