

You are viewing sample pages from our textbook:

***“Blueprint Reading for the Construction Trades, Second Edition”***

Pages 8-13 to 8-19 of Chapter 8, The Construction Drawing Set, have been included in this sample. The information shown is an exploration of the Main Floor Plans of the included fold-out solar residence drawing set.

Emphasis is placed on the information the reader should be looking for in the floor plans and on how to interpret this information. Emphasis is placed on the reader “visualizing” the shape, size and contents of the building and understanding the drawing conventions.

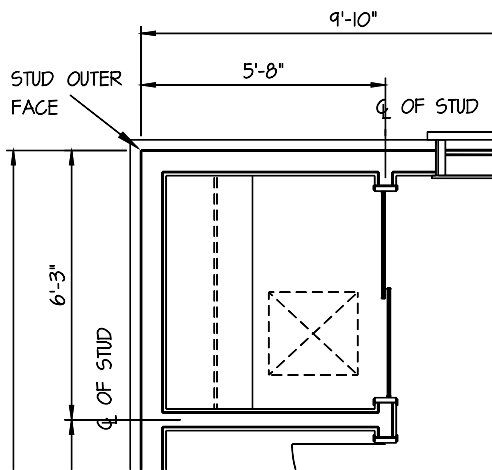
All aspects of the building are described previous to this excerpt and as the Chapter continues. There are a series of exercises during the Chapter with the answers contained in the Solutions section at the end of the Chapter.

If you require more information about the contents of this book, please contact us directly at [info@micro-press.com](mailto:info@micro-press.com).

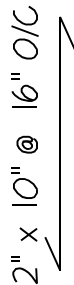
## FLOOR PLAN DETAILS

Turn now to **Sheet A2**. As you discovered in the preliminary scan, this sheet contains the lower and upper floor plans and details the size and shape of each room along with positions of windows, doors, stairs, and fixtures. Let me emphasize some important points on this Sheet:

1. Both Plans are *horizontal sections* with the section plane located about 4 foot above each floor level. Review the relevant parts of Chapter 7 on this subject.
2. On each Plan you are seeing only stud walls. The one exception to this are the foundation walls and inner stud walls of the Basement. This is because at the implied 4 foot level of the plan section, the foundation walls are below grade. You cannot see footings, but you can, however, see the floor slabs on the lower levels.



Standard system of dimensioning exterior and interior stud walls.



Notation of floor joist size and span direction.

3. Look closely at the dimensioning system for the studs. Note that most (but not all) interior stud walls are dimensioned to their *center lines*, while exterior wall studs are dimensioned to their *outside faces*. The illustration at the left explains this normally standard system. (Note that other drawing sets may show dimensions to the *face* of interior studs.)

One of the best ways to visualize the shape and size of the structure is to take a “mental walk” through each of the rooms in turn. In this way you can establish the levels and locations of the rooms in relation to each other.

Begin your “walk” on the lowest level of the house, labeled Basement (Storage) and Basement (Utilities). This level is in fact a single room that has been divided by name only, on the basis of usage. You already know from Sheet A1, and confirmed again in the Basement (Storage), that the entire floor is at the -7'-3" level.

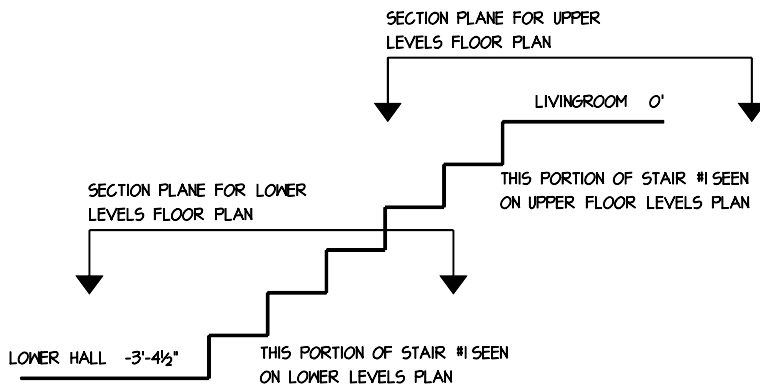
You can see two main beams that are composed of four 2" x 12" timbers, supported by the 3" diameter steel posts that are shown on the Foundation Plan. These beams are in the ceiling and support the floor joists of the floor above (a good example of orthographic “cheating”!). The size of the floor joists is indicated on this plan, even though they belong to the floor above. This is standard procedure and is used on all construction drawings. Look for the note (reproduced at the left) that says: 2" x 10" @ 16" o/c, and is underlined with a double pointed arrow. This means that 2" x 10" joists are to be spaced 16" apart and will span in the North-South direction as indicated by the arrows. In the Basement (Utilities) area you can see the positions of the furnace, electrical panel, laundry tubs, air-to-air heat exchanger, and so on.

To walk to the next level you must go up Stair#3. This brings you to the floor at Elevation -3'-4 1/2" and gives access to the Lower Hall, Bathroom, Den, Kitchen#2, and Bedroom#4. In the future, if you are dealing with a plan that does not indicate floor elevations, the presence of stairs will indicate a change in floor level. After all, if you have to go up or down a stair to get from one room to another, then the level has definitely changed! Check the size of the floor joists over this area for future reference and spend some time visualizing the shape and size of each room on this level.

From Kitchen#2 you can walk up Stair#4 into the garage at Elevation -1'-3". You can also exit from the house at this level, either through the door at the top of Stair#4 or the overhead garage door. Note that there are no floor joists called for in this area; instead, trusses are spaced at 24" o/c. The trusses support the roof of the Garage.

You have now seen all the rooms on the lower floor levels. To ascend to the rooms on the next, higher level, you must walk up Stair #1 located in the Lower Hall. On the plan, this stair appears to stop halfway along its length at a break line. This situation occurs

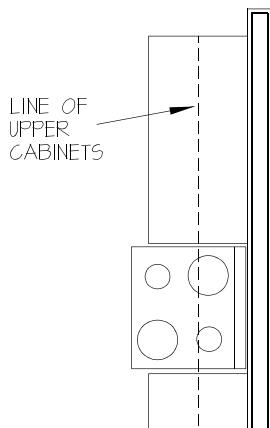
because the stair penetrates and rises above the Plan's 4-foot high section plane. When this happens, the upper part of the stair can no longer be seen on this Plan, but will reappear on the next highest Plan. Look for the top end of Stair #1 on the Main Floor Levels Plan as it leads into the Living Room. To make sure you fully understand and can visualize this important concept, look at the illustration below which shows a diagrammatic view of both floor levels and the connecting stair.



You are now standing in the Living Room. The first thing you should notice is that the floor of this room is at Elevation 0'. This floor is the base level of the house around which all the other levels are designed. The choice of this room as a base was a personal decision, since the house could just as easily have been designed around any of its rooms. The subfloor of this room sits on the 2" x 10" floor joists you saw in the Basement (Storage) ceiling. There is a ceramic tile area in the floor positioned immediately behind the three patio windows in the South wall (cross-reference the window mark numbers on Sheet A7). If you refer again to the Basement (Storage) room, you will see that in the same position as the ceramic tile above, there are 2" x 6" floor joists at 12" o/c instead of 2" x 10" joists at 16" o/c. The 2" x 6" joists are obviously supporting the ceramic tile area in a way yet to be discovered.

From the Living Room you have direct access to either the Dining Room or the Middle Hall, both of which lead to Kitchen #1. The Middle Hall also leads to the Entry and the front door. These four rooms are all at elevation +2'-0" and are reached from the Living Room by two separate sets of steps.

In the Kitchen you can see the positions of the refrigerator, stove, and double sink, all framed by the lower kitchen cabinets. The hidden line running down the center of the counter top is the face of the upper wall-hung cabinets (reproduced at the left). This particular hidden line is another of those that show a feature above the section plane in defiance of strict orthographic rules.



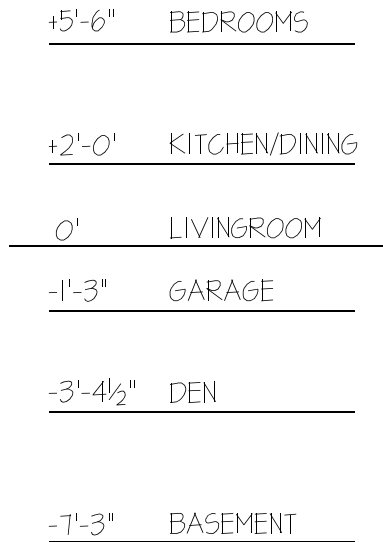
Kitchen upper wall-hung cabinets.

The same goes for the four broken lines that span North-South from wall to wall in the Kitchen and Dining Room. These four lines indicate decorative beams positioned in the ceiling area above the section plane.

Notice in both the Living and Dining Rooms a note saying "Prefab. Parallel Chord Trusses Over" with arrows showing the span as North-South. These are the roof structural members and are similar to commercial flat roof trusses. I am using them in a slightly different way, as you will see later.

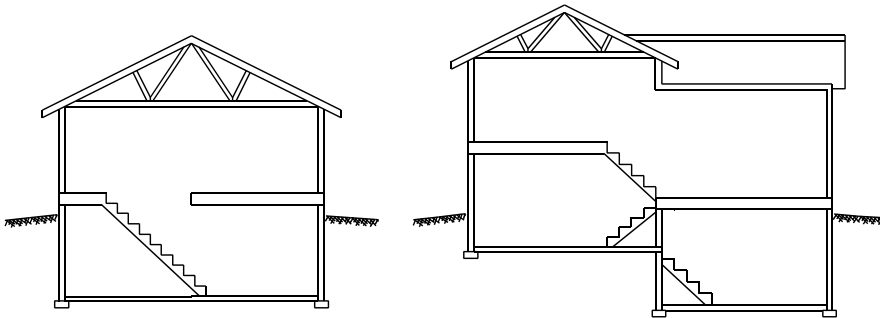
From the Middle Hall you can walk up Stair #2 into the Upper Hall. This level is at elevation +5'-6" and is, as you can see, the bedroom area of the house. The Master Bedroom has its own bathroom and a walk-in closet. Notice the hidden lines in this closet, indicating a ceiling hatch giving access to the attic space, a further example of orthographic rule bending.

Having now walked through all the rooms and levels of the house, you should be forming a mental picture of its general shape and size. It might help to redraw that diagram of the floor levels adding the additional information now available. I have done this for you at the left.



All levels of the house.

You may also find it helpful to think of the house by its general style, a split level. To illustrate how this style of house occurs, look to the left. To create a four-level split a two-level ranch style house is split from front to back. One half of the split is then raised in relation to the other, thus creating four separate levels. In doing this, minor complications arise in the placement of the additional stairs required and the design of the roof structure. On my design I have complicated things even further by an additional splitting of my Elevation 0' level, creating either a sunken living room or a raised kitchen, depending on your point of view.



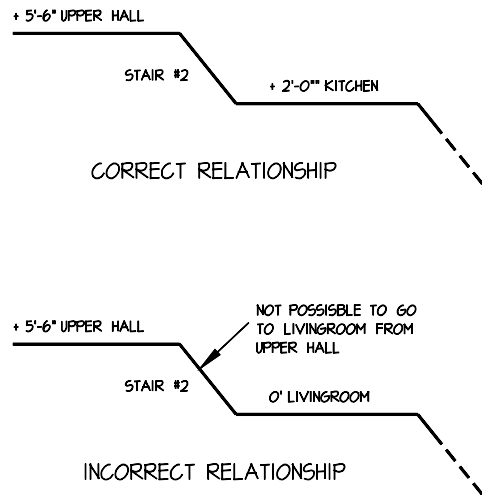
RANCH STYLE - TWO LEVELS

SPLIT LEVEL - FOUR LEVELS

The basic design changes needed to convert a ranch-style house into a split-level style house.

Time now for Exercise 2, described at the left. Complete this exercise before continuing.

**EXERCISE 2**  
 Draw a single line *schematic* of all *floor levels* of the house. By this I mean a diagram similar to the type of drawing that describes an electrical circuit or a plumbing system. There is no scale to this kind of drawing and it shows, in the simplest way possible, the relationship of each floor to the base level. It must also show the correct *access relationships* (how to get from one floor to another) of each floor level. To get you started and to show you the correct way to proceed, I have drawn below an example of the correct way and the incorrect way.



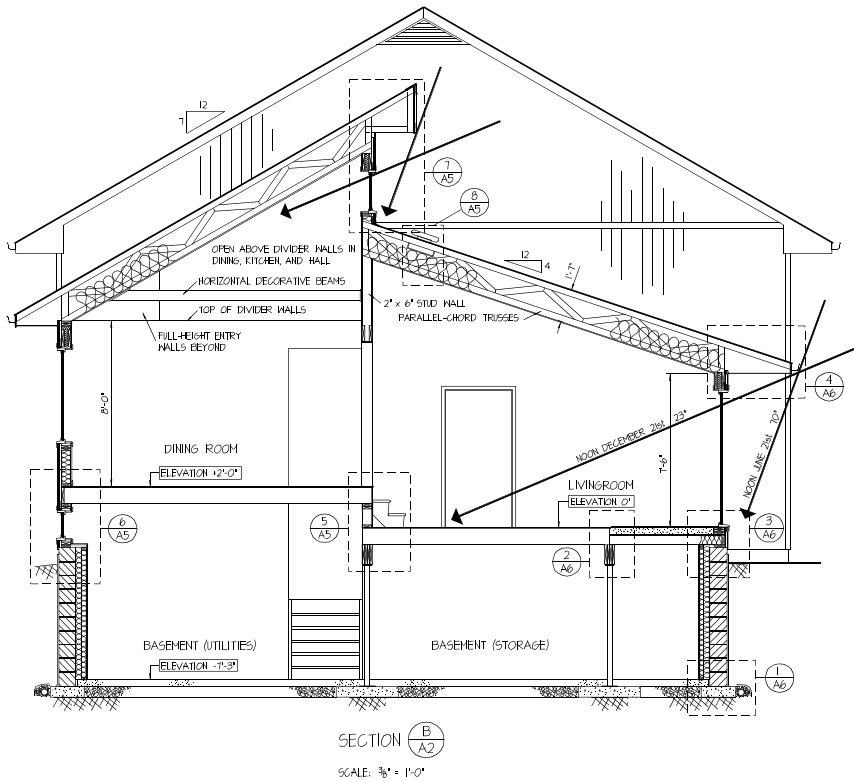
Correct and incorrect floor level relationships for Exercise 2.

## USE OF SECTIONS IN VISUALIZATION

You have walked through all levels of the house and should by now be aware of the plan shape of each room. Be aware, however, that the plan shape is only half the story and you must next establish and understand the vertical aspects of each room to complete the visualization process.

The dispensing of vertical information is one of the jobs performed by sections, and on Sheet A2 there are only two sections of major importance,  $\frac{B}{A5}$  and  $\frac{D}{A6}$ .

Start with  $\frac{B}{A5}$  which, as you can see, runs through the Dining and Living Rooms and looks in the direction of the split. It also passes through Window  $\diamond 3$ , the steps to the Living Room, the ceramic tile area, and Window  $\diamond 2$ . The same section also cuts through the Basement level and should therefore give a view of the house from foundation to roof.



Cross-Section through Living Room, Diningroom, and Basements.

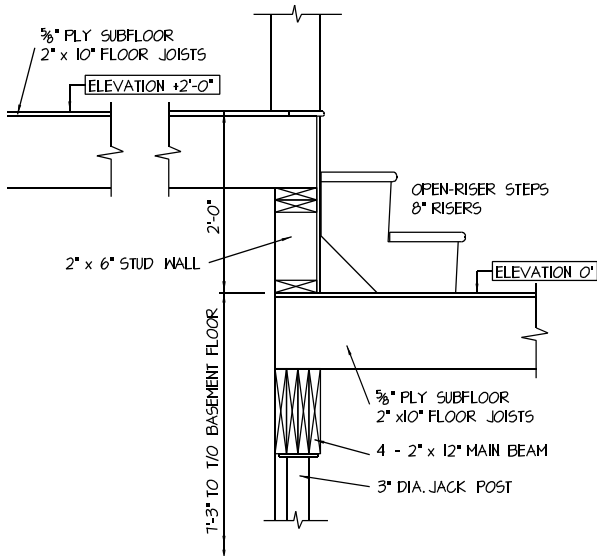
Turn now to Sheet A5. Section B, (generally called a "Cross-Section" because it cuts right across the building), does give you a complete slice through the house. It shows construction details along the line of the section and includes an exterior view of the higher split part beyond.

A good place to start your examination of the Section and its relation to the plans is in the Basement area. You already know that the entire Basement floor is at the same level, but now you can see the effect the raised Kitchen has on the ceilings of the Basement. According to the elevation levels there must be a 2'-0" difference in ceiling height between the Basement sections (Utilities and Storage). You will find this fact confirmed by the dimensions in Detail  $\frac{5}{A5}$ .

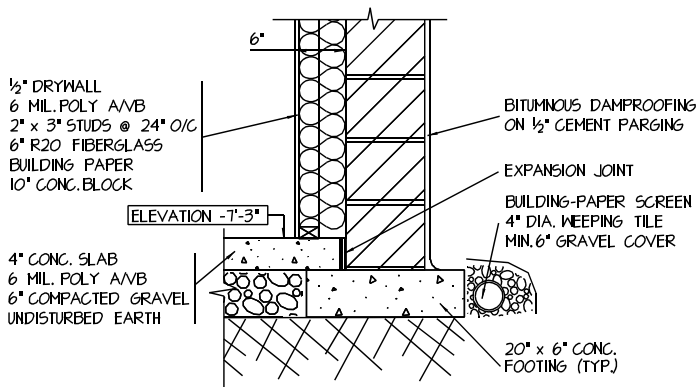
It is useful at this point to calculate the actual ceiling heights for each Basement area. This information will give you a good feel for the relative sizes of the rooms. Start with

Basement (Storage). Looking at detail  $\frac{5}{A5}$  (reproduced at the left) you have a dimension of 7'-3" from top of the Living Room subfloor to top of the concrete Basement (Storage) floor. All you need to do is subtract the depth of the 2" x 10" joist and 5/8" plywood to arrive at the ceiling height. A 10" joist is actually 9 1/4" deep and, with the plywood, makes a total of approximately 10". Subtracting 10" from 7'-3" gives 6'-5". You can see now why this part of the basement is used only for storage and why I must duck my head very carefully when going under the two main support beams! It would have made more sense to frame the floor joists of the Living Room into the *side* of the main beam, thus allowing the main beam to be raised. Hindsight is always 20/20!

Since the ceiling structure of each Basement is the same, all you need to do to calculate the height of Basement (Utilities) is to add 2'-0" to the previous dimension. This gives an 8'-5" high ceiling. It is interesting to note that the three-dimensional shape of the whole basement area is quite similar to the very first Step-Block shape you saw in Chapter 4.



Calculating ceiling heights in the Basement rooms.



Detail  $\frac{1}{A6}$  showing the foundation wall materials.

Take a look now at the foundation walls and see what kind of finish is being applied to the inside and outside surfaces. The best place to see this information is on Details  $\frac{1}{A6}$  and  $\frac{3}{A6}$ . Go to Sheet A6 to see these details. On the outside face there is a 1/2" thick layer of cement parging with a coat of tar-based dampproofing compound. The inside is a little more complex. Starting from the wall face and working into the basement there are the following components. Against the wall face is a layer of black building paper to act as a dampproof (but not vapor-tight) barrier. Next comes a 2" x 3" stud wall, the face of which is positioned 6" out from the block. This spacing is to make room for the 6" thick R-20 fiber-glass insulation placed between and behind the studs. Next comes a layer of 6 mil. polyethylene plastic air/vapor barrier, and on top of that 1/2" drywall.

### EXERCISE 3

Using the exploded isometric on Sheet 7 as a technique guide, draw a similar exploded isometric for the basement block wall and insulation system. Show all the components in the wall system, looking from inside to outside. Label all components.

Time for Exercise 3 detailed at the left. Complete this before continuing.