

The Foundation Plan



Objectives

After studying this chapter, you will be able to:

- Identify the primary features included in a foundation plan.
- Discuss the difference between a foundation plan and a basement plan.
- Design and draw a foundation plan for a typical residential structure using traditional or CADD methods.

Key Terms

Foundation Plan

Basement Plan

Brick Ledge

The *foundation plan* is a plan view drawing, in section, that provides all of the information necessary to construct the foundation. It is usually drawn after the floor plan and elevations have been roughed out. A foundation plan ordinarily includes:

- Footings for foundation walls, piers, and columns.
- Foundation walls.
- Piers and columns (posts).
- Dwarf walls. These are low walls built to retain an excavation or embankment.
- Partial walls, doors, and bath fixtures in the basement.
- Openings in the foundation wall, such as for windows, doors, and vents.
- Beams and pilasters.
- Direction, size, and spacing of floor joists or trusses.
- Drains and sump (if required).
- Details of foundation and footing construction.
- Complete dimensions and notes.
- Scale of the drawing.

The residential structure shown in Figure 12-1 has a rather complex foundation. It is critical to have an accurate foundation plan for this structure.

The foundation plan is prepared primarily for excavators, masons, carpenters, and cement workers who build the foundation. Be sure to present the information that they need to build the foundation. Also, hatch patterns are typically used on a foundation plan to show various materials. Common patterns are shown in Figure 12-2.



Figure 12-1. This house has a complex foundation. An accurate foundation plan is important to ensure that the house is properly constructed. (Sater Design Collection, Inc.)

Preliminary Steps to Drawing a Foundation Plan

The foundation plan is drawn from information presented on the floor plan, plot plan, and elevations. It is important that dimensions on the foundation plan and floor plan are accurate and consistent. The preliminary floor plan may be used as an underlay for drawing the foundation plan. These procedures reduce the time required to make the drawing and help to keep errors to a minimum.

Before drawing the foundation plan, determine the type of exterior walls specified on the floor plan. This step is important because the dimensions of the foundation may not be the same for different types of exterior walls. For example, the foundation size will be

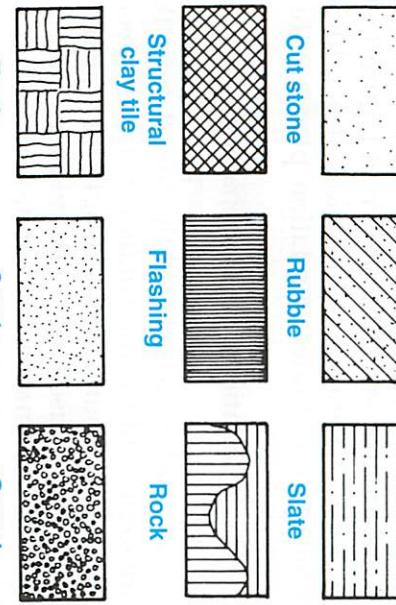


Figure 12-2. Hatch patterns representing different materials are commonly used on a foundation plan.

larger for a brick veneer house than a house with a stud wall frame. The reason for the difference is that the basic house size is measured to the outside of the stud wall for both types of construction. However, a 4" *brick ledge* on which the brick veneer rests is required for the brick veneer house. This adds 8" to the total length and width of the foundation over a stud wall structure. See Figure 12-3. The plot plan and elevation should also be examined to anticipate the need for stepped footings, retaining walls, and problems related to the grade, Figure 12-4.

Determine the required size of footings and foundation walls from the available information. Check the maximum frost penetration depth for the area. Refer to the building code to be sure that all requirements are met before proceeding. If the soil bearing capacity is questionable, conduct a soil bearing test. See Figure 12-5.

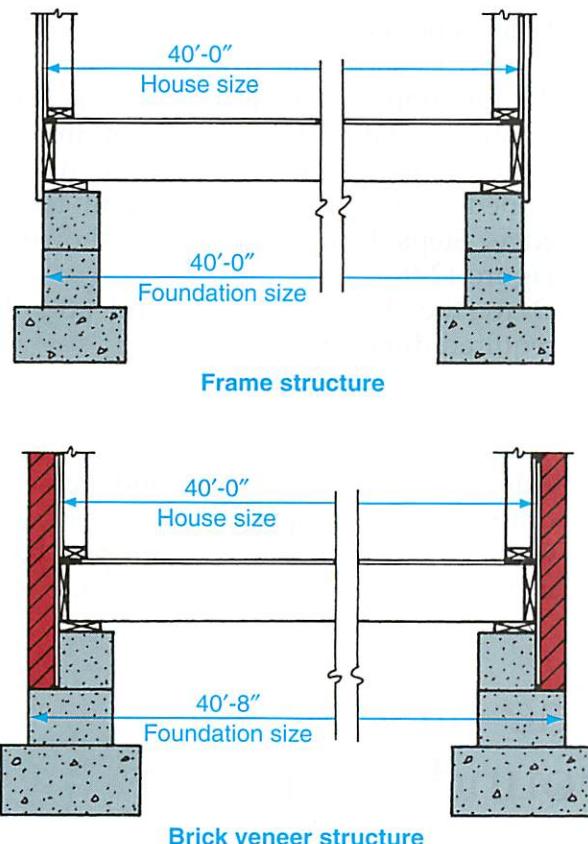


Figure 12-3. A brick veneer house requires a foundation wall 8" longer and wider than if the same house is a stud wall structure.

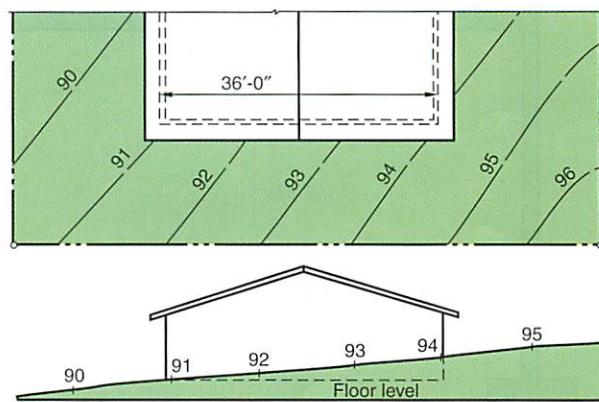


Figure 12-4. In this example, no consideration has been given to the existing grade. As a result, the finished floor level is below grade. This is most likely in conflict with the building code.



Figure 12-5. A soil bearing test is being made to determine the load-bearing capacity of the soil. (K & S Testing and Engineering, Inc.)

Drawing a Foundation Plan

Drawing a foundation plan using manual drafting techniques includes the following steps. All items will not apply to every situation.

1. Select the scale. Residential structures are usually drawn to $1/4" = 1'-0"$ scale. Be sure to use the same size tracing sheets for all drawings in the set. Steps 1 through 4 are shown in Figure 12-6.

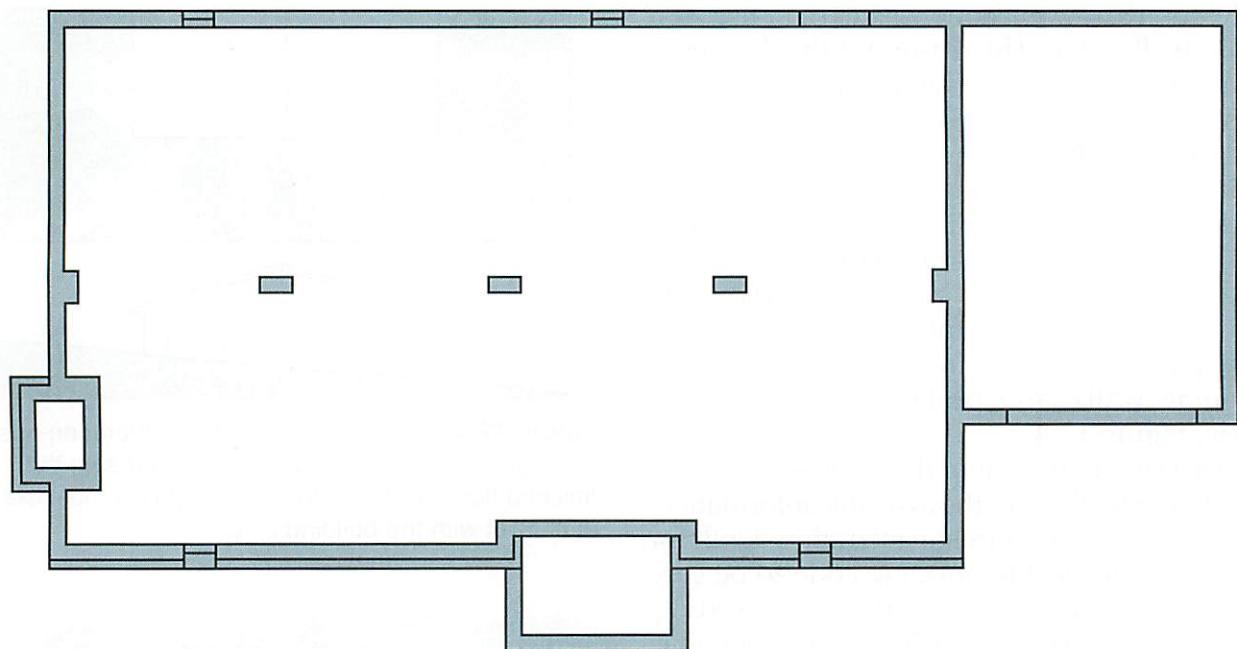


Figure 12-6. A partially completed foundation plan that shows the foundation walls, piers, pilasters, and vent openings.

2. Locate the outline of the foundation walls on the paper allowing ample space for dimensions, notes, and a title block. Use the floor plan as an underlay or draw the foundation plan from dimensions obtained from the floor plan.
3. Draw the foundation walls, piers, pilasters, and the foundation for a fireplace and chimney.
4. Indicate breaks in the foundation wall for windows, doors, access holes, and vents.
5. Lay out and draw the footings for the foundation walls. Use a hidden line. Steps 5 through 10 are shown in Figure 12-7.
6. Draw the footings for the piers and columns (posts).
7. Draw the footings for the fireplace and chimney.
8. Locate the supporting beam if one is required. Draw the beam using a single, thick centerline.
9. Show the size, spacing, and direction of floor joists or trusses using the standard notation.
10. Identify the location of sections needed to provide additional information.
11. Draw and dimension the necessary sections, Figure 12-8.
12. Determine the location of the dimensions needed to show the size of all aspects of the foundation. The length and thickness of all foundation wall segments must be dimensioned. Pier locations are dimensioned to the center rather than to the edge. Steps 12 through 17 are shown in Figure 12-9.
13. Draw the dimension lines and add the required dimensions.
14. Letter any necessary notes.
15. Shade the drawing with proper material symbols (hatch patterns).
16. Add the title block, scale, and name of drawing in the proper location.
17. Check the drawing to be sure you have included all necessary information.

The Basement/ Foundation Plan

In climates where the frost penetration depth is several feet, basements are usually included in the plans. Since the footings must be below the frost depth, it is comparatively inexpensive to excavate the soil under the

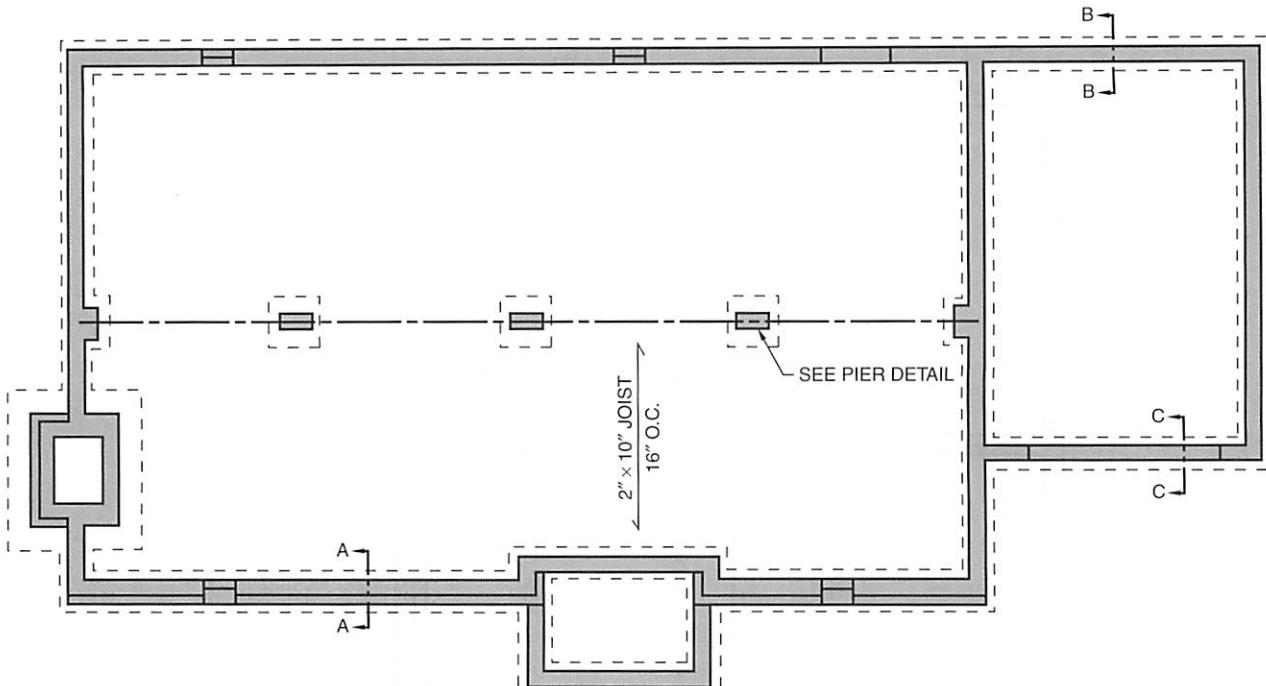


Figure 12-7. Footings for the foundation walls and the piers, the supporting beam, all section symbols, and the floor joist data have been added to the foundation plan.

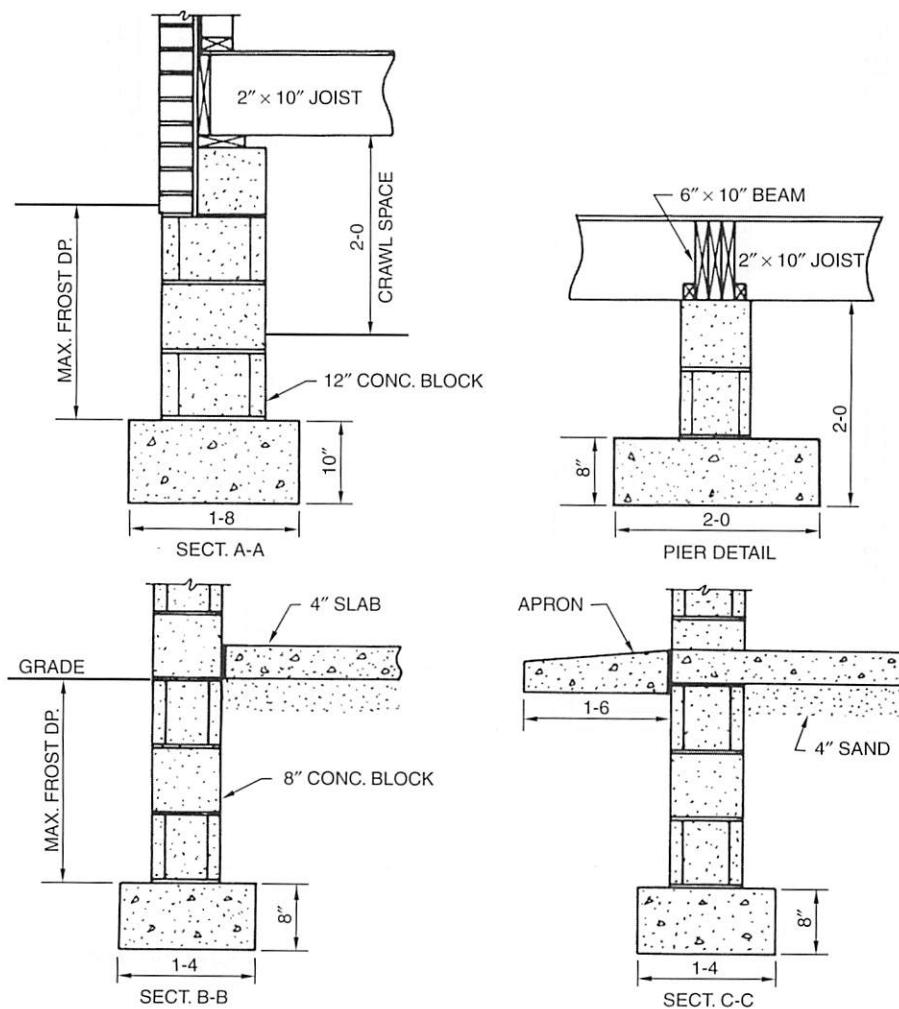


Figure 12-8. These foundation details are required to further describe the foundation construction.

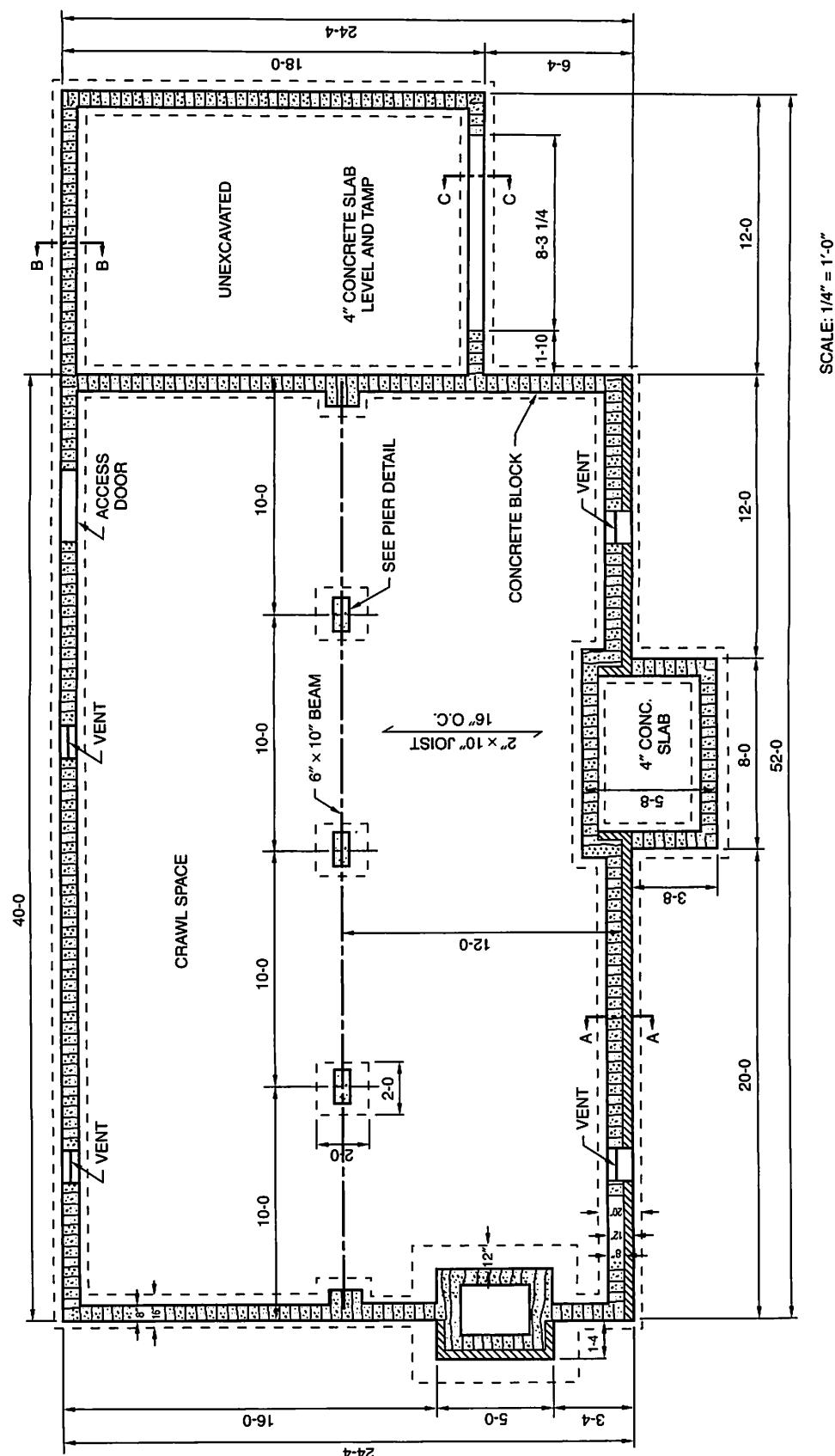


Figure 12-9. The completed foundation plan showing dimensions, notes, foundation material hatch pattern, and drawing scale. This house has a stud wall frame with a brick veneer along the front.

house and extend the foundation down a few more feet. This additional excavation provides usable space at much less cost per square foot than the first floor level. Basements are also popular in crowded areas where building sites are small.

The *basement plan* is a combination foundation and floor plan. It includes the information commonly shown on the foundation plan and, at the same time, shows interior walls, stairs, windows, and doors in the basement. The split-level house is a good example of where a foundation plan is required for one section of the house and a basement plan for the other. Figure 12-10 illustrates the use of a basement and a foundation plan to show construction for a split-level house.

Procedure for Drawing a Basement Plan

The procedure for drawing a basement plan is much the same as for a foundation plan. However, there are several additional features on a basement plan. The following steps should help to clarify the procedure using manual drafting techniques.

1. Select the proper scale to be used. Again, most residential plans are drawn at $1/4'' = 1'-0''$ scale. Steps 1 through 4 are shown in Figure 12-11.

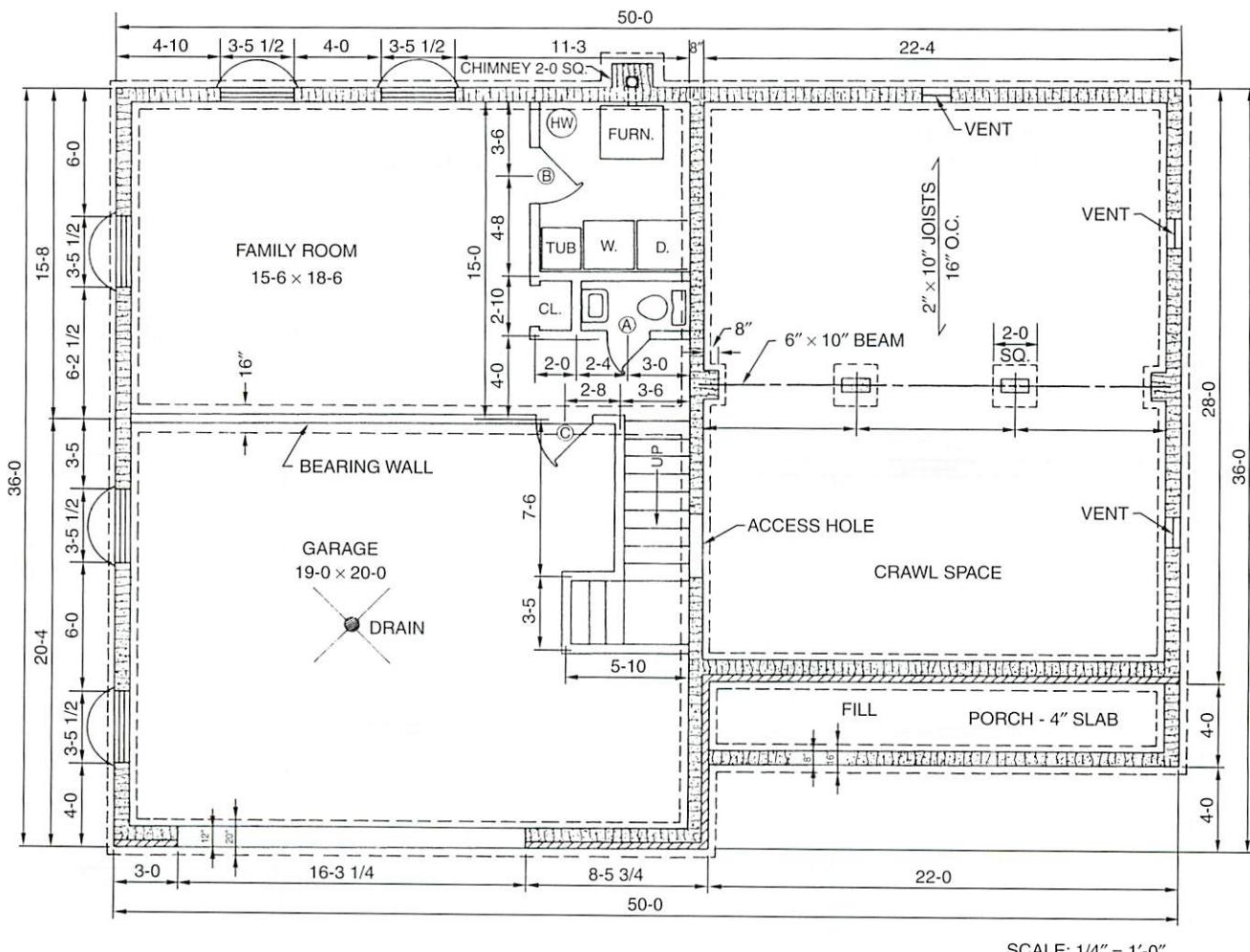


Figure 12-10. A finished basement/foundation plan for a split-level house. The house is a stud wall structure with some brick veneer.

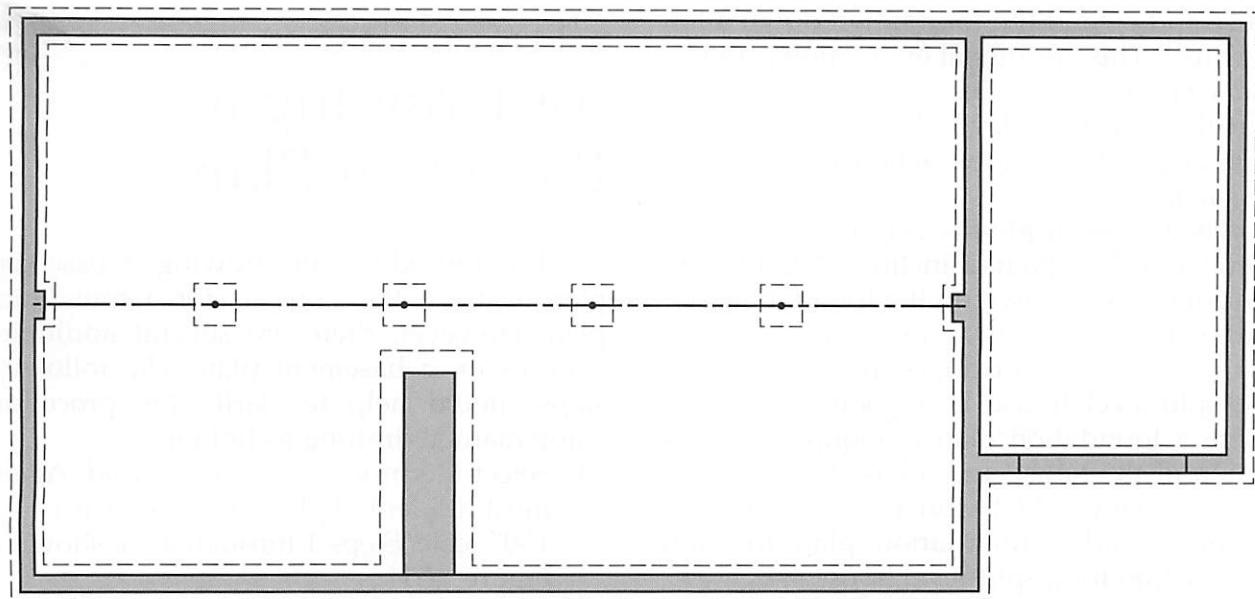


Figure 12-11. A partially completed basement plan showing the foundation walls, footings, beam, and posts/columns.

2. Draw the exterior foundation walls using the floor plan as an underlay or from information taken from the floor plan. Be sure the foundation walls are correctly positioned with respect to the first floor walls.
3. Draw the footings for the foundation walls, chimney, and fireplace. Also draw the piers and columns (posts).
4. Locate and draw the beam and supports or bearing wall partition(s).
5. Design the room layout in the basement area and darken in the lines. Steps 5 through 9 are shown in Figure 12-12.
6. Indicate breaks in the basement walls for windows or doors.
7. Locate and draw the stairs leading to the basement.

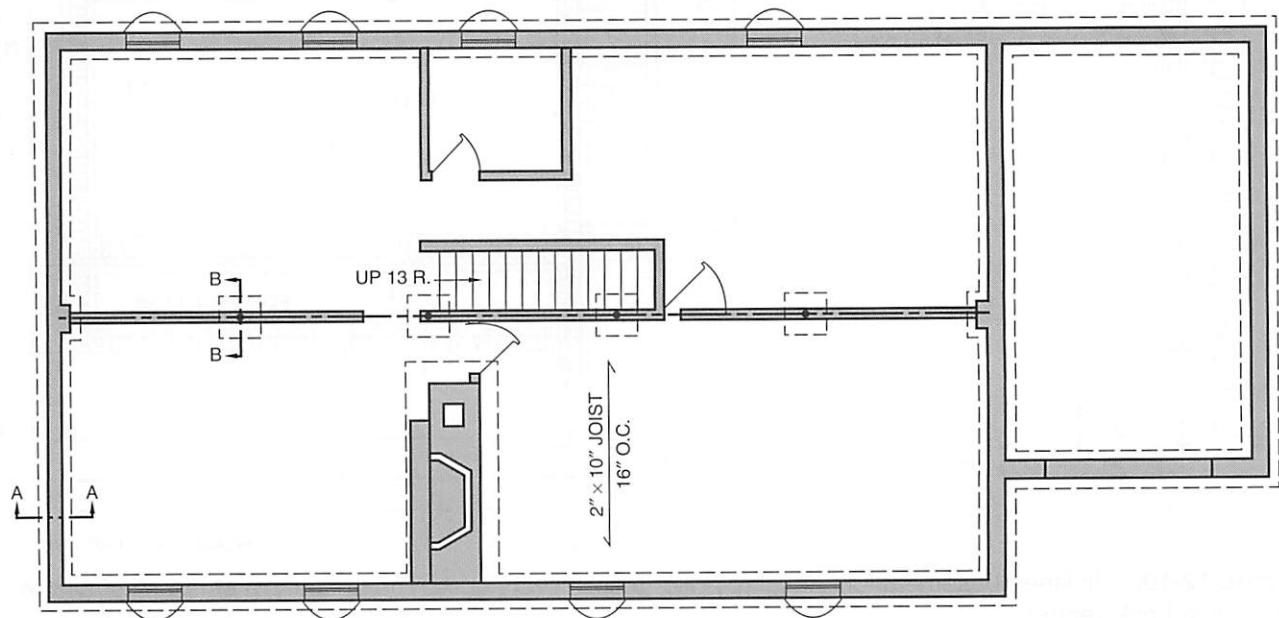


Figure 12-12. Interior basement walls and doors, windows, joint information, stairs, and section symbols have been added to the partially completed plan.

8. Show the size, spacing, and directions of floor joists or trusses using the standard notation.
9. Identify the location of sections required to provide additional information about the basement construction.
10. Draw and dimension the necessary sections, Figure 12-13.
11. Locate and draw permanent bath fixtures such as water closet, tub, and lavatory. Also, locate the furnace, hot water heater, water storage tank, water softener, sump, and floor drains. Not all of these items are necessary on every plan. Steps 11 through 18 are shown in Figure 12-14.
12. Determine the location of dimensions needed to show all features. Dimension interior frame walls to the center of the walls. Do not dimension to the center of foundation walls.
13. Draw the dimension lines and add the required dimensions.
14. Letter any necessary notes.
15. Show electrical switches, outlets, and fixtures. This step is required if a separate basement electrical plan is not going to be included in the set of drawings.
16. Shade the foundation walls with the proper material symbols (hatch pattern).
17. Add the title block, scale, and name of drawing in the proper location.
18. Check the drawing to be sure you have included all necessary information.

Using CADD to Draw a Foundation and Basement Plan

The procedure for drawing a foundation or basement plan with CADD is basically the same as when using manual drafting techniques. However, there are a couple of differences. For example, the drawing is created at full scale. Then, an appropriate scale is selected when the drawing is plotted. The following steps outline drawing a foundation or basement plan using CADD.

1. Make a copy of the floor plan on a new foundation plan layer.

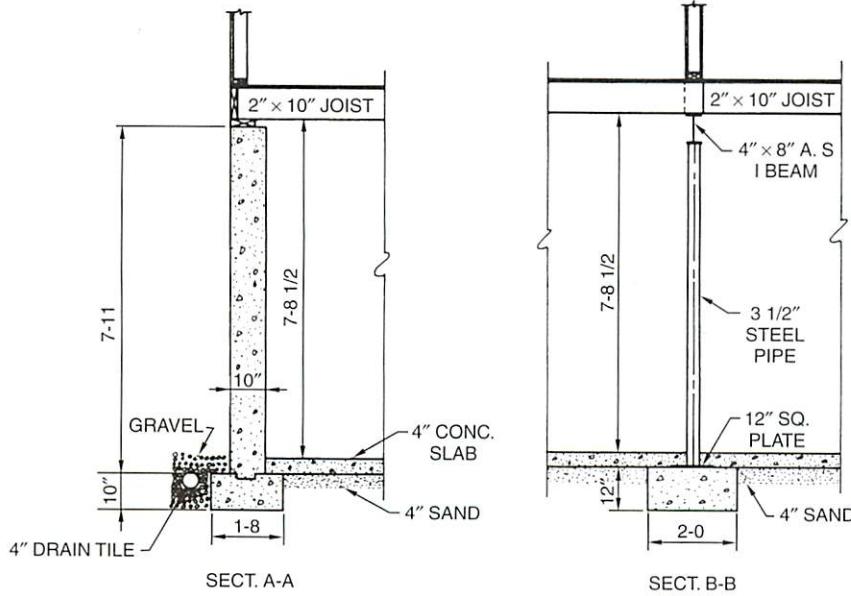


Figure 12-13. These are foundation details required to further describe the foundation construction.

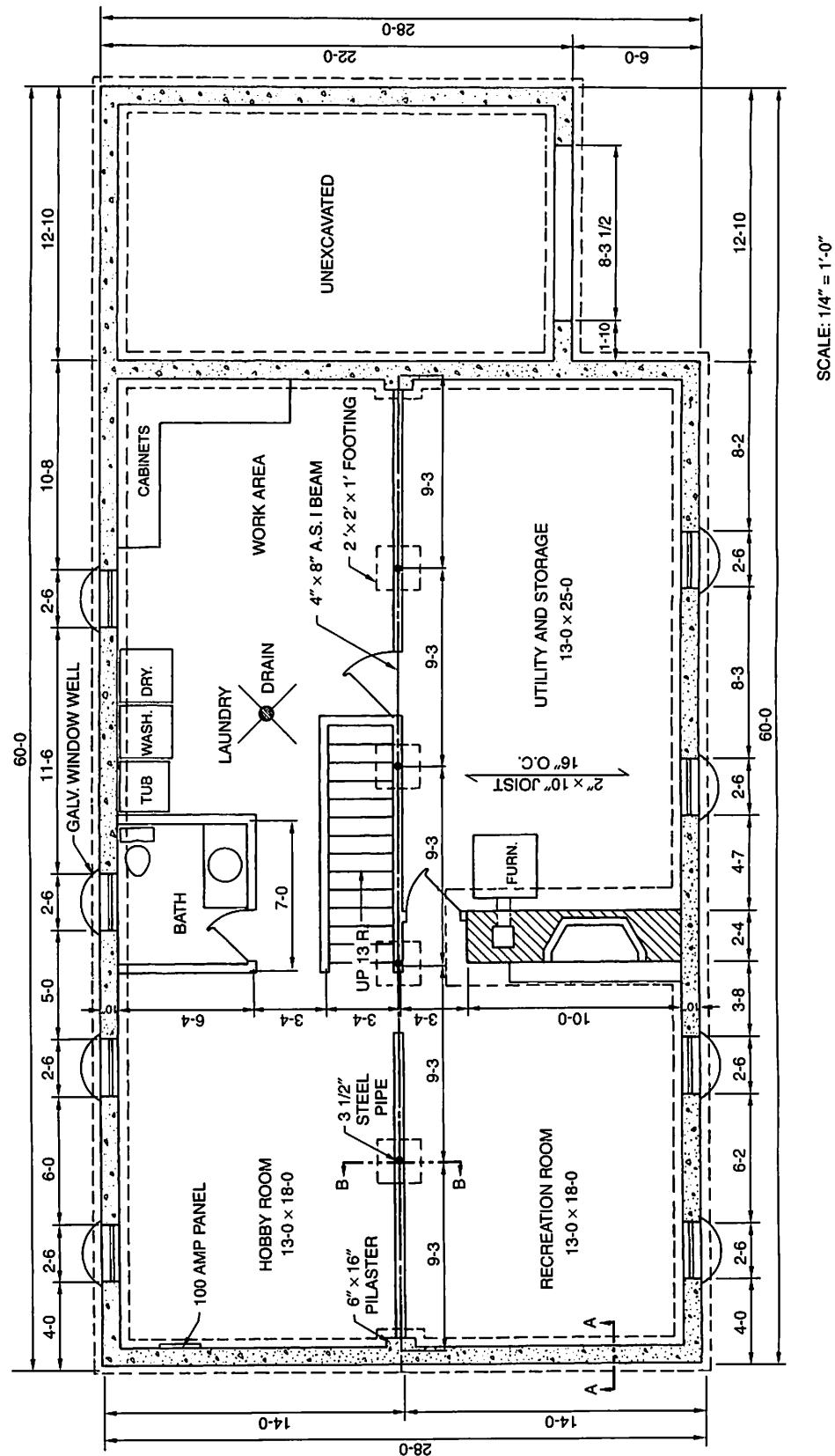


Figure 12-14. A completed basement plan. The foundation walls are cast concrete and the structure has a stud wall frame.

2. Draw the outside line of the foundation walls and delete the outside line of the floor plan wall, if they do not coincide. Generally, the outside of the foundation walls are identical to the outside of the rough stud walls on the floor plan in a frame structure with siding. Brick or other veneer is added to the outside of this point. The foundation wall is wider than a frame wall; therefore, the inside line will fall inside the floor plan. Generally, the foundation wall will be 8", 10", or 12" thick, but there are exceptions. A 12" thick wall will be used in this example. The footings and foundation walls should be drawn on separate layers since the line widths and linetypes are different. Piers and their footings may be added to these layers since they use similar linetypes and are part of the foundation. Draw all footings. Figure 12-15 shows the foundation wall, footings, and chimney located and drawn.
3. For a basement plan, draw the stairs, interior walls, windows, and doors. Place the stairs on their own layer for easy use with other

layers/plans. This is an appropriate time to turn off the floor plan layer since it is no longer needed for the foundation/basement plan.

4. Draw all interior walls and insert door and window symbols into the plan. These items should be on a basement floor plan layer; symbols should be on their own layer. Take advantage of an existing symbols library or begin one of your own. Also at this point, add other features such as joist direction arrow and window wells, Figure 12-16.
5. Dimension the plan in the same manner as for manual drafting.
6. Insert symbols for appliances, fixtures, and the furnace. These should be placed on a symbols layer.
7. Add cutting plane symbols where required and label room names and sizes.
8. Add the scale and title to the foundation plan layer.
9. Look over the plan to be sure it is complete. Figure 12-17 shows the completed basement plan.

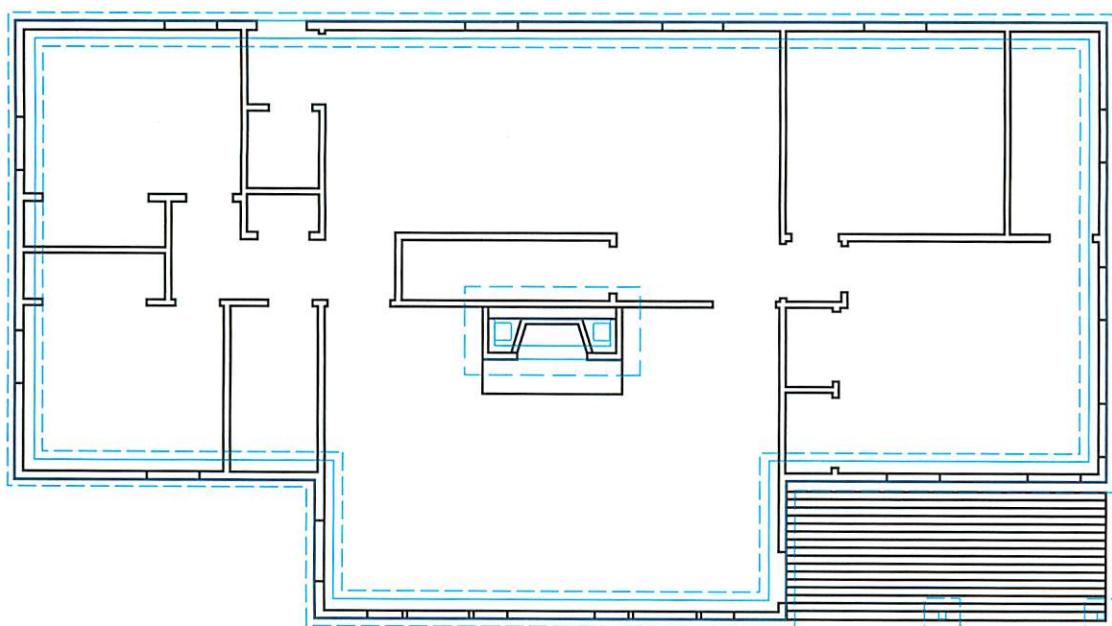


Figure 12-15. The floor plan for the first floor is copied to the foundation/basement plan layer. Footings and piers are then added. Notice how the floor plan layer is visible on top of the foundation/basement plan layer.

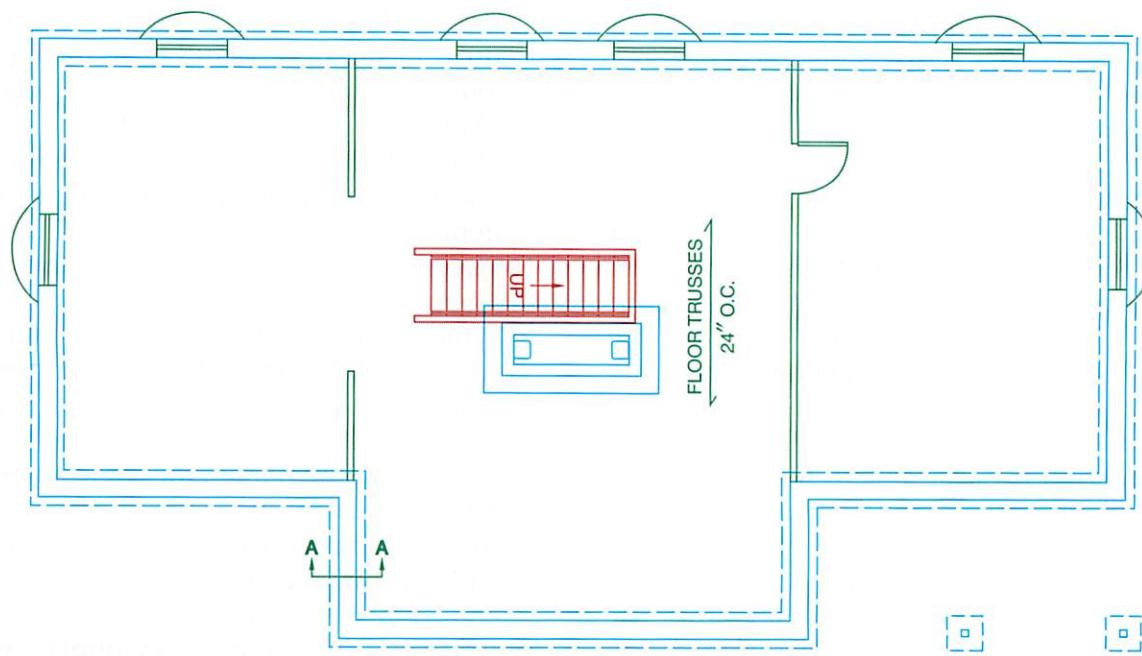


Figure 12-16. The floor plan layer has been turned off and interior walls, stairs, windows, and doors in the basement are added.

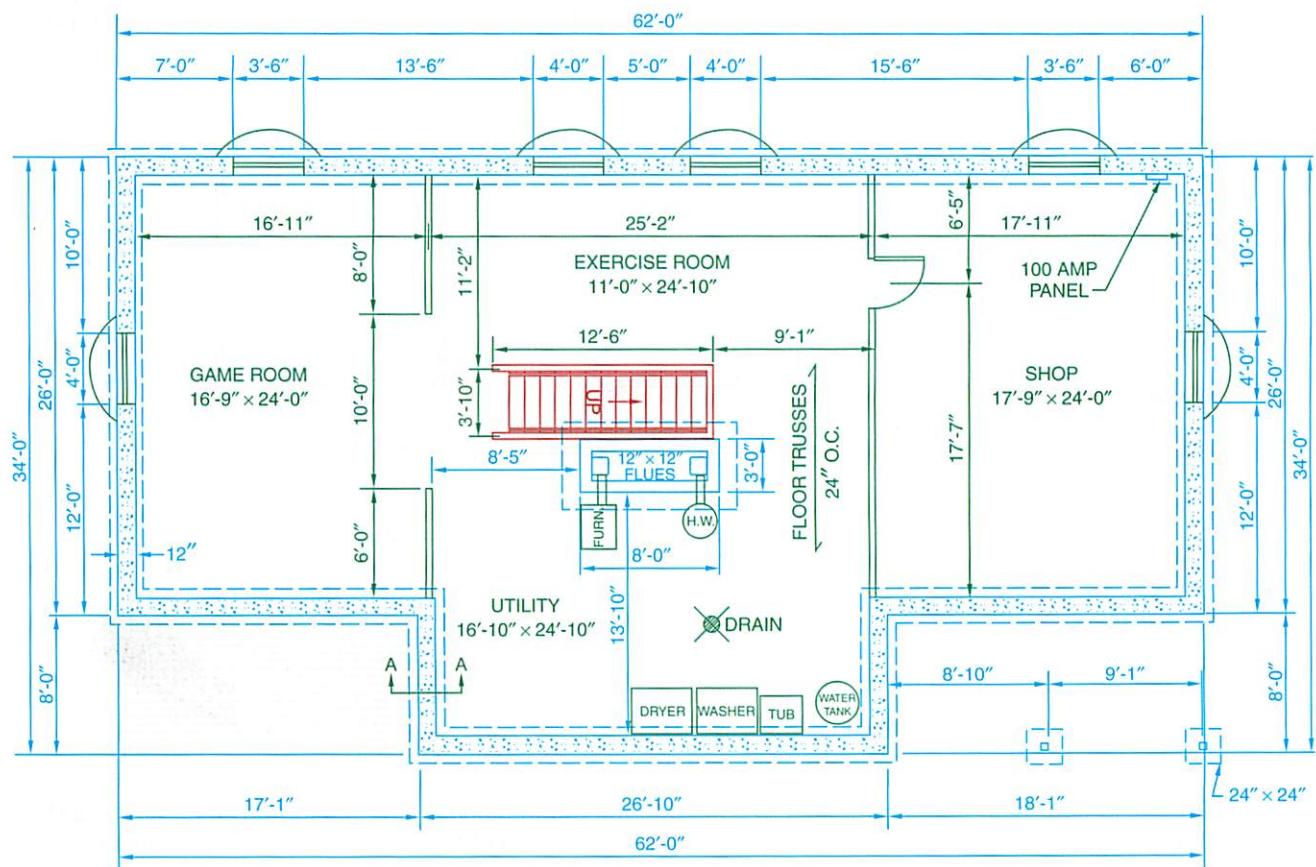


Figure 12-17. A completed foundation/basement plan drawn with CADD.

Internet Resources

www.wwpa.org

Western Wood Products Association

www.hebel.com

Babb International Inc., suppliers of autoclaved aerated concrete

www.culturedstone.com

Cultured Stone

www.gp.com/build/index.html

Georgia Pacific Corporation, supplier of building products

www.lpcorp.com

Louisiana-Pacific Corporation, manufacturer of building materials

www.architectural-ornament.com

Architectural Ornament, Inc., manufacturer of polyurethane architectural molding

www.concretehomes.com

Portland Cement Association

www.anchorwall.com

Anchor Retaining Wall Systems

www.sweets.com

Sweets Catalog File

www.thomasregister.com

Thomas Register

Review Questions – Chapter 12

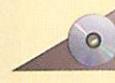
Write your answers on a separate sheet of paper. Do not write in this book.

1. Explain the foundation plan and its purpose.
2. Residential foundation plans are usually drawn or plotted at _____ scale.
3. List eight features that are usually shown on a foundation plan.
4. For whom is the foundation plan primarily prepared?
5. The foundation plan is drawn from information presented on the _____ plan, _____ plan, and _____.
6. A brick ledge is _____ wide.
7. List three considerations that should be checked to help determine the height of foundation walls and size of footings.

8. The _____ linetype is drawn thick to indicate a supporting beam on the foundation plan.
9. Hatch patterns are used on the foundation plan to show _____.
10. How is a basement plan different from a foundation plan?
11. Why is a basement a logical choice for cold climates?
12. When drawing a foundation plan in CADD, how is the floor plan initially used?
13. How are doors, windows, and appliances typically drawn on the foundation plan when using CADD?
14. When the foundation plan is drawn in CADD, at what scale is the plan drawn?

Suggested Activities

1. Select a floor plan for a garden or storage shed. Develop a foundation plan for the structure with a slab foundation. Add necessary dimensions, symbols, and notes. Provide sufficient information so that the foundation can be constructed from your drawings without additional resources.
2. Locate a floor plan for a cottage or vacation home. Then, design and draw the foundation for this house using CADD. Completely dimension the drawing and indicate details needed to explain the construction.
3. Using CADD, draw the foundation plan for a two-car garage that has a slab foundation. Assume the garage is stud wall construction and is 20'-0" x 20'-0". Show anchor bolts or sill anchor clips every 4'-0" along the perimeter. Check the required footing depth for your area and make the design meet the requirement.
4. Select a house floor plan from a magazine or other source. Draw a foundation plan for the house. Calculate the size of beam required, number and size of posts or columns needed, and the size and spacing of floor joists. Include dimensions and notes.



Section V Construction Systems

- 13 Sill and Floor Construction**
- 14 Wall and Ceiling Construction**
- 15 Doors and Windows**
- 16 Stairs**
- 17 Fireplaces, Chimneys,
and Stoves**

Pozzi Wood Windows

