

UNIT 42

The Working Drawing

OBJECTIVES

After studying this unit, the student will be able to

- describe the major sections of a set of working drawings.
 - explain the relationships between various parts of a drawing.
 - describe relationship of working drawings to drawings.
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Every construction job, regardless of the size and design, must have a set of working drawings. *Working drawings* are completely dimensioned views accompanied by all necessary notes. Working drawings are supplied to all of the trades involved in that particular job.

A complete set of drawings for a structure usually includes three major sections: architectural, structural, and mechanical and electrical. If the project is large or complicated, there may be a set for each major section to reduce the time necessary for the various tradespersons to locate information.

Within the three major sections are subdivisions, usually assembled in the following order: **plot plan**, foundation plan and floor plan, elevation drawing, sectional drawing, and detailed drawing.

When studying plans, the mason must be especially careful to read all notes included in the drawings, since they supply a great amount of information supplementing the drawing. It is important to consult the specifications for any information not shown on the plans.

SPECIFICATIONS

Specifications are defined as a written or printed description for contract purposes for a structure or equipment, and the materials and workmanship standards required on a particular job by the architect. The specifications should agree with the working drawings and contain standard provisions and any special provisions, as may be deemed necessary by the architect, pertaining to the quantities and qualities of materials

and the scope of work by the various trades working on the job. They form a part of the contract between the builder and the architect. Since they are considered to be a legal and binding part of the contract, in the event of a dispute, they can be used in court of law as evidence!

When conflicts arise on the job concerning a difference between the working drawing and the specifications, the job supervisor or foreman and the architect or his representative should meet and settle the issue. In most cases, the specifications will overrule or take precedence over the working drawing, unless there is an obvious mistake that can be corrected on the job through a mutual agreement between the two parties. In any case, the mason's employer should always be a part of any agreement and a letter or change order be instituted and signed by both parties, to avoid a misunderstanding at the completion of the job. If there is going to be additional cost to the mason contractor, this should be determined and agreed to before proceeding. Both the builder's superintendent and the masonry foreman should initial the working drawing and date the agreement, so there will be no argument later. In addition, any changes or inconsistencies on the drawing should be indicated in red pen and initialed by all parties. These are referred to as "as-builts." *Never orally agree to a change that is going to cost the masonry contractor more money, as you may be left holding the bag at the end of the job!* The mason or the foreman who is responsible for the job should always study the plans and read the specifications before starting any work on a new job. That is the time to have any

questions resolved, not later when it may involve tearing down and rebuilding masonry work. It is important to remember that basically the main difference between the specifications and the working drawings is that the working drawings show the location, height, length, and thickness of masonry walls, along with the sizes of openings and overall illustrations, etc., as the building will look when completed. The specifications state the other information needed to construct the structure, such as kinds of brick or masonry units, methods of bonding, type of mortar to use, and so forth. The specifications and the working drawings go hand in hand and both are necessary to complete or renovate any structure.

Format for Specifications

In order that no areas or components of a building are missed in the construction process, the format or style that specifications are written in varies, depending on the complexity of the project and its requirements. Simply stated, they are the printed instructions of the architect to the builders of what is required for the job. For most large jobs the architects follow the form established by the Construction Specifications Institute (CSI). Following the CSI format makes the job of finding information and requirements of each trade and area of the job much simpler in the specifications handbook.

The CSI Format consists of sixteen divisions as follows:

- Division 1—General Requirements
- Division 2—Site Work
- Division 3—Concrete
- Division 4—Masonry
- Division 5—Metals
- Division 6—Wood and Plastic
- Division 7—Thermal & Moisture Protection
- Division 8—Doors and Windows
- Division 9—Finishes
- Division 10—Specialties
- Division 11—Equipment
- Division 12—Furnishings
- Division 13—Special Constructions
- Division 14—Conveying Systems
- Division 15—Mechanical
- Division 16—Electrical

When you put all these together with all of the sub-headings that each division represents, they cover just about any thing that might be used in a new building. Regardless of new developments in the construction industry building requirements will fit somewhere in one of these divisions. From small projects such as houses or small office buildings to large projects, the size of the specification book will range from a very small to a large heavy book. It is essential for the masonry foreman or superintendent on the job to be as familiar with the specifications as they are with the working drawings.

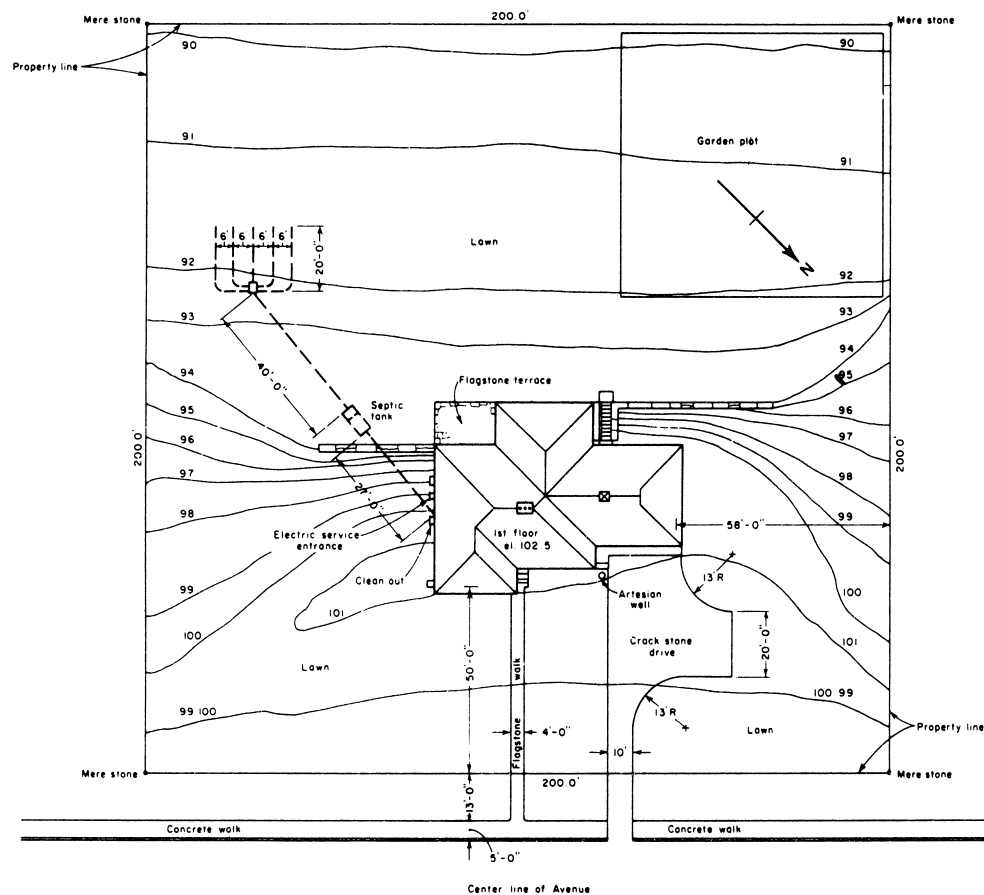
PLOT PLAN

The architect usually draws a plot plan for a building of any size or importance. The *plot plan* (also known as a site plan), **Figure 42-1**, supplies information on the following:

- Property line
- Overall building lines for the proposed structure
- Contour lines showing the rise and fall of the ground
- Indications of the location of trees, shrubs, sidewalks, driveways, septic systems, and well
- Utilities—electric, water, and so forth.

Also included on the plot plan is a reference point for determining elevations, commonly called a *benchmark*, and the *grade line* or *grade level*, which shows the rough and finished levels of the ground surrounding the structure. The elevation is calculated from coastal sea level points established by the National Oceanographic and Atmospheric Administration. Information on the grade line is very important to the masons on the job because they must be able to determine at which level to stop laying concrete block for the foundation and where to begin laying the exposed masonry such as brick or stone. The location of the land on which the job is to be built is determined by the surveyor from city or county land records, deeds, or known reference points.

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PLOT PLAN

Scale $\frac{3}{4}$ " = 20'

Fig. 42-1 Typical plot plan.

A complete plot plan is necessary before local planning and zoning authorities will issue a building permit. Many banks and mortgage companies require that a survey and plot plan be submitted before loans on the property can be made.

The plot plan usually indicates the location of the building on the plans in reference to the points of a compass. This greatly simplifies locating a particular view on a plan. It is a good practice to spread the plot plan out on the worktable in the same position as the building is to actually be built on the lot to eliminate possible errors.

FLOOR AND FOUNDATION PLAN

Floor plans show the measurement and location of such items as walls, windows, doors, chimneys, and electrical devices, **Figure 42-2**.

Most sets of plans also contain plan views for the foundation and second floor if they exist, **Figure 42-3**. The information found on the foundation plan is of extreme importance since all of the upper parts of the structure depend upon accurate layout and construction of the footing and foundation. All measurements

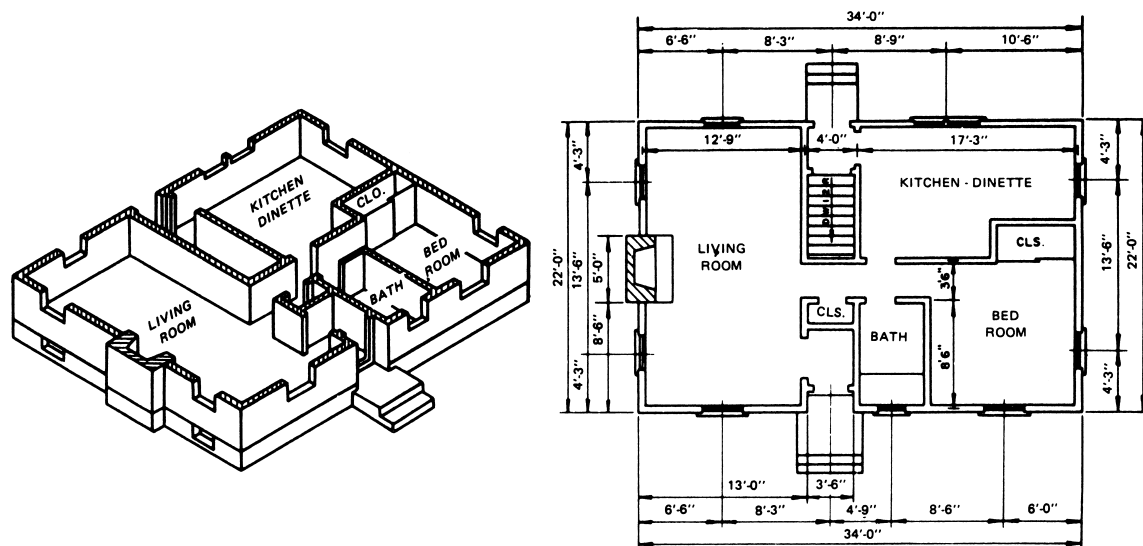


Fig. 42-2 Typical floor plan. To obtain the proper view of a floor plan, assume that the top half of the structure has been removed and that the viewer is examining the exposed section from above.

and dimensions should be checked at least twice with those on the floor plans. In cases where an overall measurement is shown on the drawing of a wall, with many smaller measurements of windows and doors shown on the same wall, the mason should add all of the smaller measurements together to be sure that the total is the same as the overall measurement. Simple mathematical errors should be caught before they become problems later. This process is known as *cross-checking*.

ELEVATION DRAWING

An *elevation* is the view of the structure that the worker has from a normal standing position, **Figure 42-4**. Elevation views indicate certain exterior features with which the worker must be familiar, such as the floor heights, finish grades, foundation and footings, and exterior and interior walls.

A typical house elevation shows a right elevation, left elevation, front elevation, and rear elevation. On many drawings, they are indicated as north, east, south, and west elevations. All the elevation views of

the building must be studied before it is possible to visualize the structure as it will look when completed.

Floor plans and elevations are usually drawn to the same scale. Windows and doors on the plan view are the same size and the same distance from the corners of the building on both views. By checking and comparing the plan view with the elevation view, the mason should be able to visualize approximately how the building will appear when it is constructed.

It is important to remember that the major difference between a plan view and an elevation view is that the plan view is always shown in a horizontal plane and the elevation view is shown from a vertical position. The information concerning measurements should be the same for each. Another important difference between the plan view and the elevation view concerns windows and doors. Measurements of windows and doors are given on the plan view but only the appearance of the window and door and the type are pictured on the elevation views.

Details not shown on the elevation view can usually be found by using the notes or references on the

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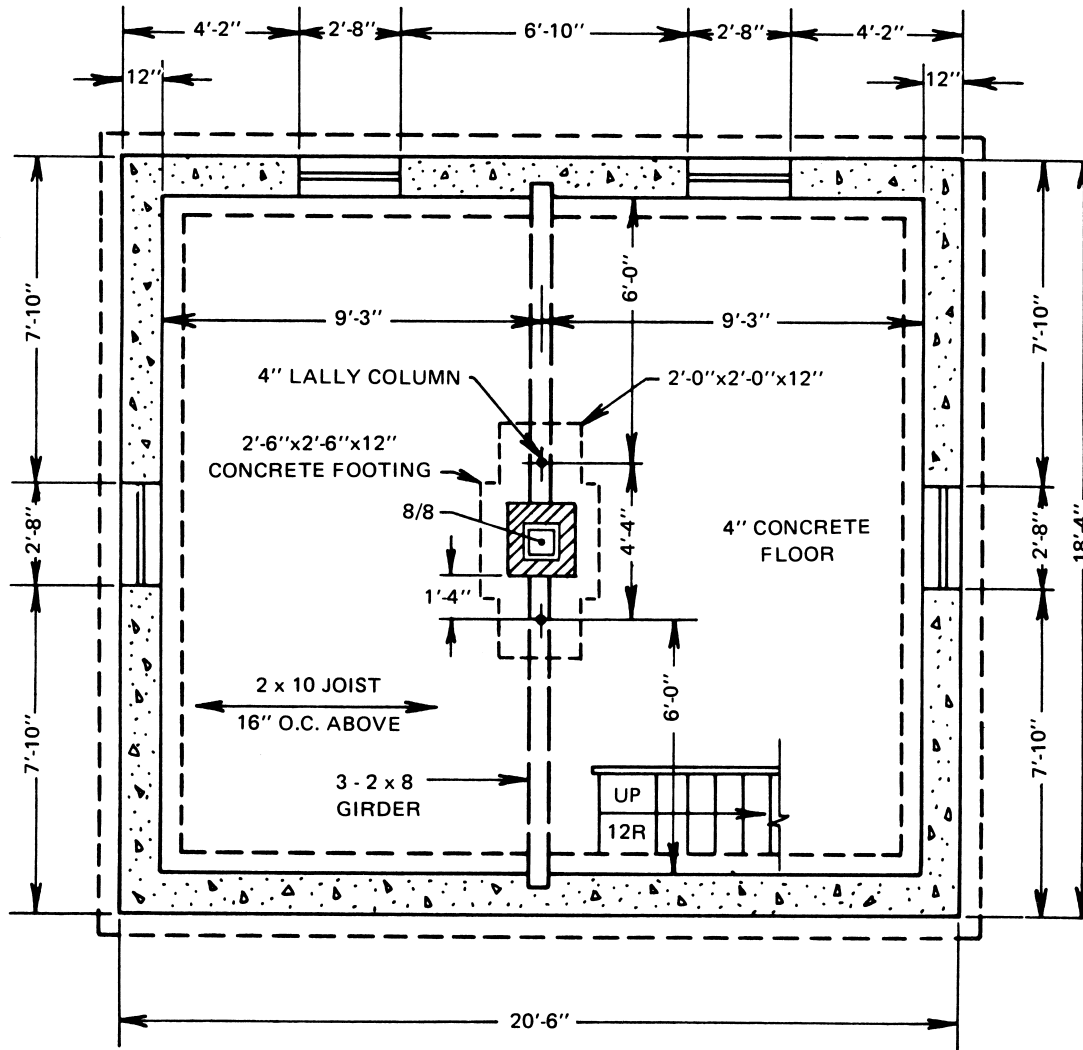


Fig. 42-3 Concrete foundation plan for a typical home.

elevation plan which refer to another sheet on the drawings where they may be drawn to a larger scale.

SECTIONAL DRAWINGS

Features of construction, such as stairs, chimneys, wall thickness, placement of wall ties, and flashing installation cannot be shown clearly by an elevation view. *Sectional drawings* are views of specific portions of

the structure. To understand the view given by a sectional drawing, compare it with a grapefruit cut in half. The exposed area of the fruit after cutting shows the inside of the fruit vertically from top to bottom. This is the same idea which the architect is trying to project to the builder through a sectional drawing.

There are three different definitions of a sectional view: a *longitudinal sectional view*, which is defined as a vertical cut through the long dimension of a building

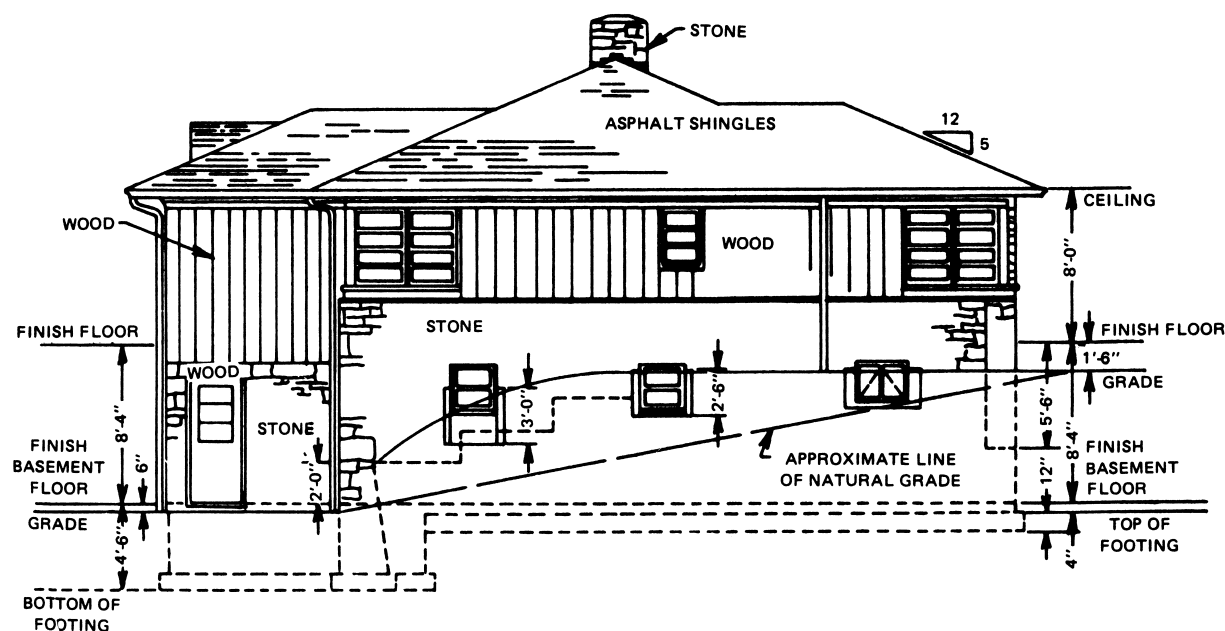


Fig. 42-4 Typical elevation view of house.

or roof; a *transverse sectional view*, which is a vertical cut through the short dimension of a building or room; and a *cross-sectional view*, showing the composition of the wall, floor, or roof. All *sectional views* show how the separate parts of the structure are to be assembled or incorporated into the total structure.

A typical *sectional view* of a wall shows specific information and measurements, **Figure 42-5**. As an elevation view shows the outside of a structure, the *sectional view* allows the viewer to look inside the wall and see items that cannot be seen on other views of the plans.

Sectional plans are also used in the construction of fireplaces, **Figure 42-6**. Information such as the height of the damper, location of the ash dump, height of the mantel, and materials used in the hearth are shown in detail.

DETAILED DRAWING

As the name implies, a *detailed drawing* is an enlargement of a drawing on a smaller scale such as a sectional or elevation view. The detailed drawing, **Figure 42-7**,

is used when the working drawing cannot show the desired information clearly or in enough detail.

Some of the many items generally shown in detail are front entrances, specific wall sections, complicated bond patterns in brick or stone, millwork, fireplace sections, and window and door installation details such as lock arrangements or sash mechanisms.

Since these **details** of construction are larger than the normal drawing, the mason must check the scale under each detailed drawing, as they may change on the same page of the plans. Details may vary from a scale of $1\frac{1}{2}'' = 1'0''$ up to actual-size drawings.

Shop Drawing

In recent years, many manufacturers have developed building products that require specific instructions for their installation. Since installation instructions for specific brands of the same item may vary, architects sometimes require that a shop drawing be supplied by the company. A **shop drawing** is a drawing provided by a manufacturer to explain the installation of a

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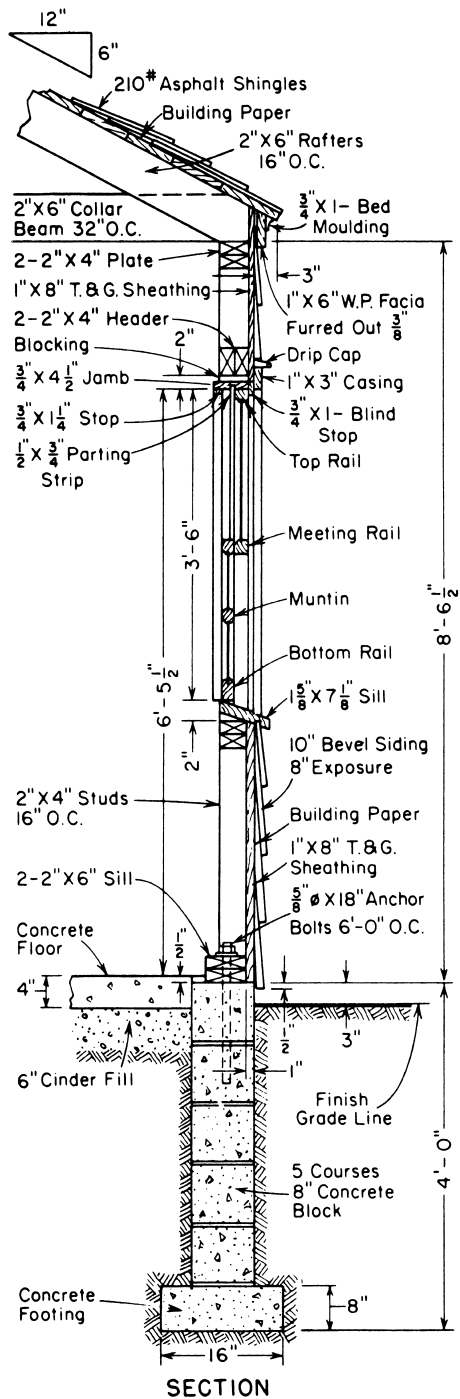


Fig. 42-5 Sectional view of wall.

product. Many times, this is the case with doors and windows, **Figure 42-8**. After the architect approves the shop drawing, a copy is sent to the contractor on the job. Another is given to the particular supervisor to whom this drawing pertains, who uses it as a working drawing.

REVISIONS TO THE WORKING DRAWING

Sometimes after the specifications have been written and the plans are drawn for a project, changes are made by the owner or architect for various reasons. These changes, known as *revisions*, must accompany the plans so that the contractor is informed of them before work is started. Revisions should be held to a minimum, but are a part of most plans.

As an example of a necessary revision, consider a door to the main entrance of a house. The size of the masonry opening is given on the floor plan, but the architect discovers after the floor plan is drawn that a door in the size specified is not available. To change the door size so that one may be obtained, a revision to the plans must be made. If the work has already been laid out by the mason, a *change order* is then issued by the architect.

CARE OF THE WORKING DRAWING

Proper care must be taken of the drawings if they are to last the entire job. The drawings should not be allowed to become wet and they should not be left in the sun for any length of time, as they will bleach out and be unreadable. The plans should be kept away from mortar or concrete mixtures and caution should be exercised when handling the drawings in the welding area. The plans should be collected at the close of the workday and returned to the job office or masons' shanty. Plans are expensive to duplicate and should be treated with great care.

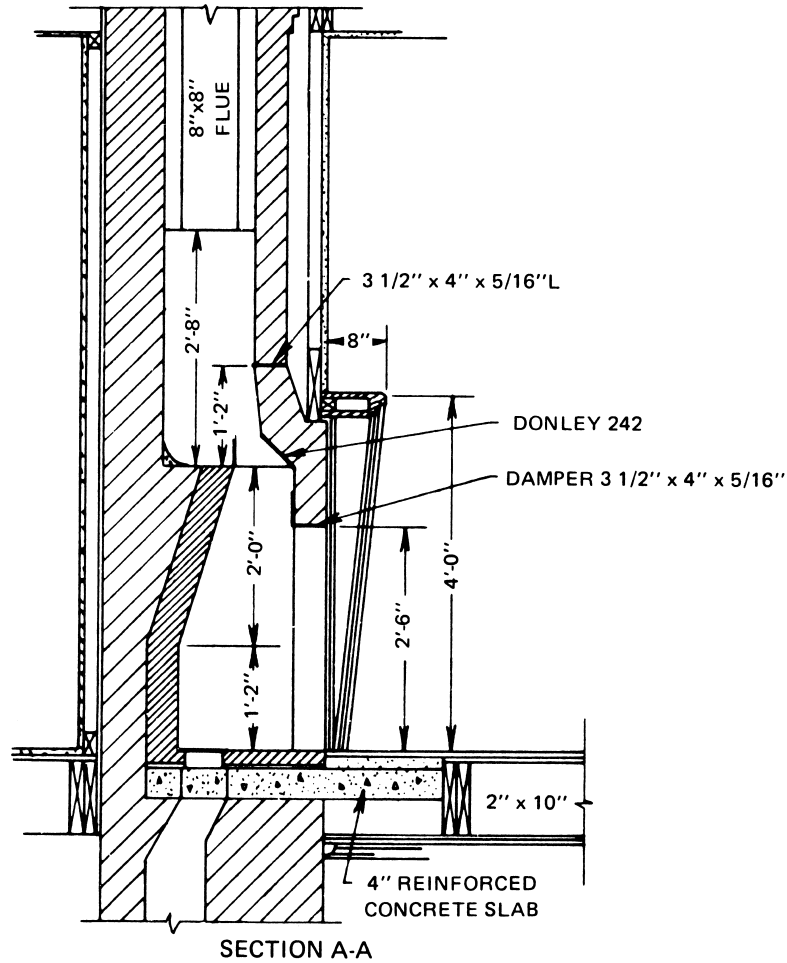
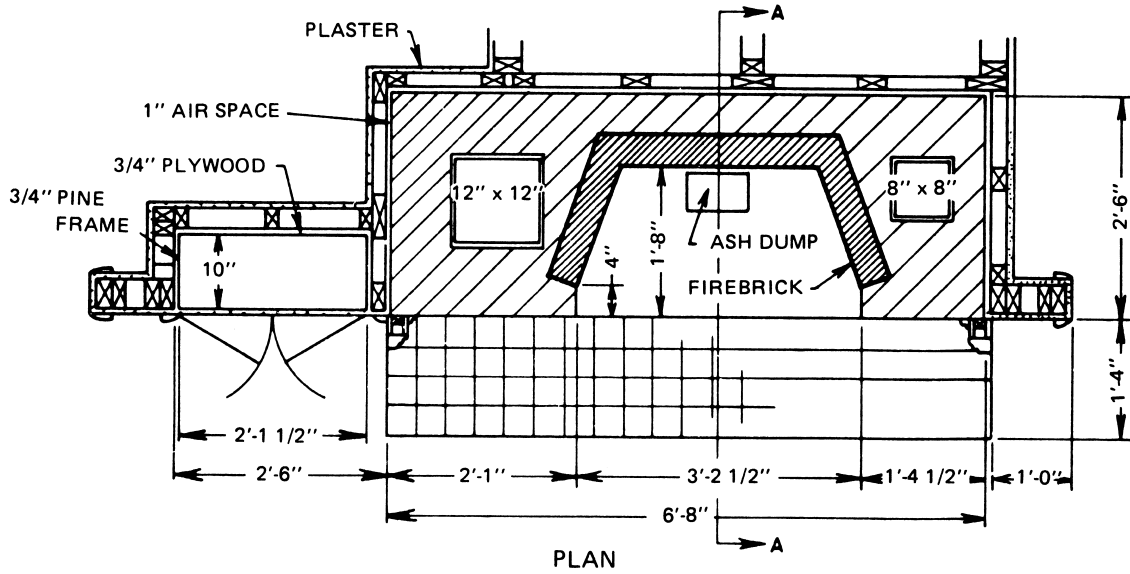


Fig. 42-6 Sectional plan for fireplace.

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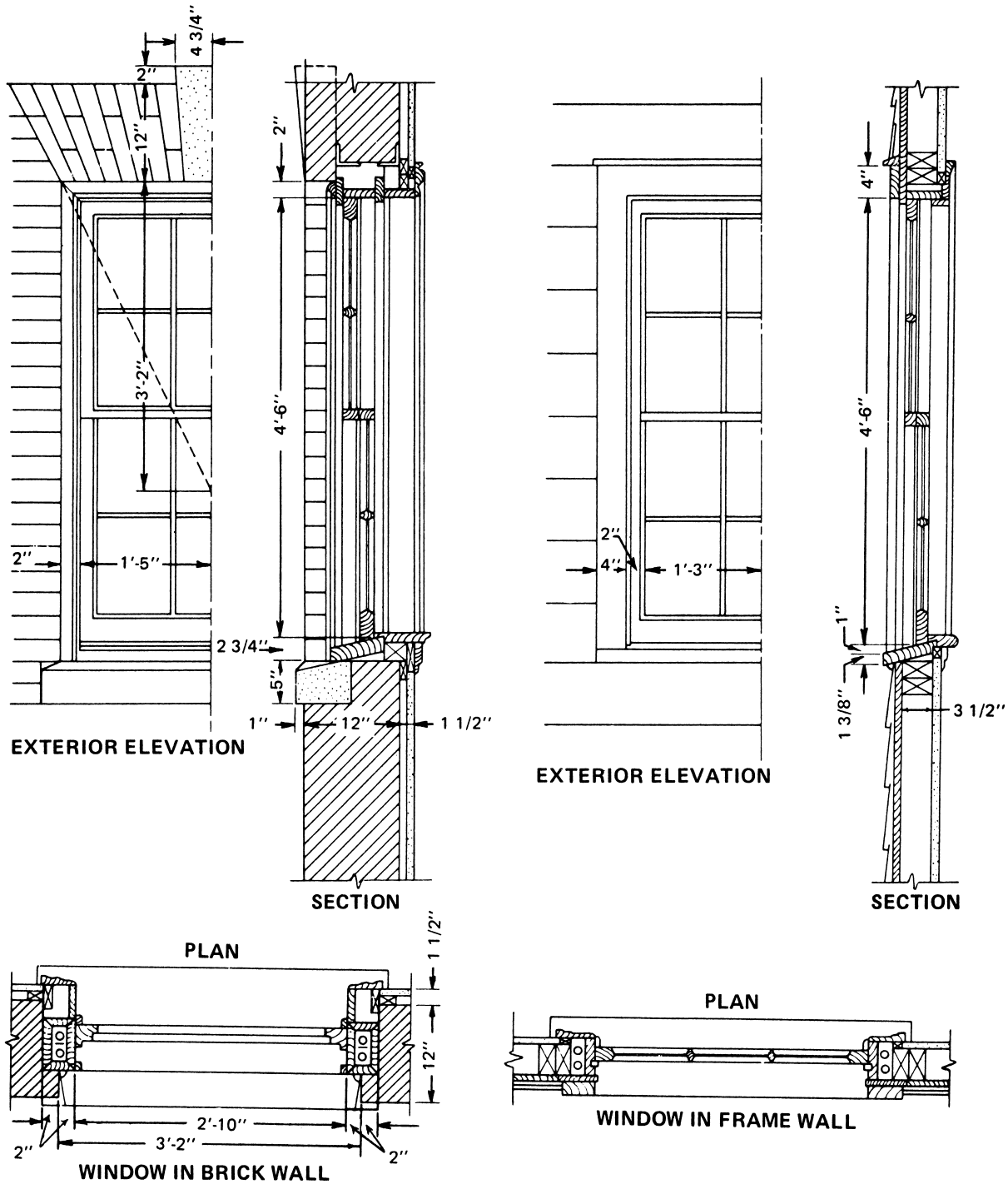
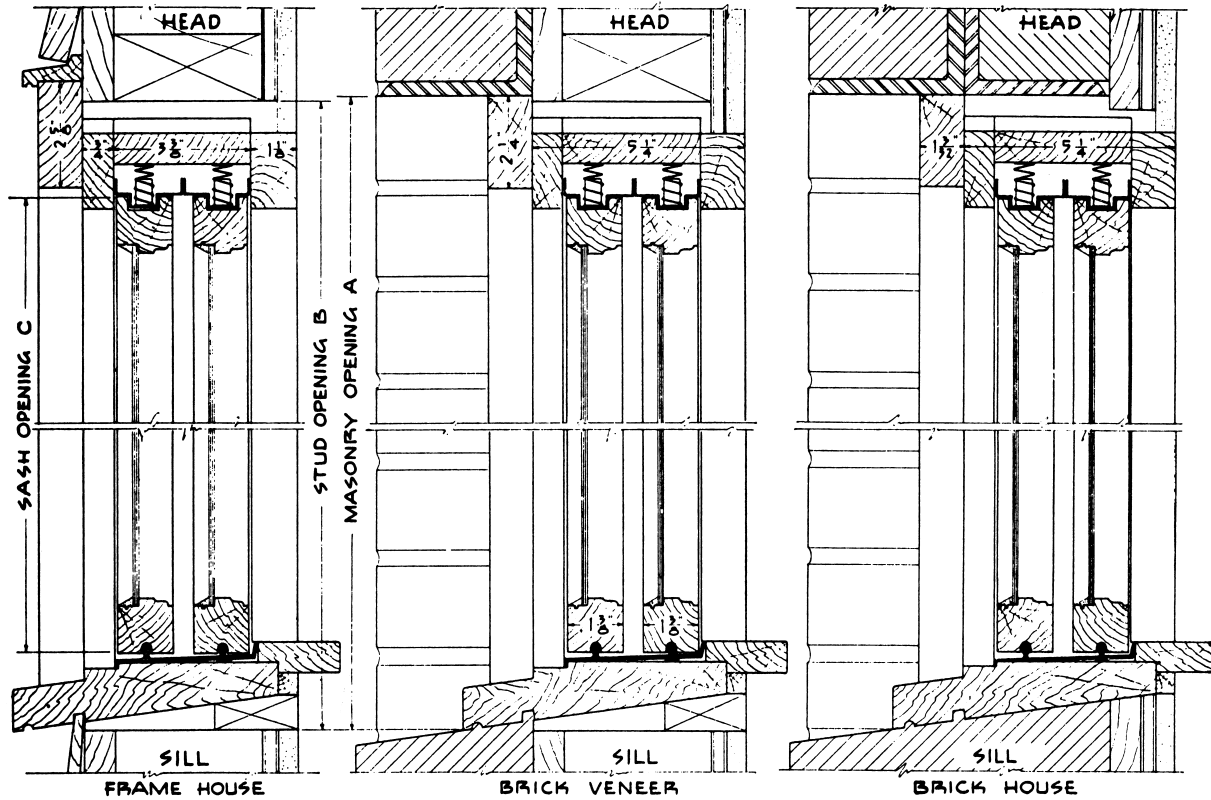
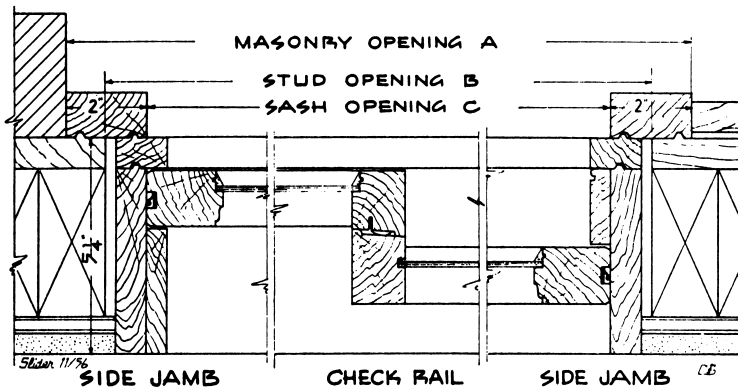


Fig. 42-7 Detailed drawing of windows in masonry and frame construction.



WIDTHS			
DESIGN	A	B	C
16	40 1/4	38 1/2	36 1/4
20	48 1/4	46 1/2	44 1/4
24	56 1/4	54 1/2	52 1/4
28	64 1/4	62 1/2	60 1/4

HEIGHTS							
DESIGN	A	B	C	DESIGN	A	B	C
20	26 1/4	26 3/8	22 3/8	36	42 1/4	42 3/8	38 3/8
26	32 1/4	32 3/8	28 3/8	44	50 1/4	50 3/8	46 3/8
32	38 1/4	38 3/8	34 3/8	48	54 1/4	54 3/8	50 3/8



DESIGN NUMBER	SASH SIZE	ROUGH STUD OPENING
16 - 20	3-0 x 2-0	38 1/2 x 26 5/8
16 - 26	2-6	32 5/8
16 - 32	3-0	38 5/8
16 - 36	3-4	42 5/8
16 - 44	4-0	50 5/8
20 - 20	3-8 x 2-0	46 1/2 x 26 5/8
20 - 26	2-6	32 5/8
20 - 32	3-0	38 5/8
20 - 36	3-4	42 5/8
20 - 44	4-0	50 5/8
24 - 20	4-4 x 2-0	54 1/2 x 26 5/8
24 - 26	2-6	32 5/8
24 - 32	3-0	38 5/8
24 - 36	3-4	42 5/8
24 - 44	4-0	50 5/8
28 - 20	5-0 x 2-0	62 1/2 x 26 5/8
28 - 26	2-6	32 5/8
28 - 32	3-0	38 5/8
28 - 36	3-4	42 5/8
28 - 44	4-0	50 5/8
28 - 48	4-4	54 5/8

Fig. 42-8 Shop drawing of sliding window from the Woodco catalog.

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A. Indicate in which of the following views the items below would be found: plot plan, floor and foundation plan, elevation view, sectional plan, and detailed drawings. If an item is shown in more than one plan, select the plan that gives the best view.

Sample: Chimney base _____ foundation plan _____

1. Masonry opening for windows _____
2. View of chimney above the roof _____
3. Location of the driveway _____
4. Layout of the partition walls on the first floor _____
5. Slope or pitch of the roof _____
6. Layout of the smoke chamber in fireplace _____
7. Pier to support first floor beam _____
8. View of materials that make up the roof _____
9. Height of fireplace mantel _____
10. Outside walls as they would appear when completed _____

B. Answer each of the following questions.

1. What does the term *benchmark* mean?
2. What general information is shown on a plot plan?
3. What type of information is shown on a typical floor plan for a house?
4. How many elevation drawings are shown on a typical house plan?
5. What is meant by the term *shop drawings*?
6. What does the term *revision* mean in a set of plans?
7. What is a longitudinal section view?
8. What is a transverse sectional view?
9. What happens to a set of plans if they are left out in bright sunlight for a long period of time?
10. Which of the working drawings discussed could also be called a site plan?