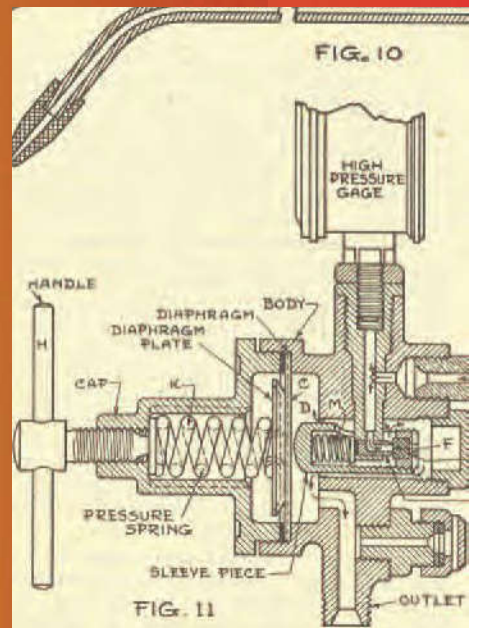


# Blueprint Reading



Module 1	
Basic Blueprint Reading Principles	5-2
Module 2	
Plans and Drawings	5-10
Module 3	
Scales and Dimensions	5-24



## Module 1 - Basic Blueprint Reading Principles



### Table of Contents

Introductory Information	5-2
Learning Objectives	5-3
Blueprint Defined	5-3
How a Blueprint is Made	5-3
The “Set of Plans”	5-4
The Importance of Plans	5-4
Specifications	5-5
Using The Plans and Specifications	5-5
Cover/Title Sheets	5-5
Architectural Drawings	5-6
Structural Drawings	5-6
Mechanical Drawings	5-6
Electrical Drawings	5-6
Architectural Drawings	5-6
Shop Drawings	5-7
Plot or Site Plan	5-7
Classroom Exercise	5-8
Homework Exercise	5-9

5-2

### List of Figures

Figure 1: Apartment Building (DWG A100; File A001)	5-5
Figure 2: Bank Building (DWG A02; File A003)	5-7

### Introductory Information

**Prints, plans, and/or drawings communicate how a building is to be built and what the structure will look like when it is completed. Everyone involved in the planning, supplying, and/or building of any structure must be able to read construction prints, plans, or drawings.**

**Blueprints and everyday road maps are designed using a similar method. They contain the big picture or general information and narrow to more refined or detailed information. Just as an atlas contains all the information for many different places, a blueprint contains all the information for a structure.**

**Module 1 - Basic Blueprint Reading Principles****Learning Objectives**

After completing this module, students should be able to:

- 1. Define blueprint and blueprint reading.**
- 2. Define plans and specifications.**
- 3. Describe how plans and specifications are prepared.**
- 4. Describe the purpose and importance of a set of plans.**
- 5. Identify and define various parts of a set of plans.**

**Blueprint Defined**

Blueprints, or construction drawings, are the sets of detailed architectural drawings used by a homebuilder and contractors to construct a house. Blueprints are a map of the home building process including drawings, symbols, legends, and elevations. Blueprints provide a universal language by which all information about a part is furnished to the craftsman, technician, designer, and others.

Blueprint reading refers to the process of interpreting a drawing. An accurate mental picture of how the object will look when completed can be formed from the information presented.

Originally, architectural drawings were reproduced by a technique that resulted in pages with white lines on blue paper, hence the name "blueprints." Technology has advanced and most drawings are done on a computer CAD system and printed out as black lines on white paper. The term "blueprints" is still used by some to describe a set of construction drawings.

**How a Blueprint is Made**

The original drawing or tracing must be reproduced many times. With this in mind, engineers and draftsmen employ computers

and materials that allow them to create drawings that can be copied.

They can draw their original on special transparent paper or polyester film called vellum, which is placed over a sheet of sensitized paper and is then exposed to ultraviolet light. The exposed paper is then fed through a developing process and it becomes a print.

The computer option is called CAD, or computer-aided design, which allows the designer to create copies via computer.



## Module 1 - Basic Blueprint Reading Principles

### The “Set of Plans”

The term “set of plans” is one name for construction drawings and blueprints. Other commonly used terms include prints and plans.

The starting point for understanding any job is to become familiar with the drawings in the set of plans. The drawings are usually grouped in different areas. The five most common areas and the letter codes that usually identify them are these:

- Architectural drawings are identified with the letter “A”
- Structural drawings are identified with the letter “S”
- Mechanical drawings are identified with the letter “M”
- Plumbing drawings are identified with the letter “P”
- Electrical drawings are identified with the letter “E”

Each set of specialty drawings is kept together and each sheet is separately numbered. For example, if the architectural drawings had several pages, the individual pages or sheets would be numbered A1, A2, A3, and so on.

### The Importance of Plans

Whether the job is residential, commercial, or industrial, chances are a set of plans will play an important role. The set of plans or working drawings form the basis of the agreement and understanding that a building will be built as planned by the architect.

Before a worker steps on a job site, the contractor must first use the plans (and specifications) to prepare a bid or an estimate for the job. The plans must be consulted to

determine what types of materials and finishes are to be used in specific applications.

The set of working drawings or plans graphically shows the structure’s design, dimensions, layout, location, and many other specific construction details. Specifically, the plans and specifications provide information on all of these: 1) the design of the building, 2) the scope of work to be done, 3) materials to be used, 4) equipment to be installed, and 5) installation methods to be followed.



The set of plans, together with the written specifications, are part of the “contract documents.” They constitute a legal document that spells out the conditions for building a structure. No changes can be made to these documents without written permission from the architect.

The original working drawings are kept on file and are considered legal documents. They are always available for reference or to make additional sets of prints. After the structure is completed, and all changes have been made on the working drawings, they are called record drawings or as-built drawings.

## Module 1 - Basic Blueprint Reading Principles

### Specifications

Specifications are often called specs and provide detailed information that cannot be provided by the drawings alone. Specifications are highly detailed and legally binding information about equipment, materials, style, workmanship, and finishes for the job. Specifications also describe the work to be done and give conditions such as job completion deadlines, penalty clauses, payments, change orders, and procedures.

### Using the Plans and Specifications

The plans and specifications describe how a building is to be constructed. The specifications are detailed written instructions about how the building is to be built.

Plans generally contain several sheets depending upon the size and complexity of the job. Smaller jobs, generally speaking, will not require as many specialized sheets as a large job.

The plans for a large commercial building will be

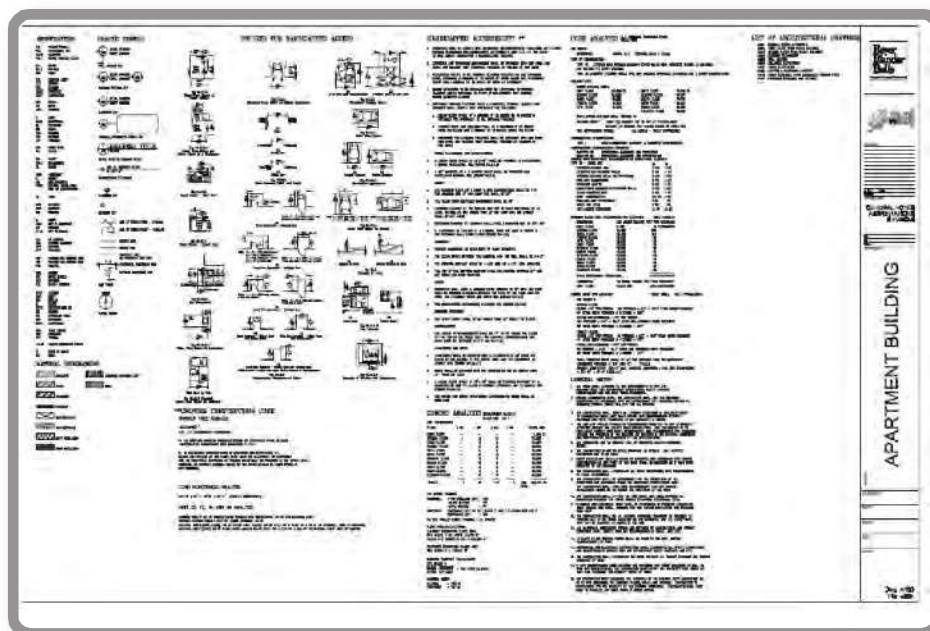
prepared by more than one office. The architect is responsible for the overall design of the building. A structural engineering firm produces the structural drawing; a mechanical engineering firm produces the mechanical drawing, and so on.

The plans for a large commercial building will most likely include Cover/Title Sheets, Civil Drawings, Architectural Drawings, Structural Drawings, Mechanical Drawings, and Electrical Drawings.

### Cover/Title Sheets

Cover/Title Sheets will give a great deal of general information. Cover/Title Sheets identify the project with information such as the name of the project, the name of the owner, and the name of the major firms that have designed the project. Additional information may include:

- Table of contents to display what sheets are in the set and how each sheet is identified
- Door, hardware and finishing schedules



**Figure 1: Apartment Building (DWG A100; File A001)**

## Module 1 - Basic Blueprint Reading Principles

- Schedule of notations and symbols used to reference and identify detail drawings
- List of abbreviations
- Title block to provide information about the project and the particular sheet. Title blocks usually contain the job title and location, project number, name of the architectural firm, the name of the engineering firm, sheet number, sheet title, names or initials of those who did the drafting, checking, or approving of the drawing, and date of completion of drawing. The title block may also show the scale of the drawing.

### Architectural Drawings

Architectural Drawings are working drawings consisting of plans, elevations, details, and other information necessary for the construction of a building. Architectural drawings describe the physical form of a building. They show what a building looks like and what is included in it. The architectural drawings are plans and elevations. They usually include:

- A site (plot) plan indicating the location of the building on the property
- Floor plans showing the walls and partitions for each floor or level
- Elevations of all exterior faces of the building
- Several vertical cross sections to indicate clearly the various floor levels and details of the footings, foundations, walls, floors, ceilings, and roof construction

### Structural Drawings

Structural drawings show the structure that supports the building. Structural drawings consist of all drawings that describe the structural members of the building and their relationship to each other. A set of structural drawings include foundation plans, framing plans and details, wall sections, column and

beam details, as well as sections, details, and schedules necessary to describe the structural components of the building structure.

### Mechanical Drawings

Mechanical Drawings show the mechanical systems for the building. These include:

- Mechanical site plan
- Plumbing plans
- Plumbing details
- Plumbing schedules
- Heating, ventilating, and air conditioning plans

### Electrical Drawings

Electrical Drawings show the electrical wiring and equipment such as the service entrance, electrical meter, panel boards, conduit, and all electrical outlets, fixtures, and controls. All electrical plans must conform to requirements of the local, state, and national electrical codes and rules. Electrical drawings include:

- Electrical site plan
- Electrical plans (power plans, lighting plans)
- Electrical details
- Electrical schedules (lighting, fixtures)

### Architectural Drawings

The architectural drawings are a means of transferring the thoughts of the architect to the various craftspeople whose responsibility it is to construct the building. Architectural drawings are the basis for all the other drawings. For example, if the plan is created on computer, the floor plan layer can be called up and the mechanical system layer or other system layer is drawn over it. When the drawings are made by hand, a tracing of the architectural floor plan is used to make the structural plan or mechanical plan.

## Module 1 - Basic Blueprint Reading Principles

When using a set of drawings, always start by studying the architectural drawings because they allow the worker to see how any feature fits into the building as a whole.

### Shop Drawings

Shop drawings are based on the original architectural plans. A shop drawing takes a portion of a structure and details the exact design, dimension, and materials that will be used by a specific trade. For example, shop drawings prepared specifically for the glazing trade's use will show the type of glass to be installed, the location of the units, the installation method, and any other pertinent information.

Shop drawings are normally made by fabricators and specialty contractors. After review and approval by the architect/engineer they become a part of the working drawings.

### Plot or Site Plan

The plot or site plan is the view of the structure from directly above. This plan will show the location of the building on the site as well as the roof view, property lines, roads, railroad tracks, the topographical layout, power lines, shrubbery, walkways, driveways, and utilities.

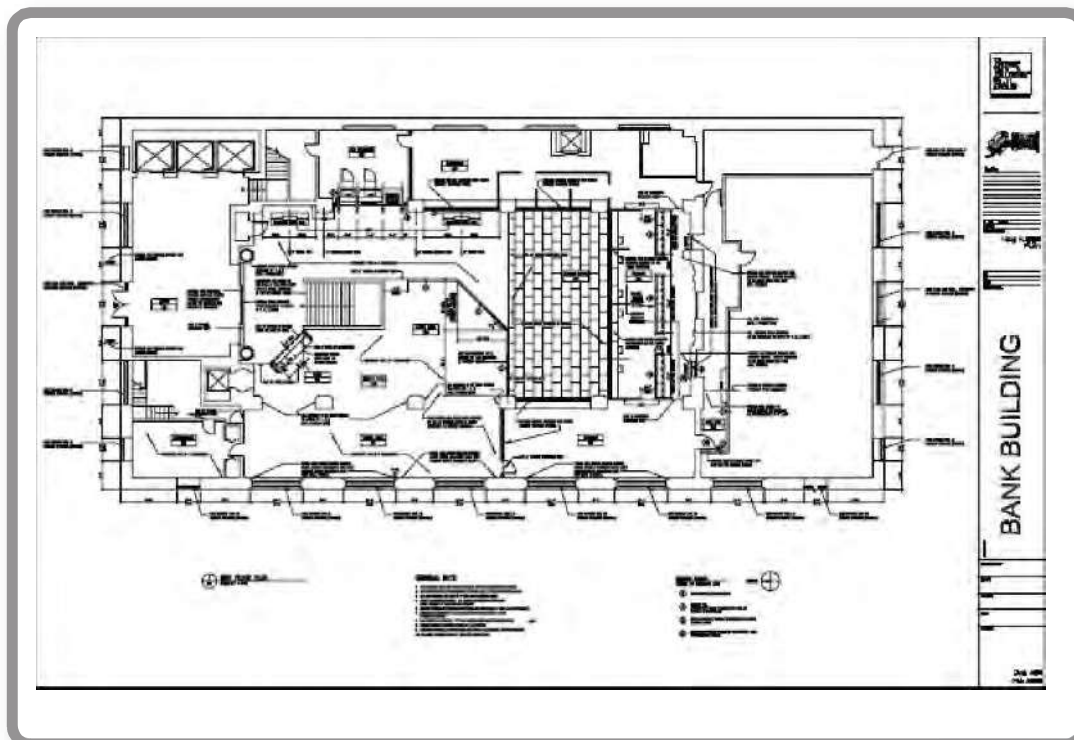


Figure 2: Bank Building (DWG A02; File A003)

## Module 1 - Basic Blueprint Reading Principles

### Classroom Exercise

Name: \_\_\_\_\_ Date: \_\_\_\_\_

- 1.** What forms the basis of agreement and understanding that a building will be built as planned by the architect?
  - A. Sketchings
  - B. Set of plans or working drawings
  - C. CAD
  - D. Specifications
- 2.** What constitutes the legal documents that spell out the conditions for building a structure?
  - A. Contract documents
  - B. Specifications
  - C. Blueprints
  - D. Bid
- 3.** Original working drawings are considered legal documents.
  - A. True
  - B. False
- 4.** The “set of plans” most likely includes:
  - A. Schedules, contract, bid proposals, alterations, contractor list
  - B. Schematics, production plans, change orders, as-built drawings
  - C. CAD drawings, shop drawings, engineering details, material lists, permits
  - D. Electrical, mechanical, structural, architectural drawings, cover sheet
- 5.** What letter code is used to identify a structural drawing in a set of plans?
  - A. M
  - B. E
  - C. S
  - D. A
- 6.** What is the means of transferring the thoughts of the architect to the various craftspeople constructing a building?
  - A. Site plan
  - B. Architectural drawings
  - C. Floor plan
  - D. Specifications
- 7.** What is shop drawings based on?
  - A. Architectural plans
  - B. Specifications
  - C. Plot plan
  - D. Building plan
- 8.** Symbols generally resemble the object or material they represent?
  - A. True
  - B. False
- 9.** What shows the location of the building?
  - A. Structural drawings
  - B. Shop drawings
  - C. Plot or site plan
  - D. Floor plan
- 10.** Generally, which plan provides the largest amount of information?
  - A. Elevation
  - B. Cross section
  - C. Details
  - D. Floor plan
- 11.** It takes a portion of a structure and details the exact design, dimensions and the materials use by a specific trade?
  - A. Architectural drawings
  - B. Cross sections
  - C. Shop drawings
  - D. Schedules



**Module 1 - Basic Blueprint Reading Principles****Homework Exercise**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Column A**

- A. Architectural Drawings
- B. Cover/Title Sheets
- C. Plot or Site Plan
- D. Structural Drawings
- E. Mechanical Drawings
- F. Electrical Drawings
- G. Shop Drawings

**Column B**

- 1.** \_\_\_ Drawings that take a portion of a structure and details the exact design, dimension, and materials that will be used by a specific trade.
- 2.** \_\_\_ These drawings include heating, ventilating, and air conditioning plans. They also include plumbing details and schedules.
- 3.** \_\_\_ Drawings that consist of plans, elevations, details, and other information necessary for the construction of the building. They show what a building looks like and what is included in it.
- 4.** \_\_\_ Show the electrical wiring and equipment such as conduit, panel boards, service entrance, and all electrical outlets, fixtures, and controls.
- 5.** \_\_\_ This plan shows the location of the building on the site as well as the roof view, property lines, roads, railroad tracks, the topographical layout, power lines, shrubbery, walkways, driveways, and utilities.
- 6.** \_\_\_ Drawings that show the structure that supports the building and describe the structural members of the building and their relationship to each other.
- 7.** \_\_\_ Identifies the project with information such as the name of the project, the name of the owner, and the name of the major firms that have designed the project.