DRAWING CONVENTIONS

plans, sections, elevations

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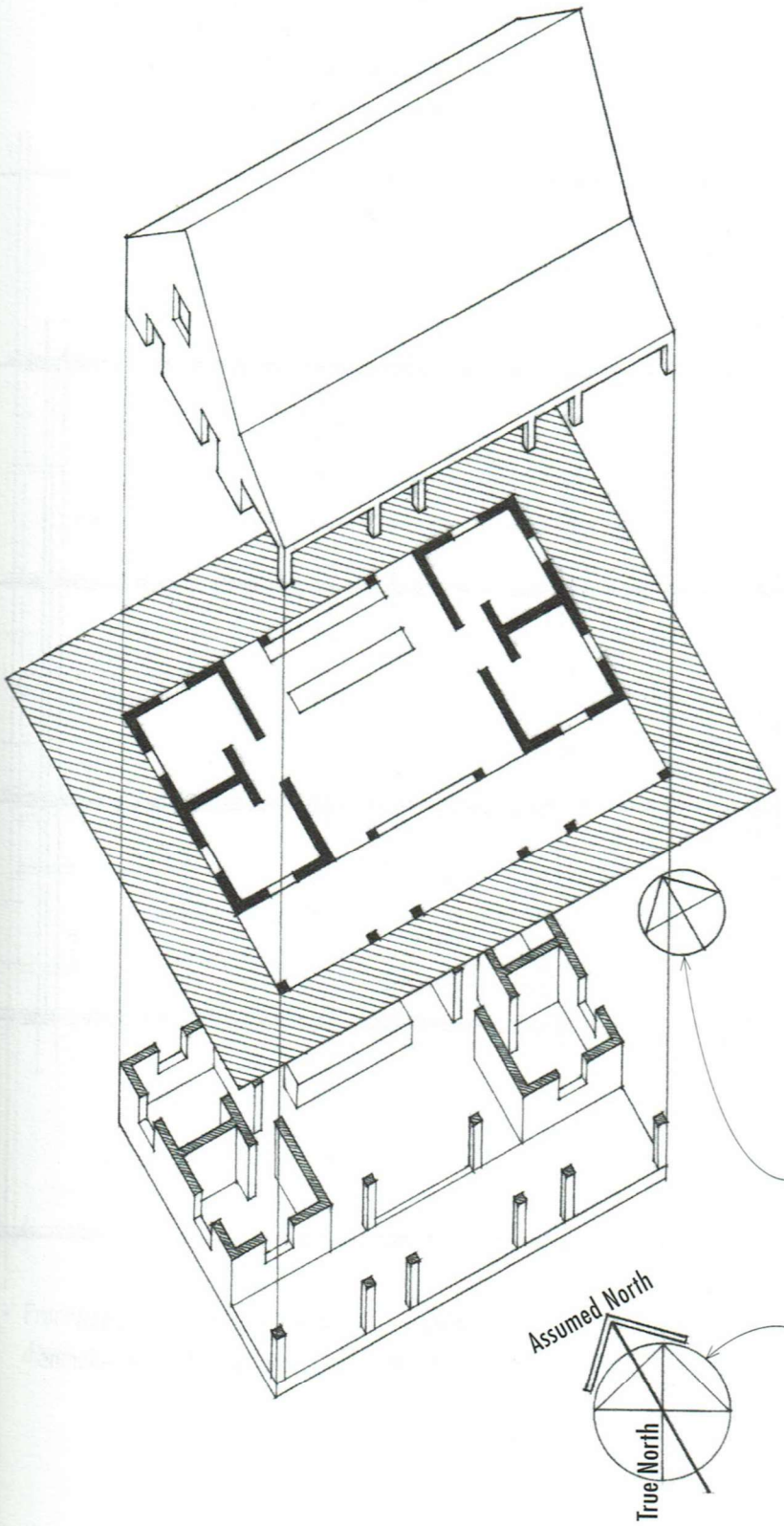
A floor plan represents a section of a building as it would appear if cut through by a horizontal plane with the upper portion removed. The floor plan is an orthographic projection of the portion that remains.



- Floor plans typically show the configuration of walls and columns, the shape and dimensions of spaces, the pattern of window and door openings, and the connections between spaces as well as between inside and outside.
- The plane of the horizontal cut is usually located about 4 feet above the floor, but this height can vary according to the nature of the building design.
- The horizontal section cuts through all walls and columns, as well as through all door and most window openings.
- Beyond the plane of the cut, we see the floor, counters, tabletops, and similar horizontal surfaces.

Digital Plans

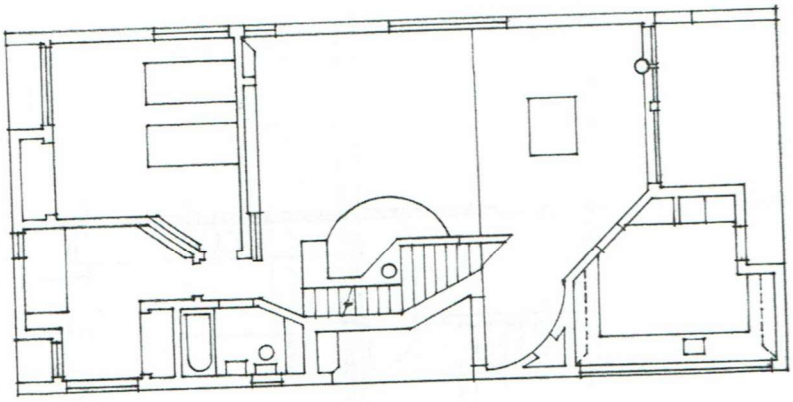
In 3D modeling programs, "front and back" or "hither and yon" clipping planes, perpendicular to a vertical line of sight, can be employed to create a floor plan from a digital model.

We use a north arrow to indicate the orientation of a floor plan. The normal convention is to orient floor plans with north facing up or upward on the drawing sheet.

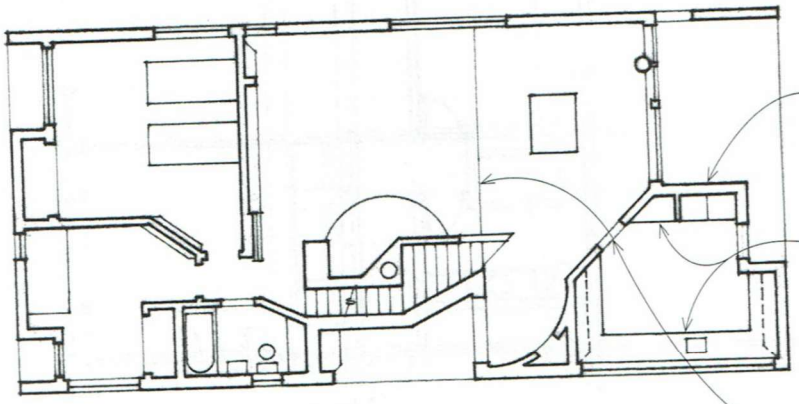
If a major axis of the building is less than 45° east or west of north, we can use an assumed north to avoid wordy titles, such as "north-northeast elevation," or "south-southwest elevation."

Defining the Plan Cut

Critical to the reading of a floor plan is the ability to distinguish between solid matter and spatial void and to discern precisely where mass meets space. It is therefore important to emphasize in a graphic way what is cut in a floor plan, and to differentiate the cut material from what we can see through space below the plane of the cut.



- To the left is the first floor plan of the Vanna Venturi House in Philadelphia, designed by Robert Venturi in 1962. It is drawn with a single line weight.

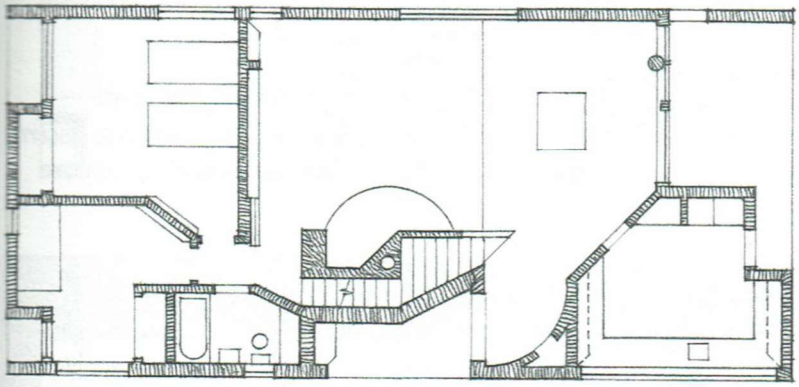


- To convey depth in a floor plan, we can use a hierarchy of line weights.
- The heaviest line weight profiles the plan shapes of cut elements. As a profile line, this cut line must be continuous; it can never intersect another cut line or terminate at a line of lesser weight.
- Intermediate line weights delineate edges of horizontal surfaces that lie below the plane of the plan cut but above the floor. The farther away a horizontal surface is from the plane of the plan cut, the lighter the line weight.
- The lightest line weights represent surface lines. These lines do not signify any change in form; they simply represent the visual pattern or texture of the floor plane and other horizontal surfaces.

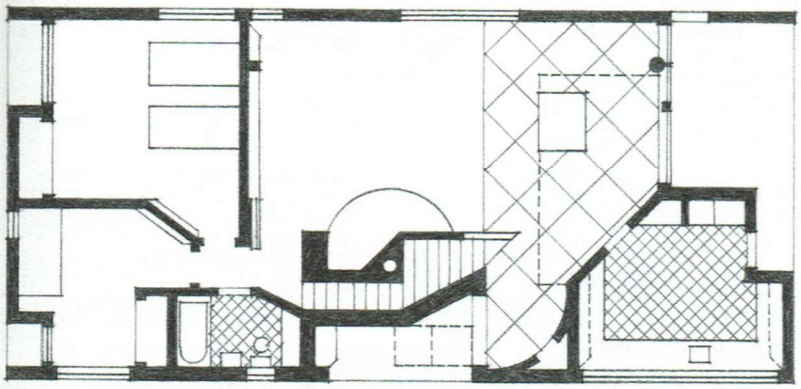
- Drawing scale influences the range of line weights that one can use to convey spatial depth. Small-scale drawings use a tighter range of line weights than do large-scale drawings.

Poché and Spatial Depth

We can emphasize the shape of cut elements with a tonal value that contrasts with the spatial field of the floor plan. We refer to this darkening of cut walls, columns, and other solid matter as poché.



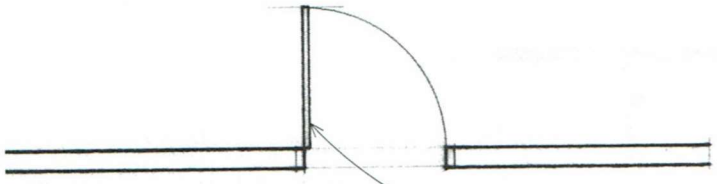
- Poché establishes a figure-ground relationship between solid matter and spatial void.
- It is typical to blacken the cut elements in small-scale plans in order to clarify their figures.
- If only a moderate degree of contrast with the drawing field is desired, use a middle-gray value to emphasize the cut elements. This is especially important in large-scale plans, when large areas of black can carry too much visual weight or create too stark a contrast.



- If such plan elements as flooring patterns and furniture give the field of the drawing a tonal value, a dark gray or black tone may be necessary to produce the desired degree of contrast between solid matter and spatial void.

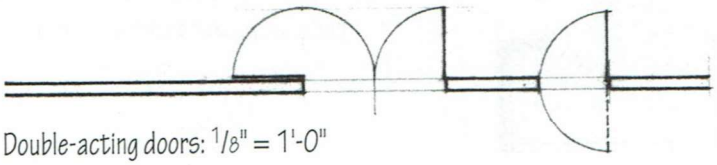
Doors and Windows

We are not able to show the appearance of doors in a plan view. For this information, we must rely on elevations. What a floor plan does show, however, are the location and width of door openings, and to a limited degree, the door jambs and type of door operation—whether a door swings, slides, or folds open.



- Swinging doors: 1/4" = 1'-0"

- Draw a swinging door perpendicular to the plane of the wall opening and note the door swing with a quarter circle drawn lightly with a compass or circle template. Be sure that the door width matches that of the door opening.
- Show the thicknesses of doors and door jambs at the scale of 1/4" = 1'-0" or larger.

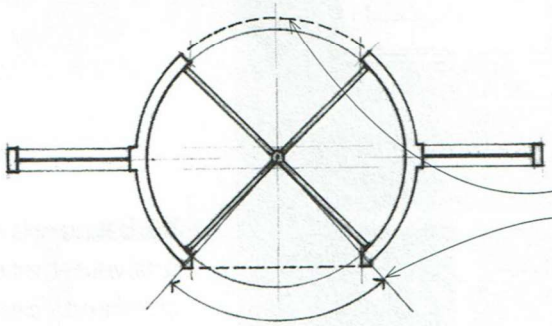


- Double-acting doors: 1/8" = 1'-0"

- Sliding door

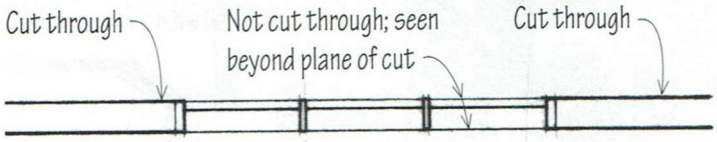
- Pocket door

- Bifold doors



- Revolving door

- Canopy may be straight or curved.
- <90°



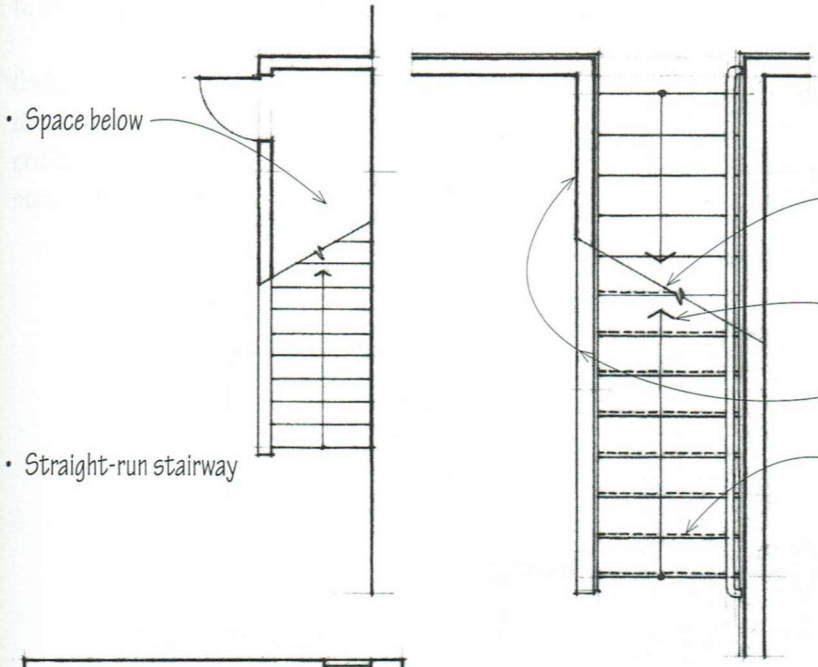
- Windows

As with doors, we cannot show the appearance of windows in a plan view. A floor plan does disclose the location and width of window openings, and to a limited degree the presence of window jambs and mullions.

- Window sills are not cut through in a floor plan. They should therefore be drawn with a lighter line weight than walls, window mullions, and other cut elements.
- The operation of a window is usually indicated in an elevation drawing.

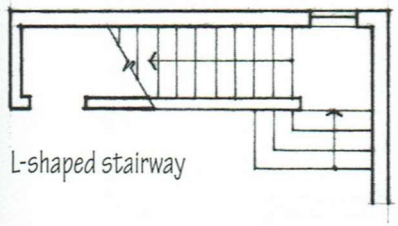
Stairs

Plan views are able to show the run of a stairway—its horizontal treads and landings—but not the height of the vertical risers.

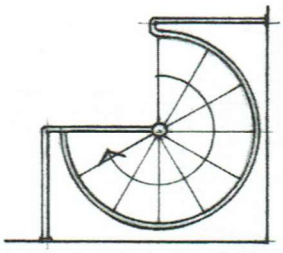


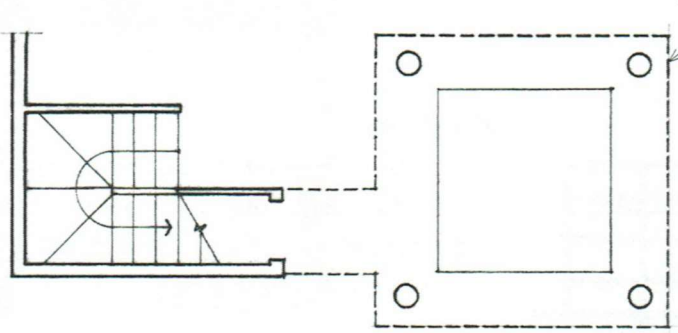
- Space below
- Straight-run stairway

- The path of travel terminates where the stairway passes through the plane of the plan cut.
- Use a diagonal line to indicate this cut and to more clearly distinguish it from the parallel lines of the stair treads.
- An arrow specifies the direction up or down from the level of the floor plan.
- Distinguish between handrails and walls that are cut through in a floor plan.
- Show detail such as handrails and toe spaces where the scale of a drawing permits.



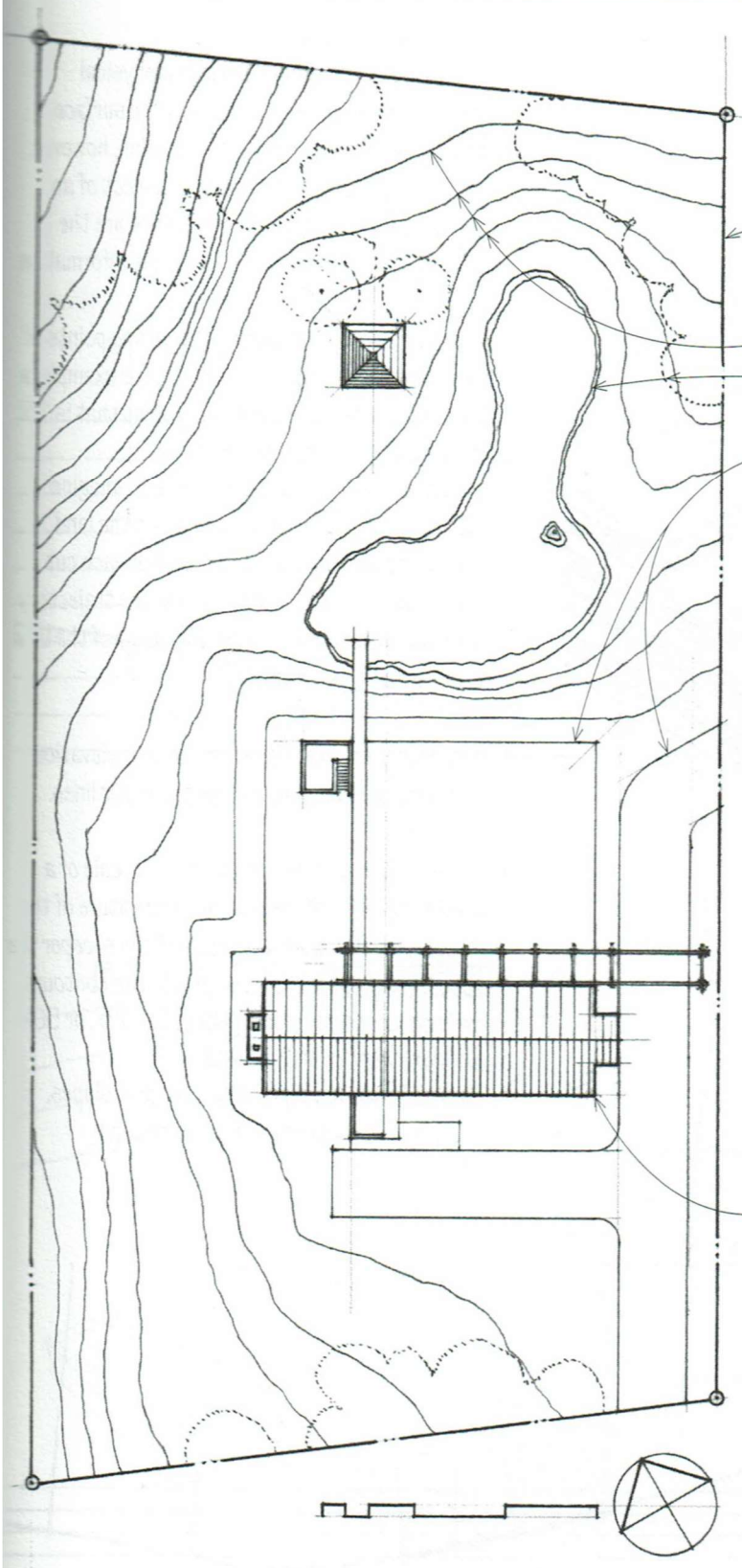
- L-shaped stairway





- Return stair leading to a loft space

- Dashed lines indicate major architectural features that occur above the plane of the plan cut, such as lofts, lowered ceilings, exposed beams, skylights, and roof overhangs. Dashed lines may also disclose the hidden lines of features concealed from view by other opaque elements.
- The common convention is to use long dashes to signify elements that are removed or above the plane of the plan cut, and shorter dashes or dots for hidden elements below the plan cut.



A site plan describes the location and orientation of a building or building complex on a plot of land and in relation to its context. Whether this environment is urban or rural, the site plan should describe the following:

- Legally recorded boundaries of the site, indicated by a broken line consisting of relatively long segments separated by two short dashes or dots
- Physical topography of the terrain with contour lines
- Natural site features, such as trees, landscaping, and watercourses
- Existing or proposed site constructions, such as walks, courts, and roadways
- Architectural structures in the immediate setting that impact the proposed building

In addition, a site plan may include:

- Legal constraints, such as zoning setbacks and rights-of-way
- Existing or proposed site utilities
- Pedestrian and vehicular entry points and paths
- Significant environmental forces and features

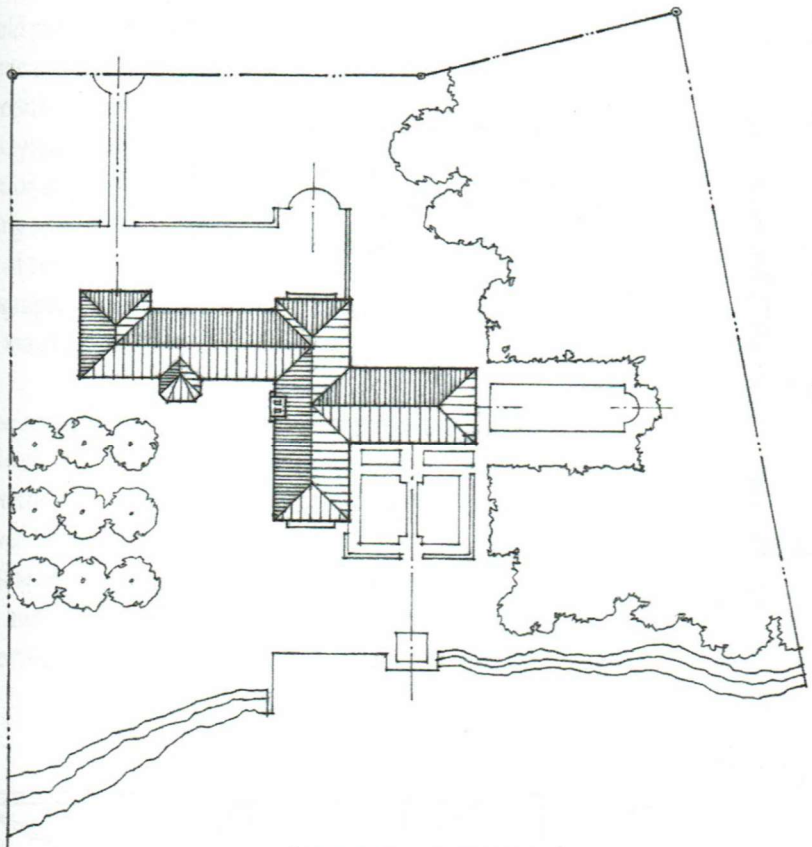
Roof Plans

A roof plan is a top view describing the form, massing, and material of a roof or the layout of such rooftop features as skylights, decks, and mechanical housings.

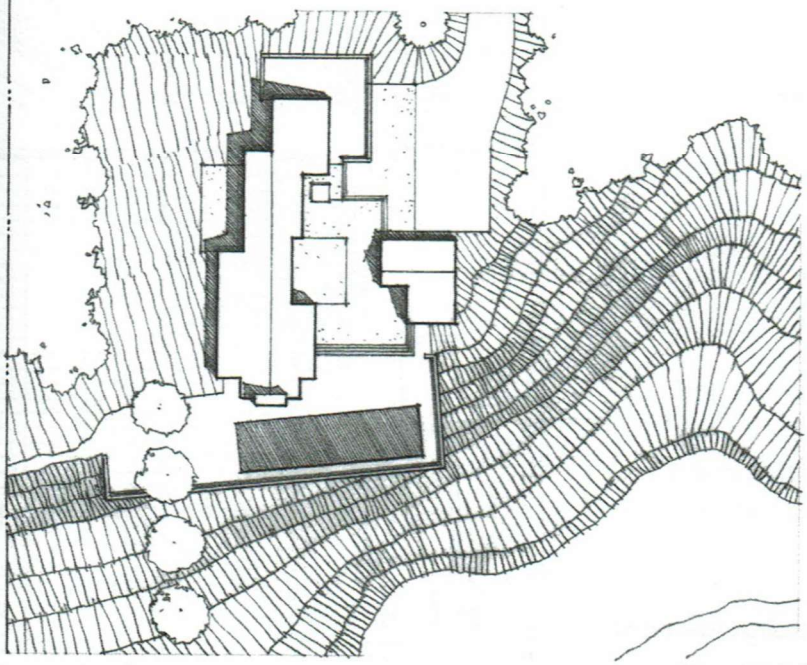
- Roof plans are typically included in the site plan for a proposed building or building complex.

- Graphic scale designates the scale of the site plan and a north arrow indicates the orientation of the site.

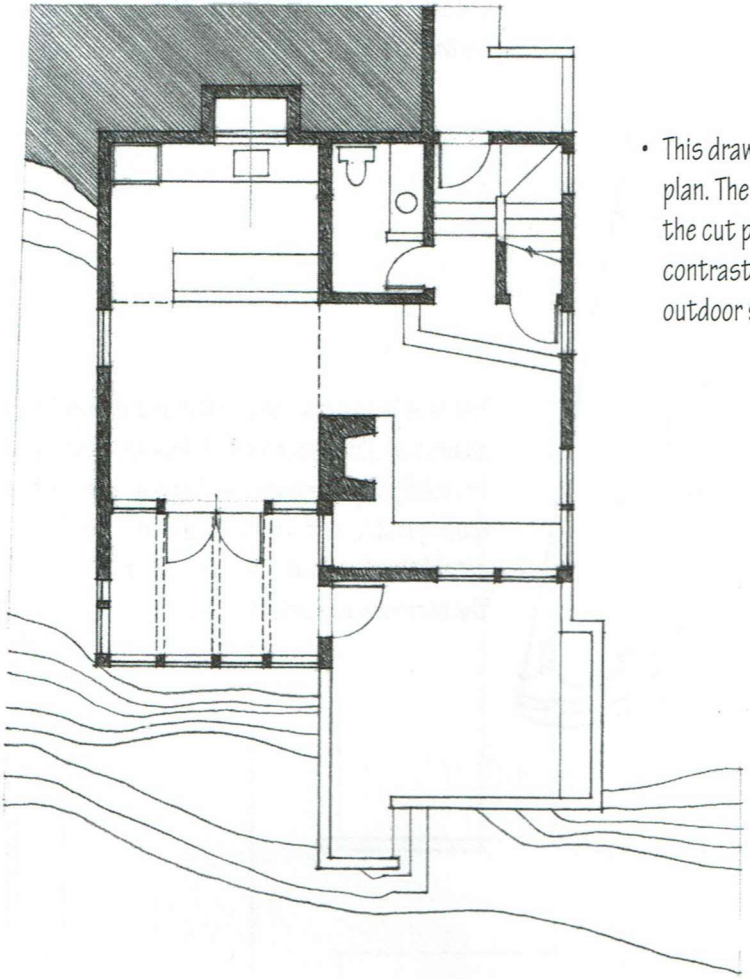
There are two principal ways to relate a building to its site and context.



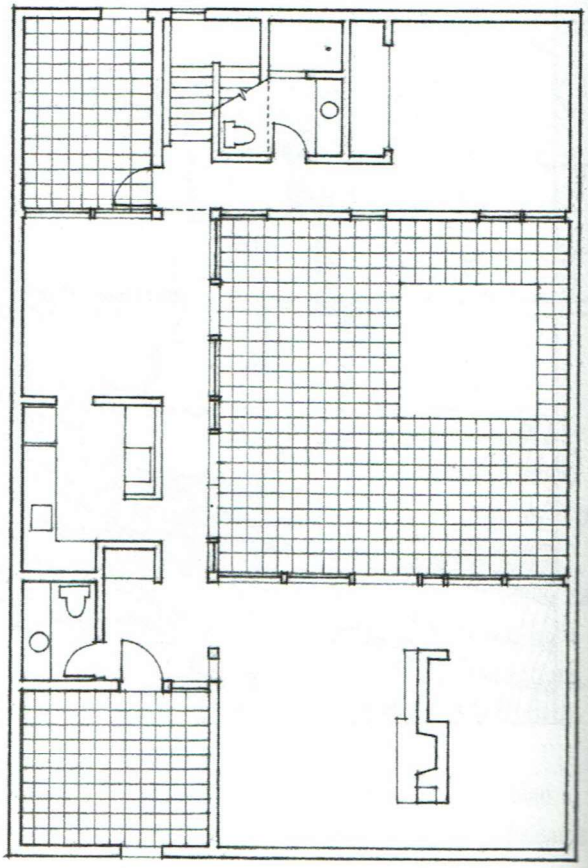
- The first is to draw the building as a darker figure against a lighter background. This approach is especially appropriate when the way in which the roofing material of the building is indicated will establish a tonal value and texture against which the surrounding context must contrast.



- The second approach defines the building as a lighter shape against a darker background. This technique is necessary when rendering shadows cast by the form of the building, or when landscaping elements impart a tonal value to the surrounding context.



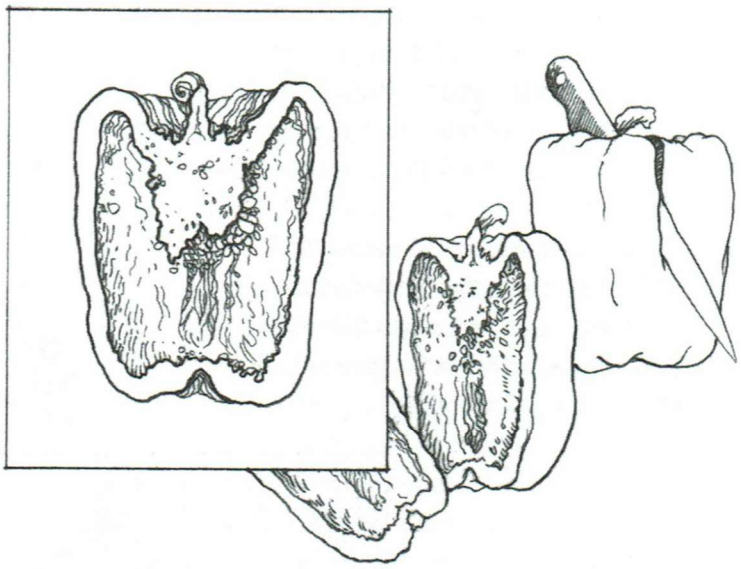
- This drawing combines a floor plan with the site plan. The shape of the floor plan and the poché of the cut plan elements provide a figural quality that contrasts sufficiently with the surrounding field of outdoor space.

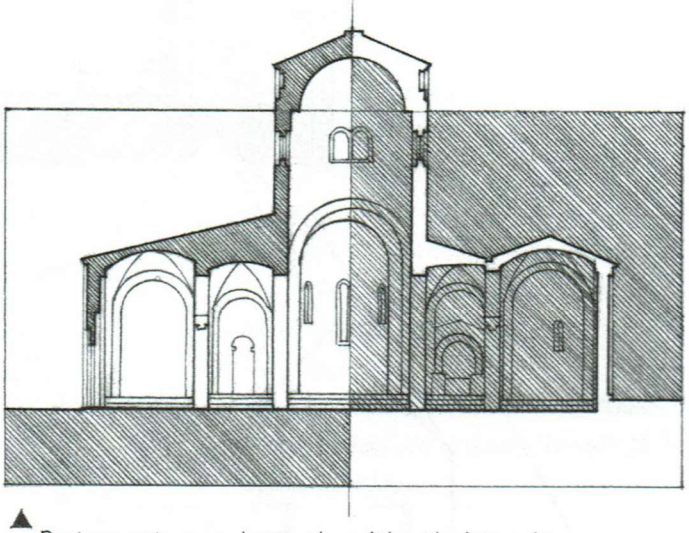


- This drawing illustrates a building whose exterior walls encompass the site; it is therefore a composite floor plan and site plan drawing.

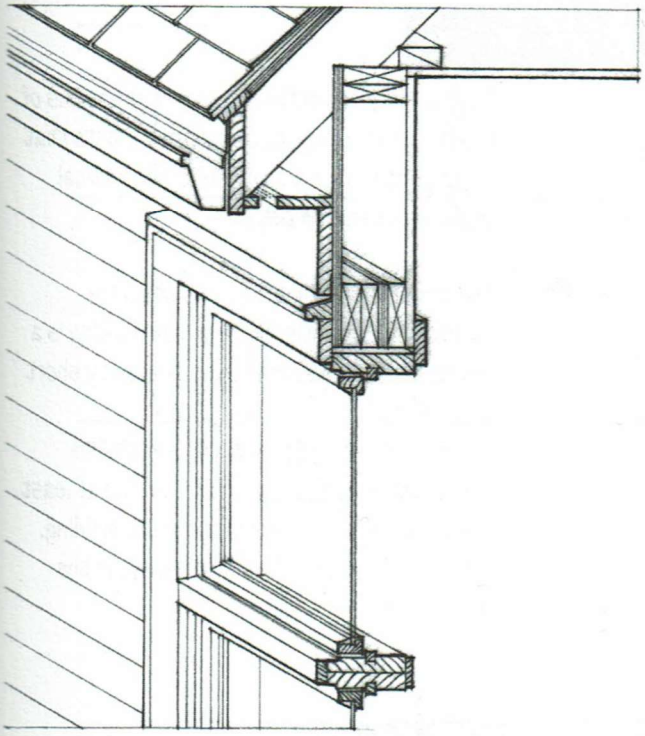
A section is an orthographic projection of an object as it would appear if cut through by an intersecting plane. It opens up the object to reveal its internal material, composition, or assembly. In theory, the plane of the section cut may have any orientation. But in order to distinguish a section drawing from a floor plan—the other type of drawing that involves a slice—we usually assume the plane of the cut for a section is vertical. As with other orthographic projections, all planes parallel to the picture plane maintain their true size, shape, and proportions.

We use section drawings to design and communicate the details of a building's construction as well as the assembly of furniture and cabinetry. In architectural graphics, however, the building section is the premier drawing for revealing and studying the relationship between the floors, walls, and roof structure of a building and the dimensions and vertical scale of the spaces defined by these elements.





▲ • Design sections emphasize the solid-void relationship between the floors, walls, and roof structure of a building and the vertical dimensions and relationships of the contained spaces.

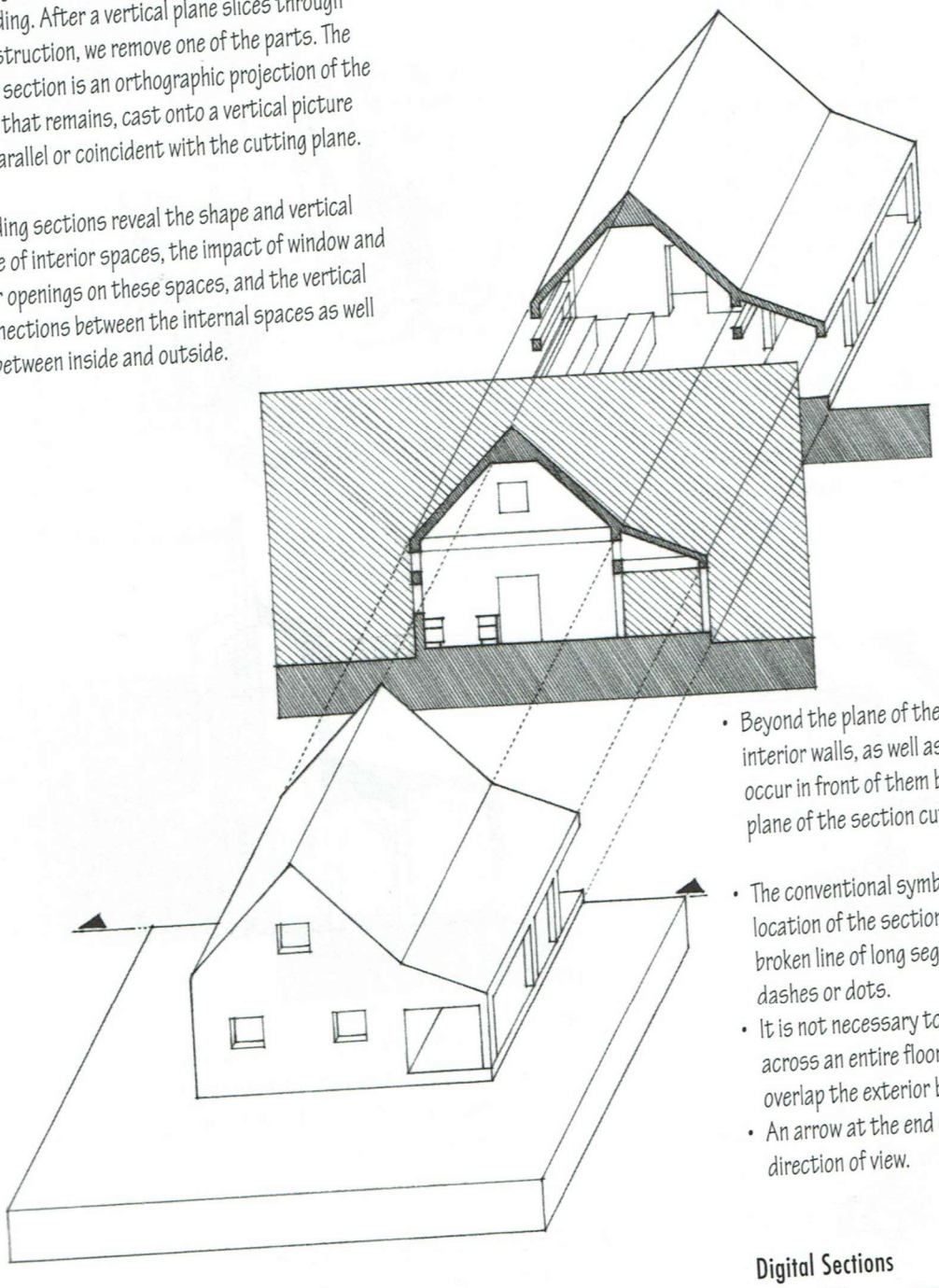


◀ • Construction sections articulate the structural and material assemblies and details of a building.

BUILDING SECTIONS

A building section represents a vertical section of a building. After a vertical plane slices through the construction, we remove one of the parts. The building section is an orthographic projection of the portion that remains, cast onto a vertical picture plane parallel or coincident with the cutting plane.

- Building sections reveal the shape and vertical scale of interior spaces, the impact of window and door openings on these spaces, and the vertical connections between the internal spaces as well as between inside and outside.

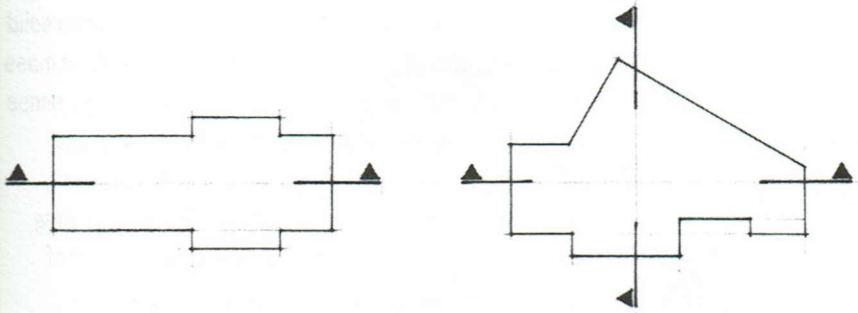


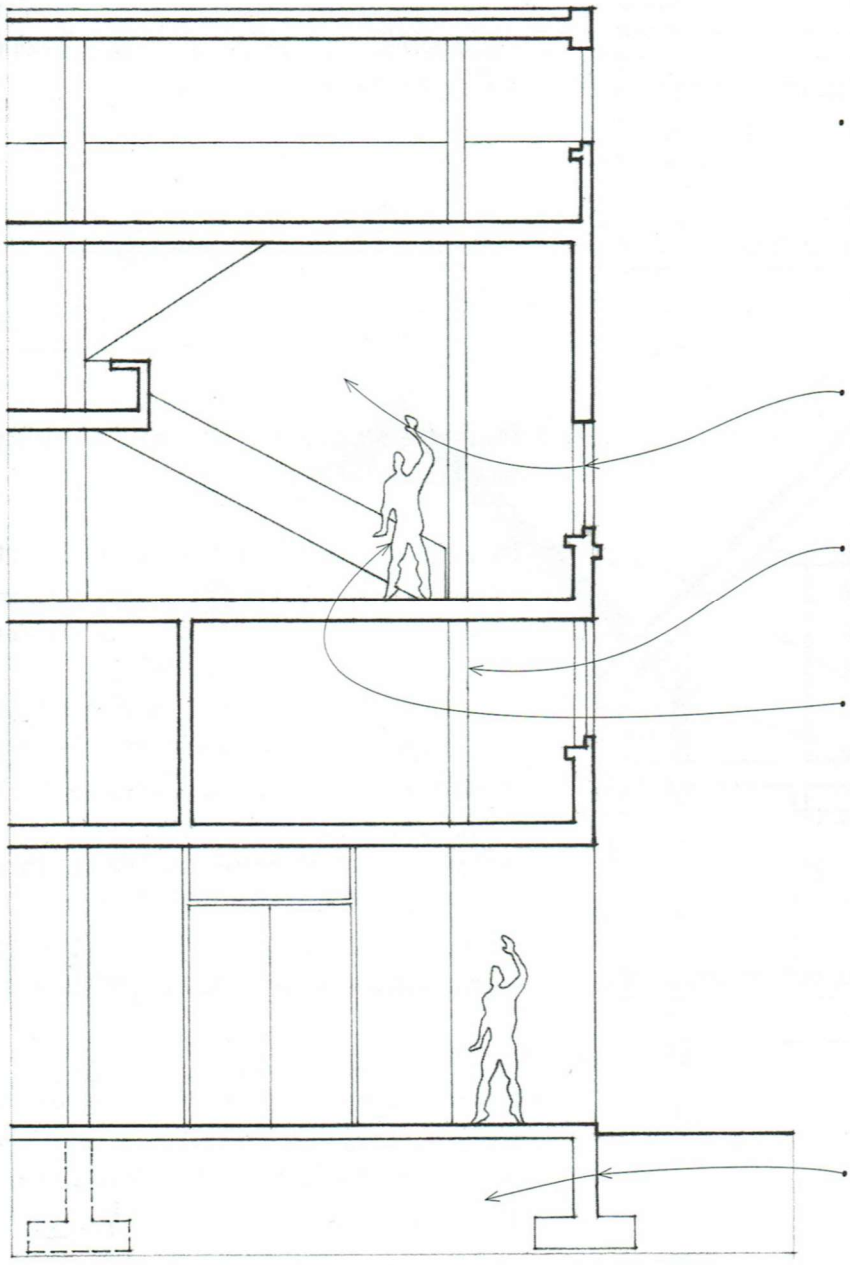
- Beyond the plane of the cut, we see elevations of interior walls, as well as objects and events that occur in front of them but behind the vertical plane of the section cut.

- The conventional symbol for indicating the location of the section cut in a plan drawing is a broken line of long segments separated by short dashes or dots.
- It is not necessary to draw this section line across an entire floor plan, but it should at least overlap the exterior boundaries of the building.
- An arrow at the end of each line points in the direction of view.

Digital Sections

3D-modeling programs use "front and back" or "hither and yon" clipping planes to create section drawings.





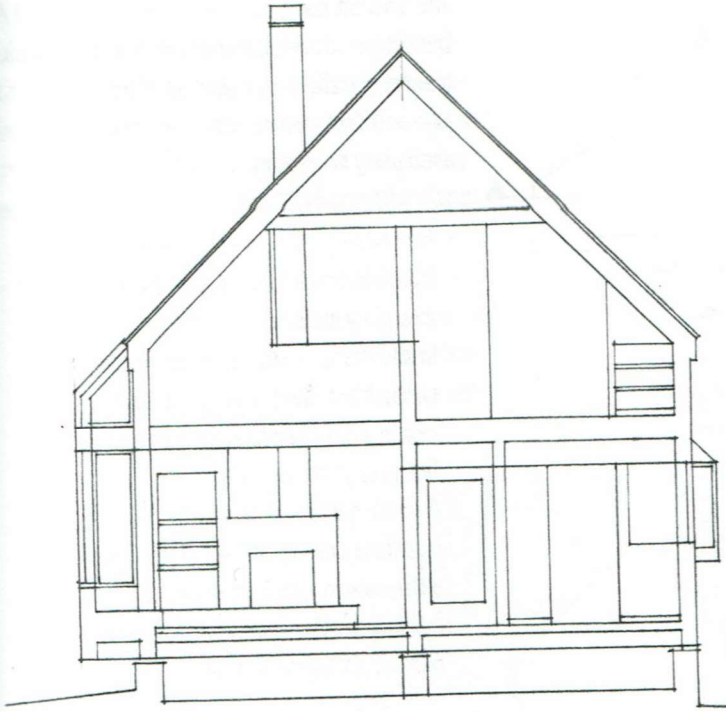
The Section Cut

Building sections should be cut in a continuous manner, parallel to a major set of walls. Use jogs or offsets in the cutting plane only when absolutely necessary.

- For buildings having a symmetrical plan, the logical location for a section cut is along the axis of symmetry.
- In all other situations, cut building sections through the most significant spaces and look in a direction that reveals the principal features of the spaces.
- A single section is usually not sufficient to illustrate these qualities unless a building is extremely simple. Remember, too, that the building section is only part of a series of related orthographic views.

- Cut sections through window openings, doorways, changes in roof and floor levels, roof openings, and other major spatial events in a building.
- Never cut through freestanding columns and posts, lest they read as walls, which would convey an entirely different spatial experience.
- It is good practice to include human figures in building sections to convey the scale of the spaces depicted.

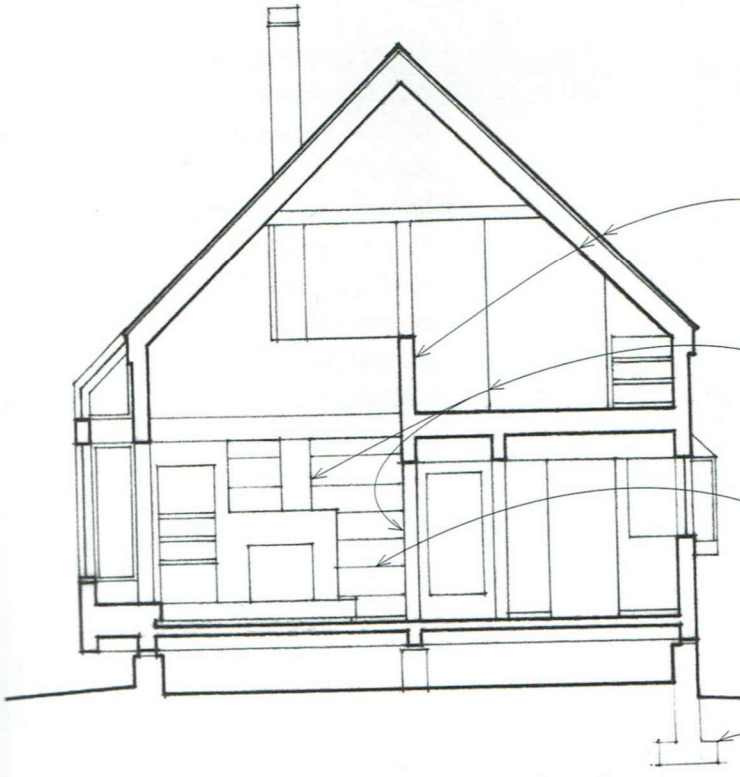
- The section cut extends to the soil mass upon which a building rests.



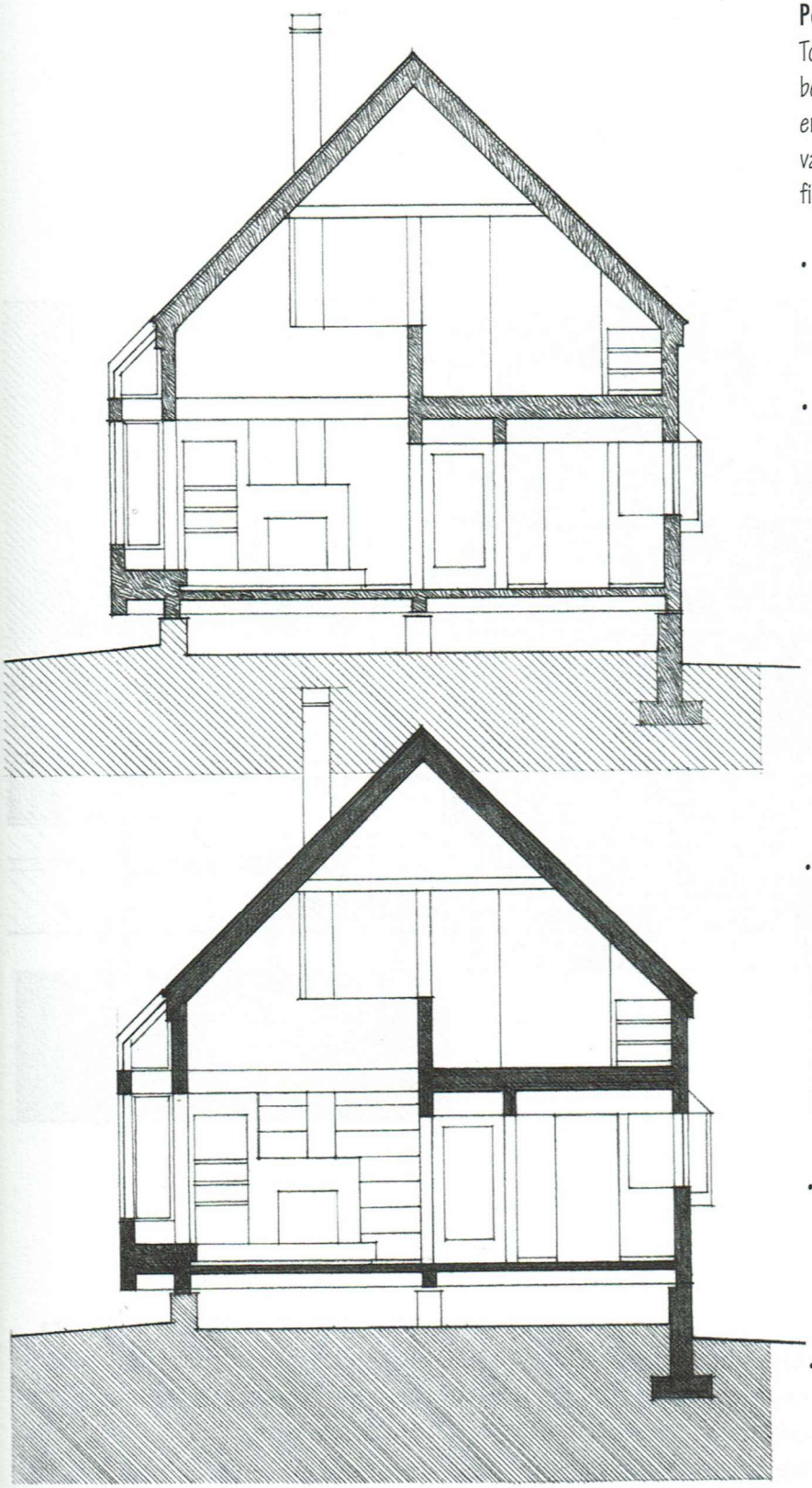
Defining the Section Cut

As with floor plans, it is critical to distinguish between solid matter and spatial void and to discern precisely where mass meets space in a building section. In order to convey a sense of depth and the existence of spatial volumes, we must use a hierarchy of line weights or a range of tonal values. The technique we use depends on the scale of the building section, the drawing medium, and the required degree of contrast between solid matter and spatial void.

- This is a building section drawn with a single line weight. It is difficult to discern what is cut and what is seen in elevation beyond the plane of the cut.



- This drawing uses a hierarchy of line weights to convey a sense of spatial depth.
- The heaviest line weight profiles the shapes of elements cut in the section. Note that these profiles are always continuous; they can never intersect another cut line or terminate at a line of lesser weight.
- Intermediate line weights delineate those elements that are seen in elevation beyond the section cut. The farther back an element is from the plane of the section cut, the lighter their profile should be.
- The lightest line weights represent surface lines. These lines do not signify any change in form. They simply represent the visual pattern or texture of wall planes and other vertical surfaces parallel to the picture plane.
- In design sections, construction details of foundations and footings below grade need not be indicated. If shown, they are part of the surrounding soil mass and should be drawn lightly.



Poché and Spatial Depth

To establish a clear figure-ground relationship between solid matter and spatial void, we can emphasize the shape of cut elements with a tonal value or poché that contrasts with the spatial field of the building section.

- We typically blacken or poché the floor, wall, and roof elements that are cut in small-scale building sections.

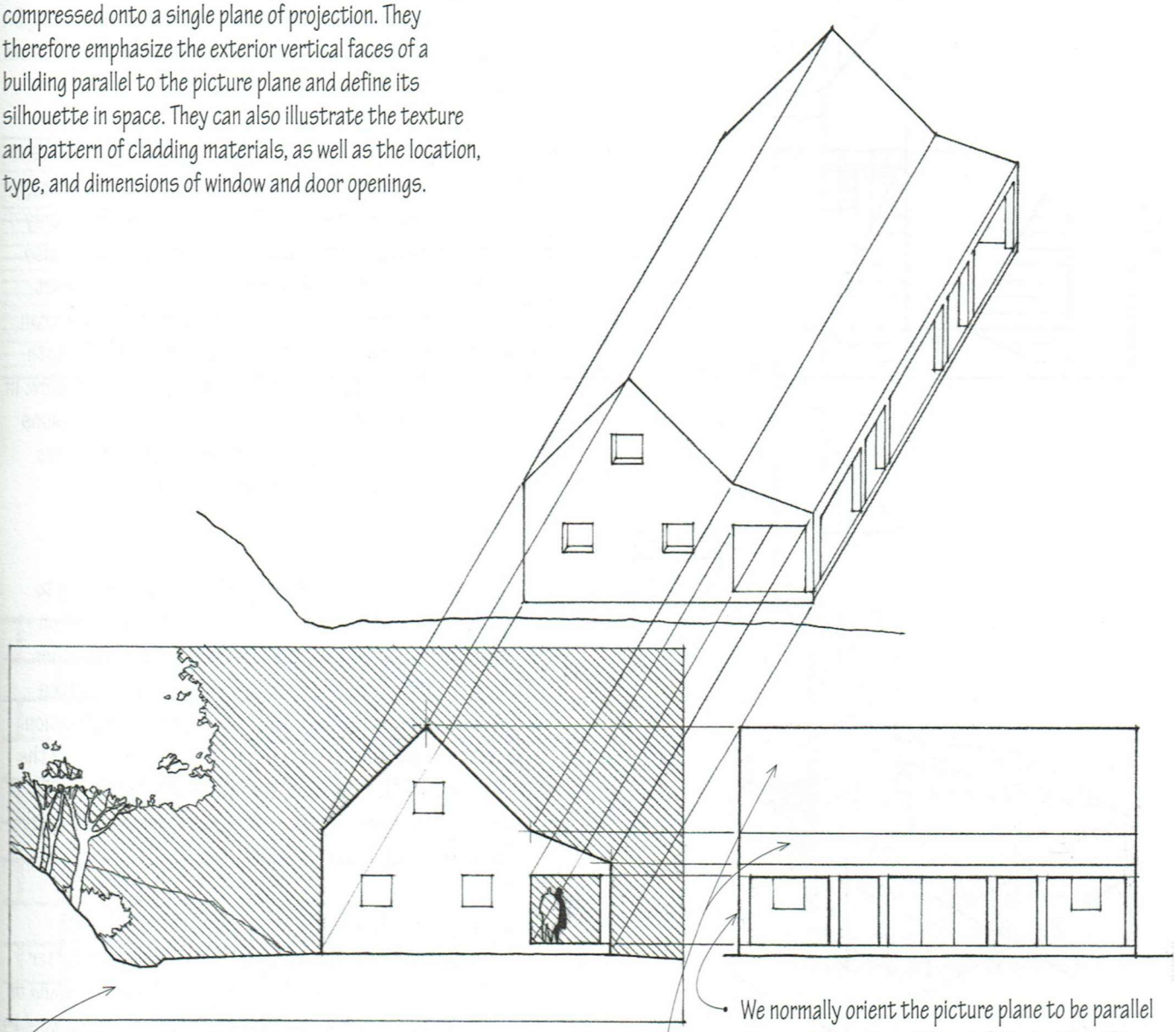
- If only a moderate degree of contrast with the drawing field is desired, use a middle-gray value to illuminate the shape of the cut elements. This is especially important in large-scale sections, when large areas of black can carry too much visual weight or create too stark a contrast.

- If vertical elements, such as wall patterns and textures, give the field of the drawing a tonal value, a dark gray or black tone may be necessary to produce the desired degree of contrast between solid matter and spatial void. In this value scheme, use progressively lighter values for elements as they recede into the third dimension.

- Remember that the supporting soil mass is also cut in building and site sections. Any tonal value given to cut elements should therefore continue into this mass.

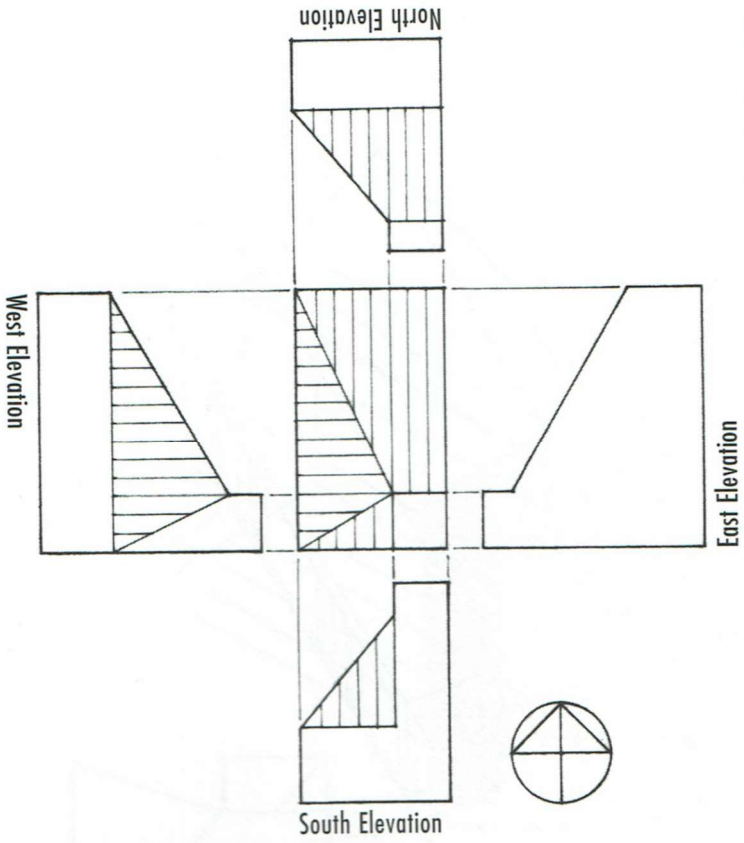
- If we wish to show a building's foundation system in a section drawing, we should be careful to delineate the below-grade portion as an integral part of the surrounding soil mass.

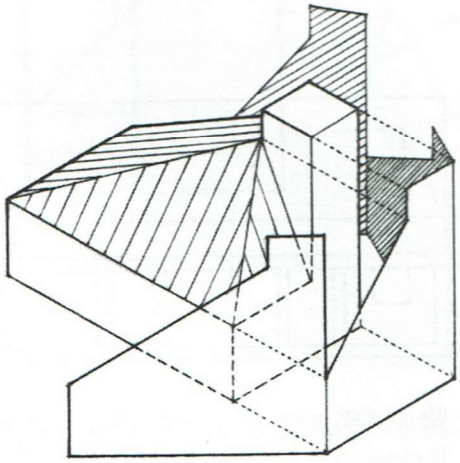
A building elevation is the image of a building projected orthographically onto a vertical picture plane. Building elevations convey the external appearance of a building, compressed onto a single plane of projection. They therefore emphasize the exterior vertical faces of a building parallel to the picture plane and define its silhouette in space. They can also illustrate the texture and pattern of cladding materials, as well as the location, type, and dimensions of window and door openings.

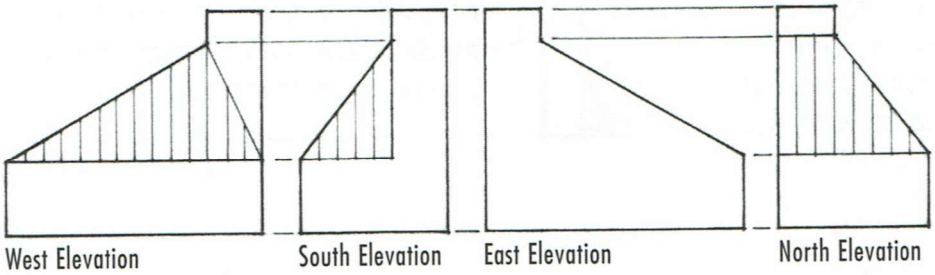


To show a building's relationship to the ground plane, building elevations should include a section cut through the ground mass on which the structure sits. This vertical cut is typically at some distance in front of the building. This distance varies according to what information we wish to display in front of the building and to what degree this context will obscure the form and features of the building.

We normally orient the picture plane to be parallel to one of the principal faces of the building. This enables all planes parallel to the picture plane to retain their true size, shape, and proportions. Any plane that is curved or oblique to the picture plane will appear foreshortened.







Arrangement and Orientation

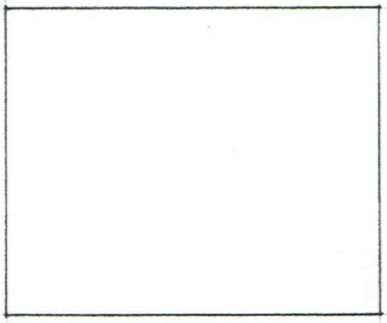
We can logically relate a series of building elevations to one another by unfolding the vertical picture planes on which they are projected. They can form a horizontal sequence of drawings, or be related in a single composite drawing around a common plan view.

- Whenever possible, we align related orthographic views so that points and dimensions can be transferred easily from one view to the next. This relationship will not only facilitate the construction of the drawings but will also make them more understandable as a coordinated set of information. For example, once a plan is drawn, we can efficiently transfer the horizontal dimensions of length vertically on the drawing surface to the elevation below. In a similar manner, we can project the vertical dimensions of height horizontally on the drawing surface from one elevation to one or more adjacent elevations.

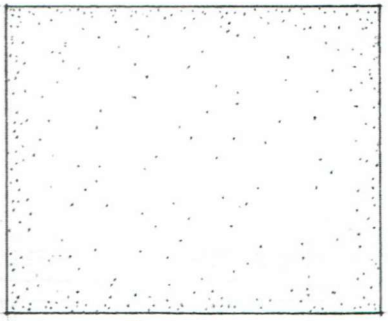
In architectural graphics, the orientation of a building to the compass points is an important consideration when studying and communicating the effect of sun and other climatic factors on the design. We therefore most often name a building elevation after the direction the elevation faces: for example, a north elevation is the elevation of the facade that faces north. If the face is oriented less than 45° off the major compass points, an assumed north may be used to avoid wordy drawing titles.

- When a building addresses a specific or significant feature of a site, we can name a building elevation after that feature. For example, Main Street Elevation would be the elevation facing Main Street, or Lake Elevation would be the elevation seen from the lake.

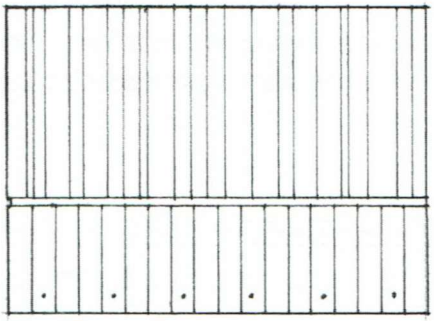
Representing Materials



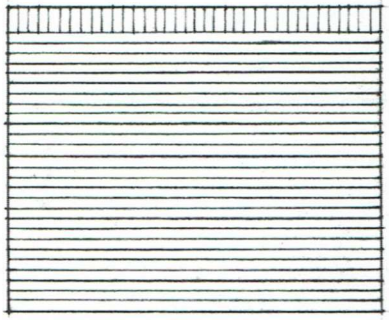
Concrete or Plaster



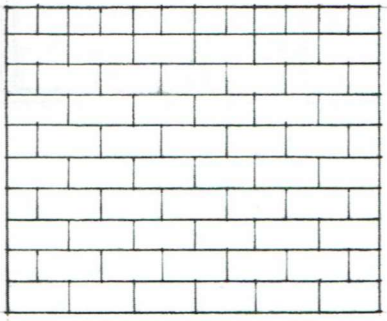
Concrete or Plaster



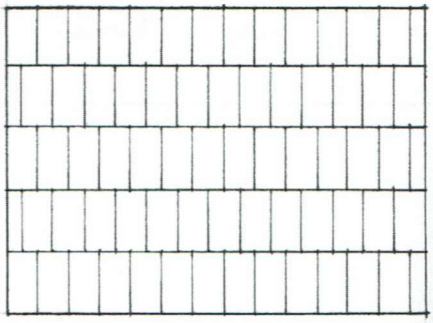
Board-Formed Concrete



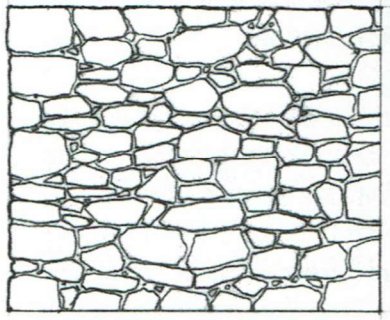
Brick Masonry



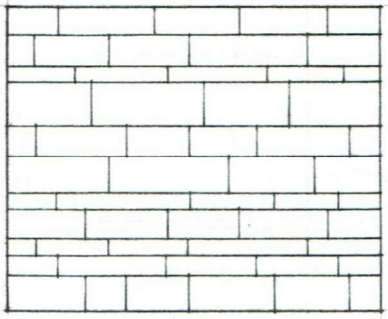
Concrete Masonry



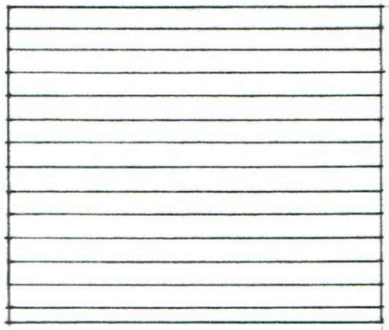
Concrete Masonry



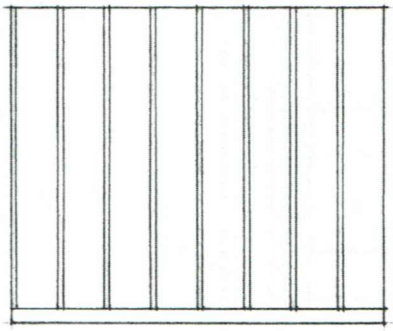
Stone Masonry



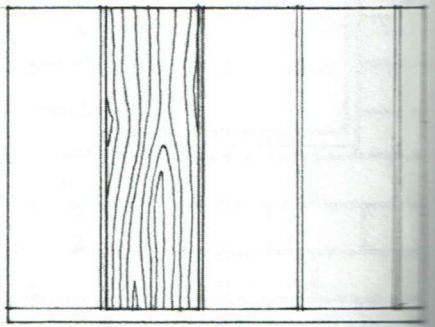
Stone Masonry



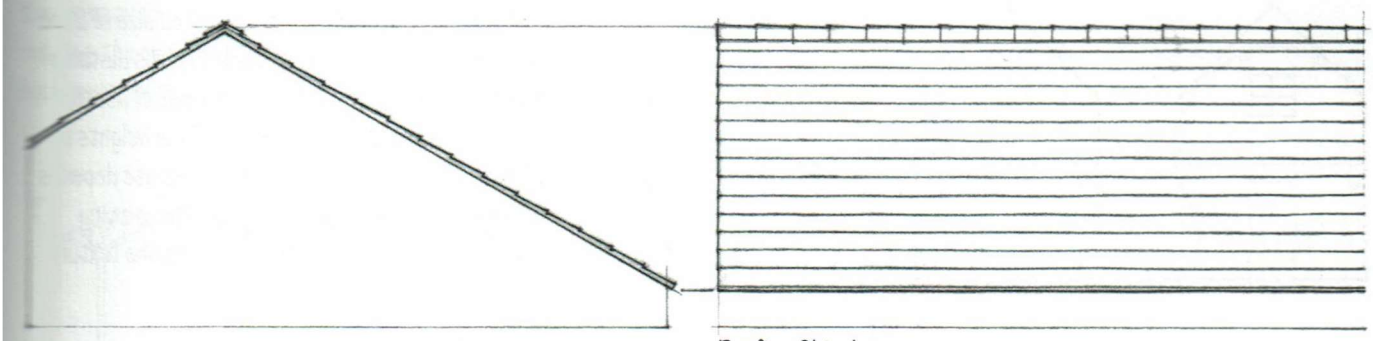
Wood Siding



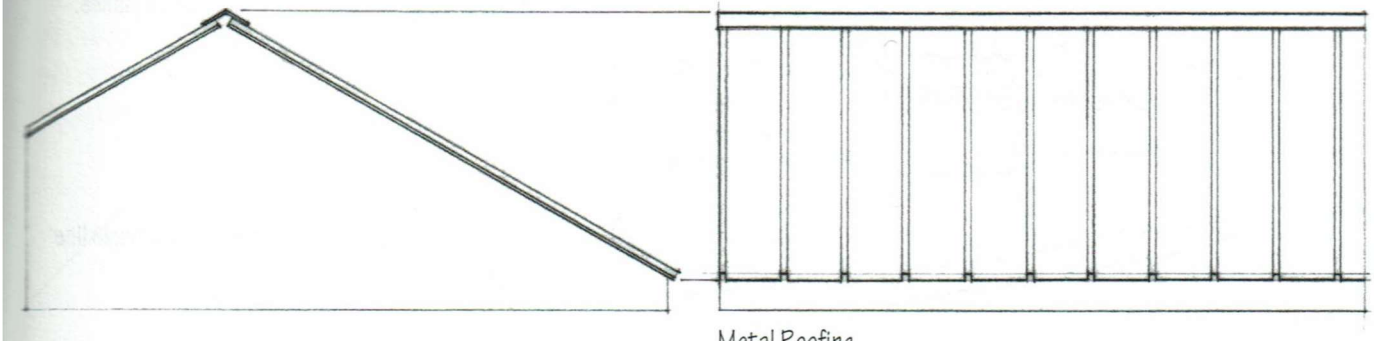
Wood Siding



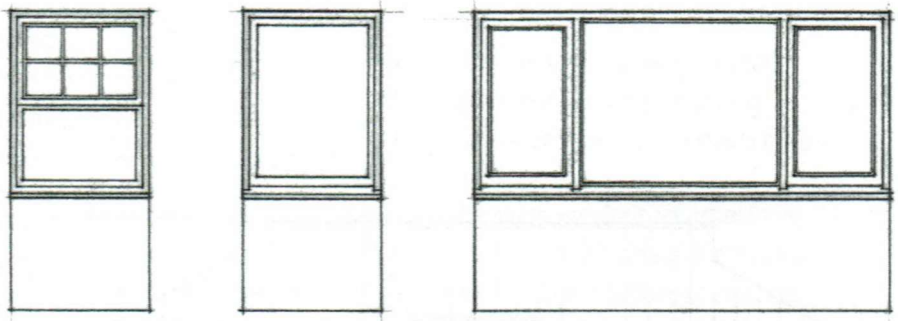
Wood Paneling



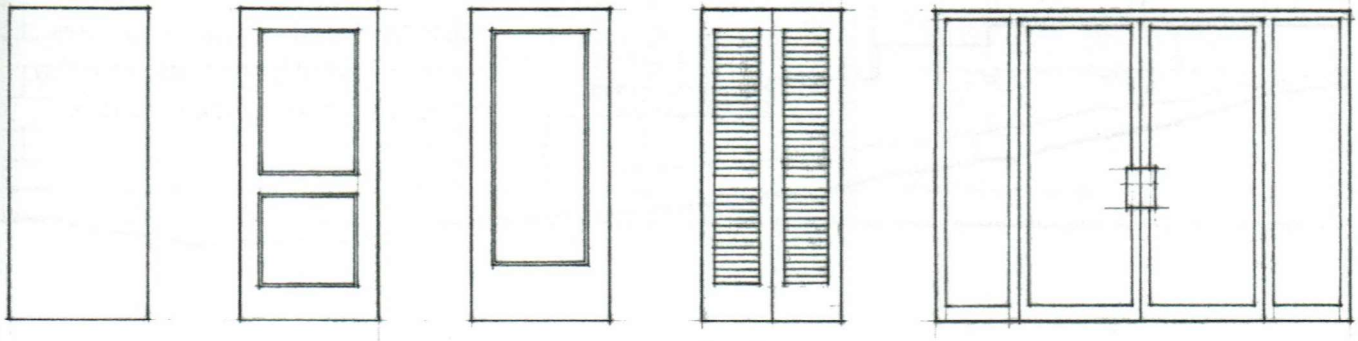
Roofing Shingles



Metal Roofing



Window Designs



Door Designs