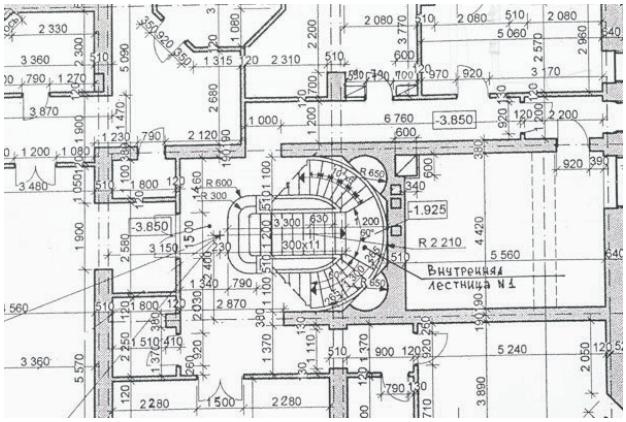
Terminology and Symbols: Construction

INFORMATION found on construction drawings can appear to be complicated. However, symbols and the correct terms can help clarify and communicate instructions between the architect, drafter, contractor, carpenter, and manufacturer. The terms and symbols are commonly used across construction trades. It is similar to learning another language; without knowing the correct terms and symbols, it is almost impossible to understand what construction drawings are intended to communicate.



Objectives:

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

Key Terms:

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

Construction Plans, Elevations, and Section Drawings

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.

NOTES

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. You must use precise and standard notes. The notes include the specific terminology used to describe or explain a design feature or 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.

SYMBOLS AND ABBREVIATIONS

Symbols and abbreviations are used to save space. Then the drafter is able to include all the necessary information on the construction documents. Several types of symbols are used in construction. 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 communicate design direction and are representational in appearance.

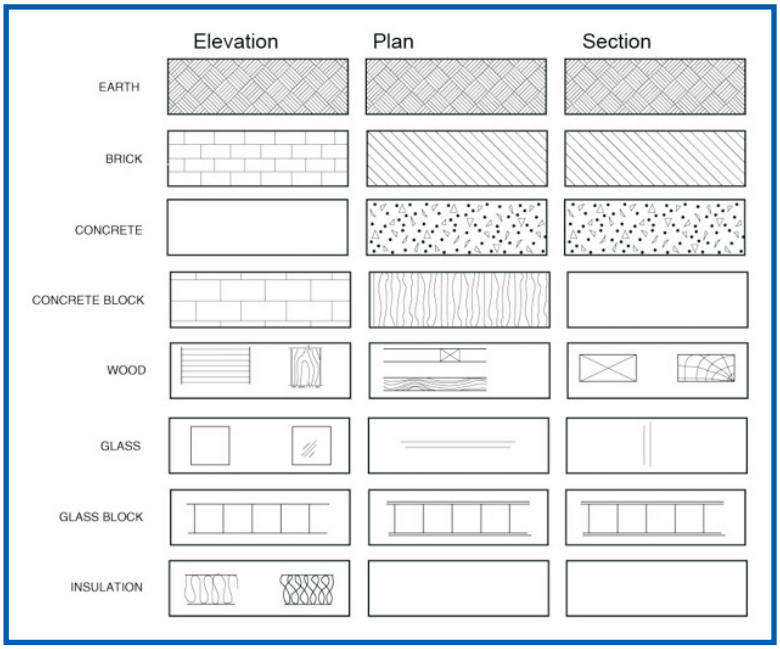


FIGURE 1. Symbols used for construction materials range from looking similar to the real material to a simple graphic, such as lines or dots. They may be represented differently in elevation, plan, and section drawings.

Symbols

Symbols on a section drawing show the object as if it were sliced vertically; it 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. Section drawing symbols are usually representative of the actual material makeup, and others are standard graphic representations. 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.

As with object symbols, a material's symbol may be different in an elevation or plan drawing than in a section drawing. In some cases in which a large area is covered with the same material, the symbol may only be used in a small portion of the drawing. 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.

Equipment and Fixture Symbols

Equipment and fixture symbols are present on construction drawings, both plans and elevations. Many symbols use an abbreviation (or number) located within a square, circle, or other basic geometry to communicate the specific type. Included in the construction drawings are a series of schedules. Schedules show the symbol and list all the important information about the equipment and/or fixtures.

Door Symbol

A door symbol or (tag) is located next to the door on the plan drawing. A door schedule (located next to the door symbol) is also present to show the door as it looks in the elevation plan. It may also be assigned a number or an abbreviation. Windows, room finishes, electrical equipment, mechanical equipment, and other plan elements also have schedules that include the related symbols and/or abbreviations.

Miscellaneous Symbol

A separate symbol schedule may be generated for use on large construction sites or when some non-standard symbols are in use.

FURTHER EXPLORATION...

ONLINE CONNECTION: How to Read Construction Documents

Learning to read construction documents can take some time and practice. Most information is in a coded form or represented by an abstract graphic. It is absolutely necessary to learn what all the symbols and terms mean and how they are represented on a drawing. To learn more about how to read construction drawings please visit http://www.youtube.com/watch?v=Nw_HdCH6wBI.

Construction Terminology and Symbols

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 that every architect, contractor, engineer, builder, and installer uses, the following are commonly used in the industry.

TERMINOLOGY

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.

- A **building section view** is a drawing that shows a view along an imaginary "cut-through" of a building indicating structural and construction elements.
- An **elevation** is a drawing that shows vertical dimensions and the exterior appearance of the materials of a structure; how the structure looks perpendicular to its surface.
- A **girder** is a beam that supports floor joists.
- A **joist** is one in series of parallel framing members (horizontal) that supports a floor or ceiling load; a structural member that spans from wall to wall, wall to beam, or beam to beam. Joists are supported by beams or bearing walls.
- **Joist hangers** are metal devices, shaped like a "U," that are used to connect two joists or a joist and a beam at right angles to each other. Joist hangars are nailed on the side of girders or other beams in order to support ceiling or floor joists.
- 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.)

FIGURE 2. Joist hangers are the standard connection between a joist and a wall or a beam. They are engineered and are quickly put in place. There are several types, each for a different condition; two common types can be seen in this image.

- **Shear wall (shear panel)** is a wall composed of braced panels to counter the effects of lateral loads acting on a structure.
- **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. (May also be nailed to joists and rafters of a building to strengthen the structure.)
- 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.
- **Structural members** are the components that frame and support a building. When strength is required in a structure, lumber that is 2-inches or more thick and 4-inches or more wide is used.
- 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.
- 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. There are tension ties, collar ties, and rafter ties.
- 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).
- 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, lakes, etc.).
- A **truss** is a prefabricated, triangulated timber or metal structures used to support a roof. Trusses are formed of one triangle or a series of triangles in a single plane. Trusses support a load over a long span and transmit all of the weight to the exterior walls; then none of the interior walls are "load-bearing." Trusses go up quickly and they are incredibly strong. Configurations include: W trusses, M trusses, Scissor trusses, and Gable trusses.
- A **truss plan** is a drawing that shows every truss in a roof system.
- A **typical detail** is a drawing that shows the standard method of construction for a specific material joint or connection. For example: streets, sanitary sewers, and greenway construction.
- A **valley** is the inside corner formed by intersecting roofs. Valleys are the "lowest" point of a roof where rafters from different angles come together.

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 cause the loss of bond or destruction of the floor covering.

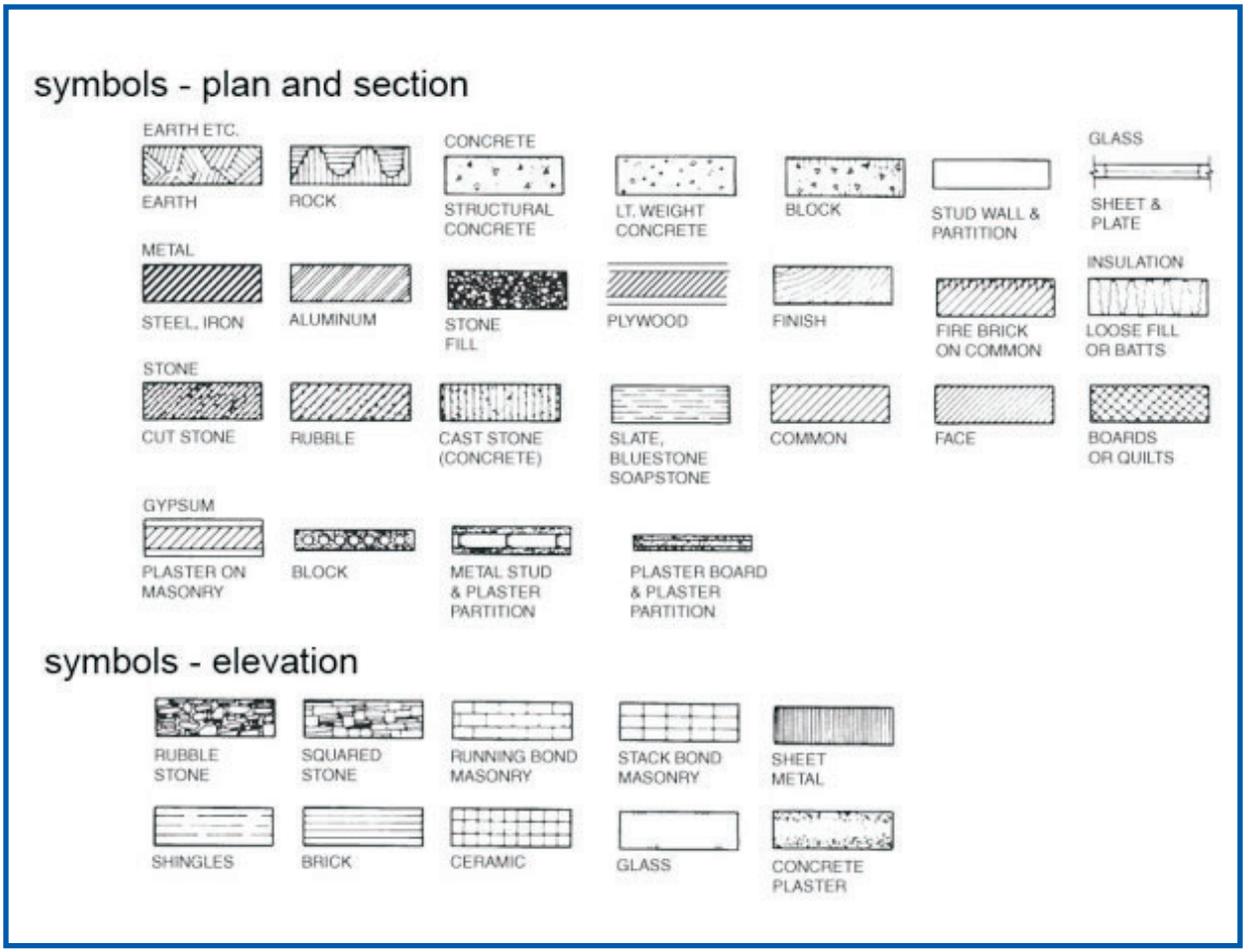


FIGURE 3. Building material symbols are used in construction drawings to show the finish material for a project, such as a floor or wall. Symbols are also used to show the internal material of construction systems and are used in detail drawings to show the make-up of walls, floors, and ceilings.

SYMBOLS

Construction symbols are defined either in a schedule, such as a structural schedule, or in a legend. Architectural symbols include building materials.

- Structural symbols include steel beams, columns, and lintels.
- Wall symbols include those for exterior and interior walls.
- Door and window symbols are also more defined in the schedule.

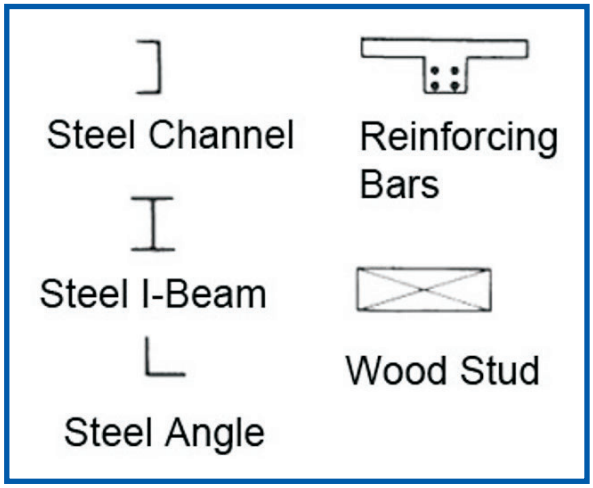


FIGURE 4. Structural symbols are generally simple and basic, showing the shape and size of the structural member.

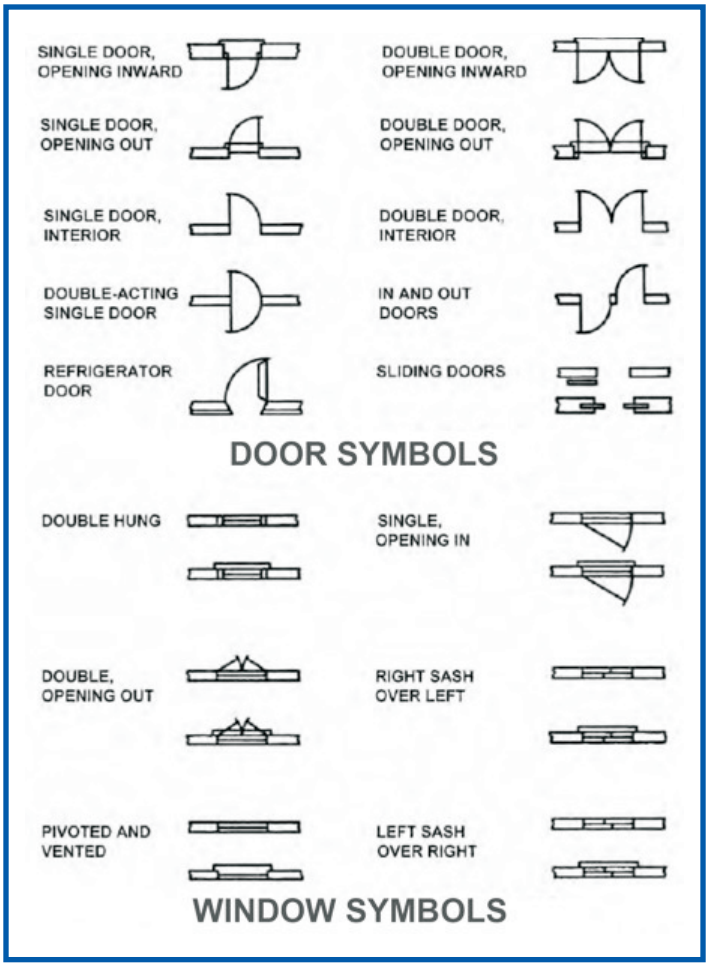


FIGURE 5. The symbols used on construction drawings for doors and windows are simplified graphics of the door or window appearance. Each type of door and window has its own symbol.

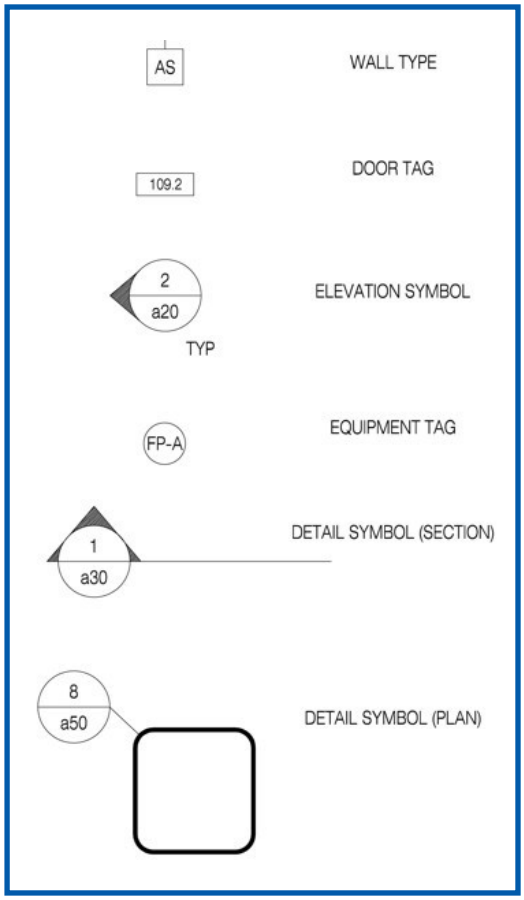


FIGURE 6. Miscellaneous symbols, such as those shown here, are used to reference another drawing or schedule. Most are standard, and they are sometimes located in a symbol legend.

- Miscellaneous graphic symbols and tags are used to reference other information that may be found on schedules or on additional drawings.

Summary:

Construction documents have a range of information all of which must be clear and organized for all readers. In addition to graphic drawings, there are notes and symbols used to clarify and represent information.

Most of the symbols used in elevation drawings look like the actual material or object. The symbols used in a section drawing show the object as if it were sliced vertically and represent the composition of the object. Plan symbols that represent an object usually look like the object; and most of the construction information is represented graphically. Some of the section symbols are representative of the actual material makeup. Others are just standard graphic representations.

Many equipment symbols use an abbreviation (or number) that is located within a square, circle, or other basic geometry. There are standard symbols and terms that are used by contractors, architects, engineers, installers, and builders.

Checking Your Knowledge:

1. Which drawing shows a view along an imaginary cut-through of a building?
2. What is the term for the vertical structural member in a wall?
3. What material prevents moisture from penetrating a building?
4. Which drawing shows what the exterior of a structure looks like perpendicular to its surface?
5. Which drawing shows every truss used to make up a roof system?

Expanding Your Knowledge:

A great way to learn more about reading construction symbols and terms is to visit a construction company or an architectural firm. These professionals use these symbols and terms all the time and can help explain the importance of using them correctly. Plan a trip to one of these offices and prepare a list of questions before hand.

Web Links:

Blueprint Reading and Sketching
http://www.craftsmanspace.com/free-books/blueprint-reading-and-sketching.html

Construction Dictionary and Glossary of Construction Terms
http://www.builderspace.com/glossary.html

Construction Trade: Technical Schools and Training
http://www.khake.com/page84.html

Video: How to Read Construction Drawings and Floor Plans
http://video.about.com/architecture/How-to-Read-Construction-Drawings-and-Floor-Plans.htm