Foreword

Freehand drawing gives us five main advantages:

1. First of all, things that do not as yet actually exist can be illustrated almost as if they did. When drawn freehand, planned buildings, rooms, landscapes, pictures, motifs, scenes, etc., become immediately visible in three-dimensional form. The advantage of the “artist’s impression” is that all our ideas can quickly take positive shape by means of the freehand sketch.

2. A comprehensive and accomplished freehand drawing can illustrate and “demonstrate” an object far more clearly than all other techniques. In an age when we are being force-fed with TV, film, and photography, the drawing leaves a more lasting impression and is often more pleasing to the eye.

3. The sheer pleasure of seeing the visible result of our own efforts as a wholly personal act and achievement, one which is permanent, lasting, and frequently beautiful too.

4. Our powers of perception are greatly enhanced: freehand drawing compels us to sort the essentials from the banal and hence to see things more profoundly.

5. Our entire way of life is visibly expanded and enriched. Our powers of observation are enhanced, the visual memory strengthened, the imagination trained, the feeling for form and space is heightened, we learn to see the essence of things—i.e., our ability to abstract is better trained.

There are many substitutes, but even in the age of advanced photographic, atomic, space, automation, and production technologies, we simply cannot do without freehand drawing.

The rapid sketch will always assist and expedite the exchange of information in a discussion, and many an expert will assert that one drawing is worth a thousand words of explanation.

Freehand drawing can capture an initial concept or idea for interior designs or designs in other fields, e.g., mechanical engineering.

In the environment, freehand drawing can awake our interest in many of life’s little details which we might otherwise overlook. As we learn to draw freehand we learn to look at our surroundings more intensively, to perceive things more clearly and understand them better.

Drawing and freehand drawing have for thousands of years been techniques which man can and has mastered (look at the cave paintings over ten thousand years old). The motivation came from a need for ornamentation, the retention of sensory impressions, or the transmission of information pure and simple.

The portrayal of self and surroundings has always been one of man’s elementary requirements and manifests itself in many different media and ways (including freehand drawing); the specific medium will be determined by such factors as environment, education, and possibilities of self-development.

In previous times, for example, one’s own half-timbered dwelling, with its carvings and color scheme, was a very personalized object. Today, on the other hand, the sole individual form of expression is often only the choice of color for a house picked out from a builder’s catalog of ready-made homes.

Freehand drawing opens up a whole new area of personal freedom which can captivate us as an intensive hobby to be pursued passionately—and one that is also inexpensive and uncomplicated.

Freehand drawing can enrich and broaden the experience of a holiday or journey. And if there is no picture, photo, or brochure handy, we can quickly draw or sketch an object we wish to show to someone else.

There is no doubt that the modicum of effort and patience needed to learn to draw freehand will be richly and diversely rewarded.

Karl Christian Heuser

1.0 Freehand Drawing—It Can Be Learned

1.1 Drawing

In the modern technological era, the ability to convey ideas clearly and convincingly is more important than ever before.

While problems and concerns can be succinctly conveyed through concise speech and unequivocal gesture, technical and structural problems can often only be explained with the aid of signs and symbols drawn on paper. This is where freehand drawing can have a special part to play, and it is no exaggeration to claim: "Anyone can learn to draw freehand provided he's willing!"

Of course, a modicum of patience is required to carry out the exercises, but it is no great difficulty to reproduce as a drawn outline what one sees. Nor need the sketching of objects on paper have anything to do with so-called "talent" or even "art." The sole requirement, in fact, is practice in observation and awareness of everyday life and in the handling of drawing materials.

Drawing can mean sketching the outlines. During the Renaissance—and even in the Bauhaus—they said things like "Good draftsmanship is part of an all-around education." Today we might add that "Good photographs may be very beautiful but we should never quite forget how to draw." The ancient Persians, Egyptians, and Greeks were excellent draftsmen and such good illustrators that today their achievements are known as ancient art.

Photographs are no substitute for the more differentiated drawing. The photograph is usually a poor substitute since most photos include all manner of detail extraneous to the actual object. Apart from the object itself being insufficiently stressed (what is it a photo of, exactly?), the surroundings and background, etc., detract from the central impression the picture is supposed to convey. A clear-cut and concise drawing that is kept free of superfluous detail can even enhance the aesthetic quality (beauty?) of a picture.

So far as modern photographic equipment is concerned, there is little doubt that any merely photographic representation becomes meaningless the moment that a camera's easy handling turns critical selectivity into snapshot mania. Just as with drawing and composition, really good photography is dependent upon the patient and concentrated observation of the subjects to be portrayed.

"Drawing" can be interpreted as "making signs and symbols of something," a process in which the essence of an object is sketched, emphasized, and brought out. As a consequence, irrelevant matter must be omitted since it merely dilutes the major point of information. In certain instances this can even entail leaving out the entire surroundings and concentrating on the essential features only. Personal style and "artistic" flourishes are not absolutely necessary unless we wish to highlight specific features.

This means that drawing gives us an opportunity to practice and sharpen our awareness of the essentials, a fact made clear by any good caricature. And as our experience grows we will find it easier and quicker to reproduce forms, buildings, and structures.

Our choice of motifs will also teach us to see specific sections of a view: we will learn to pick out drawings and pictures from an overall scene and arrange the objects in skillful form ("composition"). Finally, a thoughtfully selected observation point will do much to improve the pictorial composition as a whole.

The student should soon overcome his initial feeling of having to cover the paper with firm lines. A little practice should teach us to visualize the finished drawing as we begin the very first stroke. Before we can speak a language we must learn the vocabulary; in terms of drawing, this means that we must learn to see and draw lines—not a hard task for anyone with a little courage.

The aim of this book is to teach the student the basic manual skills and to establish his confidence in technical execution. As his experience and skill grow, the freehand draftsman will discover his own techniques in accordance with his temperament and personal preferences.
1.2 Drawing Materials—Where Do I Start?

The line and the drawing are what counts, not a great outlay on expensive paper or materials.

1.2.1 Drawing Instruments

It is essential that our materials allow for a flowing, even line and stroke. Avoid anything that broadens the stroke as it gets longer, or which can easily spoil the paper, such as too soft a pencil or charcoal stick. For the beginner, wash and ink materials are just as unsuitable as ball-point pens, since minor irregularities, blurred stroke ends, and uneven line widths can form added “features” that are unsightly and certainly unintentional. A sharp school chalk on blackboard often makes for better stroke quality and overall results.

If one were to classify materials in terms of their suitability for freehand drawing, the list might look as follows:

1. thin felt-tip pen
2. pencil, medium
3. pencil, hard
4. pencil, soft
5. charcoal
6. india ink
7. chalk
8. fountain pen
9. ball-point pen

The width of the stroke should always be kept as even as possible. Pencil and felt points should not widen too fast and should certainly not break off! Evenness of stroke can be achieved by rotating the instrument.

Drawing with a soft pencil, charcoal, or chalk has the great advantage that one can create stroke thicknesses ranging from wafer-thin to fat simply by varying the pressure on the instrument.

1.2.2 Drawing Paper

Most types of paper are suitable for freehand drawing and sketching provided they are light enough, absorbent, and somewhat coarse on the surface. Very smooth, shiny paper is unsuitable since pencil strokes will not seem dark enough, while other materials may even slip and smear. Heavy white Ingres paper, letter paper, or watercolor paper is eminently suitable for freehand drawing.

The paper should rest on a solid, firm surface, and since drawing requires both time and patience, we should also find a comfortable sitting position.

2.0 First Essentials

2.1 Free Strokes (Exercise One)

The correct movement of related muscles in fingers, hands, and arms is an absolute necessity in drawing. Begin by loosening up the hands and arms; hand and arm positions and sureness of stroke will improve after a few sessions.

There is great pleasure in seeing one’s very own first efforts on paper. We should spread an inexpensive sheet of paper on the wall or table and start by drawing free and relaxed loops as we move the arm back and forth in gentle swinging movements. The back of old wallpaper, unused wrapping paper, or similar material makes an ideal host for our initial efforts. The paper should be about 50 centimeters square; refer to Section 1.2.1 for drawing instruments.

Before actually putting pencil to paper it is advisable to go through the motions of drawing the complete form, then apply thin strokes as soon as you have familiarized yourself with the outlines. Strokes should always be drawn smoothly and briskly, and if at first you don’t succeed, use a fresh sheet of paper. Erasing, correcting, and adding more strokes should be avoided, since this does nothing to increase your confidence. So begin again on a fresh sheet of paper.

You should also avoid getting into cramped hand and arm positions—all movements must be followed through rhythmically by the body. Your first circles and ovals will not be perfect, but don’t let this deter you! Keep using fresh sheets of paper until the whole sequence of movements which produces the strokes has become steadier. In your efforts to overcome that cramped position and to draw the strokes briskly—and this should come right at the beginning of your exercises—some comfort may be taken from the knowledge that almost every drawer has been faced with the same problems at one stage or another, and has managed to overcome them. Now and then you should take a long, hard, critical look at your drawings from some distance away (two to three meters). This will help you to identify areas for improvement in terms of filling the paper, light and dark, distribution of different surfaces, expressiveness, legibility, and depth differentiation. This ability will of course grow with experience.

2.1.1 Free Strokes (Continued)

If possible, stand before a blackboard and draw the strokes shown below—or your own creations—with the arm held slightly bent to execute some generous free strokes.

Once completed, each line should be left alone! Strokes should not be drawn over or into one another. If you need to start a new line, then begin

![Figure 2.1]

Lines

Loops

Bows

Ovals

Spirals

Circles

Figure 2.1
2.2 Lines—Strokes—Dots

At some stage in your life you will have tried to draw straight lines freehand. You may have been fortunate enough to have had an excellent teacher who made the lessons so interesting that you have absolutely no fear of drawing freehand. If not, don't worry! Success can be achieved even without a helping hand. After all, freehand drawing means applying simple strokes to paper without the aid of ruler or T square. To draw straight lines the hand should rest firmly on the paper and only the hand and forearm should move across the drawing—slowly at first, then more briskly later on.

When making corners it is advisable to draw a deliberate cross. This will make your corner quite clear and unmistakable, so please have no fear of crossing over lines.

Figure 2.4 “Corners” in Drawing

So far as the thickness of the strokes is concerned, one should leave nothing to chance. The thickness should not be dictated by the pen, pencil, or felt tip but must be the decision of the draftsman alone. Long strokes of even thickness can be drawn by turning the instrument frequently. Dots should really be just that—short strokes that are meant to be dots are very ugly and look as if they have just been “dashed out,” a sure sign of carelessness and a superficial approach on the part of the artist.

- Surfaces should be dotted evenly and with a sense of balance. Dots must be really round!
- Deliberate smearing or rubbing of pencil strokes are not the proper techniques of good drawing. These are signs of superficiality, lack of concentration, and slovenliness.

It is not that hard to draw lines evenly over their entire length. With every new pen or pencil you should see whether the desired stroke thickness is maintained and how the instrument has to be held in order to achieve this. Even kings and presidents have their pens and paper tested for evenness before signing important documents.

Figure 2.6 Starting New Lines

To assist in practicing, it might be useful to take a sheet of graph paper or paper with ruled lines on which you can happily draw individual straight lines from a conscious beginning to a deliberate finish. Also, try to draw parallel lines horizontally as well as vertically.

Figure 2.7 “Continuous” Strokes
Once the initially uncertain and perhaps shaky stroke exercises have assumed more discipline and confidence, take a sheet of plain paper and do the following exercises until these too have acquired confidence and self-assurance.

2.3 Infilled Areas

Now and then it will be necessary to fill in a large or small area to make it appear black or very dark. One should always avoid monotonous shading with the same shade of pencil, charcoal, or crayon; it looks unsightly and is not good enough for any acceptable standard of drawing. If a certain area is supposed to look darker than the general background, then the most satisfactory solution is “hatching” with narrowly spaced lines.

2.4 Hatching and Diverging Lines

Hatching has two particular features, if done well:

1. the evenness of strokes and their spacing, and
2. the uniform direction of the strokes.

Just take a look at newspapers, magazines, or books; any irregularity of hatching in terms of line continuity, spacing, or direction is immediately noticeable. This means that hatching must be applied as evenly as possible, bearing in mind that too wide a spacing will sacrifice cohesion.

Hatching should never be done in a hurry. Hurried hatching is yet another sign of carelessness and untidiness in the draftsman, and is bound to give the impression that the same “can’t be bothered” attitude carries over into other areas of drawing, like design, dimensions, possible errors, etc.

Diverging lines should be avoided, especially those which intersect the main line at a very sharp angle and leave unpleasant “leftover” areas.

Far too hurried, superficial hatchings (all wrong!):

- String!
- Line remnants!
- Broken threads!
- All different directions!
- Lines not drawn right to paper edge!
- Uneven spacing!

Figure 2.11 Hurried Hatching

Just as a natural stone floor can be displeasing with its slabs of different shapes and colors, areas covered by all sorts of different lines look just as unsightly. The different directions and line lengths have a disturbing effect on the eye, and so we can conclude that a restriction in the number of directions and the avoidance of very acute angles will have a visually positive and pleasing effect in just about any drawing.

Very unsettling, with different line lengths and directions.

Pleasing impression by restricting the number of lines and angles.

Figure 2.12 Line and Optical Impression

3.0 Line Exercises

And now for a little practice! On the following pages you will find large exercise spaces for your first pencil exercises. The left-hand pages have been drawn on for your guidance, and you should try to reproduce the same lines with the least possible deviation. This will require a certain amount of patience of course; immediate success cannot be expected. The main thing is to draw each line correctly and thoughtfully, and your eye and muscles will gradually acclimatize themselves to straight lines.

Evenness of spacing will need some concentration, but minor irregularities caused by initial lack of practice or by trembling of the hand from the beat of your pulse should not deter you. The body should be relaxed for drawing. The slight physical tremors that can occur following great physical exertion will affect the results on paper.

Turn the book square on its side and draw parallel lines from left to right across the page. You will see it is not that difficult. Each stroke will give you added confidence!
And now draw your own lines. Turn the book through 90 degrees and draw the lines right across from left to right. Here is your exercise space.

Made a mistake? Never mind. Go on with the exercise.
This example will test your sureness of eye and ability to maintain a given line direction. The object is to draw lines from any direction in toward the given point.
Exercise space for some more "target practice".
Triangles can be interlinked as well.
Random interlinking of rectangles. You will soon grasp the principle. Draw something similar.
It looks so easy, doesn't it? But just try to repeat the various figures carefully and very evenly on your exercise space.

Evenness is all-important!

The following repeat exercises show that your eye is already capable of anticipating and visualizing the correct lines in advance.
With each exercise you will become aware of the countless possible variations. Your free choice of these possibilities will now rapidly grow and will give you much enjoyment.

And here is some space for you to develop similar motifs on your own:
Drawing circles is best begun by drawing coils. Start in the center and draw both clockwise and counterclockwise in tight spirals.
Draw the spirals clockwise, then counterclockwise, resting forearm on the board and making circular motions with the wrist, start from the center, then from the outside in. You will see that the last spirals are better than the ones you drew first.

Now draw your own spirals in this exercise space. Really concentrate and try to see the finished spiral on paper—then start to draw.
This time, the spirals have their centers displaced to one side. You will soon see that it is not so difficult to do as it seems. Exercise space (start from the outside).
Rest your drawing hand on the paper and start to draw the circles freely. Once you get through this difficult exercise you will achieve a big step further. Exercise space.
You should now be able to draw circles relatively easily. A circle can be thought of as being enclosed inside a square, each quarter of which contains a quarter of the curve of the circle. Points of contact are very brief. We can start by drawing a theoretical hemisphere which is then completed to form the whole sphere (circle).

Exercise space:

Now you can do it too.
Yes, the degree of difficulty is growing—but then so is your confidence!
By now you have had so much practice that each and every stroke will be exactly where you want it to go.

Now practice a few wavy lines.

Exercise space:
A few suggestions for practicing wavy lines:
Exercise space for more variations on the wavy-line theme:
And finally, try to draw lines similar to those shown on the opposite page.
Please note all characteristic features before putting pencil to paper!
4.0 Drawing Surfaces and Areas

4.1 Area Infills

The simplest way to draw an area as a coherent unit is by hatching (or alternatively by the use of black/white or color contrast with the background tone). We must remember however that hatching can very rapidly become untypical for the drawn object, giving an abstract impression. The intensity of the shading must therefore be in harmony with the area's meaning. With increasing darkness, for instance, we interpret greater weight, etc. Hatching is normally used at places where other devices or representations of the material's quality are unacceptable because of prohibitive effort or complexity.
Magnified illustrations or drawings of near-symbiotic nature give us a good indication of the material quality (pores, grain, etc.) and perhaps of the type of surface as well.

Comprehensible clarity and good drawing quality can be improved by the judicious incorporation of the material's characteristics into representations of areas and surfaces. With actual material surfaces we distinguish between:

- **Structure** (determined by a natural or chemical process),
- **Texture** (determined by construction or manufacture), and
- **Facture** (added by subsequent surface treatment).

**STRUCTURE**

**TEXTURE**

**FACTURE**

4.2 Surface Limits

A precisely drawn limit line is often enough to identify different surfaces.

Most areas and surfaces are set off against others or their surroundings by black-and-white or colored optical delimitations, and these should be reproduced as exactly as possible. Different limits (a window in a concrete wall or a white sheet of paper on a white tabletop) should be drawn in a manner that is typical of the material or its appearance.

4.3 One Exception: The Visualization of Superimposed Levels

In discussions of technical problems or aspects of urban planning, it may be necessary to give an exact representation of two or more superimposed surfaces of differing size and shape on a single picture plane. In this case the problem can only be properly solved by the use of hatching (and cross-hatching) drawn in alternating directions.

Even the thickness of a limit line by comparison with reality — i.e., the object represented — determines the quality of a good showing of different surfaces. The merely linear identification of the area's boundary is only one possible way to identify that area; the other is to fill in the various areas with graphic devices.

4.4 Hollows—Elevations—Hills—Mountains

Occasionally it will be necessary to draw all sorts of hills, eminences, and so on in a single plane, and for this we can use contour lines, banking, shading, and perspective.
4.5 The Even Division of Line and Area by Eye

Dividing an area or line into even sections or lengths will at first seem difficult, but the solutions are in fact simple. With the eye some distance away from the paper, try to view the entire area or both ends of the line and then split it up optically into equal portions. Again, before committing pencil to paper, your desired sections or lengths should be firmly fixed in the mind’s eye. Halving the distance between two points is not difficult either: the distance is magnified “for fun” and we then try to determine exactly where the center is. With a little confidence which will come with practice, we will be able to extend this process by halving the halves, and so on. We obtain quarters simply by halving twice, while further halving will divide a line into eight equal sections, and so forth.

With practice we should be able to estimate how big the subdivisions should be.

To divide a line into three equal parts, it is necessary to guess with the eye how long the third would be, then place it centrally between the two line ends.

Practice on a sheet of paper right away. With long lines you should take your time, estimate the thirds with your eye, and then start drawing the divisions.

Six equal parts can be easily obtained by applying the halving method discussed above.

Dividing a distance into seven or nine equal sections is easier if we start by splitting up the line with faint dots and then correcting rapidly as we go. A little practice will soon convince you that dividing lines and areas into equal parts is no great art.
4.6 Representing Solids and Spaces by Drawing Only Three or More Simple Viewing Planes

If you are as yet unable to draw perspective to show three-dimensional relationships within a two-dimensional picture plane, but you still wish to draw solids and spaces, there is a very simple method to help you achieve this: drawing the individual sides of the solid or space as separate views. This is an age-old method used particularly in the advanced civilizations of Persia and Egypt. Even children in their innocence easily tend to draw typical solids and spaces with clear, cohesive, and flat-folded elevations.

4.7 Dimensioning Sketches and Elevations

Dimensioning sketches and elevations may be necessary for two reasons:
1. to provide data for the construction of a building or the production of an object, or
2. to give a better idea of the actual proportions of existing structures and buildings.

The most important factors here are the main dimensions and main axes, which can be amplified by the addition of typical detail dimensions. Overall dimensions should be outermost in the drawing, while individual dimensions are placed further in toward the object. The thickness or arrangement of the dimension lines should in no way disturb the drawing or compete with it. Equally important are the dimension end points; i.e., from and to which point is the interlying distance actually measured? These end points must be easily recognizable.
4.10 Size, Clarity, and Legibility of Illustrations

Clarity is first achieved by drawing the overall context. Care should be taken to provide optical and graphic points of contact. In terms of information density we should add that several sketches on different sheets of paper are always better than a single overloaded drawing. (Just think how unpleasant it is to look at a dress pattern, for instance; the pattern can only be unravelled by staring at the pattern and pursuing individual lines.) At least one-third of the areas in every drawing should be left blank as white surfaces so as not to irritate the optical nerves too much.

Many examples especially of Oriental drawing, show that the drawing area is far from completely covered. At the same time we must ensure that fear of overcrowding the paper does not lead to thin postage-stamp drawings on huge sheets of paper. Care should always be taken to attain satisfactory and pleasing relationships in the size of drawing.

Just as one listens to other people's points of view in discussion, so the draftsman should bear in mind his potential audience. Sketches intended for small discussion groups, for example, should be kept small as well, while for lectures and large discussion groups, account should be taken of the greater distance between illustration and spectator. It is always awkward and embarrassing in discussions, talks, and meetings when the session is interrupted by people jumping up to take a close look at one's sketches and drawings.

The way in which twentieth-century urban planning is decided on the strength of toylike models (almost matchbox size) would be funny were it not so tragic.

So always go for legibility, scale, and proportion.

4.8 Orientation Layout Plan (Page 63)

Areas and spaces are suggested by simple hatching. It is vital to select and arrange lettering that does not destroy the impression given by the general view. Nor should the hatching lines be drawn through the letters since this will affect legibility (see drawing at foot of page 63).

4.9 Exterior Building Elevations

Light wall colors, dark window areas, and shadows determine the flavor of this sketch. Lighter and somewhat detached sketches of the buildings in the background are necessary to differentiate the various masses.
5.0 Good Drawing Arrangement and Layout

The arrangement of freehand drawings and sketches on a sheet of paper needs to be considered, especially if they are meant to be looked at and evaluated by others later on. Freehand drawings should always make use of the entire sheet format, since tiny drawings on large sheets of paper usually look curiously lost.

5.1 Prominent

One illustration dominates the area, and everything else appears of secondary significance (for space and surface drawing).

5.2 Framed

The tension between two elements (pores), e.g., structural sections, determines the drawing’s statement.

5.3 Rows

The statement is determined by the repetition of identical or very similar things in a row. The monotony of a row can be overcome by highlighting one of its component parts.

5.4 Arranged around Axes

The arrangement of equal surfaces around one or more axes seldom gives a satisfactory result, and the important statement is frequently suffocated beneath the formalism of such empty symmetry.

5.5 Rhythmic

The picture is dominated by characteristic and similar forms that recur at given intervals. It will seldom be possible to construct a sketch in this way.

5.6 Grouped

The regular repetition of identical groupings can be used in exceptional cases, provided we make sure that the typical feature of the individual group is kept quite distinct. Here again, the rather lifeless groups can be enlivened by making one more prominent than the others.

5.7 Agglomerations (Ordered and Disordered)

Ordered agglomerations, usually arranged perpendicular to each other, are a typical occurrence in our technological age.

A certain equilibrium between the various areas and their graphic values (optical weight) is desirable, and an adequate amount of space (white) between the areas helps to avoid confusion.

5.8 So-Called “Free Forms” and “Free Composition”

You could be forgiven for thinking that the “free form” depends on the total absence of any of the criteria so far mentioned. In reality, however, the statement made by the free form is essentially determined by the reciprocals of individual sections and lengths and by a more or less uniform statement (purity of individual lines, whether only arcs, angles, straight lines, etc.).

5.9 Usual Arrangement of the Drawing Sheet

As a general rule, it has become the custom when drawing solids and spaces to put the ground plan in the lower part of the sheet with the associated exterior and interior views above. In an equally logical but rather different manner, the ground plan is placed in the center of the sheet and the various exterior and interior views are arranged around it. One good trick is the explanatory method where a small section of the view is added as an indication of potential construction. This is useful for many technical drawings and trades. The addition of explanatory detail sketches to a drawing, e.g., a ground plan, is a legitimate and consistent informative device.
6.0 Accuracy and Outline

The guiding principle here must be “Quality alone convinces!”

Apart from anything else, this means that the greatest possible accuracy in drawing is always more highly judged than one or more inaccurate drawings or rapid sketches. One fashionable artist, or another may achieve recognition for the quick rough sketch, but this is the exception. In reality, “artistic freedom” leaves little room for untidiness.

The primary task is to show the main object and its outlines (as accurately as possible without aid) then the more important details can be shown. Details can also be placed on the same sheet to a larger scale provided enough space is left for them, and can also give a very pleasing effect; the detail gives the object more substance and the need for shuffling several different sketches is eliminated.
7.0 Lettering and Dimensioning Freehand Drawings

7.1 Conventions in Lettering

The lettering is a most essential part of any drawing. As handwriting can tell us much about its author, so lettering either can influence or emphasize the image of a newspaper, company, interior, or drawing, or can ruin it by inferior quality. Fashionable lettering is usually short-lived and therefore little suited to our purposes. Good text however can highlight, consolidate, and improve a subject.

Architects and interior designers prefer block lettering, which they feel reflects the clear, simple, and unadulterated intent of their creations. Standard lettering preferred by technicians and engineers has the aesthetic character of "frozen" handwriting.

7.2 Types of Lettering

Lettering, or text, is a sign language used to capture and impart information, and information in turn is used to communicate with other people or to assist the memory. This means that previously imparted information can be recalled and revived. Writing first emerged in three main areas of the globe (approx. 5,000 years ago); in China, Mesopotamia (Near East), and Egypt.

In the beginning, the more important objects in life were drawn more or less true to life, but later on they became symbolized and abstracted. Concrete form writing is a good example.

"Writing" consists of individual letters or figures which represent information either individually or in particular groups. Its essence lies in its legibility, clarity, and the untainted transmission of the information content. Additional information can be added (superimposed) to written information by means of contractions.

This can also be done by distortion. For example, the observer's attention may be drawn to the exotic character of a Chinese restaurant by lettering on the menu or on an outside sign in the Latin alphabet that has been given a Chinese look.

"Gothicized" lettering can provide the date of a historic event or the title for a book on Gothic art.

Generally speaking, however, such revivals of ancient styles should be avoided. We live in an age which must find, and has already found, its own forms and symbols.

7.3 Tone and Weight of Lettering

Just as we use the same grade of paper and the same drawing instrument for related drawings and sketches, so we must use the same instrument for drawing and lettering, since different tones or shades will destroy the picture's unity, disturb the drawing, and possibly lead to confusion and misunderstanding.

An ink drawing therefore must always be lettered in ink; a pencil drawing should only be lettered in pencil.

Lettering can lend the drawing added expression, but it can also detract from it. This must be determined once the drawing is finished and before adding the text. One should always avoid using ill-considered styles which will appear alien to the drawing instead of an integral part of it.

7.4 Sizes of Lettering

We cannot stress often enough that a clear, distinct, and simple text is better by far than distorted, mangled, and hence affected lettering, since it also influences the face—i.e., the outward form—of what is written.

Adequate legibility, text height, and letter thickness are very important elements of any illustration. Lettering should possess a balanced size and space relationship with the background, the object, and the drawing's statement. Superfluous, self-evident words should be left out. (Example: "Design of a leisure area to a scale of 1:50". It is quite adequate if the sketch is entitled "Leisure area—1:50").

Lettering that is perhaps too light or too small is always more tolerable than text that is too big,
7.6 Styles of Lettering

Block lettering has proven to be quite adequate, with its simple, perpendicular capitals constructed of straight lines, circles, and arcs. A perfectly clear and readable text face is achieved with simple geometrical lines (straight and curved) in which line thickness is matched to letter height, by optically perfect spacing and a clear tonal contrast with the background. The succinctness and clarity of a textual statement is essential and most convincing to the reader.

In addition, the proportions of the individual letters and numbers can be easily learned with a simple diagram, and lettering should come easily with a little practice. It is sometimes even legible upside down to the person opposite you.

Try not to slant the letters or add little flourishes or other trifles. The same goes for the numbers as well, of course. Anyone who has experienced the dire consequences of unclear numbering, misleading figures, and careless playing with the numbers 1 and 4, 3 and 8, 3 and 5, or 6 and 9 will know how sensible and safe it is to keep text and figures clear and simple, both singly and in groups.

The need for good, clear lettering makes it absolutely vital to give some brief notes here on drawing and inscribing the various textual components.

An A must occupy the area of a square; its crossbar can only come in the lower third—other forms will look too wide or too thin.

The B should be inscribed within two squares, one on top of the other. Its curves are arcs of a circle. All three joints should end in short lines horizontal to the upright.

The letter C consists of a three-quarter circle, and anything else will tend to be too narrow or man neristically wide.

D is drawn with a full semicircle and should look substantial. This is done by putting long horizontal con nections to the upright.

E is inscribed in two squares, one on top of the other, and it is important to ensure that the central bar is exactly the same length as the other two.

F is the same as E without the bottom bar. Its two bars must be of equal length, the ends of the bars must be precisely aligned.

The outer line of the letter G should be an almost complete circle. Exactly halfway up the right-hand side of the letter, a horizontal line is drawn from the circle line in to the center. The line should be kept short. Any extraneous additions and deviations can only be bad.

H stands in a vertical rectangle of a height width ratio of 4:3. The bar should be at half height level. The system sketches on these pages clearly show that in principle all horizontal bars in letters should come at the same height—i.e., half the letter height, which also corresponds with the height of the center of a circle.

The letter I is just a vertical line. Dots and serifs should be avoided.

J is inscribed in an upright rectangle with the height width ratio of 4:3. The lower part of the letter consists only of a near- semicircle.

K occupies an area with the superimposed squares. Its two obliques move up and down respectively from half letter height at an angle of 45 degrees.

The letter L is very simple. The lower stroke should be half the length of the upright.

Figure 7.5 Face of Drawn Black Capitals (width-to-height ratio of letters)

Figure 7.6

Figure 7.7
The letter M is written so that it occupies a square field. Care should be taken to ensure that the two outside uprights (left and right) are absolutely vertical.

The letter N is also inscribed in the 4:3 ratio rectangle.

Shapeless ovals should always be rejected in favor of the pure form of the circle for a truly clear text. The letter O should thus be a complete circle.

P is based on a height/width ratio of 2.1, and its upper part consists of a semicircle with horizontal lines linking it to the upright at the top and at half height.

The letter Q is of course based on the O. Make sure that the tail, drawn at 45 degrees, actually ends in the bottom right-hand corner of the theoretical square.

The R can be seen as an extension of P; its tail is also drawn at 45 degrees from the letter center.

The letter S is often the cause of genuine difficulty in attempts to achieve a succinct character. This becomes easier however when we visualize its basic geometrical construction. The letter S consists of two circles—one above the other—whose lines are not completely closed. It is easy to imagine the transition from upper to lower circle as being oblique; geometrically, it must be horizontal.

T fits neatly into the 4:3 rectangle.

You should now be able to work out the constructions of the remaining letters for yourself: U has a semicircle at the bottom with two vertical lines either side.

V is again incorporated into the 4:3 upright rectangle. The only letter that gets wider is the W; which consists of two V's drawn immediately side by side.

It is now easy to see that the letters X, Y, and Z are constructed within the 4:3 ratio rectangle.

For the sake of "character" one should remember to make the leg of the Y oblique (as an extension of the top right-hand arm).

Numbers of the same type are governed by the same rules: straight lines and arcs of a circle. With numbers, total unmistakability is an essential factor (wrongly read numbers lead to misunderstood data and hence to error).

With the number 1, its first stroke should not be horizontal because it could be taken for a 7.

The 2 has a semicircle at the top connected to the horizontal base by an oblique at 45 degrees.

The 3 only has an arc in its lower half—the top consists of straight lines at an angle of 45 degrees to each other. Otherwise there is always the danger, if done quickly, of confusion with 8.

4—its upper field must be fully closed. 4 ends at the top in a triangle point.

To prevent confusion between 3 and 5, the 5’s top left-hand line must always be kept absolutely vertical.

The figures 6 and 9 should be executed by first drawing a full (uncompressed) circle then adding the tails at an angle of 45 degrees tangentially to the circle. Any other form will naturally imply possible confusion and error.

The figure 7 might be mistaken for a 1, so draw a short horizontal bar at half height. 8

The figure 8 should consist of two full circles, one on top of the other.

It is advisable to avoid drawing zero as an oval and to use the full circle for this figure.

Clarity and freedom from superfluous forms will be more convincing and will convey the impression that the author of the lettering really has a clear concept in mind.

*Translator’s note: The author’s comments regarding numbers 1 and 7 do not apply to America and Britain, since 1 is rarely begun with an upstroke, there is no confusion with 7.

Figure 7.8

Figure 7.9
Please note that wide and narrow letters and numbers require different spacing, each according to its graphic weight.

In your further exercises, aim at equalization of optical balance.

Take care also to equalize the internal distances between letters and numbers.
Figure 7.12 Good and Not-so-good Lettering

Stencil Lettering:

**LETTERING ART**
- too closely spaced

**LETTERS**
- too faint

**FURNISHING**
- standard lettering for mechanical engineers

store store

outlines too thin

better, but where are the interiors?

ARRANGEMENT
- standard lettering
ditto, filled in

ARRANGEMENT
- architects' lettering
ditto, filled in

Examples of really bad lettering:

- disfigured
- distortion

unbearably mannerist scripts

Note: Lettering should convey information and not be the cause of possible misunderstanding.

Figure 7.13 Lettering Positions

These examples give some idea of how to arrange lettering or titles on all types of drawings.

For sketches, lettering should start in the bottom left corner.

Figure 7.14

Lettering of freehand drawings, title pages, posters, cabinets, doors, etc. (good and bad examples).

Please work with large, white, and well-ordered spaces that will relax and compose the eye.

Working Drawings
- Drawing 1974
- Working Drawings
- Working Drawings
- Catering—Fitted Units
- Drawings
8.0 Drawing Solids and Spaces

8.1 Isometries

For relatively small and not-so-detailed parts of solids and structures, one suitable method is to sketch views of solids and spaces from different angles. This method is especially useful for very rapid drawings, and isometries have proven to be of immense value for explanatory drawings in mechanical engineering. The more demanding, experienced draftsman, on the other hand, will reject isometry on grounds of imprecision and "unreality," in favor of the more professional and more expressive perspective drawing. This is why the most frequently used isometries are shown only briefly here. There are four typical methods, all of which distort depths to a greater or lesser degree. A little intuition and imagination will prove that these methods give a natural impression to a very limited extent.
8.1.1 Example of Isometric Projection (soundproof window)

Position of building walls relative to each other

Section of a soundproof window with ventilation ducts

Exterior

Principle of sound attenuation in air duct

Interior

Lateral soundproofing in vent ducts

Soundproofing with various different working thicknesses and weights

8.2 Frontal Perspective

We shall confine ourselves to a few basic comments regarding perspective insofar as it is useful for freehand drawing, i.e., the drawing of projects, buildings, and environments.

8.2.1 Construction of Frontal Perspective

8.2.2 Sightline and Picture Plane

The essential element of this type of drawing is that the sightline strikes an absolutely vertical wall at right angles. The picture plane (drawing block, paper, picture surface, etc.) lies exactly parallel to the wall. The picture plane of the perspective is always perpendicular to ground level.

8.3 Terms in Perspective

All horizontal lines of walls, floor, or grid come together at a vanishing point somewhere in the distance (railway-track effect). This vanishing point always lies on the horizon, a fact which will be realized with a little thoughtful observation.

8.3.1 Horizon

The sight horizon is taken to be all around us at eye level. All verticals (perpendicular lines) will also appear in the drawing as vertical.
8.3.2 Field of Vision

It is well known that the normal field of vision of the human eye only reaches to about 15 degrees either side of the axis of vision. Within this viewing angle all objects are seen without distortion. In order to avoid undesirable distortions in our drawings, therefore, we must make sure that our illustrations are of things which lie within this field of vision, since anything that projects beyond it will look unreal and comical. To get as much into the field of vision as possible we should assume a standpoint in the extreme corner of an existing room, say, or in the case of a design, outside the future room.

8.3.3 Eye Level

By eye level we mean the distance between ground or floor level and the height of the observer's eyes. On the average, people standing or walking have an eye level of between 1.6 and 1.7 meters. When a drawing is to include people as well as things, their heads must be on the same level irrespective of whether they are in the foreground or in the background. Since all vanishing points are always on the horizon (at eye level) the first priority is to draw in the horizon line.

8.3.4 Distance

An impression of depth and scale is also achieved by putting people in the foreground and middle ground of the picture.

The "distance" in this case is that between the eye (standpoint) and the picture plane. In order for an image in a drawing to look more or less real, the observer should, in theory, be the same distance from the drawn object as the draftsman himself when executing his drawing.

8.3.5 Drawing Density, Depth, and Outlines Close-Up

Things close to us are always clearly visible and must therefore be drawn more precisely and with more detail. As depth in picture and space in-
8.3.6 Foreground—Middle Ground—Background—Picture Depth—Contours

Illustrations of spaces of great depth can be divided into the following areas of perceptibility and reproducibility: foreground, middle ground, and background. A proper grasp and understanding of strong and weak optical impressions makes it possible to achieve the appearance of varying depth by graphic devices. If you are not sure of drawing the correct outlines or shadows, it is worthwhile partly closing the eyes for a second in order to determine the really essential outlines with strong contrasts. One should start by drawing the essentials.

If there is still some doubt about threedimensional drawing, we suggest the following method as a temporary aid to attain more feeling for freehand, spatial drawing: select a drawing that you admire and trace it line by line. You should of course take a critical look at each line and its meaning. For instance, ask yourself why a line is at a particular place or why the line is of a particular quality.

One should in any case beware of mindless copying in freehand drawing.
8.3.7 Shade
Whenever light plays a part in the spatial illustration of frontal perspective—which is often the case—it will be necessary to draw shade in order to enhance three-dimensional effect. Shade covers those surfaces which belong to the illuminated solids but which are actually averted from the light incidence. These surfaces lie in shade.

Figure 8.8

8.3.8 Cast Shadow in Frontal Perspective
Since edges that run completely parallel to the picture plane or that run away to a vanishing point cast shadows, the shadows of those edges must in consequence also be drawn parallel to the picture plane or back toward the vanishing point. The shadow is cast according to the position of the sun or light source. If for instance the sun is facing us, we can insert it into the picture plane (above the horizon line) simply by drawing the perpendicular from the theoretical sun down to the horizon line; we then locate the vanishing point for the shadow line and so obtain simple vanishing lines for the outline of the shadow. If the sun is behind us, we just have to assume a theoretical solar point below the horizon line and proceed accordingly.

Figure 8.9
Special Case—Cast shadow on glazed surfaces:

Depending on the direction of illumination, glazed areas appear as light or dark surfaces on buildings seen from the outside, and must be drawn accordingly. As a general rule, in a very brightly lit facade the windows appear as dark areas (almost hole-like). A similar approach applies to a glazed area or window only partly lit by the sun and which thus lies partly in shadow.
Special Case—Bright edges:

Another interesting case is the marking of the brightest-lit edges through the partial omission of their outline. When observing the picture, the eye completes the object for itself and only perceives form and brightness. As a rule these are drawings of very familiar everyday objects.

Figure 8.13 Brightly Lit Edges

Figure 8.14 White Silhouette

Figure 8.15 Black Silhouette

Special Case—Silhouette in front of dark and light background:

Two special cases resulting from very marked differences in brightness from sunlight or artificial light are the silhouette in extreme counter light (sunlight) and its counterpart, namely the illustration of a brightly illuminated object against a darker background (night or storm clouds, etc.).

8.3.9 Reflections

Mirrors produce a true to life image turned about the mirror's axis; in other words, the mirror's surface reproduces things in their natural dimensions and distances in relationship to the given plane of the mirror.

Please note that a scene and its mirror image have a common vanishing point.

Figure 8.16
As unlovely as symmetry so often is, it cannot be ignored in mirror images. In this example the mirror's surface is the surface of the water. All dimensions and lengths are taken from the real objects and then "folded" through the given mirror plane to make the mirror images.

9.0 Central Perspective (Frontal Perspective) as the Likeness of an Object

9.1 Drawing Paper—Format—Detail

One important step in any introduction to this subject is the selection of a simple, see-at-a-glance motif. The picture's horizon plane as seen by the eye should also be horizontal in real life, so never draw with a falling sightline! When drawing, you should be at a distance from the drawn object that corresponds to the size of your drawing paper. Hold up the paper with arm outstretched in the sightline, then "take bearings" over the edges of the paper to see whether the particular detail you wish to draw has the right size and proportions. From what we have already said in previous

sections, it is clear that we can fix a particular scale for the picture on the basis of our fixed standpoint and given length with our outstretched arm. Hold up the drawing paper once again and note the horizon line or, alternatively, hold up your pencil in the line of sight to find an exact location for the horizon. The next step is to mark the vanishing point; in central perspective this is the meeting point for all vanishing lines in the distance. We can now proceed with the remaining steps just as confidently, provided we think about them calmly; drawing the horizon, the first frontal upright surfaces and solids—as well as their vanishing lines.
A small trick may assist when selecting the detail you wish to draw. Cut out a frame from heavy-grade paper or card of suitable size that fully encloses the finished picture format. Hold it up at arm’s length and use it to find your exact motif. Make a mental note of reference points such as horizon level and left-hand or right-hand edge so that you will always be able to find the detail again.

When choosing a horizon level for designed objects—i.e., objects which do not as yet exist in reality—one should be skeptical; the first solution does not necessarily make for the best likeness. Different horizon levels will of course produce different views of one and the same object.

For the majority of outdoor architectural drawings the horizon can lie on the line of the bottom third, which leaves the top two-thirds of the drawing area available for the sky.

When drawing a building by itself it should not necessarily be right in the middle of the drawing. The resulting symmetry is boring in most cases.

If the building is located more to one side or another, a sense of imbalance may soon form in the mind of the observer.

This visual disequilibrium can be remedied by placing a counterbalancing detail from the foreground or with other objects (trees, etc.).

9.2 Object Arrangement

Figure 9.2
Figure 9.3
Figure 9.4
9.3 Dimensions and Guidelines
Students are often afraid of drawing the wrong sizes onto the picture planes. This can be overcome by measuring off individual lengths and dimensions in thumb widths (outstretched arm) or in fractions of the length of the drawing pencil. The main outlines should always be drawn before concentrating on the details, even if the latter are technically perfect and beautifully executed. To start with one should draw guidelines—they are nothing to be ashamed of and should be left as working aids. Hasty erasing or correcting will hardly improve the quality of the drawing.

9.4 Proportions
Basically one should first look at an object from all sides and try to grasp its character, structure, design, purpose, and content, and then begin to reproduce on paper what one sees. It is vital to memorize height and width proportions.

9.5 The Whole Drawing
Here again, a little trick can help: look at the object carefully for proportions, heights, widths, depths, and details, then close your eyes for a few moments and try to visualize the object in its essential components. You will soon see which points have not received sufficient attention. Look at the object again and take in the details you missed before. Now close the eyes again—this time you can see the object much more clearly and completely.

It is most important to break down composite forms into primary and secondary forms in order to understand how the various proportions relate to each other. In the same way, we draw the main form first, followed by the secondary forms.
10.0 Use of Central Perspective

10.1 Example of a Front Door in Central Perspective

We have selected this object with its relatively clear-cut dimensions and proportions to illustrate the step-by-step construction of central or frontal perspective. The step sequence is as follows:

10.1.1 Picture Detail

We select the particular detail from among the various possibilities.

The distance between the eye and the door is such that the important parts of the object are at a certain distance from the edge of the drawing block. All components are arranged on the picture plane (drawing plane) in such a way that all the essential details come fully within the picture. Symmetry is avoided in this instance, since equality between the left- and right-hand halves of the picture is not the drawing’s intended statement and the sense of it would not be apparent.

10.1.2 Horizon Line

The first step is to draw the horizon line at eye level across the paper from left to right.

10.1.3 Fixing the Main Point

Next we fix the position of the main point and perhaps add a vertical line through the main point as an aid to orientation.

10.1.4 Main Point

Now we insert the chief outlines of the main object, the door. This is a rectangular area with an approximate height/width ratio of 5:1 or 6:4. This ratio should first be carefully estimated with the eye or with the aid of a reference size (thumb width, rule width, fractions of pencil length, etc.).

10.1.5 Vanishing Lines

The next step is to indicate the vanishing lines to the main point. Once all vanishing lines have been inserted it will be possible to outline the entire canopy on the strength of these new reference points and the estimated length and height of the canopy, which vanishes to the main point. We now draw in the spatial dimension, the step and grid for scraping off muddy shoes.

And so it is with many other things which are foreshortened by perspective. If you are still uncertain about judging foreshortened lengths, we suggest that you plot and measure the various parts of the apparent image with outstretched arms. Parts that lie parallel to the drawing and picture plane in central perspective appear bigger.

Another point, though obvious, is worth mentioning: your drawing standpoint must never vary while you prepare your freehand drawing, i.e., there must be no change in standing or sitting position. Similarly, the eye must always follow the same sightline. Deviations in standpoint or sight-line will immediately falsify the illustration.

Dimensions and spaces in the drawn parts should be checked now and again for correct proportions.
10.1.6 Shadow Cast by Sun or Artificial Light

Shadows cast by the sun or artificial light can be added to the drawing for extra three-dimensional impression, but beware of too many contrasting effects. It can be awkward if persons viewing the picture get the feeling that you are using shadow to conceal weaknesses or design defects or to attract particular attention to yourself. Later additions to a drawing should also be avoided; under no circumstances should large shadows be added afterward to "improve" clarity.

One common error is to draw the sun shining from the north or to provide northerly views with deep shadows. This mistake can be avoided through exact reproduction of the scene or, if necessary, by verifying the correct geographical references (points of the compass).

Much patience is needed to determine shadows in very good drawings. Professional photographers often wait for hours for the sun to reach the right position before taking a shot of some architectural views. This indicates that the position of the light source and the arrangement of shadows is very important. With drawing of course we have rather more freedom than a photographer, and so it is permissible to compute the various possible shadow positions in rough-sketch form (shadow length and width) to find the most suitable optical location. The shadow must in any event be correctly constructed and as true to life as possible.

10.1.7 Shade

A further complement is the representation of shade on all solids and surfaces. Surfaces turned away from the light always appear darker, and a light tone of gray can be achieved by very light hatching; shading can also be shown by the clear representation of structure, texture, or feature on the surface which is lying in shade.

10.1.8 Details and Marginal Areas

Details and marginal areas must be drawn in full whenever a drawing or sketch is passed on for information or intended for wider publication. But here again, the principle should be "all things in moderation," since an excess of subsidiary information will detract from clarity in even the best drawings. Surfaces should therefore be filled out completely only in the rarest instances. It is often enough for the margins of a given area to be well drawn or suggested; the eye will provide its own infill for the residual bright areas.

We stated at the beginning that drawing can also mean leaving out much—or all—extraneous matter. Our deliberate description of the various steps in the creation of a freehand drawing has meant that the final step in this example has been drawn in full detail. Normally, however, an excess of detail can be fatiguing for the spectator.

Do you remember the individual steps?

Figures 10.2 through 10.7 reproduced in series.
10.2 Some More Examples

10.2.1 A Street Curving Away out of Sight

This example is based on the assumption that the street continues on the same level. As can be seen from the indicated vanishing lines and vanishing points, all vanishing points lie on the horizon, which is determined by the sightline. All perpendicular lines remain vertical. With its parallel ground and roof edges, each building has its own vanishing point depending on its place in the street. With a little observation you should find this type of street scene, particularly in old towns. The charm of the picture lies in the sweep of the ground and roof lines and in the diagonals.

10.2.2 A Road Climbing Upward and Away

A more complex picture, this. Basically speaking, we first divide up all sections of road and landscape into rectangles and then identify the horizons and vanishing points of these existing and theoretical rectangles. Since the road climbs slowly away into the distance the vanishing points of the assumed road levels must also climb, one after the other. With drawings like this one must always ensure that the image is within the normal field of vision and that it is always viewed horizontally. In this particular example the observer’s standpoint lies somewhat higher above the foremost level (at foot of picture) than would normally be possible.
10.2.3 A Staircase Leading Upward

In the same way as Figure 10.8, Figure 10.10 shows an outside staircase of a castle drawn from an elevated observer standpoint. The particular effect here is that the staircase leads from beneath the horizon line upward above the horizon line.

Figure 10.10

10.2.4 A Staircase Leading Downward (Page 108)

It might at first appear as if this could not be drawn at all or that the vertical walls and lines should not be drawn parallel to each other. The fact is that the frontal perspective, horizontal sight-line, theoretical horizon, vertical walls and lines can all be drawn just as before. When deciding on picture size and sightline, however, it is vital to ensure that the finished drawing will be within the field of vision.

The vanishing points of inclined and level surfaces will always lie on the vertical line that is drawn perpendicular through the main point (the breakthrough point between sightline and picture plane). All other perspective constructions can be done in accordance with the principles already discussed. It isn’t much more difficult to draw down staircases which turn left or right.

Figure 10.11
10.2.5 A Down Staircase Turning Right (or Left)

Construction is similar to the preceding example, but the vanishing points shift to the right/left as the landing swings.

10.2.6 A Staircase Leading Upward

Unlike the down staircases, our constructions and images now drift above the horizon line. All vanishing points once again converge on the vertical line through the main point.
11.0 Angle Views with Two Vanishing Points

11.1 Constructing a Perspective with Two Vanishing Points

This type of perspective has two vanishing points. As we view the edge of a cube from an angle, the top and bottom lines of the left-hand face of the cube converge upon the left-hand vanishing point and those of the right-hand face converge upon the right-hand vanishing point (both vanishing points are on the horizon). The picture plane is again perpendicular to the sightline and can be located at any desired depth in three-dimensional space.

11.2 Sightline and Picture Plane

The size of the picture plane and its distance from the observing eye determine which portion of the overall view the observer wishes to draw. The distances between picture plane and the sides of solid bodies are always different. For a more outstanding picture we usually select a variety of different angles between picture plane and object sides. Symmetry in the arrangement of the two vanishing points is not beneficial or particularly expressive.

11.3 Main Point H

The main point H is the target of the main sightline and determines the breakthrough of the line of vision through the picture plane. All the horizontal lines of a rectangular grid will find their vanishing points on the left or right of the horizon. All true vertical lines in perspective will also appear vertical in the drawing.

11.4 Horizon

The horizon (circle of vision) lies all around us at eye level, and so should be shown in this way in the drawing.

11.5 Field of Vision

As we have already said, the eyes can only see sharply within 15 to 25 degrees around the central line of vision. If a particular object is perceived to be outside the field of vision, you must shift your standpoint or change your sightline, in which case the previous line of vision disappears since it can only be used for one and the same drawing. The objects which are to be drawn must always be kept within the field of vision (Fig. 11.3).

11.6 Eye Level

As with frontal perspective, the eye level should be taken as 1.6 meters above ground level (Fig. 11.4).

11.7 Distance and Standpoint

In perspective with two vanishing points, the distance between the eye of the observer/drafter and the picture plane is important insofar as the vanishing points move outward to left or right as the distance increases. So much so in fact that the vanishing points are difficult or even impossible to locate.

This can be overcome by bringing the standpoint closer to the object (reduction of distance D1 to D2—Fig. 11.5), although this...
may of course put the object once again outside the field of vision, in which case the only answer is to laterally shift the standpoint from A to B (Fig. 11.6) or to turn the object itself (angle α between object and picture plane changes to angle β—Fig. 11.7).

When selecting your standpoint, take steps to ensure that the lateral faces of the object do not assume an equal width in the drawing—a—a (Fig. 11.8). Uneven lengths should be achieved by shifting the standpoint—a b—to give the right impression of length proportions (Fig. 11.9).

11.8 Example: Perspective of an Entrance with Two Vanishing Points

In principle, the drawing is started by determining the horizon line, just as previously with the front door example in Section 10. The next step is to draw a prominent vertical line as an optical reference point.

Figure 11.6

Figure 11.7

Figure 11.8

Figure 11.9

Figure 11.10

Figure 11.11
The proportions of the awning, retaining wall, and plant tub are then indicated with a little concentration. Only the width proportions are plotted. With a little contemplation we must now try to imagine where the vanishing points lie left and right on the horizon. The precise points can be checked by drawing vanishing lines above and below the horizon and always to the same point. If the vanishing point lies off the page, then the vanishing line will have to be inserted approximately, bearing in mind that foreshortenings can only be proportionately as big as they recede into the depth of the picture (indicated here by fifths).

Once the basic construction is in place we can begin to insert the shadows; added expression and detail is achieved by drawing in materials and environment.
In Figure 12.1 there are certain characteristics that are immediately apparent: the impression of great depth and the associated difference in quality of drawing of things near and far; the representation of solids with simple lines without any special emphasis on shade or cast shadow; the topography suggested by sloping lines, the indication of mountain ridges by running these lines together, the suggestion of water without any indication of waves or water surface.

Here again we can see that light and very light areas on the drawing plane should be left untouched and white.

With this type of drawing it is also important for the lines to be flowing and continuous, even at the risk of allowing minor inaccuracies to creep in. When representing contour lines (easily recognizable here as stone retaining walls), one should remember that the vanishing points of parallel walls always lie on the horizon, a fact that should make it easier to arrange the walls with their vanishing points in natural fashion.

As has been stated before, the outlines of more distant objects should never touch those of objects that are more close-up—this is clearly seen from the mountain ridges.

Only those stones located in the immediate foreground are accurately drawn, with their shade suggested by accompanying contours beneath and to one side instead of detailed shading. The size of the stones diminishes rapidly with increasing pictorial depth: only simple outlines are used to represent the stones in middle ground, while in the background they become just crinkly lines that eventually tail off into single lines in the very far distance. The ground between the stone walls can...
be given a degree of character in the foreground by suggested irregularities (holes, pits, etc.), but as picture depth increases there is no need for precise soil features. In middle ground, a few dots and short strokes are perfectly adequate, while beyond these the areas are best left plain. Even so we still give the impression that these areas are actually land rather than sea or sky.

Un fortunately it is not every day that we come across a scene as in this example. Still, in any drawing it is essential to look for and find successful ways of representing spatial sequences, juxtapositions, and superimpositions.

When selecting a particular subject scene and deciding which surfaces are to be darkened by more lines—and hence emphasized—it is once again advisable to half close the eyes for a few moments. The resulting blurred impression will help you to pick out the differing degrees of darkness and also confirm what we stated at the outset—that drawing means simplifying.

An example of explanatory sketching in construction drawings: steel balustrade with steel rope stressing.

13.0 Drawing Plants

The convincing representation of plants in freehand drawing places great demands on the draftsman's power of observation.

We can only state the most important principles of drawing in nature, and this should be practiced as often as possible.

First and foremost, we must draw; in other words, avoid slavish copying, embroidering the influence of excessive romanticism or graphics of a precious insistence on accuracy and "true-to-life" reproduction. Drawings done in nature should concentrate on plants and their surroundings only.

Finally, we are often again drawing lines, surfaces, and solid bodies.

All plants possess a structural skeleton which is developed according to a logical "unfolding" system. In trees, for example, it is perfectly possible to start drawing from the middle outward. The overall image is best grasped if the structural skeleton which also carries the sap is closely observed and memorized.

Trunks, branches, twigs, blades, etc., generally grow and develop along forking lines, i.e., main axis, primary side axis, secondary side axis, and so forth. When drawing plants we also must observe and evaluate the various main and secondary dimensions—this will familiarize us with the proportions (length, height, width, depth) and spaces.

Countless forms of branches, twigs, leaves, blossoms, and fruits should never make our drawings
Nevertheless it is worth studying the direction of the leaf axes and the position of leaf surfaces to discover that there are indeed certain uniformities in practically every scene, something that can be of great help to the draftsman.

Grasses

Lines are typical symbols for grass. As a rule, fewer and thinner lines should be drawn than actually exist in nature. The eye of the spectator who has not seen the original will subsequently optically multiply the lines, complete the picture, and interpret the overall context.

From this it follows that you must think about the relative value of what you see (main features and secondary information) and about the type of representation that is most appropriate, whether contour, line, surface, or hatching.

Under no circumstances should the results of your efforts look unfamiliar, since you are, after all, drawing what you know.

Everything we have so far written regarding perspective, detail, shade, and cast shadow obviously applies to the selection of plant subjects.

Herbaceous Plants and Climbers

With these plants we see more the individual leaves rather than the underlying branches and "supply lines," and so they constitute an apparently haphazard surface.

Simplification and Symbols

Constraints of scale and time necessitate a certain degree of simplification in plant drawing, even when incorporated into architectural views or when drawing landscaped areas, gardens, etc., and here we are faced with the eternal struggle between graphic language and artistic representation. One method that has crept into use in recent years consists in indicating trees simply as plain circles (white discs instead of trees). While it may be graphically acceptable to show small plants as circles or bushes as curves in architectural elevations, drawing flowers as crosses and bushes as triangles means that we are getting far away from the true natural scene.

Nevertheless it is sometimes necessary to make exceptions, especially when dealing with an extremely small scale. Vegetation can then be shown in the manner used in Figure 18.21 (p. 149), for instance.

Generally speaking, however, it is better to draw actual outlines and structures, and lines should not cross each other arbitrarily; after all, branches that grow together with others at their ends simply do not exist in nature, and from this we can conclude that all intersecting lines are ugly and unnatural. The lines we draw should always have a minimum of space between them so that the impression of crossing lines does not even arise.

One special type of cross-connection is permitted, however: cross-linking through bifurcation.

Trees

There is no harm in restating some basic criteria: typical features are central axis and symmetry on all sides at roots, trunk, and crown, with many ramifications. The tree trunk has the greatest thickness compared with main branches and twigs. The diameter of the various branches must decrease with increased branching.

Leaves get smaller toward branch and spray tips because they are younger. Wind and weather naturally have a major influence on the form. Isolated trees must try to attain a closed form with a more "aerodynamic" outline to protect them against the wind, and so there will be few branches projecting much beyond their profile. The topmost branches frequently point heavenward while the lower branches grow almost horizontally or drop...
Our drawing will turn out very differently depending on the type of tree, the season, distance, and lighting. In winter when the leaves have fallen we have an excellent opportunity to study and draw the tree’s structural elements.

Fast- and slow-growing trees differ substantially in trunk and branch lengths, growth form, and ramifications.

In summer, on the other hand, we can usually only see the outlines of the crown and trunk at medium range. The sun and daylight make the uppermost parts of the tree appear brighter while the underside of the crown has dark areas of shade.

In southern latitudes especially, there are many trees which allow light to fall through the crown because of its sheer intensity and the great heat from the sun.

Trees can be represented either by simple outlines or with many individual leaves (like the shading on a sphere). It is possible however to opt for simplifications that show only outlines at the top and individually projecting branches in the upper crown, while suggesting very dark shadow edges on the underside of the crown.

Tree trunks can also be drawn in different ways. Two lines as the external profile are a somewhat sparse indication of a tree trunk, and can be amplified by the addition of other differentiated and variously spaced lines (like the shading on a true cylinder). With some types of trees it is possible to draw horizontal rings around the trunk to indicate roundness. Most trees possess roots similar in size and diameter to their crown.

Shrubs; Bushes; Brushwood

Everything we said about trees applies equally to these plants as well, with the following exceptions:

Leaves and flowers are considerably larger in relation to the overall volume. Most of these plants...
begin to branch out from ground level (e.g., no visible trunk). Isolated bushes often have a structure which (like trees) develops from the center outward with a short, round form offering as little wind resistance as possible.

There are however many shrubs and bushes that grow along the ground or have other irregular expanding shapes. Groups of plants of varying heights and lengths constitute light solids and—when seen together—form enclosed spaces. Typical types of branches and their leaf roots as well as extra large leaves and other peculiarities compel the draftsman to study each line carefully before committing a single stroke to paper. When reproducing motifs from nature it is advisable to study the chosen scene for some considerable time—almost learn it by heart—and visualize the finished result in the mind’s eye.

Plants in Architectural Drawing

Trees in plants and artists’ impressions should suggest something of their form and nature. In simple terms, there are the two possibilities of summer and winter greenery: with and without foliage. The degree of detail must be in harmony with the overall intent and purpose of the drawing; one should always confine oneself to a distinct type of drawing in each illustration (either trunk and branches or solids and volume).

Like grass and shrubs, trees should be similar to each other in form of expression.

Even if plants are represented by outline alone, one should make certain that the individual profiles reflect a certain similarity or uniformity; otherwise may be made of arcs and circles, it may be. The student should spend some time studying these features in good drawings; the practiced draftsman confines himself to a uniform expression, just as with other graphic techniques, so that the finished drawing does not have a confusing effect on the spectator.

Figure 13.14

14.0 Drawing Flowers and Blooms

Despite the infinite variety in the plant world it is possible to summarize a few rules at this stage which should help to facilitate an understanding of the forms involved and hence of the drawing technique to be employed. For many of the phenomena encountered in this area we can say that the rough outlines always fall within a closed geometrical form (sphere, cone, cylinder, oval, egg-shape, circle, polygon, trapezium, rectangle, triangle). The general images often develop centrically (in relation to a point or axis). Structures are frequently more or less symmetrical. Stalks, stamens, leaves, and petals narrow toward the tip. Plants and blooms become lighter and more airy upward and outward. Faint guidelines can assist in the drawing of flowers and will hardly impair the quality of the finished product. Erasing the guidelines could leave a bad impression, on the other hand.
15.0 Drawing Boats and Ships

The vanishing lines of watercraft may make it more difficult to perceive their exact and simple geometrical body lines than with cubes and parallelepipeds, but they are nevertheless solids that are governed by quite definite laws. Once the latter have been studied more closely it will be found that drawing boats and ships is not so hard. Generally it can be assumed that almost every hull has a fore-and-aft axis (centerline) which is usually an axis of symmetry. From the viewpoint of safety from capsizing and sinking, we can also suppose that the centers of mass and gravity are often in the center of the vessel and as low down as possible. Using the general rules of perspective, we can imagine hulls with transverse axes running perpendicular to the centerline. It should not be so hard, therefore, to capture a vessel's attitude in a drawing.

To become "acclimatized" it is advisable to begin with orthogonal drawings (ground plan, side and front elevations). The streamlined forms of lighter watercraft have an important part to play, while huge bulk carriers are built almost like long rectangular boxes. It is surprising, for example, to realize just how rectangular barges or tankers can be. Before starting to draw, it is important to become familiar with the object—the draftsman should "experience" it by walking (or sailing) around it. Then one must decide on the vessel's three-dimensional and structural breakdown. Finally, our knowledge of perspective will help us to draw foreshortenings and the entire body of the vessel. Even the quickest and best draftsman impresses the overall construction in his mind, then visualizes (perhaps in a split second) the three-dimensional implications.

Ships in their dominating attitudes and often isolated positions on calm seas can have great charm and attraction as subjects for our drawings: reflections in the water can complete the picture. The mirror axis is the water level.

Only the upper parts of the vessel need to be drawn as reflections on the water.

Land vehicles and aircraft have similar characteristics in their outward appearance, and so the same rules apply to them as to watercraft.
16.0 Drawing Other Forms of Transport

The better one is able to grasp all contours, especially the vanishing lines, before setting pencil to paper, the better one's drawings of land vehicles, aircraft, and marine vessels will be. Free curves which do not lie in planes that are perpendicular to each other can pose problems, and so it is frequently advisable mentally to insert reference shapes (sphere, cone, cylinder, annular ring, etc.) into the volume and then determine the boundary lines accordingly.

Closer study will always reveal reference axes for the more awkward shapes.
17.0 Drawing People

We shall confine our comments to the most essential principles.

Travel sketches, artists' and architects' impressions, street and garden scenes are always more expressive when they include human figures.

The specific aim of this section is to prevent otherwise successful geometrical drawings from being ruined by the inclusion of deformed human shapes.

Our eye level determines the actual human dimension for all our activities within the man-made world. Buildings, structures, parks, streets, and landscapes should always be matched to human requirements for attainability, accessibility, suitability, adequacy, etc.

If we assume a certain uniformity in human stature we may conclude that the individual parts of the human body are of uniform dimension also.

Since antiquity it has been customary to divide up the human proportions into eight equal parts, with certain parts of the body located at each subdivision. The length of the head from crown to chin may generally be taken to represent one-eighth. The sketches on this page give a rough indication of the main reference points. The reader is advised to take a sheet of paper and copy the divisions until he has fixed the sectional structure firmly in his mind; this will also help to avoid some typical mistakes. The neck for example must be set in such a way so that the head does not sit directly on the shoulders. In many sketches the head can be simply positioned above the body without any interconnecting lines. A wedge shape can be assumed for human bodies—in rough terms—and this begins at shoulder height from around two-eighths of the overall height, narrowing rapidly toward the ground.

Drawing heads should not cause too many worries once one has studied and memorized certain proportions. The entire head is subdivided from top to bottom in seven sections. In the upper part a circle of 5/7 is drawn, in the lower part one of 4/7 diameter. The following proportions are important: the hairline comes at 1/7 down from the crown, followed by 2/7 head height as the forehead and temples. Eyebrows and the root of the nose come immediately beneath the forehead. The nose is about 2/7 head height in length and ends 2/7 above the chin. The mouth is located slightly above the bottom seventh (see Fig. 17.2).
Here are some examples of figures shown in outline. This simple method of representing people is most suitable when the chief aim of the drawing is to show objects, in which case the figures should lend the illustration scale (sense of proportion) and a certain degree of expression. Once again the ground rules: as few lines as possible should be drawn; only the typical lines of the figure should be highlighted and stressed, areas need not be filled in; omit unnecessary detail.

18.0 Motifs and Subjects: Some Practical Examples

Beginner's exercise: a simple box.

Experience shows that beginners choose far too difficult subjects. First exercises should be drawings of small boxes, models, pots, glasses, bottles, teapots, and that sort of thing.

Next we should practice drawing frontal/orthogonal (rectangular) facades of houses, e.g., half-timbered.

The main dimensions should always be indicated.

One should always enter the main proportions to gain training in control and scale.

Architectural section: accessible measurements and main dimensions must be indicated.

Estimated Dimensions
18.1 All Kinds of Containers

Drawing containers may seem rather difficult to the beginner, but it should come fairly easily with a little practice in observing and in the drawing of circles and ellipses. To begin with it is best to draw guidelines in the form of height lines and center axes. Another useful aid is the tangential contact between uprights and horizontal circles and ellipses. The turning point of the line is where the dotted axis in the explanatory sketch meets the arc of the circle. The fewer the lines drawn, the better and more convincing will be the overall picture of well-drawn objects. Shade should also be sparsely indicated.

18.2 Quick Sketch of a Very Simple Household Object

The objects to be illustrated should show typical and few—but clear—forms.

A spatial view in the form of a perspective drawing with two vanishing points should always be preceded by drawings of ground plan, front elevation, and side elevation. In this way the onlooker will immediately recognize first the dimensions, second the proportions, and third any complex line intersections. A typical drawing should also indicate overall and individual dimensions. Small sections made in the frontal drawing can provide useful information as details (e.g., of cross-sectional profiles which are otherwise seen only as one of four possible external surfaces in the view).
18.3 Object and Architectural Drawings

Architectural drawings can be made in the form of flowing freehand sketches. Drawings of objects and artifacts should be done with sufficient care so that a relatively simple object could actually be handmade without too much effort. Main views from the front, the side, and a view-from above (top view) should convey a good overall impression, and can be supplemented by explanatory information (details) regarding main structure and by formal statements. It is also advisable to add a small perspective view of the overall object. Further clarity is provided by overall and single dimensions, materials, colors, and surface finishes. Date, place, and other attendant details can also be added.

18.4 Extract Taken from a Lecture

Simple line sketches, presented clearly, can facilitate the understanding of structural parts and structural relationships. Like marks or symbols, they help to convey the basic subject matter and imprint it on the memory.
18.6 Detailed Section through a Timber Frame as a Masonry Finish

This example clearly demonstrates how one can visually interpret the differing properties of materials and their effects on adherence and cohesion. The structural layout of the frame, along with the details of the connections, is shown here with an emphasis on the timber elements. The material qualities, such as strength and density, are indicated through various notations and symbols.

Cross sections through the walls and roof can be drawn in the background to give a sense of scale to the cross-sectional area. The typical strength of the materials will be very clearly highlighted. The choice of materials and their installation are crucial in achieving the desired structural integrity and stability. The drawings show the detailed connections and the overall construction method.
18.6 Freehand Construction of a Timber Staircase

The structural cohesiveness and eventual appearance of a building or other construction can often be indicated by means of a sketch. The main outlines are first measured off and drawn in freehand or lightly with a rule. Once the main lines of reference and points of intersection have been drawn, it is relatively simple to fill in the rest of the construction freehand. An almost realistic effect is achieved by the correct use of emphasis on light and heavy strokes. The practiced draftsman will be able to use this technique to identify and solve wider problem areas as well. The technique, which can do without tedious, exaggerated accuracy, will also increase drawing speed.

18.7 Sketches of Classical Furniture

This makes no great demands on the draftsman, provided the furniture has more or less closed forms. The horizon line is plotted first, as always. Then come the verticals, which also provide height-to-width proportions for the various faces. The vanishing lines converge left and right on common vanishing points on the horizon. If these vanishing points are unsustainable, we can use scale lines to indicate the correct vanishing line direction.

Another drawing aid with symmetrically constructed objects—as is the case here—is the axis of symmetry which, once found, can be used to locate the correct points for the individual lines with the use of further scaling. Where there is shade or cast shadow, the timber faces can be provided with drawn grain lines.
18.8 Sketches from a Lecture on the History of Architecture

These are routine examples of typical historical styles and were drawn in the lecture hall.

This kind of sketch is typified by its concentration on the most conspicuous parts of the structure, rapid execution, and the total absence of any "useless" ingredient. Shadow and detail are unimportant. The lines are simple, bold, and confident. No stroke is drawn twice. The lines can be interrupted at corners, etc. A lot of repetitious features such as rows of detail need only be partially shown. The spectator will complete the picture with details he has already seen and experienced.

The fact that many parts of small sketches seem too strong because of the thickness of the stroke should not worry the beginner, since it is typical of this type of illustration. If one needs to make a lot of small sketches like this, for whatever reason, one will eventually learn to pick out just the essentials of an object and then to set them down on paper in a very short space of time. Small details may be overlooked in the process, but this will make the outlines all the clearer.

18.9 Interiors

Not everyone has the same powers of imagination, and with some building or design projects it may prove difficult to explain to a client, for instance, which spatial effects or finished appearances one is aiming for, or what the possible alternatives are in terms of cost-cutting or restrictive regulations.

These examples show that just a few freehand strokes are enough to convey a relatively accurate impression of interior space.
18.10 Exterior Views of a Shop and Cafe

With this more interesting but rather difficult job, the first step is to plot the verticals and the horizon line as shown in Figure 18.13. Next we determine the proportions of the various visible surfaces, drawing first their vertical and then their oblique lines. Glass as a building material requires little or no indication in this type of sketch. Surfaces which lie in shade or shadow can be darkened by hatching. To give the less imaginative viewer a better idea of the substance and volume of the solids, it is sometimes useful to add a small ground plan in one corner of the drawing. Human figures complete the sketch by suggesting scale and size.

Figure 18.13

Figure 18.14

Example of a very rapid sketch that might have been made in a cafe on the back of an envelope.
18.11 Artist's Impression of a Building Project

An exterior view should give the client a proper visual impression before construction commences, and the first thing is the precise design of all parts of the building. The aim of obtaining a complete and uniform image was achieved here by generally illustrating with lines—there are no completely black areas. Hatching replaces surface detail. All light gray, dark gray, and other tonal shades are represented by texture, structure, and lighting. The contrast between light and dark areas is intended to give the picture a certain density and substance. The overhanging branches and foliage frame the building and lend a sense of depth to the drawing. Plants, grass, and stones in the foreground can be shown in great detail, but lose their sharpness with increasing picture depth. The strokes are shorter and thinner.

The building is given substance by the contrast between surfaces lying in direct sunlight and others in shade. Glazed areas and small windows within illuminated surfaces are best represented by dark, close hatching; the building facade will then appear bright against them. This optical effect is frequently observed in bright daylit and especially in buildings without curtains at the windows. It is best to leave the sky blank against the leaves on the tree, the tree trunk, and the undergrowth; the lamp globes should also be left plain against their background. To give the single-storey building greater volume against the bright sky beyond, the trees in the background are shown with dark leaves (dots). This building's windows are also close-hatched to indicate darkness. Finally, there is an appropriate entrance and human figures to give an impression of scale.

18.12 Civil Engineering Projects

These can be drawn freehand very easily in spite of their often huge dimensions. All the rules of perspective of light and shade and of simple stroke and line apply. The choice of a scale that corresponds with the human eye level will produce adequate expressions of solids and space.
18.13 Layout of a Chemistry College

When sketching layouts like this it is important to pick out the essential structures and exterior spaces in simple lines. The buildings are just sharply outlined—their floor areas are left plain as are roof areas. In contrast, landscaped areas should be close-hatched. The trees are shown as plain circles. The layout is given a feeling of substance by the inclusion of shadows cast by diagonally incident sunlight. Cast shadow is shown along two sides of rectangular buildings depending on their elevation.

18.14 Ground Plan of a Chemistry College

The various rooms are arranged with their appropriate communicating routes with the aid of an orientation grid. Corridors are close-hatched for added clarity. With a little basic experience in the reading of plans it will be easy to see where buildings are located and where structures are positioned. The critical zone of the drawing lies in the transitional areas between exteriors and interiors. An overindication of green spaces can well blur the overall impression of the building itself, while too sparse an indication will fail to identify a given area as interior or exterior.
18.15 Drawing Major Roads

The chief difficulty here is to recognize the foreshortening of roads that lead away into the distance. Even with these freehand drawings it is easier first of all to mark horizon, main point, and width divisions on the picture plane. We then have to study the curves and bends, plotting their turning points and sketching a likeness. The foreshortenings in the background, the width of the stones, or the exact position of the crash-barrier supports are things that can cause problems to begin with. One should first lightly mark in the divisions and then do a little correction work afterward, if required.

The utmost concentration is needed to illustrate the landscaped green areas and trees. It will be useful to make a few attempts at the edge of the sheet or try the various forms of graphic/artistic representation before achieving the best and most appropriate reproduction of terrain and vegetation.

The draftsman should also refrain from attempting to draw every detail; he should have the courage to leave white areas (which may perhaps appear gray in reality, e.g., concrete). Contrast between very light and very dark areas will give sufficient indication of the outlines (limits) of solids, buildings, and green spaces.

In these particular examples with great depth of perspective, the degree of detail, freedom and heaviness of line will naturally diminish as distance increases.
When drawing a garden plan, one is naturally inclined to record the many varied forms of nature. The main object of the task and its difficulty lie in the simplification of these forms and their symbols.

Such involvements can of course be provided with this particular example of a small enclosed garden, this would not involve a great loss of utility. The shadows cast by buildings, trees, and bushes in a particular garden show a different pattern. This is an example of a very studies build.

This is a typical General sketch aimed at giving the reader a clear view of the plan. The main object of the task and its difficulty lie in the simplification of these forms and their symbols. The main object of the task and its difficulty lie in the simplification of these forms and their symbols.
In the example shown in Fig. 18.26, it was essential to capture the unusual form of the buildings. With spheres and spherical solids this can often only be achieved by plotting circumference lines at equal distances. With more complex and difficult forms it is permitted to use more pronounced and more typical guidelines.

The points on the domes indicate the hardly visible lightning rods. The sequentially arranged structures display outlines which should not come into direct contact in the drawing. The resulting cast shadows are deliberately played down so as not to mislead the viewer. In reality, too, the shadows on the ground are blurred by a multitude of factors.

People can only be shown on a very small scale: dots for heads and squiggles for bodies are sufficient, since the observer’s eye will fill in the rest of the detail. The surroundings are not shown, since the forms of the structures are expressive enough on their own.

18.18 Illustration of a Road Bridge for a Competition

The characteristic appearance of a bridge should be drawn as realistically as possible for competition purposes to serve the panel of judges as an aid to making their decision.

The engineered and calculated designs are first entered precisely in cards, with constructive perspectives drawn from specific viewpoints. The perspective should take careful account of the elevations of road and terrain. To make the picture as natural as possible, highway authorities will require the inclusion of banks, embankments, and natural environment in the illustration. Even the bend in the river must be accurately shown: just a few millimeters of inaccuracy in the lines will give a false impression of the project. Apart from having a thorough knowledge of perspective techniques, the draftsman should also be versed in freehand drawing. All "ingredients" such as figures, vehicles, plants, open spaces, etc., demand a true sense of scale and experience in the rapid representation of vegetation and tree trunks.
Here are some tips you should remember: many areas can be left blank. The main thing is to indicate prominent features, details, and characteristics at particular places. It is advisable to include a reference figure to give some idea of the location of the horizon. Shadows must be cast at the correct angle according to the sunlight. Reflections in water should be indicated. Depth and focus are achieved by a lighter background and more detail in the foreground. Leaves, clumps of grass, and stones in the foreground indicate image depth.

You may see a lot of detail, but you don’t have to put it all into the drawing. We have already said that good drawing also means eliminating insignificant detail, and overloading a drawing with too much detail can soon obscure the overall appearance and three-dimensional effect of a scene. So beware of drawing too much—too few strokes are much easier to bear.
18.20 Freehand Sketches Marked by and Oriented on Verticals

Once we have mastered the technique of drawing, after some practice we can begin to simplify in a meaningful way. Dividing up the drawing paper, marking in the widths and elevations, and stressing the verticals can be done both quickly and accurately by starting with the vertical lines. Once the widths have been plotted we can draw in the horizontal lines. If the verticals have been drawn too long, it does not matter; they can be left alone and are not without a certain attraction in the finished picture, so erasing the surplus is quite unnecessary.
18.21 Preliminary Design for a Ski Cabin

The overall impression determined the way in which the sheet was divided up. Note the essential features: blue sky, wide-open space, and almost blinding snow; the house with its natural materials forms a dominant contrast; the mountain sunshine has melted the snow on the timbers.

Both vanishing points are outside the picture. The horizon line roughly coincides with the underside of the soffit that projects out over the natural stone plinth. The size of the cabin can be quite easily plotted with its lengths and proportions. Wall length and building height are easily related to each other. The roof pitch is about 30 degrees. The size of the angle can be seen at the gable end—the roof pitch can also be observed at the chimney stack. The particular design of the structure means that for once the two visible walls can be shown as more or less the same length. One side of the cabin lies in cast shadow, and this can be clearly and typically illustrated by showing the building materials in all their structure, texture, and finish (with wood grain, natural stone courses, reflecting glass areas, etc.).

These surfaces of the cabin which lie in the sunlight should only include the barest indication of the properties of the materials. The cast shadow should be shown more distinctly. On the gable wall with the weatherboards, this is adequately done by adding a stroke between the outlines of each board. For very small surfaces like the left-hand roof support, it is quite legitimate to make the small shadow area totally black.

The snow area should of course be left untouched as it is. The same applies to the mountain formation. Only the apparently darker, deep-blue sky is marked by close hatching.

18.22 Rapid Sketch of a Gateway at Ephesus

This example also clearly shows the marking in of the horizon, the vertical subdivisions, and the proportions as aids to drawing. Once you have walked around the structure a few times and have grasped its geometrical implications, you can begin to sketch its various parts in schematic form. The overall illustration is fairly simple to construct, provided it is determined by cubes, rectangles, and arcs. In this instance it was irritating to find that the gateway had to be reconstructed from rubble after 2,000 years and that certain parts were either missing or extensively damaged so that the spectator must complete the lines in his own mind. But the richly detailed profiles should not cause any problems. First, draw the main outlines, leaving blank those areas which are very bright, almost white in the sunshine. It is best to start drawing the fine detail where there is shade or cast shadow, as this will save effort and unify the illustration at the same time. One should try to represent the darker parts as typically as possible; the thickness of stroke used will naturally impose constraints. Some parts can only be shown by short lines, dots, or other simplified devices. Here again, it is better to leave something out than to put in too much. However romantic or fascinating it may be, the background is simply omitted—small, thin contour lines are sufficient. Surfaces which lie in cast shadow must be close-hatched to show darkness.

With this kind of drawing it is advisable to half-close the eyes from time to time to check on the darkest and the brightest parts, then put in the hatching accordingly.
18.23 Japanese Tea House—a Holiday Impression

This drawing incorporates practically all of the drawing techniques dealt with in this book. Perspective, reflection, shade, shadow, vegetation, etc., are all illustrated in a successful and pleasing holiday picture that was executed during a trip to the Far East, or perhaps in a large municipal park.

18.24 Small Cafe

A rapid sketch. The impression of space and depth is given by fixing a central vanishing point at eye level. This could be a sketch done on a beer mat or paper napkin during an initial project discussion. The overall impression is important—exact detail will follow later.
19.0 In Place of a Postscript

Our environment, both the beauty of nature and man-made townscapes, has been captured aesthetically and impressively in drawings for many centuries. This same environment is under such constant and intensive threat every day that the next generation will be able to experience and illustrate only a fraction of aesthetically pleasing natural and cultural landscape.

Directly or indirectly, it is man himself who is disfiguring and destroying the world. It begins by carelessly and thoughtlessly throwing away a plastic bag in a wood or into a river and ends in unsightly rubbish dumps on the margins of city, forest, and field. Or it can start by someone changing his car oil and allowing the old oil to seep away into the soil. The result is always the same: a destroyed environment means a lower quality of life.

Polluted water and air are not just harmful to our bodies, they increasingly take away what nature and man have created over thousands of years. Just think of the entrance to the Parthenon in Athens that had to be closed to the public because of the risk of damage from environmental influences; the statue of Marcus Aurelius in Rome is also threatened, and nearly everywhere cathedrals and stone sculptures are being eaten away by pollution in the atmosphere. No wonder smaller works of art are kept safe in air tight showcases.

Nature's balance too is being eroded more and more. Many species of fish, birds, and mammals have lost their once healthy life-supporting environment and are on the verge of extinction. Everything we call "beautiful" is gradually disappearing, and so everything which we take pleasure in drawing will have to be sought after more and more.

And what can we bequeath to our descendants? Bringing children into the world seems much easier than offering them a tolerable world. The responsibility for a better environment in the future rests with us all. We must develop alternatives!

Let us hope that the art of freehand drawing and the privilege of being able to draw within a harmonious, well-formed environment will help us arouse more interest in a better quality world.

Perhaps then man might spend more of his energy on protecting and preserving the environment.