DRAWING INTERIOR ARCHITECTURE

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BY NORMAN DIEKMAN AND JOHN PILE

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Stacor Corporation, Newark: 34
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Vaga, New York/SPADEM: 36, 159
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CONTENTS

PREFACE

There is an extensive literature concerned with architectural drawing that may be roughly divided into two classes: works that are methods, or "how-to-do-it" books, on the one hand; collections of drawings, sometimes the work of one individual, sometimes focusing on a particular style or period, on the other. In both categories, the interiors of the buildings tend to have a secondary role, to be deduced, perhaps, from floor plans, and to show up in decidedly second place as compared with the impressive and dramatic illustration of exterior mass, volume, and form.

The prime reason for building is, in the vast majority of situations, the creation of the interior spaces to provide practical functions that make the building useful. However exciting the external form of a building, it is the experience of going inside that makes it understandable and significant as an environment for the human life process. Still, many fine drawings of interiors exist, and the ability to show interior space effectively is an important skill for any designer or architect. This book provides a study that will focus on interior drawing not only by showing examples, but also by providing practical suggestions on how to go about making interior drawings.

In calling this book "drawing" rather than "rendering," we are making a distinction that is not always precise, but that needs general explanation. The term "rendering" is usually understood as describing the kind of highly realistic color illustration that is often made to convince a client, "sell" a project, or display how aspects of a building will look before construction is complete. It implies that the design process *is* complete and the renderer (whether the designer or a specialist) concentrates on showing what will be built in a way that approaches a color photograph as nearly as possible.

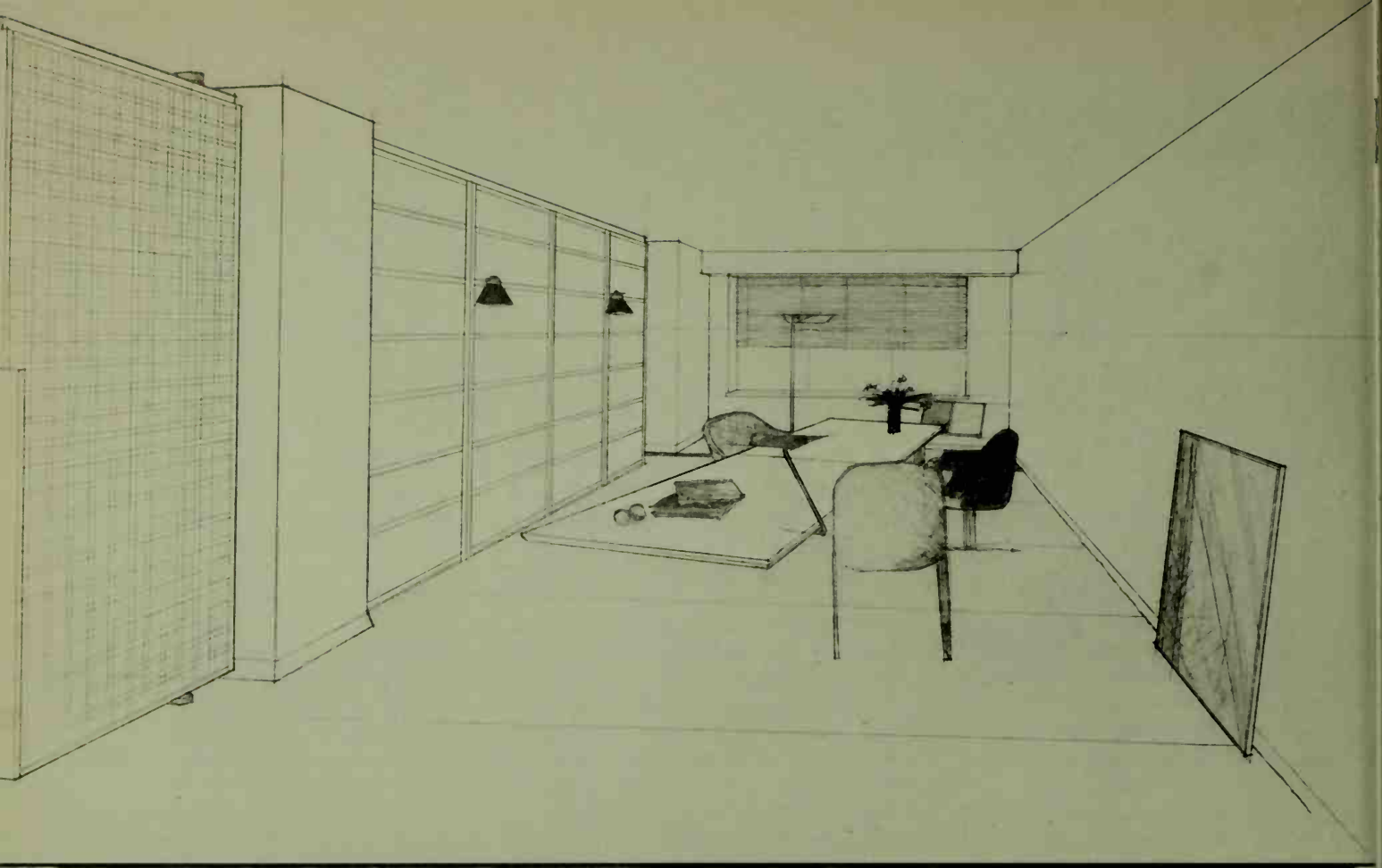
"Drawing," in contrast, implies a process vital to all design work—that is, converting ideas to a visible form in order to aid in their development and convey information about them. Designers draw, often solely for their own eyes, to help form concepts. Drawing can be rough or sketchy, abstract or realistic, strictly conceptual or highly utilitarian, serving as the basic information for rendering, model making, criticism and approval, and, finally, cost estimating and construction.

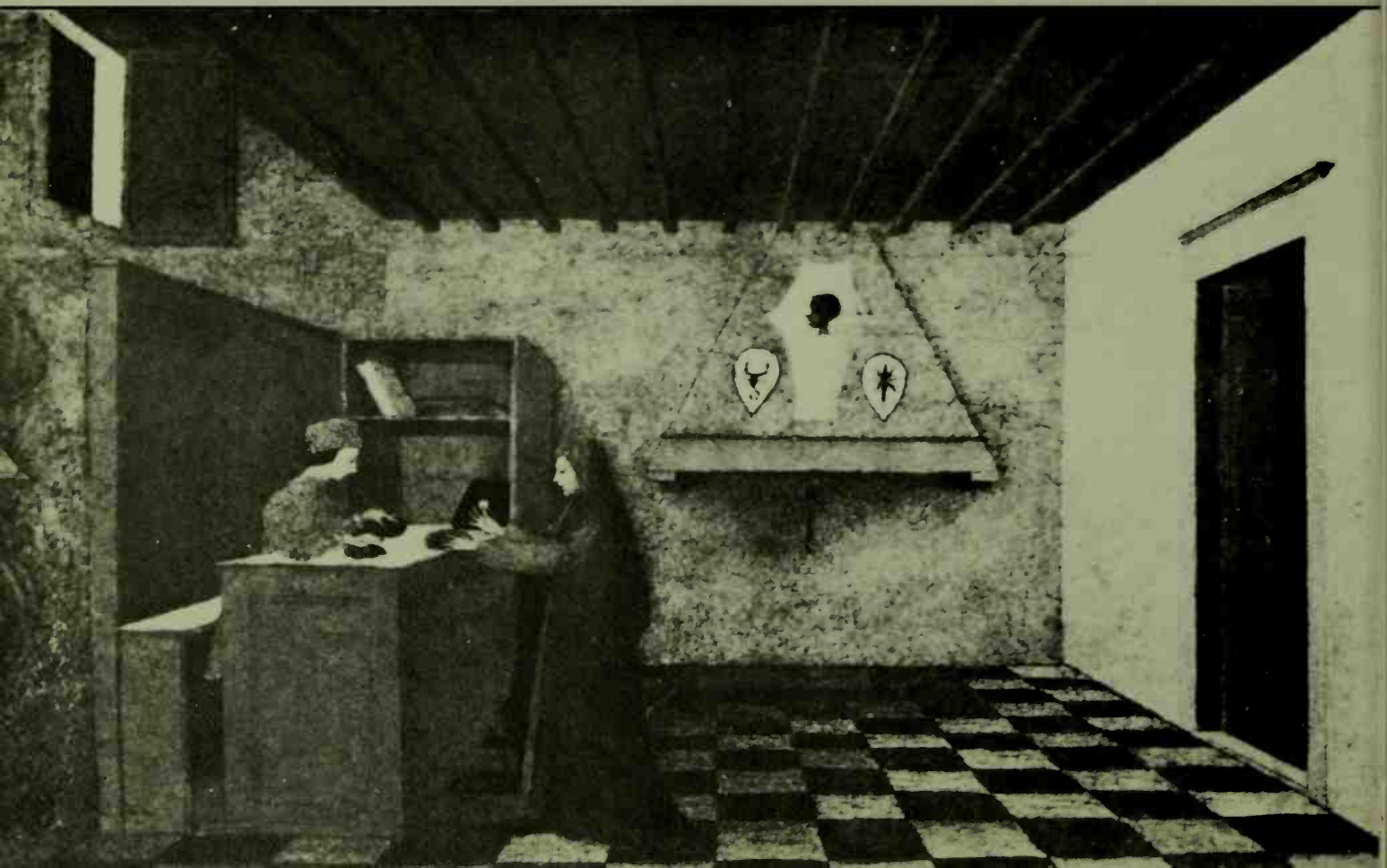
The kinds of drawings that are used for construction, often called "blueprints" by laypeople and "working drawings" by professionals, are not the focus of this book. Many technical manuals deal with the complexities of making them. The concern here is rather with the range from roughest sketch to finished presentation of interior design projects, stopping short of the specialized techniques involved in realistic presentation renderings.

In offering instruction on how to go about interior drawing, this book is not intended to include a course in basic drafting skills of the kind taught in introductory courses in design school, or even in "mechanical drawing" classes in secondary schools. Readers, it is assumed, will have acquired these basic skills in most cases and, if not, will find useful books widely accessible to help with self-instruction if a classroom experience is not available. It is also quite possible to take up interior drawing of the kind dealt with here without any such background, entirely on the basis of the information offered in this book, although a knowledge of basic drafting may be a convenience and may help to build confidence.

It is also intended that readers who are already skilled in interior drawings, or who have no intention of undertaking such drawing themselves, will still find this a useful book in its exploration of what interior design drawing can do, its special relationship to the design process, and the results that the process produces.

A book with dual authorship always raises some question in a reader's mind—how can two people write a book? Who has actually been responsible for what parts of the final result? In this case, there is a simple explanation. Norman Diekman has produced all the original drawings that illustrate the text (with the exception of some examples of the work of others, which are clearly identified as such). John Pile has written the accompanying text, incorporating shared ideas that have been developed in discussions between the two authors. This book thus represents a shared point of view developed in professional work and teaching over a number of years and in a wide variety of situations.





INTRODUCTION

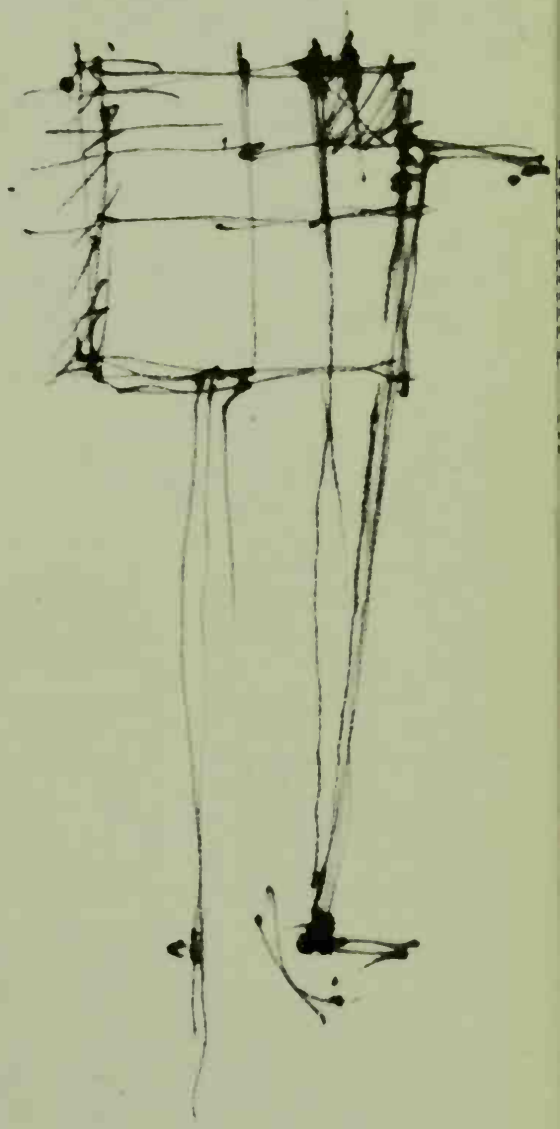
The art of architecture faces certain problems that none of the other arts must confront. The painter and sculptor can work directly with their materials to develop their ideas: that is, *design* their works at the same time that the finished actuality is being created. Buildings cannot be designed in this way. The construction of the actuality is a slow and costly process that at best begins after design is well underway. The easy processes of observation, self-criticism, and revision that the painter uses on canvas and that the sculptor, with somewhat less ease, perhaps, can use in creating a finished work are out of the question in the design of buildings.

As a result, design in architecture depends on the use of a visual language that replaces solid structures of brick, stone, steel, and concrete with a fluid and rapid means of recording imagined possible forms. This permits review, revision, and development in advance of the decision making, which is finally turned into the firm instructions that are the basis for construction.

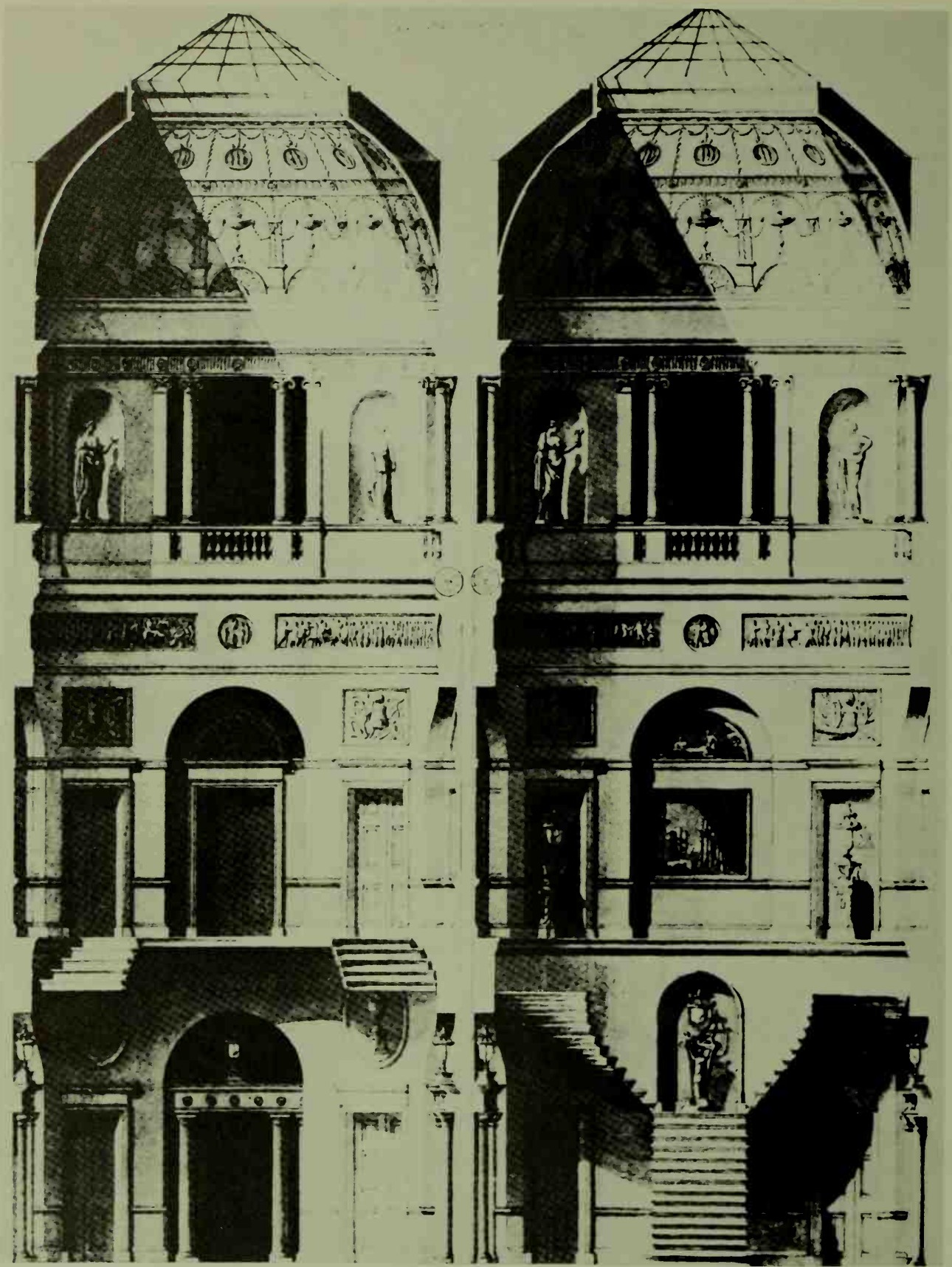
Architecture and music are often said to have parallel qualities. Just as the symphonic composer cannot expect to use a symphony orchestra as an experimental forum while developing a work, the architectural designer must learn to work a step removed from the intended final result. The composer must work with notes on a staff on paper to represent the massive sound developing in imagination. In design, lines and tones on paper must represent a three-dimensional reality envisioned as a future development.

The language of written music can only be understood in the mind as sound by those with very special skill and training. Happily for the designer, many kinds of drawings are quite immediately intelligible to most people because they are seen as more or less "realistic" images of the subjects they represent. Why a few lines and tones on flat paper, often a highly abstract set of forms, are seen as a "picture" representing three-dimension spaces and objects remains somewhat mysterious, although students of experimental psychology called "perception" have made some progress in developing explanations. We see the reality of space as the result of images that the lens of the eye projects on the retina. The mind, on the basis of experience, interprets these clues into meanings that can be understood and remembered. Flat images on paper that project images onto the retina can generate similar interpretations. Thus it becomes possible to look at a photograph and recognize a person, a thing, or a place. Making such images by hand on paper is the art of drawing, which serves architecture as the written score serves music.

Looking at the drawing on the upper left, any viewer will immediately see a portion of a space, a room, with specific proportions, forms, shapes, and recognizable elements, such as walls, doors, table, and chairs. Even some specific materials can be recognized. How this is all so clearly seen is something of a puzzle since the drawing is not at all like a photograph. Not realistic in any way, it is simply an arrangement of lines with a few solid tones. We see the space nevertheless and



Opposite page: The modern interior perspective (top) and the Ucello (bottom) share a common representational purpose, although separated by some 600 years. A concept sketch (above) of a proportional study in plan is the generating point in an office design project. (Michael Kalil)



even accept such unlikely elements as a table top floating in air with no visible support, understanding intuitively that there will be support and that its omission simply reflects the incomplete design development of this detail.

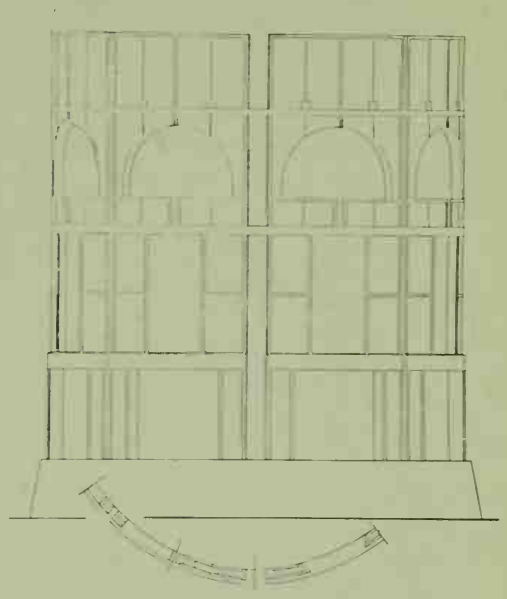
The success of such drawing in conveying the impression of the actual experience of being inside a real space depends on the series of discoveries in what we now call the field of descriptive geometry that made it possible for artists in the Renaissance, for the first time with consistent success, to show space in a way that viewers find truly realistic. The Ucello painting on page 10 below gives us some sense of the artist's delight in this achievment. The squares of the floor diminish as they move back in space, the beams travel across the ceiling and the door, window and furniture take their places, making us forget that we are seeing a flat surface and convincing us that we are actually within a very specific real room.

The drawing on page 11 is not so readily understood as an image of reality. In fact, to the uninitiated, it may appear totally abstract and diagrammatic. Anyone involved in architectural work, however, will recognize it as being a plan, a rough sketch plan of the sort that might be drawn quickly on yellow tracing paper or even on the back of an envelope to make note of ideas about the arrangement of space. To the designer who makes such a drawing, it is richly meaningful, acting as a kind of shorthand expressive of a complete, three-dimensional reality taking shape in the mind. With verbal explanation, such drawing is often a useful aid in communication with others, layperson or professional. Even without explanation, the nature of the aesthetic ideas involved can be felt by any sensitive viewer who will take the trouble to look.

Such drawing is a reminder that, while interior drawings often serve to indicate visual reality—the image of a real space as it might appear when actually built—there is another family of architectural drawings that are linked to intended reality in a more abstract, diagrammatic way. This is true of all plan drawings, for example. No one will see the floor plan of a building while walking through it; the plan of a room is not "how it looks" in the usual sense. Plans are nonetheless vital to architectural thinking; "the plan is the generator," Le Corbusier said of all architecture. Laypeople usually come to understand plans quite readily as true accounts of real space, just as maps are understood even though they are not "pictures" of what can be seen. The understanding of elevations and sections—the other basic drawing types that make up the family of orthographic projection on which technical drawing of all kinds depends—is not quite as immediate, but it soon becomes clear that we have no other way of describing complex spatial realities in a precise way.

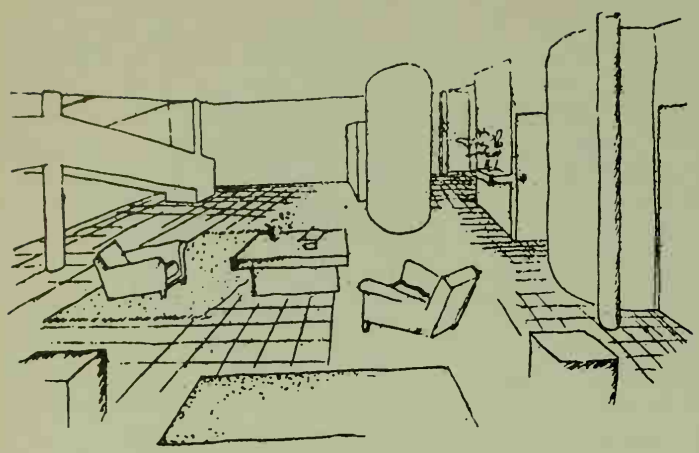
Robert and James Adam, for example, around the year 1775, conceived for the house at 20 Portman Square in London* a main staircase to be set within a circular space that would rise through the height of the house to a skylight on the roof. Such a space can be imagined and, once built, can be experienced, but no perspective drawing with its fixed point of view can give any idea of what the experience would be. The Adam brothers turned then to a pair of sectional elevations that, in effect, split the cylindrical space and opened it up like the pages of a book (see illustration, opposite page). We would never see the real space in this way, but the drawing, complete with shading to make us feel the sense of hollow roundness, tells as much as a visit to the real space would; it may tell us even more since we can inspect even the most inaccessible parts in fullest detail.

The interior of a cylindrical space might seem a highly unusual problem of representation, and yet we find one of America's greatest modern architects, Louis I. Kahn, working with a similar problem in sketches (above) for the meeting house portion of the Salk

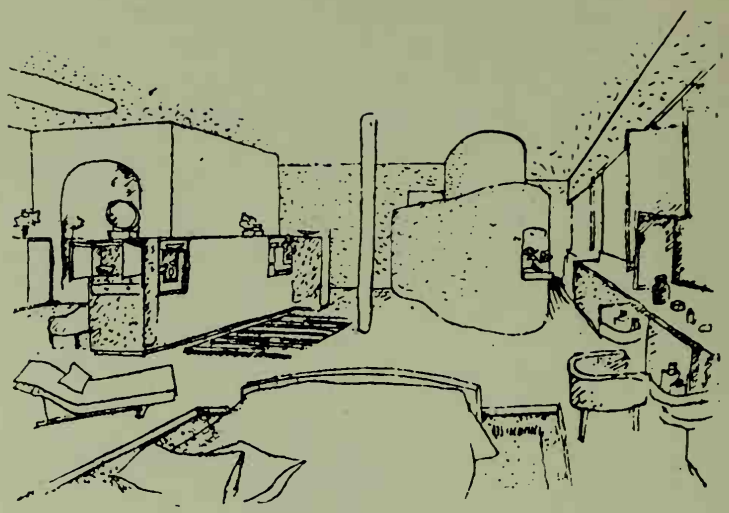


Drawings by Robert Adam (oppasite page) and Louis Kahn (above) are both studies in the design of cylindrical space, 300 years apart in time.

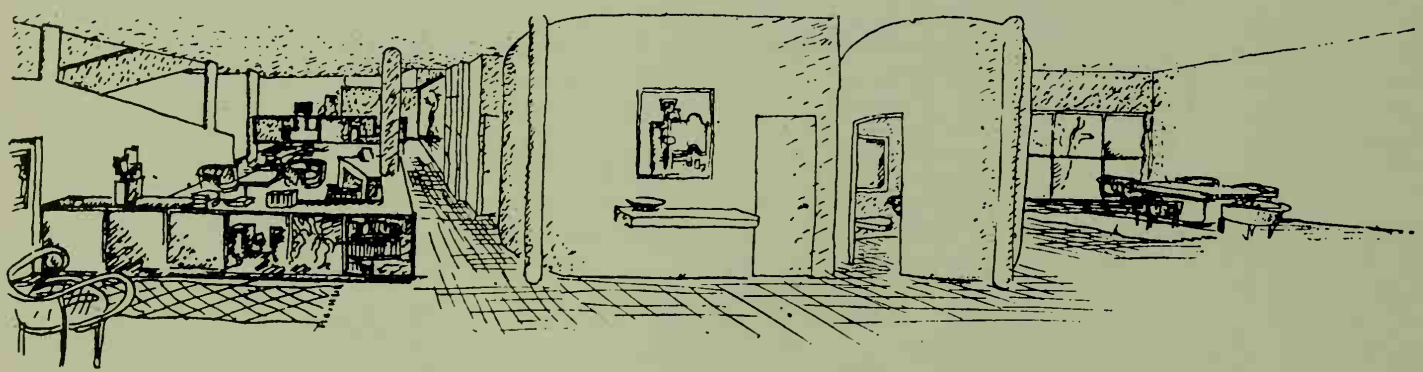
*Originally it was the home of the Dowager Countess of Home; now it is occupied by the Courtald Institute of London University.



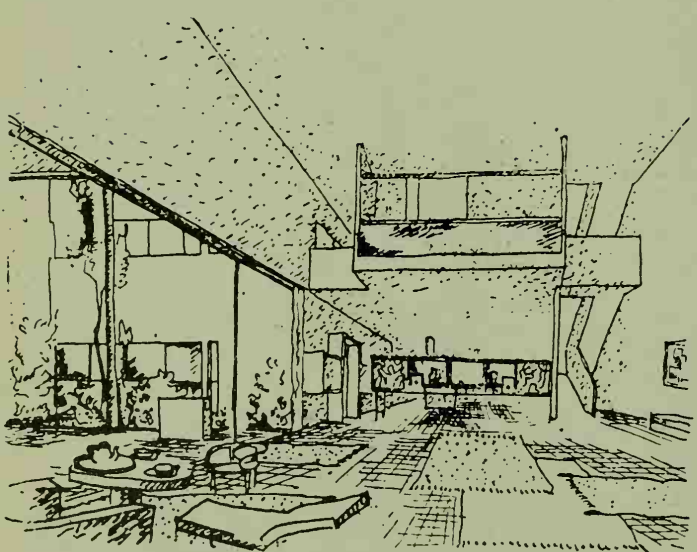
LE VESTIBULE



LA CHAMBRE A COUCHER

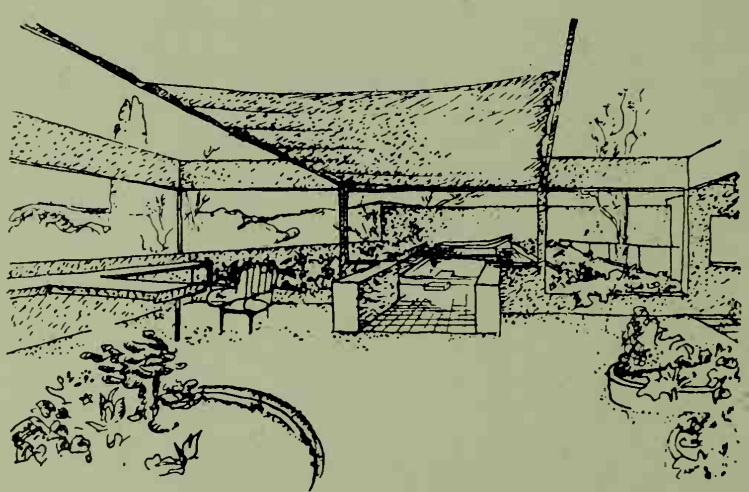


LA RÉCEPTION



LE SALON

MAISON DE MADAME M..., A NEUILLY



LE JARDIN SUR LE TOIT

Institute complex in San Diego. In this case the drawings do not give full and detailed specifics as the Adam brothers' did; instead, Kahn is sketching here as an aid in the development of his own ideas. The drawing is not intended for any eyes but the designer's himself and, perhaps, associates who might be involved in discussion of the developing concepts. Nevertheless, Kahn's drawing is highly expressive and has been exhibited, published, and admired as insight into a great man's way of thinking.

Kahn's drawing is also an example of another special role that drawings can play—to illustrate a building not yet (and probably never to be) built. Every designer must face the reality that many projects are postponed, canceled, or changed so that ideas, even developed designs, may never be realized. Drawings can represent realization in a way, however, and sometimes may become more widely known and more influential than an actual structure would be. A number of famous cases of this sort are associated with architectural competitions in which unbuilt designs have become more admired than the building actually built. The design of Eliel Saarinen for the Chicago Tribune Tower, which was awarded second prize, is such a case; although unbuilt, it was a major factor in making the designer's reputation. An equally famous case involved Le Corbusier's designs for the Palace of the League of Nations in Geneva, which, although they received no award, became, when published, a great example of this architect's work, admired in a way that the dull building actually constructed will never be.

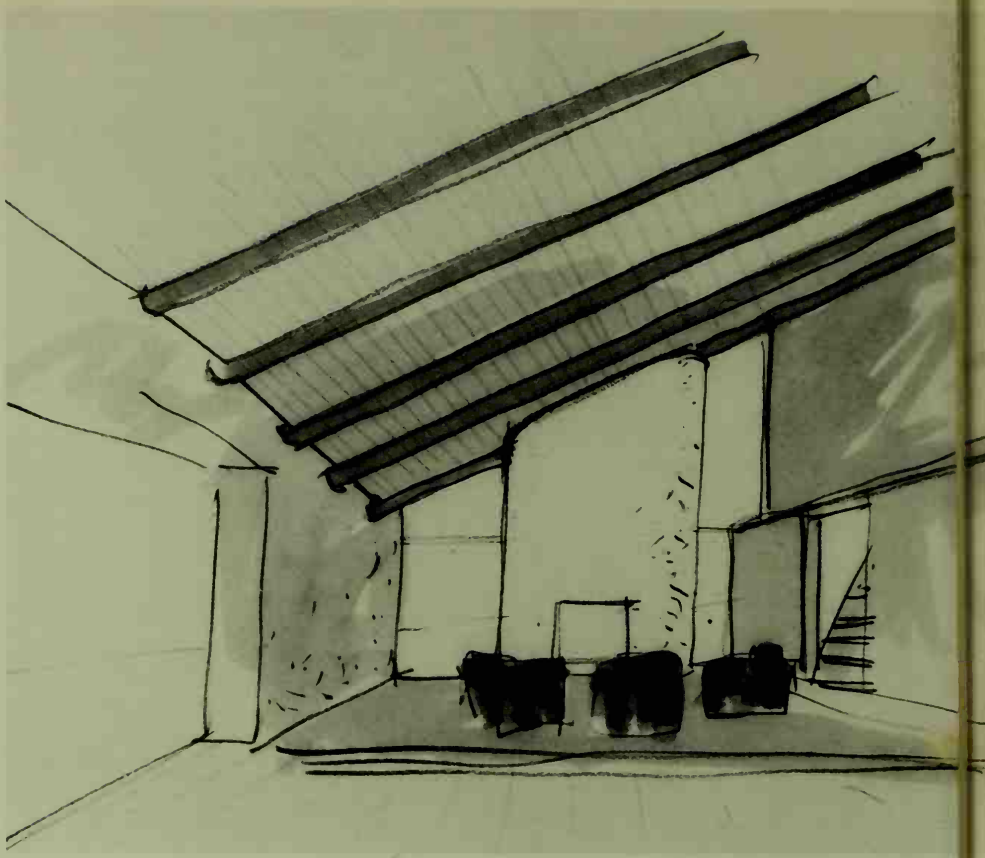
In 1925, Le Corbusier designed a more modest project, a house for a Mme. Meyer to be built in Paris. Although it also was destined never to be built, it has become well known through plans and the page of sketches (at left) that illustrated a letter in which Le Corbusier described his plans to his client. "This design," he wrote, "did not spring in a flash, between telephone calls, from the pencil of an office draftsman. It was slowly ripened, caressed, during days of perfect calm looking out over a great classical site." The sketches make up a kind of tour through the house, the letter providing accompanying commentary. Had the house been built, only the owners and a few visitors would have experienced its reality, but the drawings are known to every student of Le Corbusier's work and continue to interest and inform us now and in the future.

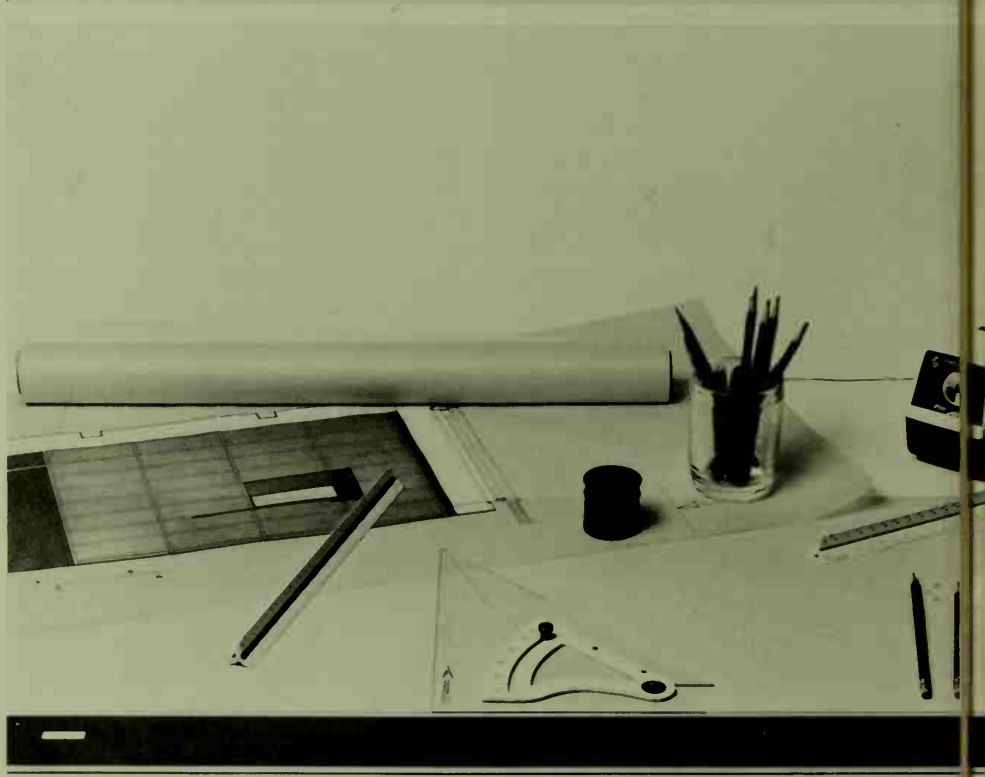
These sketches are examples of the way the simplest of techniques can serve, if the ideas expressed are strong, to convey an understanding of interior space. Mastery of various materials and tools makes it possible for the designer to go beyond the quick sketch into many kinds of drawing. These can serve to develop ideas, communicate ideas while development is still in progress, aid in making specific those details that convert a general concept into reality, and explain concept and realization to others. A client who must approve and prepare to pay for something that, until built, will be known only through drawings particularly needs these aids to understanding.

The drawings tools used by the designer, the subject of the next chapter of this book, are relatively few and generally simple. Yet they are to the beginner and to the experienced master alike a stimulus, a lure, a source of excitement inviting use and suggesting the ever-present possibility of creating on blank paper something totally new, never seen before, and, it is to be hoped, something exciting and beautiful. Frank Lloyd Wright in his autobiography talks about the never failing excitement of going to the board where a fresh and still untouched sheet of paper is waiting, picking up pencil and instruments, and starting the first strokes of a drawing that will quickly grow into a realization of what was before only a set of ideas, vague and invisible except in the mind.

Design is, like every art, in part a craft, and tools and materials are vital to each craft. The workbench and tools of the cabinetmaker, the camera, lenses, and tripod of the photographer, the instruments of music, each have

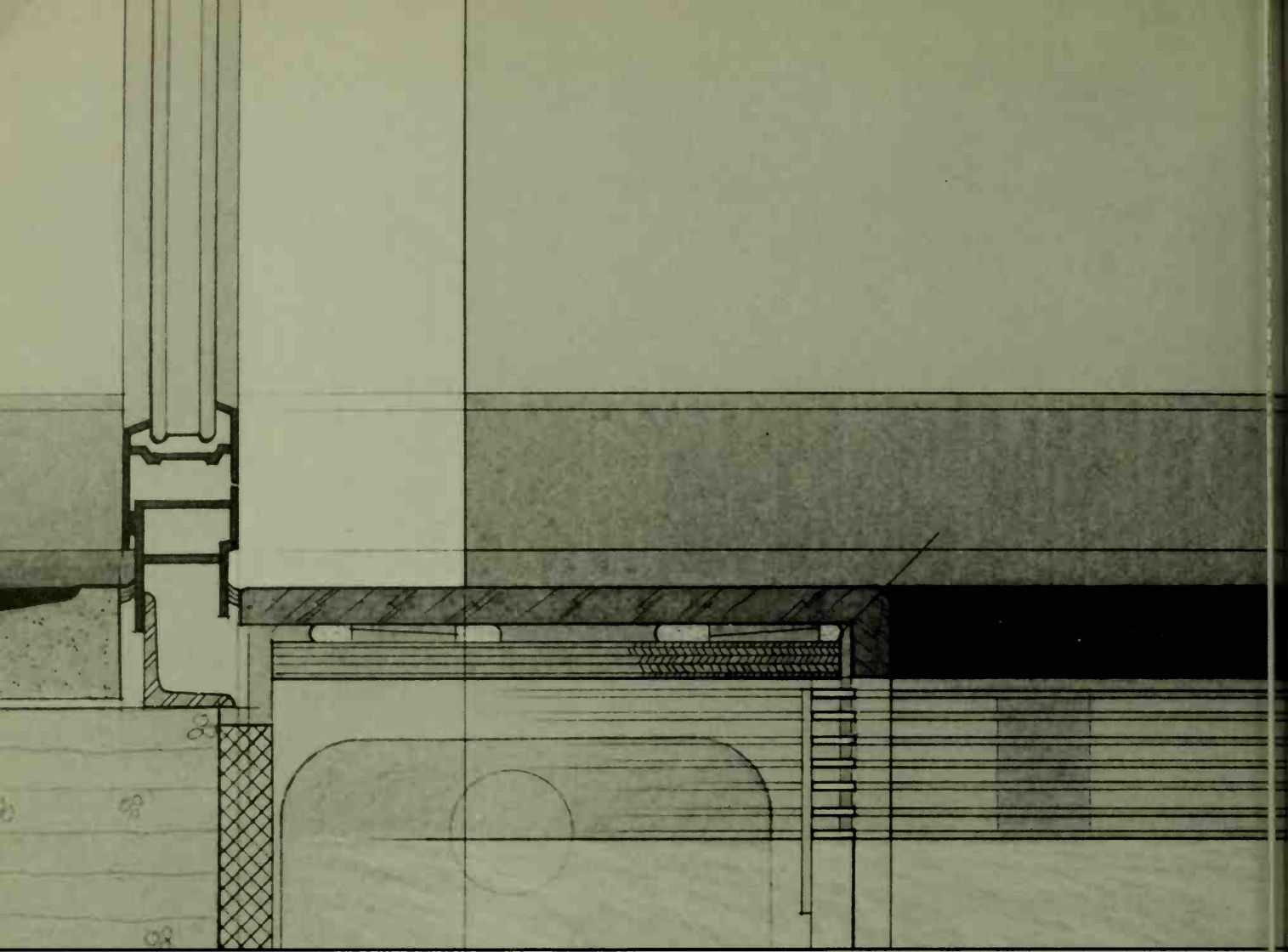
Le Corbusier's sketches illustrate his 1925 letter to a client, Madame M. . . . (From L'Architecture Vivante, 1927, author's collection)

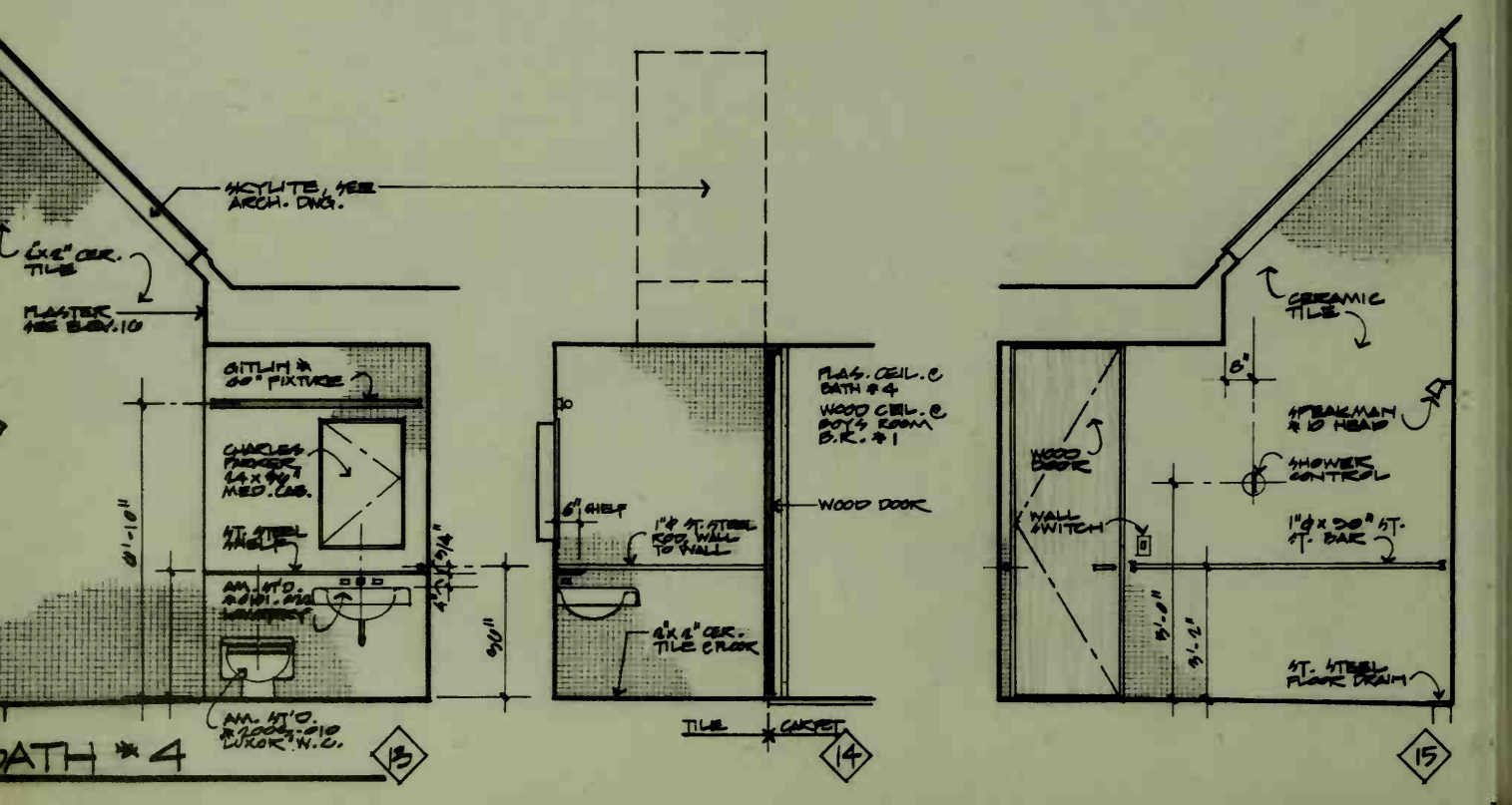




A quick concept sketch (top) pins down the idea of seating and fireplace. The tools of drafting (bottom), essential to all design work, are simple and basic.

Opposite page: In this presentation plan for a model apartment subtle color is used to articulate materials and textures and so convey the spirit of the finished space. (William Machado, Norman Diekman, designers)




SKYLITE, SEE ARCH. DWG.
6x6" CER. TILE
PLASTER SEE ELEV. 10
GITLIN # 20" FIXTURE
CHARLES FAUCET 4" x 4" MED. CAB.
4" ST. TOWEL RACK
AM. ST'D. # 101. 410 LAVATORY
AM. ST'D. # 2004-210 LUXOR W.C.
6'-10"
4'-2 1/4"
90"
BATH # 4
13
SKYLITE, SEE ARCH. DWG.
FLAS. CEIL. @ BATH # 4
WOOD CEIL. @ BOY'S ROOM B.R. # 1
6" SHELF
1" ø ST. STEEL ROD, WALL TO WALL
WOOD DOOR
4 1/2" x 4" CER. TILE FLOOR
TILE
CARPET
14
CERAMIC TILE
6"
4" SPEAKMAN # 10 HEAD
SHOWER CONTROL
WOOD DOOR
WALL SWITCH
1" ø x 30" ST. ST. BAR
8'-0"
8'-2"
4" ST. STEEL FLOOR DRAIN
15

an attractiveness of their own that makes them objects valued for their own sakes, even aside from the tasks they are intended to perform. People collect tools, cameras, and violins, even sometimes with no intention of putting them to use. The tools of design and drafting are not often collected with such zeal, perhaps because they are fairly few and simple, but they still have an almost magical power to suggest skill and professionalism. The roll of cream tracing paper, the big drawing board with triangles, scale, and drafting pencils laid out draw the beginner into the world of the established professional. One could draw on some other paper, measure with an ordinary ruler, and use an everyday pencil, but this would mean remaining an amateur, an outsider not yet aware of the craft aspects of the design professions.

Devotion to specialized tools is probably in part habit, in part the urge to develop a professional mystique that holds laypeople outside an invisible barrier beyond which the trained expert operates. The person in the street finds an architect's scale mysterious, has no idea what triangles are for, and is not likely to keep a roll of tracing paper at hand. As these tools and materials become familiar, it becomes clear that they are not simply emblems of a craft. They turn out rather to be accepted because they serve their purposes particularly well. One can work more easily, more quickly, and better with these materials and the techniques associated with them. Finally they become indispensible and central to the daily design practice.

In much the same way, the sorts of drawings that interior architectural design depends on range from the familiar and obvious to types that are, at least until explained, often mysterious and unintelligible to the layperson or beginning designer. An informal sketch is the most natural possible means for communicating design ideas, familiar to professional and layperson alike. The client who sees the upper image on page 16 is put in touch with the designer's ideas and is able to comment and, if things go well, to express support and enthusiasm for the project as it is developing. The color plan (on page 17) is a more complex type of drawing—not necessarily any more difficult to make than the simple sketch, but less familiar to the general public. Although an explanation in words is often required to help a client fully understand such a presentation plan, its precision and completeness can generate the confidence that leads to approval. Beyond this point, the designer must move onward into the world of detail: the more technical drawings that will control the specifics of construction, craftsmanship, and materials that will fill out the plan into three-dimensional built reality.

Every designer needs fluency in these different sorts of drawing: the sketch or "concept" drawing, the finished and detailed "presentation" drawing, and the detailed drawings that spell out instructions on what and how to build. Sketches may be plans, sections, elevations, perspectives, or details. Presentation drawings may be perspectives, plans, or both. Detail drawings can include plans, sections, and elevations. Still we recognize the three tiers of sketch, finished drawing, and detail. This book will explore with examples and in discussion these three tiers and the kinds of drawings that make up each level and so trace each step of the typical interior design project. In an active career, the designer may turn to specialists, to renderers and to draftsmen, for production of specialized drawings. Nevertheless, the ability to make such drawings and to make them well is part of the mastery of the designer's art.

The professions of design and architecture could hardly exist without the production of drawings. The drawings that are produced out of necessity can be, when made with skill and devotion, as much works of art as the built reality that they describe.

In this window sill detail (top), color and tone are used to define differing materials. Elevations (bottom) are typical of the many such drawings that become part of the complete drawing set necessary for construction.

1

MATERIALS, TOOLS, AND EQUIPMENT

"Enough, if something from our hands have power to live, and act, and serve the future hour."
(William Wordsworth)

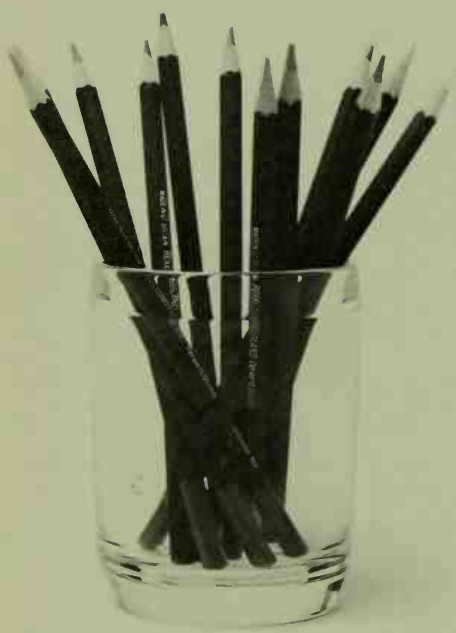
The equipment needed for making interior drawings is fairly simple, and most of it is likely to already be on hand at the desk or table of the professional or student currently involved in the fields of architecture and interior design. The matter could even be pushed aside with the statement that *any* tools and materials that give the desired results will serve, but this hardly aids the beginner who may need advice on what to collect and what not to use. The suggestions here represent years of experience in finding what is most useful and what can best be avoided. This chapter is not intended to be a consumer guide based on comparison testing; therefore brand names and catalog numbers are only given in cases where a particular product has been found to be outstanding. New products appear constantly, and some people may have old favorites that they will prefer to whatever is mentioned here. Every designer will eventually arrive at a personal and individual roster of tools and materials to suit his or her ways of working. Doing this involves experimentation, beginning with a few basics and branching out to add additional items as needed.

The cost of assembling the basics is happily small, and people living and working where art and drafting supply stores are at hand can add items as needed. Many larger dealers in major cities issue excellent catalogs so that mail order purchase can also be quite convenient, but it does require some advance planning to make sure to have on hand whatever items may be needed while a project is under way.

In deciding what to buy, it usually turns out to be wise to select top quality products. The consumable materials—pencils, papers, erasers, etc.—are not very costly in the modest quantities that any one person can use, while the tools needed—scales, instruments, and the like—are few and will, in most cases, last a lifetime. It is easiest to economize by simply not purchasing some elaborate equipment that is highly attractive in the shop, but which is rarely needed. In comparison with many other fields (photography, for example, or woodworking), interior design will make little demand on the budget, so it is easy to form a habit of buying the best whenever possible.

The basic tool of all drawing is, of course, the human hand, and artificial tools exist to make the hand capable of creating lasting marks and to aid it in doing so. Observing, even studying one's own and others' hands as they open, grasp, lift, and manipulate objects may be helpful in developing a sense of the way in which tools extend the function of the hand and make it capable of producing the drawings that are the vital communicative language of design. It is important to note that the term "hand" has come by extension to mean something beyond the actual physical part of the body. A heavy hand or a delicate one describes a style of drawing or even a style of behavior. Drawing with a heavy hand involves habits of muscular use and attitudes of mind as well. Most beginners draw lightly in a way that conveys uncertainty and timidity. Tools and materials can be selected to accommodate and encourage the heavier hand that comes with, and is expressive of, experience and confidence.

On the following pages are detailed suggestions dealing with consumable materials and tools (pencils, erasers and shields, pens, and papers), with more lasting tools (straightedges, scales, triangles, and instruments) next, and finally with the larger items of equipment that approach and include furniture, such as drafting tables.



Pencils, in great variety, are the most basic of designers' tools.

PENCILS

Of all drawing implements, pencils are the most used and probably most useful. Convenience, easy availability, economy, and familiarity reaching back to preschool and school age plus experience are all in the pencil's favor, but it is also one of the most satisfactory of all drawing tools. It is available in great variety, offers a directness in extending the use of the hand that leads to wonderful expressivity, and has also, in most of its forms, the extra feature of easy erasability. Pencils are the dominant drawing tool used for most professional design work, and it is possible to work effectively using this medium alone.

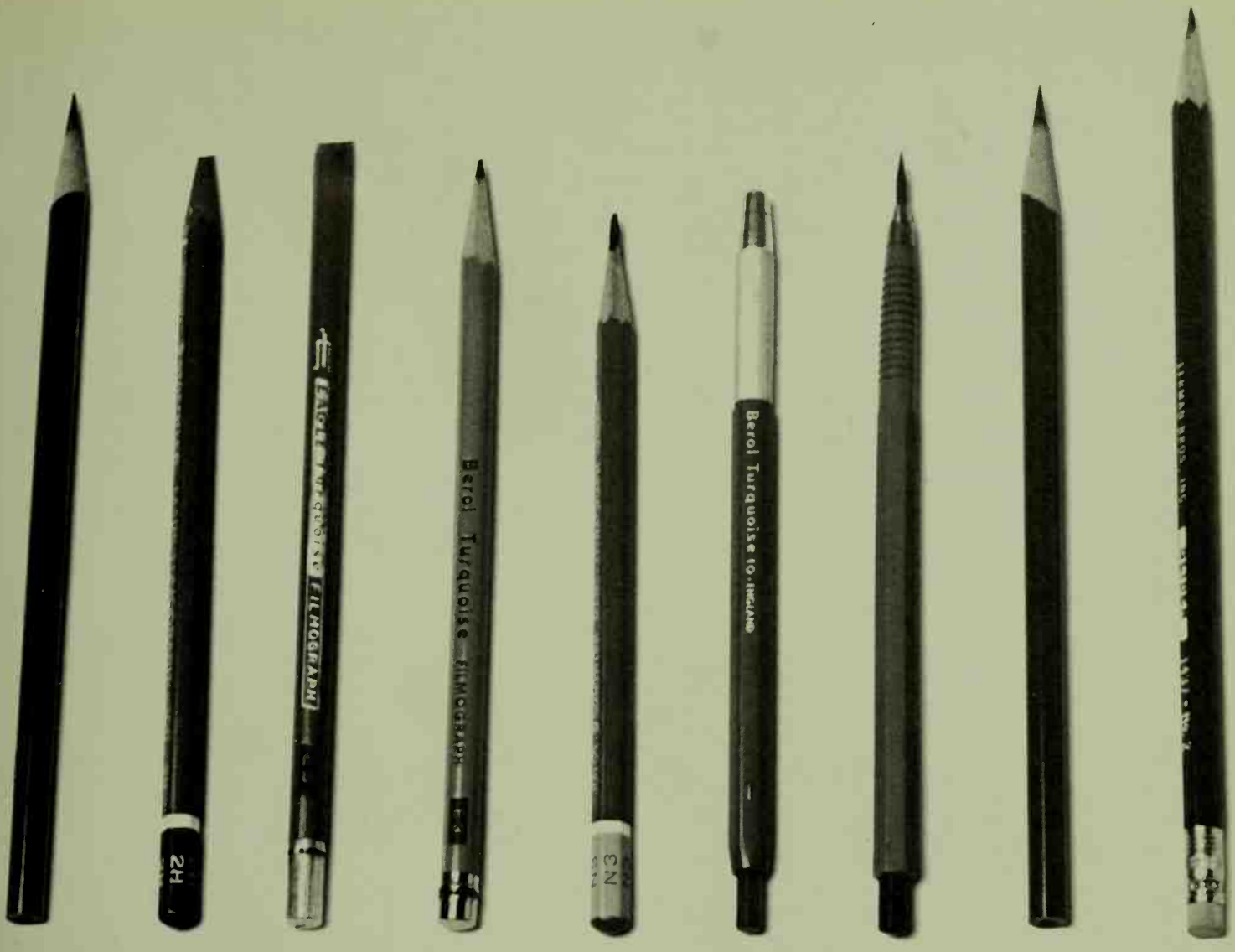
Many of the ordinary pencils to be found in any stationery or variety shop are quite useful in design drawing, but some are of poor quality (gritty or too easily broken) and a high proportion of those in everyday use are too hard. Pencil lead is called "hard" when it makes a pale mark, even with heavy pressure, and "soft" when it makes a strong, black mark. Hard pencils do not break easily and their line does not smear. They are often chosen for general use for these reasons, but for most uses in design and the arts, softer pencils are best. A soft pencil can make a pale, fine, delicate line when well sharpened and used lightly, but it also can make a strong and even a broad line as well. This gives a range of expressivity that is vital to creative drawing.

Pencils specially made for art and drafting use are produced in grades marked on the pencil with letter designations. H stands for hard, B for soft ("black"), while HB and F indicate medium softness. Hard pencils are made in grades from 9H (hardly able to make a visible mark) down to H. F and HB follow in order of softness, with grades B to 6B indicating successive steps of softness. In general, grades harder than H are useless except for special purposes. The very soft grades are hard to keep sharp and break easily, so they are usually reserved for sketching or places where a thick, heavy line or tone is needed. They are far more useful than the harder grades, however. A starting stock might include several (even a dozen) each of H, F, HB, and B grades. One or two 2Bs, 4Bs, and 6Bs should also be at hand. Well-known brands include K and E, Dietzgen, Staedtler-Mars, and Eagle; the last maker's Turquoise pencil (the lead is black; only the exterior is painted that shade of blue) seems to be a special favorite with many professionals.

Other black pencils can include regular general use types, with hardness shown by number. No. 2 is the hardest grade that is useful—Eberhard Faber Mongol no. 2 (catalog no. 482) is an excellent choice, as is Lerman Glider no. 2 (catalog no. 1437). Another specially useful pencil is the Eagle Chemi-Sealed Draughting pencil no. 314. Despite its name, this is not a drafting pencil, but a thick, soft-lead type, ideal for sketching and also able to take a good point for drawing with a strong, black line.

Colored pencils are available in great variety; however, many are too hard or of poor color for design use. Eagle Prismacolor brand is a good choice for serious use. Sixty colors are available, but a few strong colors will often be all that are needed—true primary colors, perhaps a few neutrals, and a supply of white for use on yellow tracing and colored papers. Other useful colored pencils include the Stabilo brand, Venus Col-Erase (erasable, as the name implies), and a nonreproducible blue with thin lead, such as the Eagle Verithin no. 761½ for layout lines that will not show up in print. Eagle no. 748, which is red at one end and blue at the other, can also be convenient. Chalk-based or pastel-type colored pencils come in ranges of excellent color, but they are hard to sharpen, they break easily, and their line smears at the least touch so that they are of only occasional use in design work.

Pencils require, of course, the inconvenience of constant sharpening. Sharpening with a sharp knife and shaping the lead point on a block of sandpaper are traditional methods, now largely displaced by the use of modern pencil sharpeners (discussed



Even black lead pencils exist in surprising variety.

below) in both manual and motor-powered versions. However, maintaining a sharp point is also partly a matter of technique. While drawing a line, rolling or rotating the pencil while moving it helps keep the point sharp and the line width constant—particularly helpful when using softer pencils.

Another way to avoid sharpening is by using the device called a "drafting lead-holder." This is a version of the automatic pencil in which special leads (in the same grades and from the same makers as quality pencils) are held in a permanent metal holder. The lead is pointed on sandpaper, on regular paper, or in a special device made for the purpose. Some like the convenience of the constantly feeding lead; others prefer the special feel of the conventional wood pencil. Designers tend to join the latter group.

Special leads are available in both pencil and lead-holder forms for drawing on the new plastic films that are replacing paper for many technical uses. These leads can also be used on paper and have a special feel—usually not particularly liked. Any number of other special purpose pencils are available: waxy china-markers, charcoal-like graphite pencils, Conté crayon leads—all useful in special situations, but hardly needed in everyday practice.

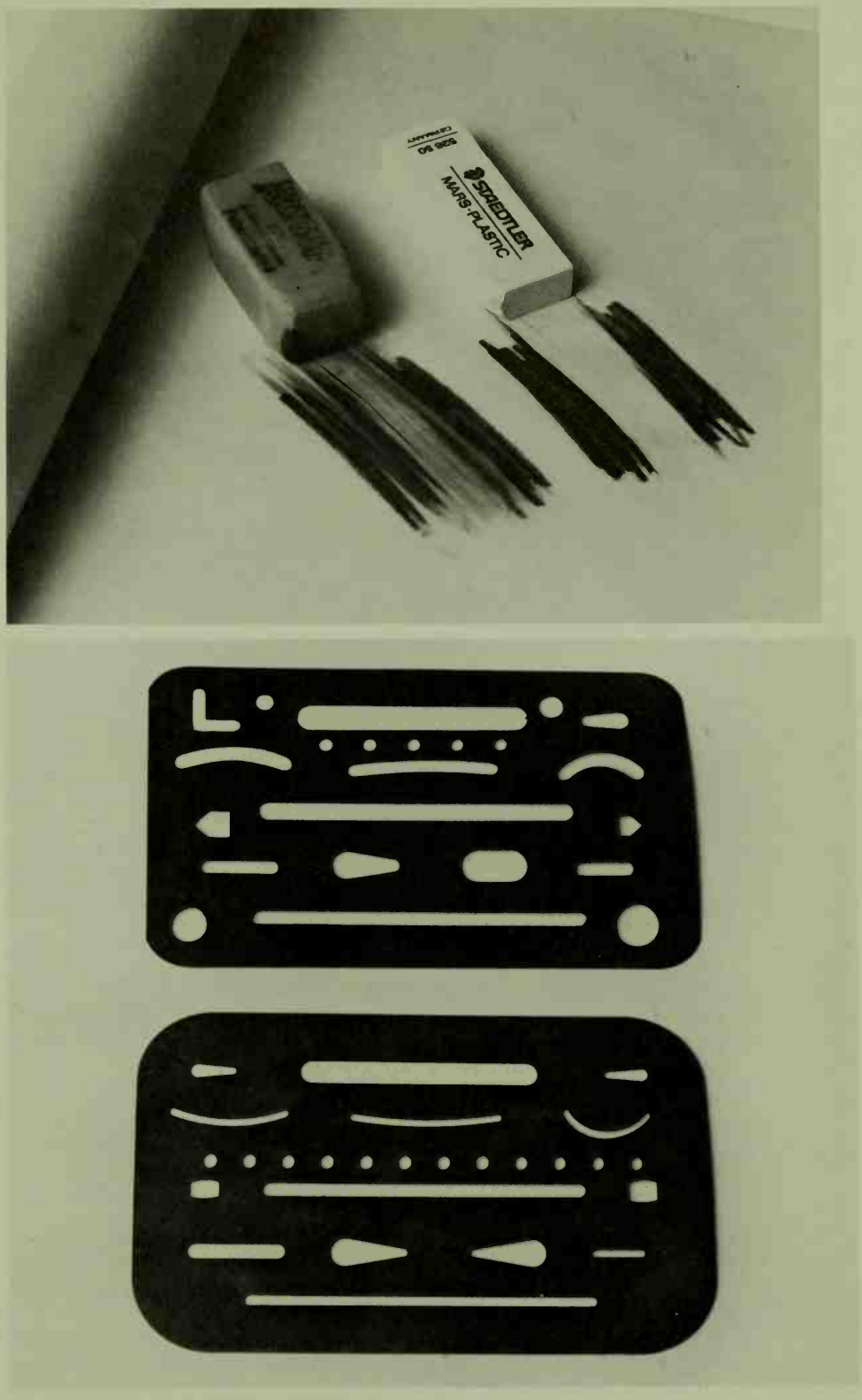
Colored pencils are still more various.

ERASERS AND SHIELDS

Since erasability is one of the key advantages of the pencil as a drawing tool, the eraser becomes a tool of almost equal usefulness. The ordinary eraser mounted on the opposite end of many pencils is convenient and useful when it is fresh. However, it wears away quickly and often becomes hard, making ugly smears or even tearing paper. Therefore, serious work demands good, separate erasers. Old favorites are such red rubber erasers as those with tradenames Ruby and Pink Pearl. These harden with age and can then cause smears. Make a point of throwing out smeary erasers as soon as discovered, before they have a chance to do damage by smearing or tearing paper.

Happily, a new type of eraser made from a plastic may soon replace all rubber erasers. Staedtler Mars no. 526 50 is an excellent eraser of this type and should be on every drafting table. It not only does not smear, but slides over even the most delicate papers without any tendency to catch or cause wrinkles or tears. The kind of eraser called "Art-Gum" is occasionally useful for cleaning up a paper surface, and the crumbs it makes, if left on a drawing, will reduce the tendency of smears to appear as instruments move over the paper.

Electrically powered erasers are used in some drafting rooms, but their cost and bulk make them questionable for most design drawing. The eraser shield, on the other hand, is small, cheap, and extremely useful. It is a small slip of metal or plastic with a variety of holes cut through it in various sizes and shapes so that erasure of small details and control of erasure up to a particular point is made easy. The transparency of a plastic shield can be convenient, but metal shields last better and are not so easy to lose in desk-top clutter. Select one with small holes, and it will be less likely to bend or kink.



New Mylar erasers offer better cleaning than the traditional gum or rubber types. Erasers (top), when used as a drafting tool, need better area control that can be gained by using an erasing shield (bottom).

PENS

Pen and ink drawing conveys a sense of precision and authority and has a special character that has made it a favorite medium for architectural representation. It also presents certain problems that often discourage its use unless the sharp contrast of black ink on white paper is really needed—for printed reproduction, for example, where ink line will show up more clearly than more subtle tones. Because ink is difficult—almost impossible to erase—ink drawing calls for a high level of skill, a skill that was the pride of every good draftsman in the past and that is still cultivated in Europe. Avoiding ink is a way to protect against awkward slips, blots, and spills, but mastering the pen is a challenge that invites effort.

In recent years the appearance of a new breed of pens that are not refilled, but simply thrown away when dry has made ink drawing simple and eliminated the need to invest in special drawing pens except for special purposes. Disposable pens are of two main types: ballpoints and felt-tips.

The ballpoint pen tends to produce a rather unreliable line, all too consistent in thickness but erratic in starting and sometimes inclined to skips and smears. It is not particularly recommended, although it may serve for sketching when no other pen is available. Only black ballpoints are worth considering; brand names Pentel and Quicksilver Flair identify some of the best presently in production. A positive photostat of a ballpoint sketch will often reproduce quite well, with the stat appearing superior to the original sketch.

Pens (above) and markers (opposite page) are now usually disposable felt-tips that require no filling or cleaning.

Felt-tip pens have become very popular with designers and are often used for serious work. A great variety are available, and new types seem to appear constantly. The best felt-tips produce a strong, black line hard to distinguish from conventional ink and make it possible to vary line width to some degree. The felt point itself determines how the pen will act and feel. Pens with a fine tip are usually most useful, but the tip will wear with use, leading to a gradually broader line. This problem can be turned to advantage if a few used pens are kept at hand that have worn to successive line widths. Three pens that are new for fine line, partly worn for medium line, and well worn for a broader line will make a very useful group. The Flair pen with fine tip is a good choice for this. The Flair Hardhead, however, has a special stiff point that wears more slowly. It is an excellent pen for shading and background sketching.

The Ultrafine Flair produces a lovely, delicate line and can be used with a template for circles. In red, it is useful on working drawings and on yellow trace drawings for such things as plumb lines or center lines.

There is a Pentel felt-tip which delivers good line quality with a plastic tip that gives somewhat more the feel of a ballpoint. The Pilot pen, particularly the type called "Razor Point," is also popular for design drawings in fine line—for delicate sketching, for example. There is an element of personal preference in choosing among these varieties, and since all are inexpensive, it is easy to experiment to find the types best suited to an individual way of working.

A close relative of the felt-tip pen is the pen with a broad felt end usually called a "marker." These come with various widths and shapes of tips and in a great range of colors. They have

become very popular for colored renderings and have generated a whole new special technique. The ease with which they lay in color tone can be a temptation to crude and garish use of color, but, when used in a very limited and careful way, they can provide color tone conveniently with good results. It is usually best to avoid the stronger colors and to choose a few delicate and neutral tones that relate well to each other.

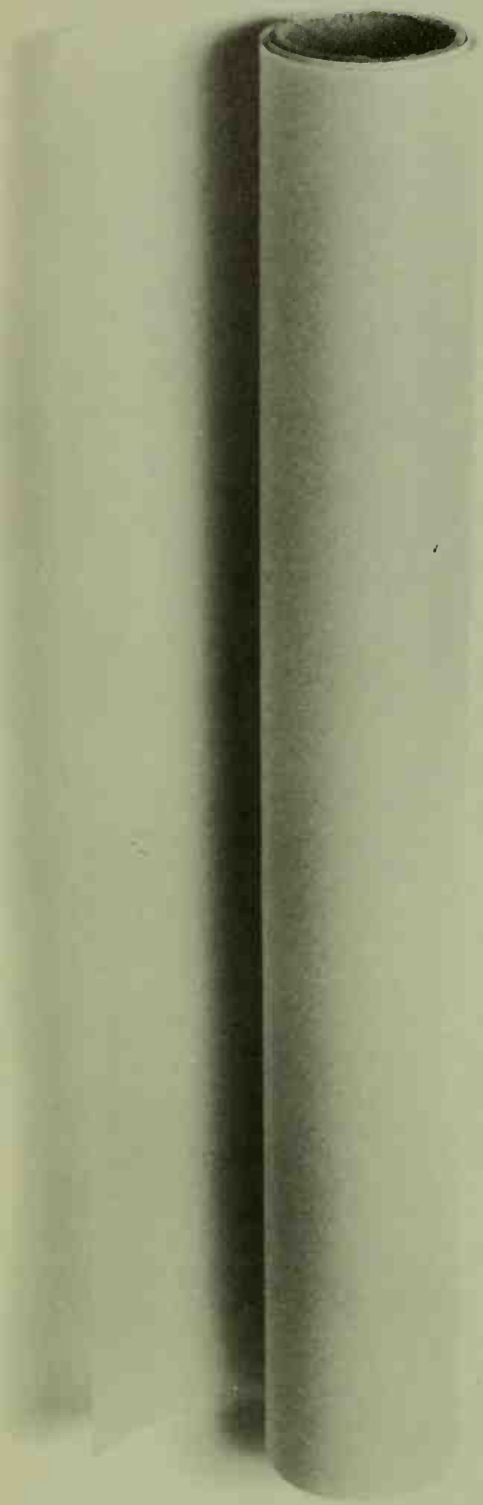
Conventional pens that require ink from a bottle are less used today than in the past, but survive in spite of the popularity of throwaways and remain useful for special purposes. Pens of the type used for writing have the advantage of giving varied line widths of the sort characteristic of handwriting and calligraphy. The width and stiffness of the point must be chosen to suit the user's style and intentions. Steel pens in a holder (often called "crow-quill" pens) are the simplest and least expensive form of conventional pen, but they present the problem of refilling by constantly having to be dipped in a bottle or inkwell. The fountain pen with an internal ink supply is more convenient, can be carried anywhere, and may double as a writing implement. Well-known brands for design use include Osmiroid and Montblanc, the latter in its more luxurious versions serving as a status symbol as well. Writing inks are usually watery and blue in color; black inks tend to clog fountain pens, although some special inks claim to reduce this problem.

The technical pen is a modern derivative of the writing fountain pen. It uses a tubular point to produce a line of precise and consistent thickness—one must change pens (or at least change points) for each line weight to be used. Such pens are usually sold in sets of many line weights; adaptors are available to hold the point at an angle more natural for sketching than the upright position used in drafting. Well-known brands include Koh-i-noor Rapidograph and Rapidometric, Castell TG and TGH, and Montblanc. These pens are particularly suitable to making precision engineering and other technical drawings.

Designers are often tempted to invest in the attractive and expensive sets of technical pens that always look appealing in the shop, but in practice the inconveniences of filling and cleaning, changing line width, and coaxing the finer line pens to start (they clog with particular ease) are often discouraging. Try out one or two technical pens experimentally before investing in a set. In most cases designers will not require technical pens.

A pen that was usual for ink drafting before the development of the technical fountain pen uses two blades to hold a small amount of ink that flows onto paper to make lines whose width is adjusted by turning a small screw. This is the type of ruling pen usually included in sets of drafting instruments. It is also available alone at a very modest price and can do anything that a set of technical pens can do. It will serve very well for occasional use, although it takes some practice to learn how to fill it with quill or dropper and how to control its line to avoid blots and spills.

All conventional pens require ink, of course, available in fine, dense black, as well as in a range of colors. Pelikan and Higgins are favorite brands in waterproof types that will not run once thoroughly dry. A useful companion to ink is a bottle of white opaquing fluid that can be used to white out the inevitable minor slips.



The roll of cream tracing paper is another basic item for designers to keep at hand.

PAPERS

There are innumerable types of paper, perhaps thousands that might be used by artists and designers. Only a few basic types will be discussed here. Each paper has a characteristic degree of opacity or transparency, a particular porosity, and a special surface or "tooth" affecting the way pencil, pen, or other medium will react with it. Since design work consumes paper in quantity, cost is an important issue, and it may be disturbing to discover that most papers of moderate price have poor lasting qualities.

Ordinary paper is made from wood pulp, and acids left in the paper during manufacturing gradually attack the paper fibers, causing them to turn yellow or brown, to crack and crumble, and, eventually, to disintegrate. One hundred percent rag fiber-based paper has a long life—hundreds of years with care—and is usually of fine quality, but it is very expensive and so usually used only for special purposes.

Beginners are often surprised to discover that almost all design work is done on thin paper with good transparency, usually called "tracing paper." This is because this paper makes it possible to work over a previous drawing, elaborating on it or using it as a reference, and because drawing on tracing paper makes quick and inexpensive reproduction possible by the processes usually called "blueprinting" (although the familiar white line on blue print has now been almost totally supersceded by other print types that give a blue, brown, or black line on white paper).

Drawings on opaque paper can be reproduced by the more expensive processes of photostating or photography and by the ubiquitous copy machines led by the well-known Xerox. Most copy machines can only deal with small formats and have not, at least as yet, supplanted blueprint processes in the design world.

A review of a few of the most used paper types includes the following:

Found papers. In this category are napkins, placemats, or used envelopes in white or pale colors. This might seem a frivolous listing, but it deserves consideration because they are so often the media for the quick idea sketch produced, as often as not, at a luncheon meeting with a client where a napkin or mat may be the only paper to be had. Its blotting-paper quality reacts with ink or felt-tip pen in ways that can produce highly expressive images. Very soft pencil will work on this fragile paper too. Similar results can be had with Japanese rice papers if larger sizes and less informal format are called for.

Newsprint paper. Available in pads of various sizes, it is less absorbent than napkin paper, but still has some of the blotting-paper characteristics that make pen and marker lines bleed into it in a way that can be used for controlled effects in sketching and rough drafting. Newsprint is, of course, a low-grade paper that tears easily and has poor survival prospects, but its very transitory nature may sometimes encourage a freedom in its use that a better paper might discourage.

Brown wrapping. The sort that is usually sold in rolls for package wrapping is a very useful medium for design drawing. Because it is cheap and comes in big rolls of good width (typically, 36 inches), it has been a traditionally favorite medium for full-size drawings of architectural details and of furniture. The brown color makes it possible to use white or other light colors along with black pencil, charcoal, or marker to produce strong images at big scale. Various weights are available, but a sturdy weight is best and will, if a sizable roll is on hand, also serve for package wrapping as needed!

Sketchbook papers. Various weights and qualities are available in pads and bound books (often spiral bound). These are actually lower grade watercolor or drawing papers with various surfaces that are appropriate for pencil, pen, ink, and market sketching and drawing. These papers come in various sizes and are convenient and

appealing as take-along materials when traveling or simply away from office or studio.

Yellow trace paper. The familiar tracing paper with a strong yellow tint and its close relative, cream trace, with a slightly paler color tint are the most basic of materials for interior (and indeed all architectural) drawing. Available in fat rolls in various lengths, they are economical, highly transparent, making tracing from a lower sheet easy, and are responsive to most drawing media.

The thinness of these papers makes them fairly fragile, and harder pencils will tend to dig in and tear them, but softer pencils, colored pencils, pens, and markers work well on yellow trace and make it the favorite material for preliminary sketches and studies. Drawings on yellow trace turn out so well that it is often used, carefully stretched and mounted, for more formal presentation drawings for which it was, in reality, never intended.

No design work can proceed without a roll or two of yellow trace at hand. It is probably the most useful of all materials in design practice.

White tracing paper. Good quality tracing paper is the material most used for more finished architectural drawings including working drawings. The best white tracing paper has good transparency, but is tough enough to withstand erasures, to show pencil lines with good contrast, and to make good prints when required. Different manufacturers and shops offer such paper under various brand names. It is a good idea to experiment to discover a favorite type and then stick to that type so that its particular qualities will become familiar and can be exploited to maximum degree.

Such paper is available in pads, in sheets cut to standard sizes, with or without printed borders and title blocks, or in plain rolls. It is in the last format that it is usually kept at hand as the standard material for more careful and finished drawings, particularly for drawings that are to be printed, possibly time after time. Notice that vellum

Sketch books supply good quality papers in a convenient range of sizes and formats.

tracing paper, similar at a glance, is quite a different material. It has a different surface—smoother and with less tooth—more transparency, and, unfortunately, a rather brittle structure that creases badly and may even crack or tear along fold lines. It is a special purpose material, not to be confused with the basic white tracing papers available in several weights (thicknesses) and in rolls of widths of 30, 36, and 42 inches. K. and E. Albanene is a favorite example of quality white tracing paper.

High-quality papers. In most cases 100 percent rag content, high-quality papers are made for various uses in the art and design fields. They are generally quite expensive and come in individual sheets, sometimes made up in pads, books, or blocks with a stiff backing behind a stack of individual sheets. Such papers are usually called "charcoal paper," "watercolor paper," "calligraphic paper," or some other name that suggests a use, but there is no reason not to experiment with other uses beyond those suggested by the name.

Many quality papers are imported, and makers with names such as Arches, Fabriano, Sennelier, Strathmore, and Whatman are associated with high-quality papers. Charcoal and pastel papers have a marked tooth and are made in a range of colors that show up light color pencil or pastel effectively. Watercolor papers have a textured surface that ranges from fairly smooth to quite rough and are of a quality to withstand the wetness of watercolor painting without hopeless wrinkling. Strathmore produces a range of illustration board from a #1 (1-ply) to #6 (6-ply) weight. The 1-ply board is almost a heavy paper, while the increasing numbers of ply indicate heavier materials, cardboardlike but with a paper surface suitable for fine drawings. While 1- to 3-ply board tends to be somewhat sensitive to humidity, 4- and 5-ply weights are best for presentation drawings that must hold up under all conditions.

While not strictly a paper, Mylar plastic film should be mentioned since it is used increasingly as the material for technical and engineering drawing. Mylar is very durable and stable and makes excellent prints. Its surface has a different feel from paper, and special pencils and leads are made to be used with it. Conventional paper is still usually preferred for most design and presentation drawings, but it may be interesting to experiment with Mylar to discover its special characteristics and consider where it might best be used.

Mylar is particularly suitable for use in the plotters involved in computer-aided drafting (discussed in Chapter 9). In these devices, technical pens are mechanically operated to make drawings in response to computer commands. The need for total consistency and freedom from clogging of ink in these high-speed devices makes the fibrous surface of paper problematic, while the slick surface of Mylar is ideal.

TOOLS

The drawing tools that are not consumed with use include a small number of essentials and a long list of optional items that may be convenient for special purposes, but that can be done without in normal practice. A review of the most used items follows.

Straightedges. All mechanical (as distinguished from freehand) drawing requires some means of producing exactly straight and, when required, exactly parallel lines. The traditional tool for this purpose is a T-square, a straight rule with a head set at right angles (giving the object its name) that runs along the edge of a drawing board or table. T-squares are made in lengths to suit boards of various sizes—those 36 and 42 inches are most useful. They may be plain or with transparent edges, the latter helpful when spacing lines by eye. T-squares are also made with adjustable heads to aid in drawing parallel lines at an angle, but in most uses a fixed head that is absolutely sturdy and immovable will be most satisfactory. Using a T-square involves some development of simple techniques, with one hand (usually the left) moving the head into position and holding it in place while the right hand holds down the rule and draws along it at the same time.

The inexpensive, portable, and traditional T-square has been, in modern practice, largely supplanted by the parallel rule, a straightedge controlled by cords at each side which run over wheels attached to the drawing board in a way that keeps the rule always in line. Parallel rules are somewhat easier to use since they do not require a hand to steady a head as with a T-square, but they are fixed to a particular board and are comparatively costly.

An even more highly developed technological tool for parallel line drafting is the drafting machine, a device holding straightedges (one vertical and one horizontal in normal setting) in line with a pantograph-like system of arms. A drafting machine is fixed to the board on which it is used and has a dimensional reach to suit. It is very convenient but very expensive—normal for concentrated engineering drafting, hardly needed for most design drawing.

In addition to the drafting straightedge, it is convenient to have a separate steel straightedge to use for cutting (never to be done with the drafting edge since nicks will inevitably occur) and as an extra edge in certain situations, for example, perspective drawing.

Scales and measuring tools. Architectural plans, elevations, and sections are always drawn to scale, that is, with all dimensions a particular fractional part of their real (full-size) dimensions. The tool that makes this possible is a special ruler called a "scale," which carries, in addition to an ordinary scale of inches, other markings that represent feet and inches reduced in a consistent proportion to one of the usual scales used for architectural drawing. To work at a scale of ¼" = 1', for example, one uses the markings indicated by ¼ at the right-hand end. Along this edge, quarter-inch spaces are marked off by 0, 2, 4, etc., to represent those numbers of feet, while the first space at

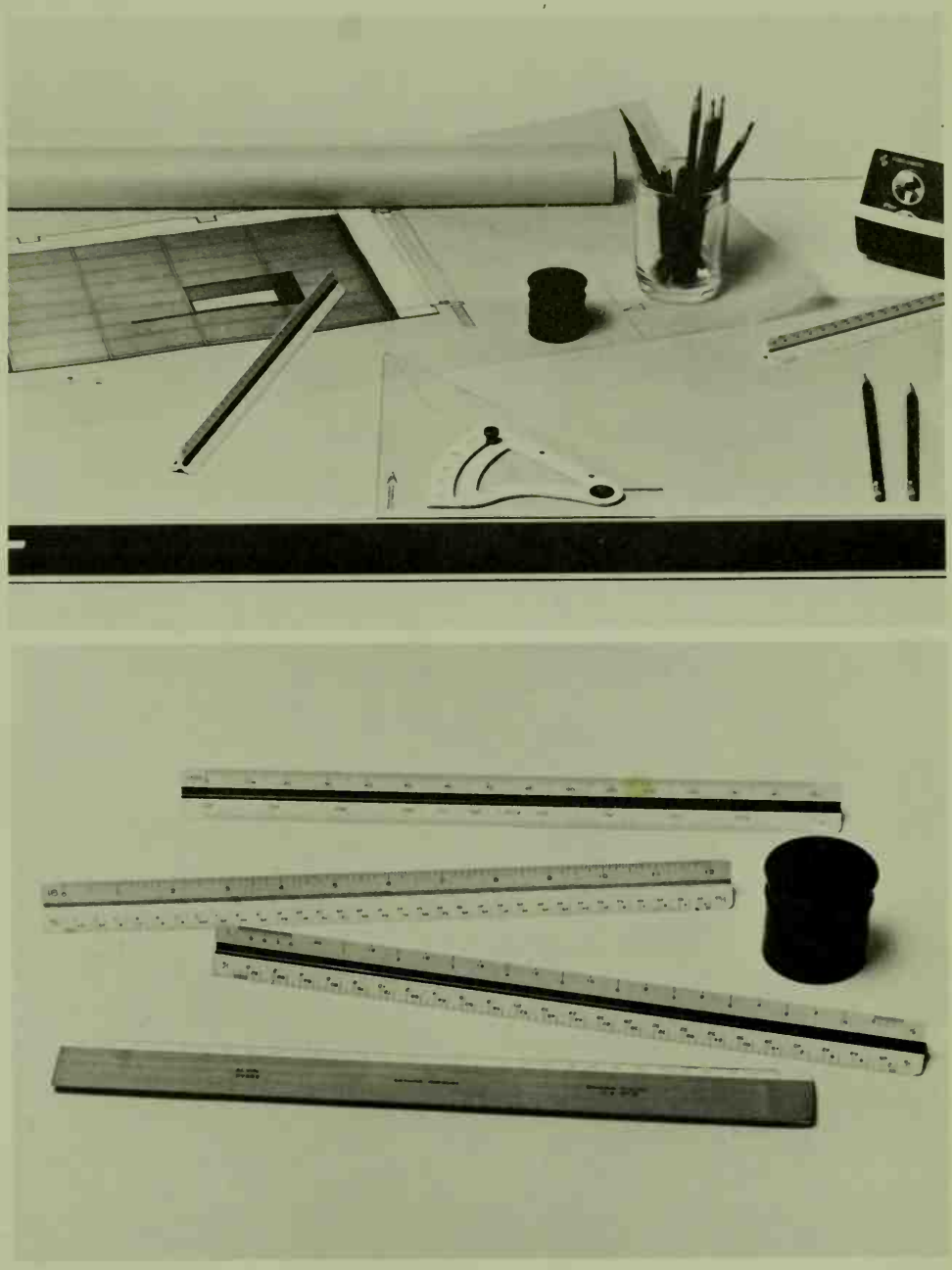
the right, before the 0 mark, is divided into twelve parts to represent inches at scale. To measure 7 feet, 4 inches, start from the mark between 6 and 8 (indicating 7) and draw to the right to the fourth inch mark representing 4 inches. The same scale will be found to have similar markings beginning at the left for the scale of ⅛" = 1'.

The most used scale is a triangular plastic rule with its six edges carrying ten different much used scales plus, on the sixth edge, a regular 12-inch rule. The type of scale needed for interior design work is called an "architect's scale" and carries the scales ⅛, ¼, ½, 1, 3/32, 3/16, ⅜, ¾, 1½, and 3 inches equal 1 foot, as well as the full-size rule (marked 16). A similar scale called an "engineer's scale" is divided into decimals, such as tenths, twentieths, thirtieths of an inch, etc., used in engineering work. It is not used for architectural drafting.

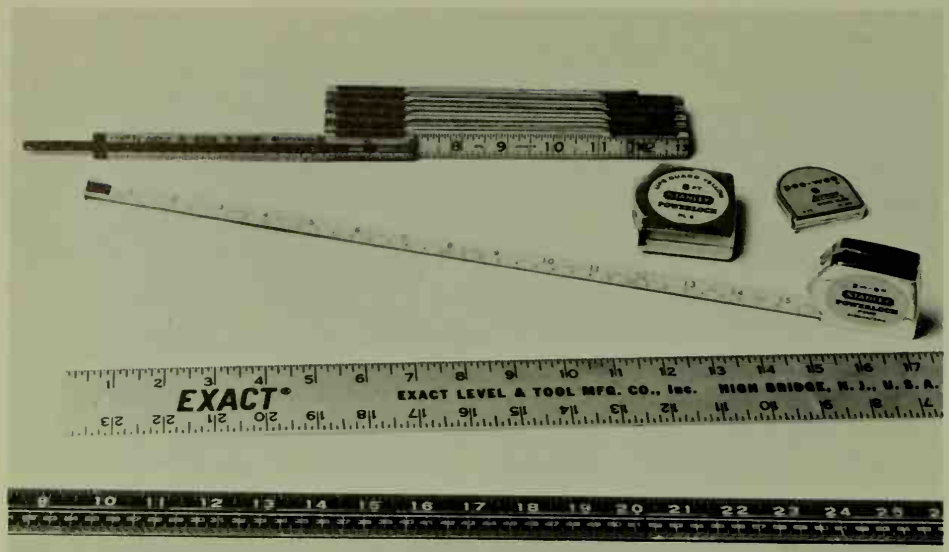
In most countries around the world the metric system is in use rather than the English system of feet and inches. The United States may change over to the metric system sometime in the future, but for work abroad, metric scales are in use now in some situations. The metric scale makes a particular metric unit (a centimeter, for example) represent a meter, and units are divided into ten parts rather than the twelve inches of the English system. At present, the designer must become accustomed to working with feet, inches, and fractions of inches used in customary architect's scale proportions.

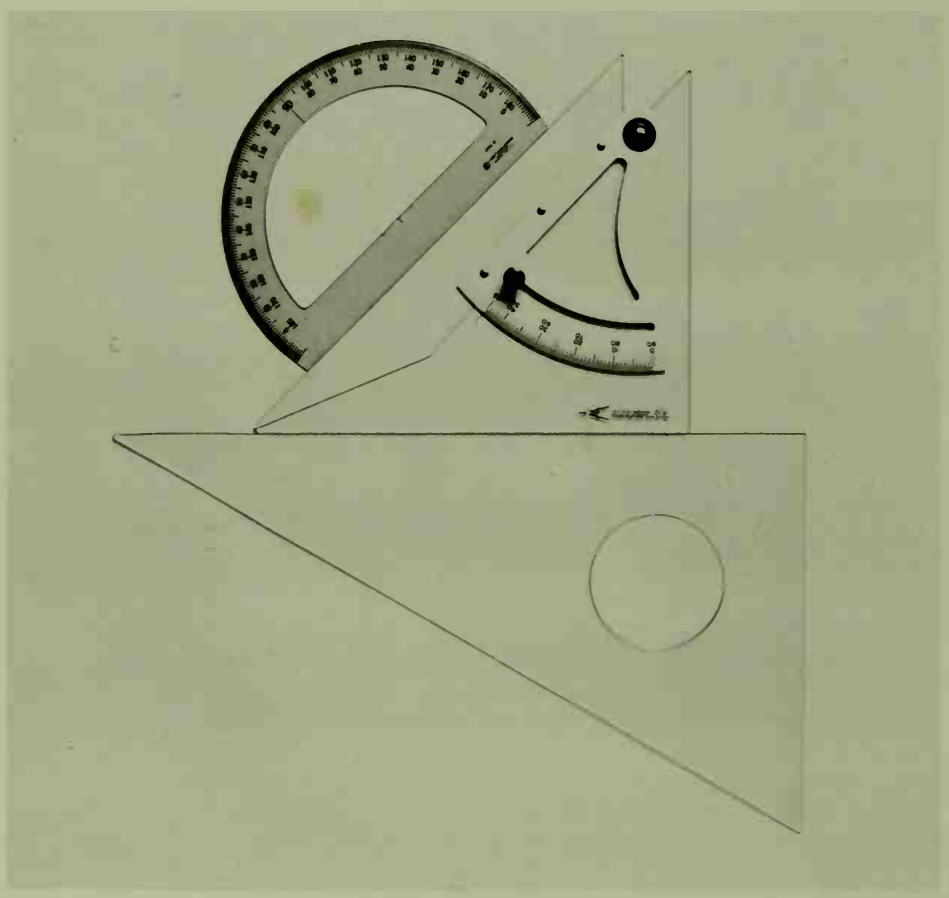
In addition to the triangular scale, scales are available in a flat ruler form with only one or several scales. A six-inch long flat scale is often convenient to carry in a pocket for use away from the drafting table. Other useful measuring tools are a yardstick for observing real dimensions and rough sizing of paper, mats, etc., and a carpenter's folding foot rule of the sort available in hardware stores. The latter is essential for measuring existing spaces, and investing in a good quality folding rule will make such tasks easier. A pocket steel tape is also often handy for taking full-size measurements, while a 100-foot tape may be a convenience when measuring large spaces, particularly if a helper is available. The last is fairly costly item, and purchase can be delayed until there is a specific need.

It is not good practice to use the edge of a scale to draw along; the edge may not be smooth enough and will quickly become dirty and worn if used this way. Dimensions should be marked off along the scale, but lines drawn along the drafting straightedge or along the edge of triangles.



The parallel straightedge drafting rule (top) has largely replaced the traditional T-square. A variety of measuring scales and rules (bottom) each have special functions.





Rulers and tapes (top) are needed for measuring existing conditions on the job. Triangles (bottom) establish lines at true perpendicular to the horizontal straightedge. Protractors and adjustable triangles deal with angles other than those of the fixed triangles.

Triangles and other tools. The triangle is the usual instrument for drawing vertical lines. It generates an accurate perpendicular when held against the horizontal straightedge and provides a smooth drawing edge. The usual triangles are a 45° and a 30°/60°, each named for the angles formed by the hypothenuse. Triangles are sometimes of wood or metal, but those most frequently used are of transparent plastic, sometimes colored to make them easy to locate. A range of sizes is available; one each of medium size (8 or 10 inch) will serve at first, with larger and smaller sizes added as needed. An adjustable triangle is more expensive, but can be set for any angle from 0° to 45°, a convenience that may justify its purchase at some point.

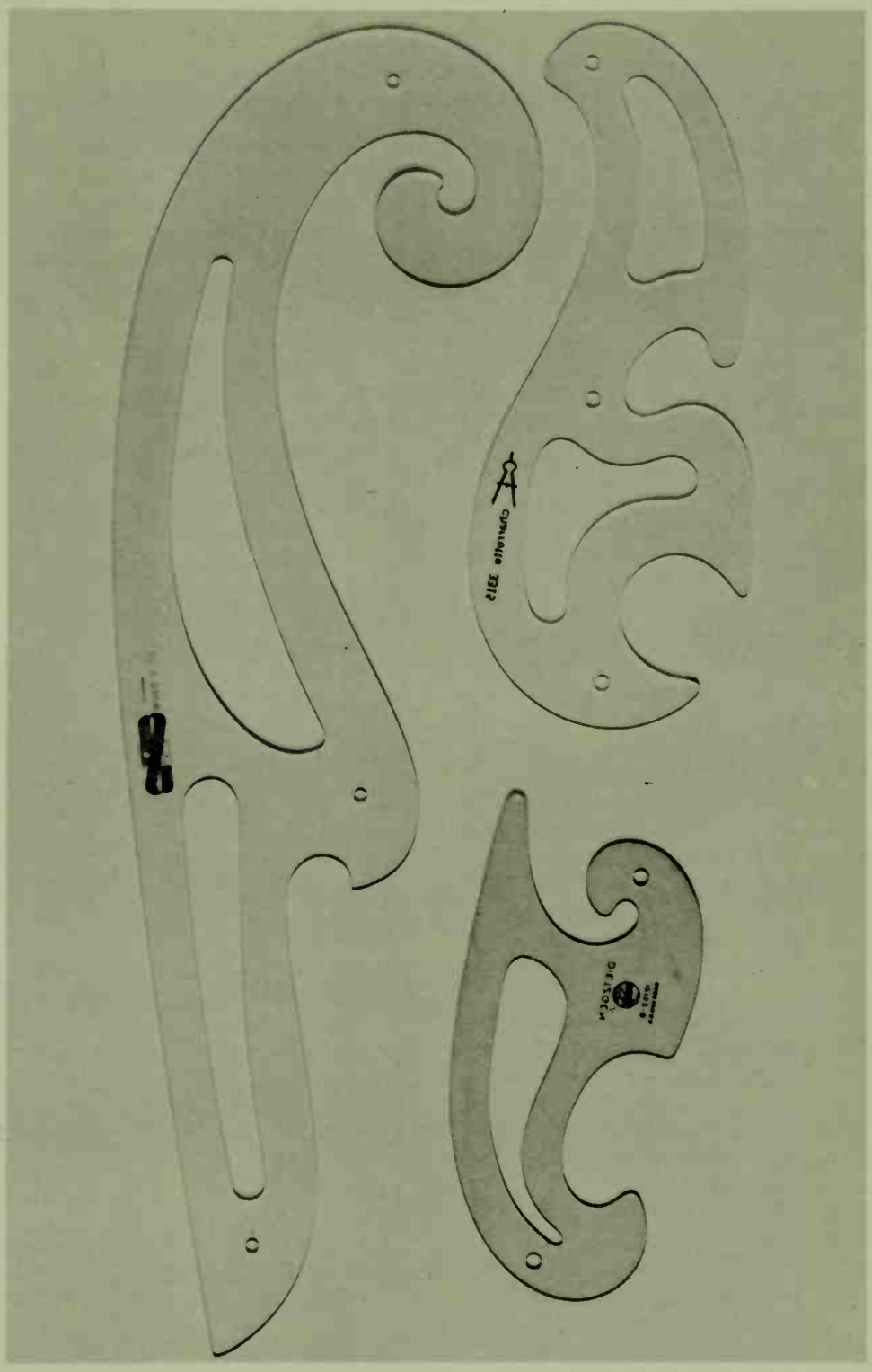
Templates—rectangles of transparent plastic with cutout holes in various shapes to aid drawing—are available in great variety. Some are almost indispensible, others only needed for special purposes. A circle guide is a basic and highly useful aid for drawing circles and curves that are parts of circles. A range of diameters from 1/16 inch up to 1½ or 2 inches will be most useful. Ellipse guides are similar, but since ellipses vary in shape as well as size (from near flat to near circular), a number of templates are needed to cover a full range. A single guide with a range of sizes in most used proportions is a good general purpose item.

Templates with small squares, hexagons, and a vast variety of special purpose forms are available. Shapes representing plumbing fixtures, typical pieces of furniture, and elements used in office layout at much used scales can be time-savers in drafting, but such standard forms should not be used to the exclusion of more original drawing. A template chair shown in plan is always routine and characterless while a hand-drawn chair in plan can express the quality of a specific chair design. Lettering templates and stencils are similarly convenient but nonindividualistic. Stencils are best used only for large letters and numbers that are difficult to form well freehand.

Irregular curved lines (not part of circles or ellipses) can be drawn with the aid of a French or irregular curve, a guide with one of some dozen traditional forms that seem to include almost any flowing curve needed. Two or three French curves will serve most needs. Long lines of slight curvature are drawn by using adjustable curves that can be bent as needed and straightened out after use. One type of adjustable curve permits the setting of curves with large circular radii on a calibrated scale; others can be bent to free curves as needed.

Instruments. This term is used for the drafting tools that come in complete sets, as well as individually, including compasses, bow pens and pencils (really very small compasses), ruling pens (discussed earlier), and various special purpose drafting tools needed to draw dotted lines, twin parallel lines, ellipses, etc. Drafting instruments, handsome and gleaming in neat cases, are very attractive, expensive (at least in good quality versions), and rarely used in modern practice. A compass may be useful occasionally, but even this simple instrument is somewhat difficult to manage and its work can usually be done more conveniently with templates or adjustable curves.

The beam compass is a special instrument for drawing circles or parts of circles of very large radii. The pivot point and drafting pen or pencil are separate units that slide along a long bar or beam to allow for radii much larger than the usual standard compass. Pantographs for enlarging drawings, devices for drawing ellipses, and any number of other special purpose instruments are to be found in the catalogs of art and drafting supply shops. Most are ingenious and attractive, many are expensive, and almost all are, in normal interior practice, rarely used. It is most economical to acquire individual instruments only when clearly needed, thus avoiding the expense of a full set.



French curves provide curvilinear shapes not based on fixed-radius circular forms.

EQUIPMENT

In addition to tools and instruments actually used on the drawing board, it is necessary to arrange a place where drawings will be made—some sort of table and board. In everyday life, space always seems to be in short supply, and it may take some ingenuity to work out a way to provide for a fairly large drawing surface. It is vital to have room for sheets up to 24 × 36 inches, and larger sheets are needed for perspective drawings and full-size furniture drawings. A 30 × 50-inch board should be obtained if at all possible.

Ready-made drafting tables are available in a great range of prices, but an improvised arrangement can also be satisfactory. A hollow-core flush door, available at any lumber yard, is quite inexpensive and serves well as a drawing board. It can be supported on horses made from 2 × 4s with metal brackets as used in regular carpentry, or the horses may be more finished types in wood or metal. Determine the height and tilt that suits your individual work habits before buying or making horses. Tilt can be adjusted with blocks as needed, but height is fixed once the horses are obtained. A simple table of this sort is quite like the ones in Gothic paintings and is very much in the tradition of simple equipment in artists' studios and designers' ateliers.

The bare wood of the board should be covered with some protective surface that gives a bit of resiliency and is easy to keep clean. Drafting supply shops carry special papers for this purpose, and a vinyl sheet especially made for this is even better, more durable, and less subject to wrinkling with changes in humidity. Even a sheet of gray cardboard or illustration board can serve as a board cover. Double-faced adhesive drafting tape is used to hold it down. Linoleum is an even better board cover, but not so easy to obtain, cut, and mount, but very durable and easy to keep clean. If a T-square is to be used, it is wise to mount a metal Tru-Edge to the side of the board where the T-square head will run. A parallel rule or drafting machine is mounted to the board according to the directions for the particular type used.

If space and budget permit, a drawing table with its own base may be selected. Various features are available, such as height and tilt adjustment, foldability, or even powered adjustments. In any case, it is important to make sure that the support is sturdy and that adjustments will not slip. A fine drafting table can be attractive and convenient, but fine work (including the work of many masters) has been done on a well-worn board on horses.

To complement the selected drafting table arrangement, choose a stool or chair to suit your individual work style. Even if you usually work standing up, you will usually want a stool for occasional rest or as a perch when telephoning or just meditating. Incidental furniture can include some sort of side table, stand, or artist's taboret to hold tools and instruments and keep the board surface uncluttered; storage drawers or a rack for tubes of rolled drawings and paper; bookshelves; and even, if space permits, a second reference table to store drawings flat where they can be consulted without spreading over work at hand on the drafting table.

Lighting is also a matter that needs some thought. Daylight is excellent if available, but it is not controllable and not, of course, available at night. Choice of artificial light is somewhat a matter of personal preference—some prefer strong fluorescent illumination, others insist on incandescent light only. The popular and inexpensive Luxo lamp with its highly flexible pantograph arm support is a great favorite. It is available with a variety

A sturdy drafting table of this type allows architects and designers to handle all sizes of drawings. (Courtesy: Stacor Corp.)

of reflector heads and heads for different types of lamp bulbs. One or two of these units will usually serve well for all types of design work.

Miscellaneous items. There are some odds and ends useful that can best be collected in advance and a few special purpose supplies that can be acquired when and if needed. In the first category is a roll or two of drafting tape needed to secure paper to the board, a pair of good quality scissors, a mat knife, and a supply of single-edged razor blades, a paper of dressmaker's pins, a box of pushpins, a stapler and supply of staples to fit, and a clean board brush for clearing away eraser crumbs. A lined yellow letter or legal pad and some memo paper are obviously also helpful. Some designers are devoted to a Dry-Clean pad—an open weave sack containing a supply of eraser crumb-like material that is spread on the work to make instruments roll without smearing and to help clean up any smudge that may develop.

You will find constant use for a pencil sharpener, so good ones are very well worth acquiring. A small pocket sharpener is handy for use away from home base and will serve for temporary use. The kind that holds the shavings are convenient; versions with a truly sharp blade are desirable, but not easy to find. For regular use, the familiar hand-crank sharpener is more convenient. It can be clamped to the drafting table or mounted on any convenient wood surface. The widely available office versions will serve, although the imported Dahle sharpener will do a superior job and has a stop device that prevents wasting pencils by grinding beyond the turns needed. The model with a self-feed clamp is convenient. Electric pencil sharpeners are now also widely used and make it easy to sharpen in an instant using only one hand. Whether their bulk, noise, and need for a trailing wire offset their convenience is a matter for individual decision.

Other items of a more special purpose sort, to be picked up as needed, might include a supply of transfer tissue sheets in tones and colors that provide lettering in various typefaces (Zip-A-Tone and Letraset are well-known tradenames), a supply of quality colored papers (such as Color-Aid), a magnifying glass (possibly on a stand for small detail work), a reducing glass for viewing work as if from a distance, and a can of spray fixative. A light box for tracing is a luxury, which can double as a viewing box for color photographs. Frosty transparent tape and double-sided tape are useful, as are several types of paste and adhesive. Duco cement is often useful. Avoid using the popular rubber cement that can produce ugly stains with the passage of time.

The ultimate luxury is work space—a studio, office, or room where work table and related storage can be spread out, where a free-standing table can be turned (it might even be on casters) to the most convenient work position, and with wall space where work in progress or reference materials can be tacked up. Such arrangements are hardly ever available to the beginning designer, but habits of making do with cramped and inconvenient work arrangements often hang on into a career and can take a toll in irritation, exhaustion, and lost productivity that is quite unreasonable. Doctors and dentists, business executives, even cooks and carpenters take it for granted that suitable work space is a necessity. Designers would be wise to adopt a similar attitude.

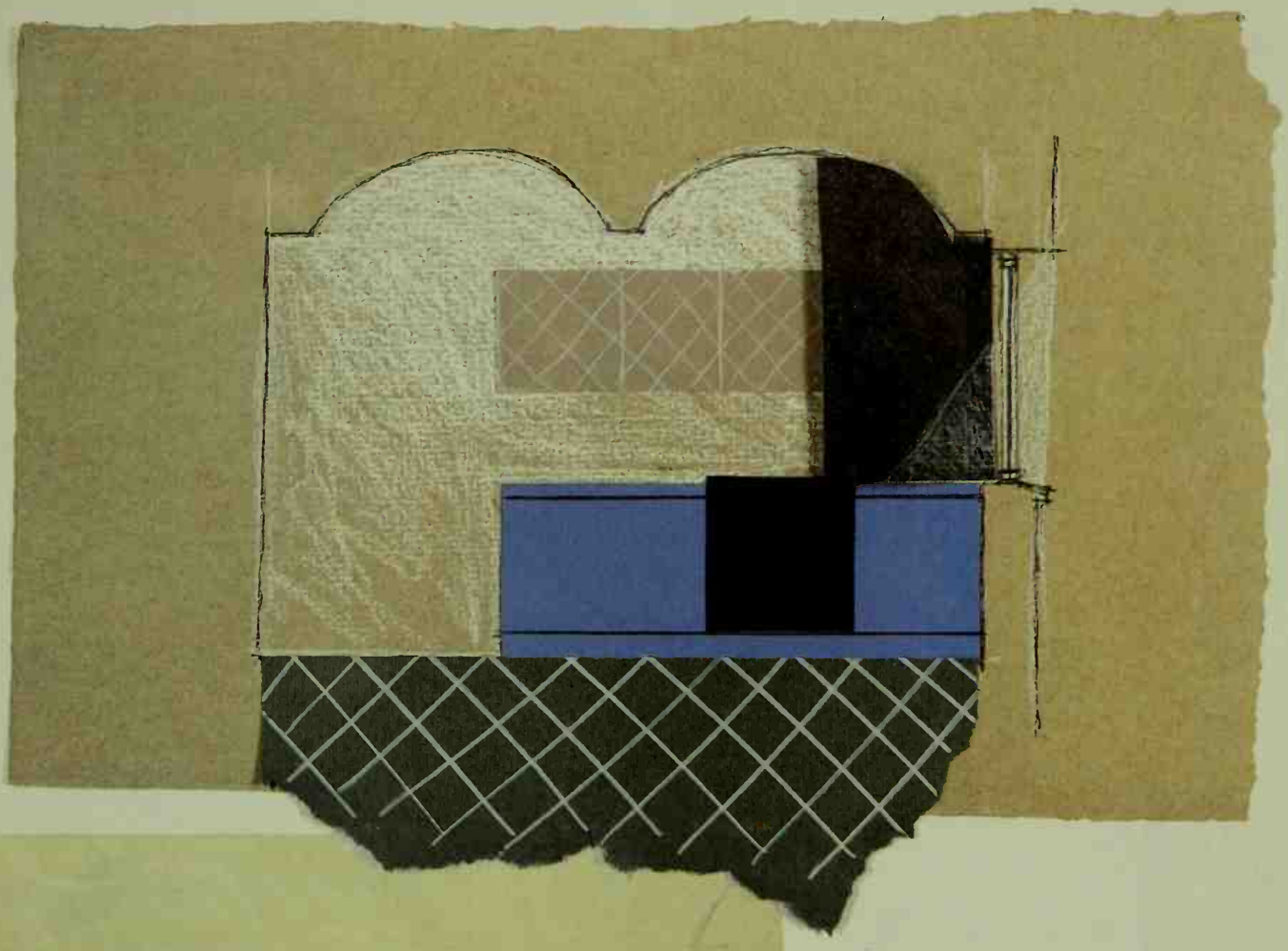
CONCEPT DRAWINGS

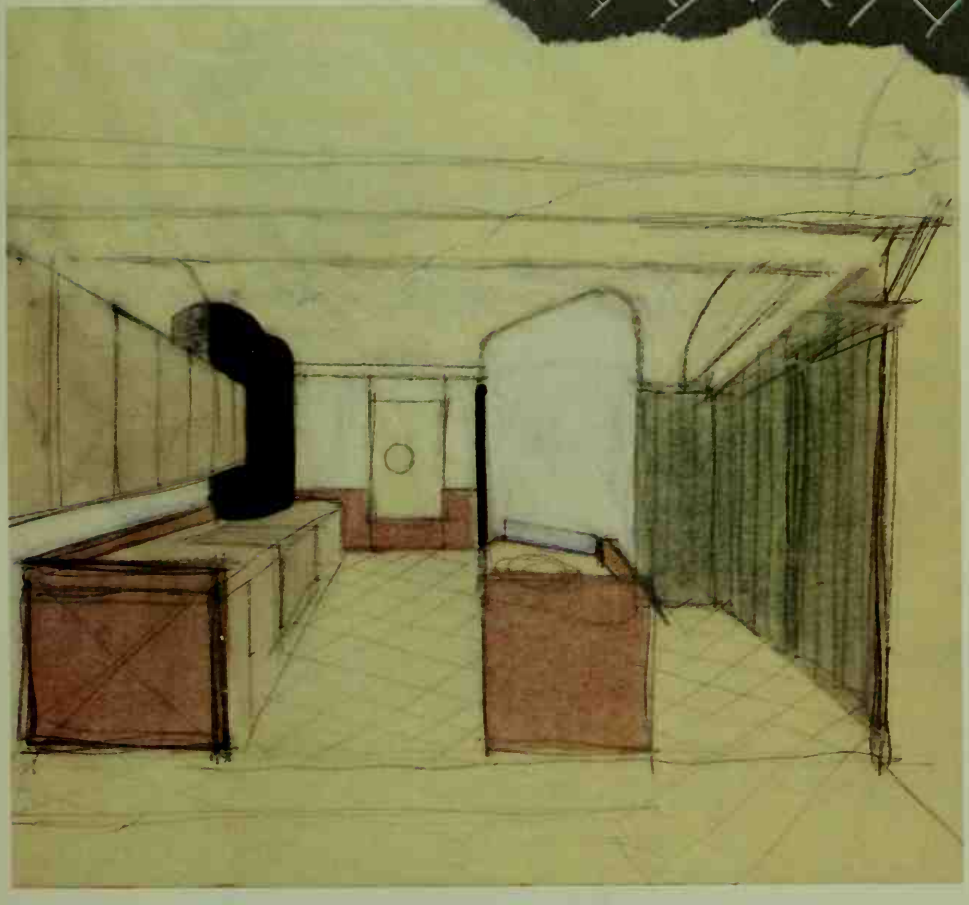
Picasso canstructian: Bauteille de Bass, Verre et Journal, 1914. (Callectian, Musée Picasso, Paris)

The notion of *concept* as a central key to successful design achievement needs some explanation. The word means, literally, a thought, an idea, but it is usually used, at least by architects and designers, to mean something more: a special kind of idea that overrides and dominates other ideas—a *central* idea or theme. A strong concept seems to be essential to the achievement of an outstanding design work, to making what might otherwise be dull and routine practicality into something more, something that can be called "a work of art." In the fine arts, such as in painting, sculpture, and music, we recognize "concept" as the quality that separates great works, the things we can call products of genius from works that may be skillful, even pleasant or entertaining, but no more than that. When Picasso took a discarded tin can from the trash, cut and bent it, and applied paint, we find it suddenly transformed from trash into a brilliant work of cubist sculpture. The transformation was not so much a matter of manual skill or vast effort, it was rather a matter of imposing a powerful concept onto ordinary materials, and it is this concept that makes us respond to the result as art of great mastery.

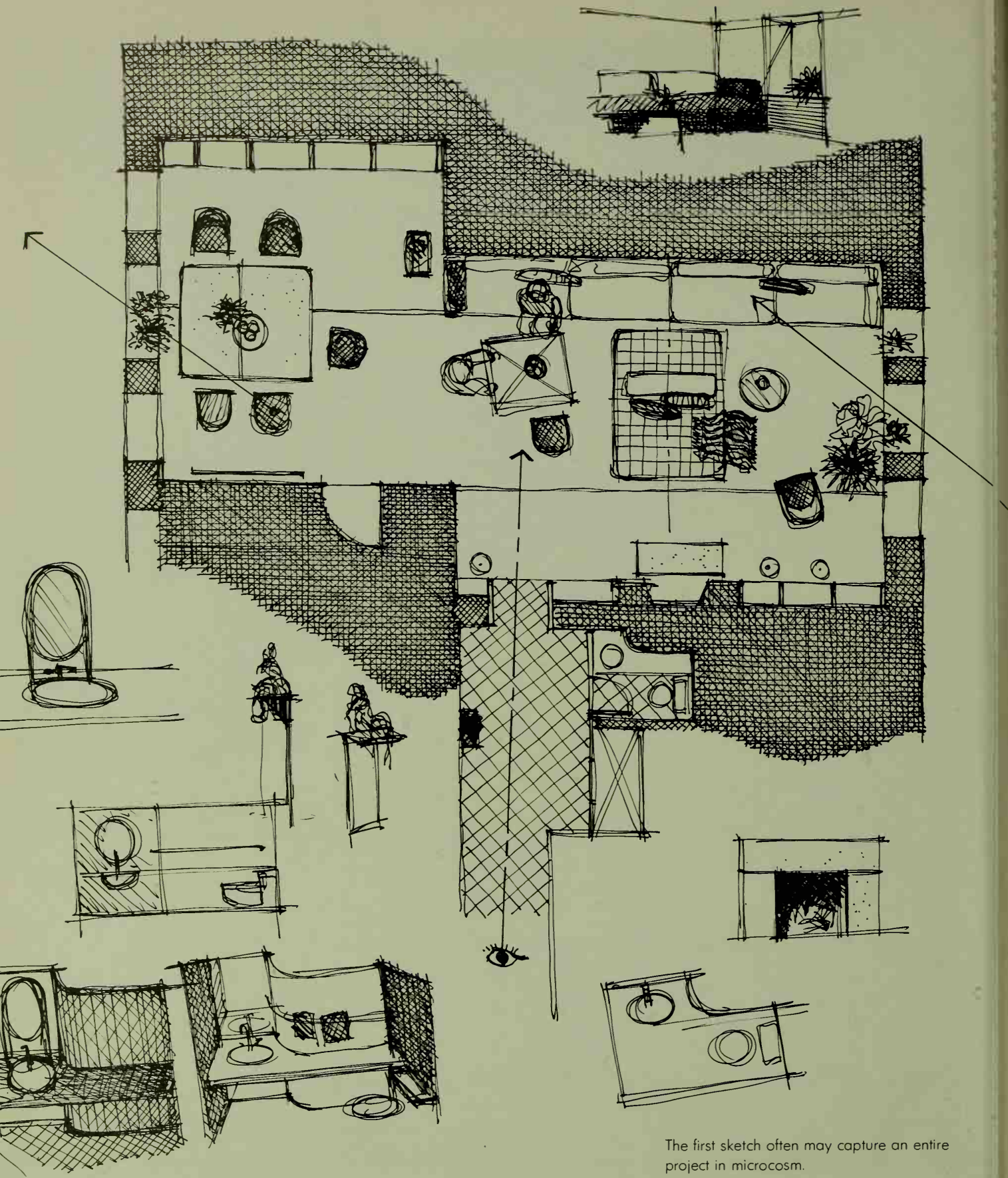
Modern art brings home the notion of concept with particular force because it so often suppresses the trivial details of reality, even omits any elements that are recognizable as references to the real world, leaving us with concept, central idea, spirit, or essence as its only substance. In the absence of any strong concept, painting becomes no more than illustration or ornament, sculpture becomes decorative modeling. In music, minor work is not often so clearly representational, but it is not hard to sense the differences between great works and the trivia of background music or advertising jingles. Whether the work is by Monteverdi, Beethoven, or Charles Ives, we sense at once the presence of strong concept in great music and miss it in commonplace and commercial musical production. Architecture is often compared with music (as in the familiar cliché "architecture is frozen music") because it is also not an art of representation. As with music, the difference between the ordinary and the great can be understood in terms of the absence or presence of a guiding concept.

What is often referred to as ordinary building—the omnipresent variety of stores and shops, factories and warehouses, houses and apartment buildings—is largely managed without design consideration or with design that is strictly limited to practical and economic matters. The contractor who puts up a garage or shopping center and the real estate developer planning a subdivision may do without an architect or may employ an architect who will simply put together boxes of space enclosed by walls and roofs as the uses and economics of the project may require. The results are the familiar clutter of everyday buildings that serve their purposes to some degree, but that offer no particular satisfaction and cannot possibly be thought of as works of art. They lack any design concept and are simply a jumble of mundane realities without any guiding thought to bring the realities into coherent relationship.





An elevation study (top) for a small kitchen quickly executed in paper collage. A sketch (left), done with pencil on paper, quickly executed in a way suggestive of collage.



The first sketch often may capture an entire project in microcosm.

In contrast, outstanding works in architecture and interior design are characterized by strong concept. Amateur designers, like their mediocre professional counterparts, tend to work without concept. The householder who decorates a room will usually do so by making a large number of decisions each without reference to the others. Selection of a floor covering is made in a showroom. Furniture is chosen in another shop or from a catalog. Paint colors are selected in conversation with the painter, drapery and other decorative details are added at whim, and furniture arrangement is improvised on the spot. The result may be serviceable, but it is often a jumble that offers no particular satisfaction, is hardly memorable for even an hour, and is certainly not an aesthetic achievement in any sense.

It is only necessary to mention a Greek temple or a Gothic cathedral to bring to mind a powerful concept, a concept that dominates the building type and the particular buildings of that type. The Parthenon, the temples at Paestum, the cathedrals at Chartres or Winchester are each structures with a concept strong enough to make them easy to remember even without a picture at hand. Interiors, although typically only one aspect of an architectural concept, can have similar conceptual power. The Pantheon in Rome, Paxton's Crystal Palace, the "great room" of Wright's Johnson Wax Office Building are each interior spaces of great conceptual power.

Design teachers often suggest to students that a concept is a design idea that can be expressed in a sentence or even a few words. This is a somewhat misleading half-truth. It is certainly true that we can think of projects that can be described in such phrases as "a huge round room topped by a hemispherical dome" or "a square box up on stilts," but each of those phrases could describe many different realizations. The particular reality that each phrase describes which we are most likely to think of has conceptual qualities that go beyond the brief phrase. Concept can involve plan layout, three-dimensional form, material, color, a combination of these things, and other considerations as well. To say "a long, narrow space" or "an all-white room" deals with only one aspect of concept.

In practice, words are dangerous tools for dealing with any visually perceived reality because they are ambiguous and because any verbal account of a visual reality that is to be fairly complete will tend to be long and detailed and still only partially satisfactory. We recognize the dominant concept of the Greek temple or Gothic cathedral, but it is not easy to put in words—even one picture tells us more than a lengthy description.

This explains the vital role of drawing in the development of design concept. Development of concept is first of all a mental process, and the designer's mind is free to wander among the various but related elements of space, plan layout, material, color, details, and the relationships of all these things, but their very variety and complexity make all these elements difficult to keep in mind.

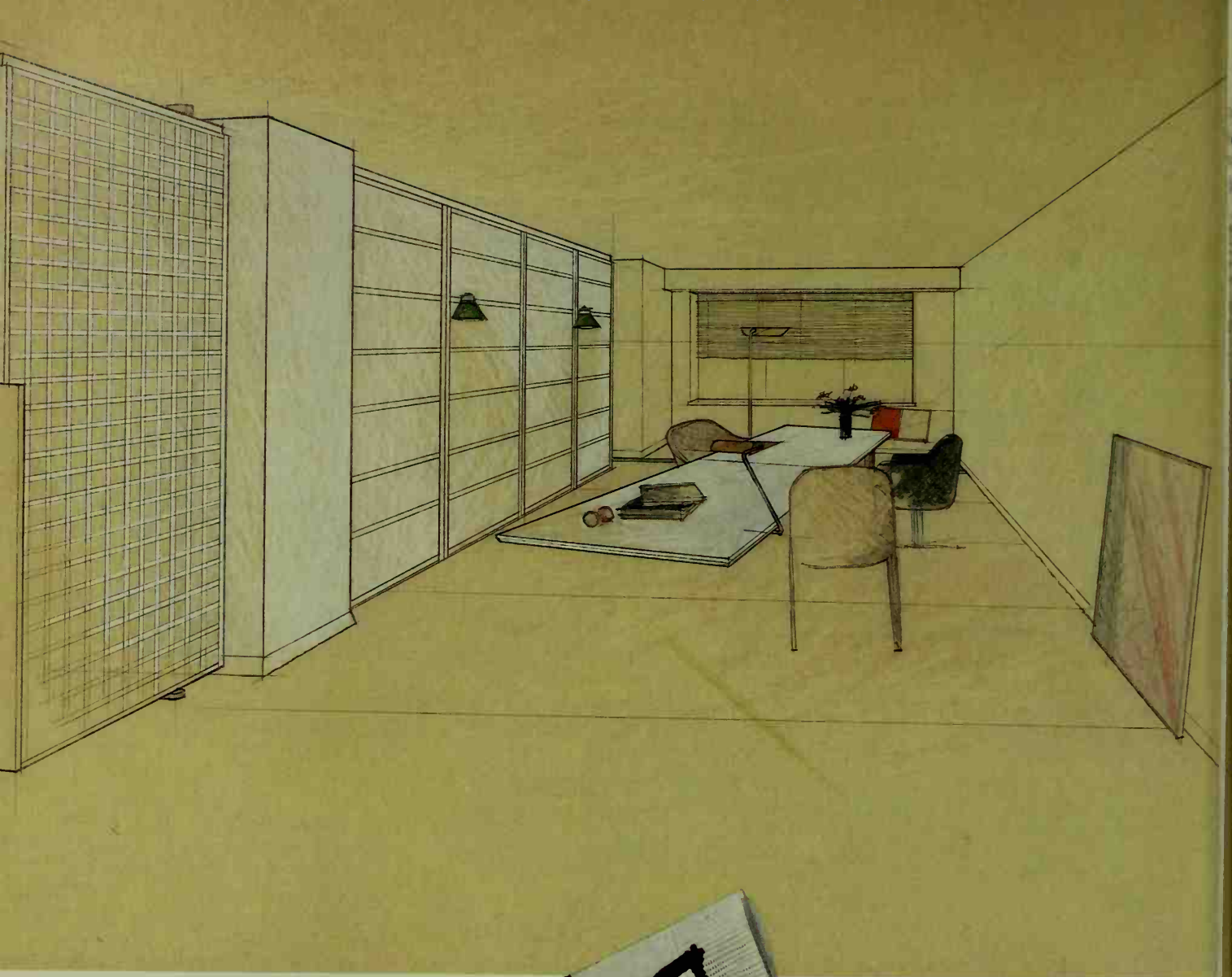
A painter can start a canvas and then add, change, and modify as the work develops, but the designer must go through the whole design process from beginning to end before any realization can even begin. Concept must be strong enough to dominate and control this process. In a form so unsuitable as words, if present only in the mind as an imagined, but still vague guiding idea, concept tends to fade, become confused and weakened, and is eventually lost. Concept drawing is the medium that makes concept visible, frees it from the problems of verbal description, and makes it a tangible record, a document to go back to, consult, modify, and develop as a project moves ahead.

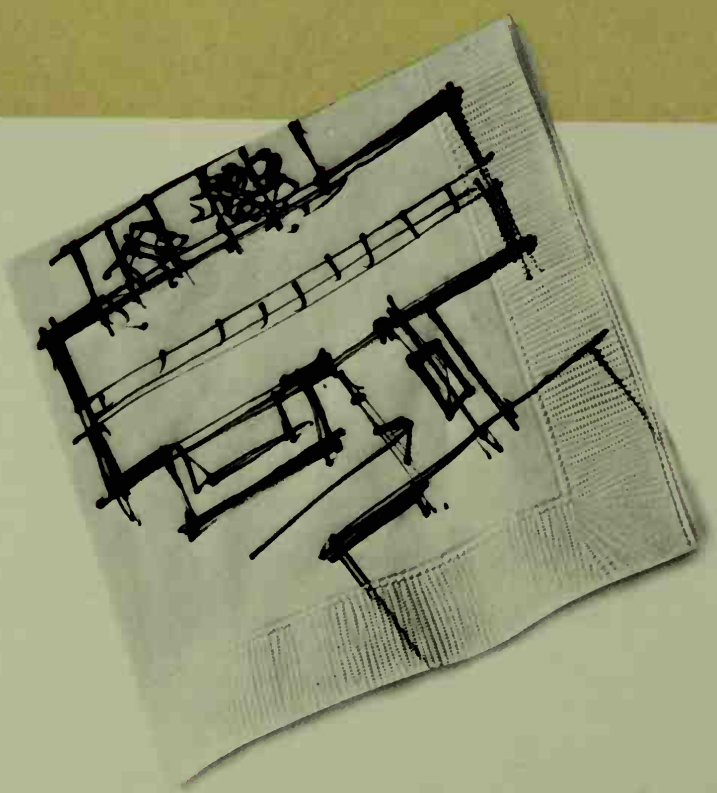
CONCEPT DRAWINGS

A concept drawing can be extremely rough—even totally abstract—and may not even be, in the narrowest sense, a drawing. The upper illustration on page 39 is a conceptual sketch made up of torn bits of paper pasted down as collage on a torn-off piece of cardboard carton. Such a sketch may not convey any literal sense of what the built project might look like on completion, but to the designer who made it, it serves as the first forms roughed out on a new canvas serve the painter. It makes ideas visible so that they can survive, develop, and include the mass of detail that will be needed as progress is made toward realization. The very abstract quality that makes such a sketch seem remote from realization is evidence that it is *concept* alone, not representation of circumstantial detail. Like Picasso's sculpture, it freezes a conceptual idea without the clutter of representational detail.

The illustration below it, a conceptual perspective sketch for a residential kitchen interior, comes much closer to being a representation of an actual interior, yet it too is in a way a collage of colors and materials—black boxes enclosing space, areas of brown, white, and green set out to form a composition that is *conceptually* abstract (and so not easy to describe in words) although the realization will, of course, involve walls, cabinets, etc., of a totally real and practical sort. Notice also in this sketch the dominating impact of a detail that is already part of the design at the conceptual stage—this is the panel with a portholelike circle in the center. The panel is to be a window of frosted glass that admits light while obscuring an indifferent city view; the circle is a clear view hole left unfrosted so that a glimpse outside is possible to check on weather and time of day—a minor but unusual detail that becomes a thematic focus for the whole space.

While concept can develop first in abstract sketch or in perspective, it is equally possible to begin with exploration of plan. Plans are the very essence of architectural design, and a habit of beginning with plan seems to be natural to interior designers and architects, although it is a drawing type less easily understood by laypeople and beginners than more realistically representational forms. Where the interior designer is dealing with existing space or space already planned (even if not yet built), plans of existing conditions are the best way to become





A free-standing toble, low seoting, ond grid bookcose (obove) set the chorocter of o room by their relationship (see Chopter 8 for more development of this project). In this poper nopkin drowing (right) the concept begins to toke visual ond spatiol form.

acquainted with the given circumstances, and it is accordingly natural to move first into concept expressed in plan.

The drawing on page 38 is a plan sketch in which concept is seen in the process of development. The somewhat sketchy ink line makes it clear that this is not a presentation drawing and suggests that planning is not yet in a final stage of development. The access corridor is identified by the diagonal squares that suggest a tiled floor. A dot-dash arrow line moves through the corridor from the image of an eye (below) into the living space, identifying a key vista along the line of approach. There is a table, its angled position suggesting that it is a mobile table, near the built-in seating that stretches across the larger space, and one observes an unusual detail of the drawing: there are people seated at the table. People are not often seen in top view in plan drawings, but their presence here gives the space a sense of scale and hints at how it might be occupied.

Other details—rugs, cushions, light fixtures, a lamp, and plants—help build up a sense of what the space will be like. The designer is also developing detailed ideas as concept becomes formed, as seen in the thumbnail perspective sketches scattered in the open spaces around the plan. Above at the right, there is a glimpse of the plan corner nearest to it where the built-in seating meets the corner where a plant rests in the deep window recess. The sketch at the lower right is clearly a hint of how the fireplace will be developed. Farther right is a scrap of plan, clearly the round wash basin in the bathroom counter with the change in wall surface plane behind it. Is the corner to the right of the basin to be rounded?

At the left below two tiny perspective sketches explore this corner. We see the round basin with a mirror behind it and the rounded wall projection with a curving towel bar carrying a few towels. A tiny detail, perhaps, but such small, unique features are the very elements that turn a routine project into something special. They need to be noted visually as they come to mind, ready for later development in detail.

On the preceding pages, there are concept drawings in perspective sketch form in which color is a significant element. In the upper drawing at the right, the white table top and bookshelf grid stand out against the yellow tracing paper. In the lower sketch, seating is grouped between massive columnlike architectural elements. The drawing on the lower left is the proverbial "sketch on the back of an envelope," actually in this case a paper napkin. In it the plan of another residential project is explored in a diagrammatic way.

CONCEPT PLANS

The conceptual plans on the facing page are the kinds of sketch plans that may fill innumerable sheets of yellow tracing paper as the designer develops ideas. They may not seem to mean much on casual inspection, but they deal with ideas that are vital to conceptual design. The upper sketch is concerned with movement through a sequence of spaces, the arrows suggesting paths of movement that might be taken in a walk-through visit to the completed project. Architecture is so much an art of space and movement that this kind of exploration is vital to developing ideas that will make a project a lively experience for the users and occupants that will inhabit it. To wander through a project in the mind, using the pencil to track movement while thoughts about what the experience will be are explored, is a key part of planning and of moving from plan to the other views that will stimulate thought about what the reality of the finished project will be.

The lower plan is a similarly abstract exploration of another key aspect of architectural design: the relationship of volumes. Here spaces, the larger square below and the smaller above, have been defined and marked with a conventional X, indicating that they are spatial units—not necessarily rooms but volumes, units that make up interior architecture with their variety of large and small and their relationships of location. Modern architecture is often opposed to the concept of boxlike rooms, yet space is best understood in units, volumes that the mind can comprehend and remember, whose relationships become the sequences within which movement can occur. The identity of a space, a unit of area, identified by an X for conceptual thinking, helps in grasping the relationships of large and small, near and far.

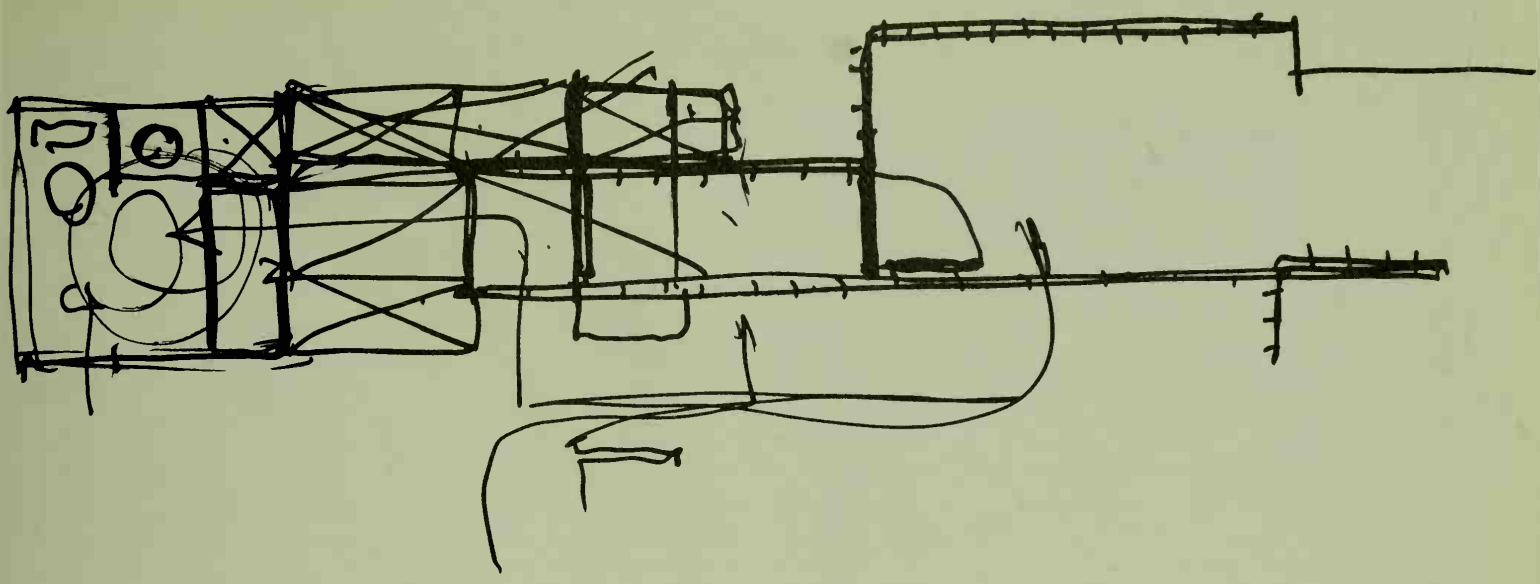
Notice that the upper plan, concerned primarily with concepts of movement, also has boxes marked out with the symbolic X, in this case each unit implying a solid, perhaps a storage mass, closet, cabinet, or shelf unit. The lower sketch also displays an arrow form, a movement symbol suggesting that areas, volumes of space, are also subject to issues of access, circulation, and sequence. It is the interaction of these matters—blocks of space and lines of movement—that are the conceptual values that underlie planning.

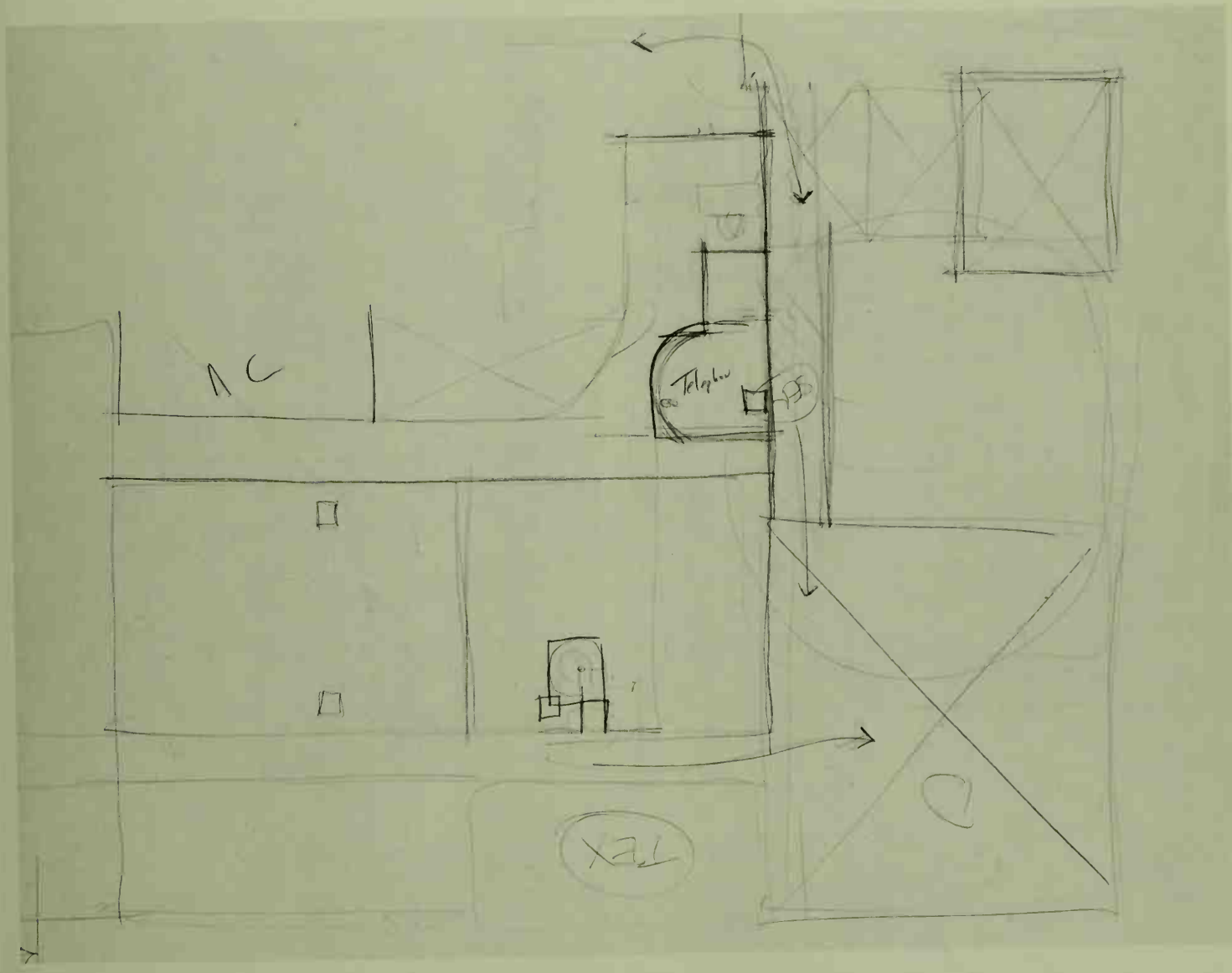
In these two versions of concept development in plan, the idea of "walking through" the space in drawing is a key to design thinking.

PLAN DEVELOPMENT

From such skeletal and abstract fragments, conceptual design must move to more specific proposals drawn up in the more precise vocabulary of architectural planning. This need not and should not imply a rush to settle upon a fixed form no longer subject to revision. The plan sequence on page 44 shows a fragment of a plan through various stages of development. In stage 1, a space with a curved wall appears as the primary variation on otherwise rather routine partitioning in a modern, modular highrise building. The curve is rather free and casual, a hint of freedom in contrast with standardization. In stage 2, the curved form is being studied with more specificity; it appears first with a smaller radius and then again, drawn with more certainty at a slightly larger radius. Lines at 45° angles define the location of the center of the curve. In 3, the curved form has been moved to a position aligned with the main 90° axes of the building plan, generating a more normal space within its enclosure and a more expected relationship to the space around it. The 45° lines, present in the earlier plan, survive, however, with ambiguous meaning, suggesting the designer's reluctance to rub them out and revert to a fairly obvious set of space relationships. In stage 4, we find that it is the curved wall that has been abandoned and the 45° relationships that are retained. The space that had first surfaced inside a curve is now straight, but at a diagonal in relation to the main lines of the plan. The diagonal relationship is repeated in the grid of the floor pattern, and we expect to find it important in other plan relationships to be developed in detail later.

It is the willingness to sketch and sketch again, to draw over and over

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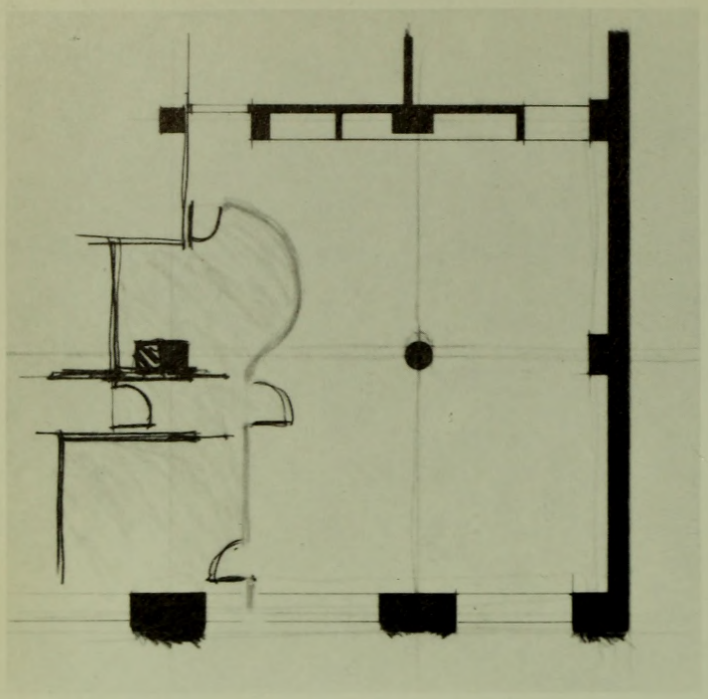
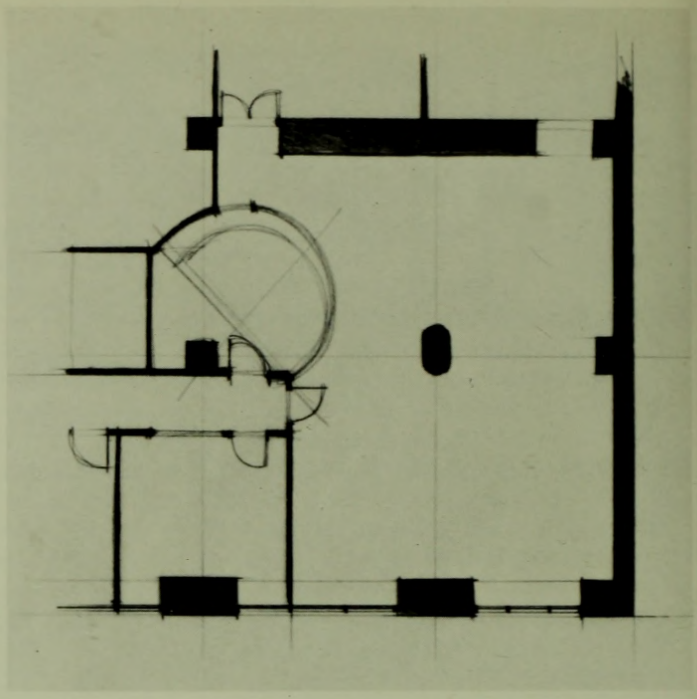
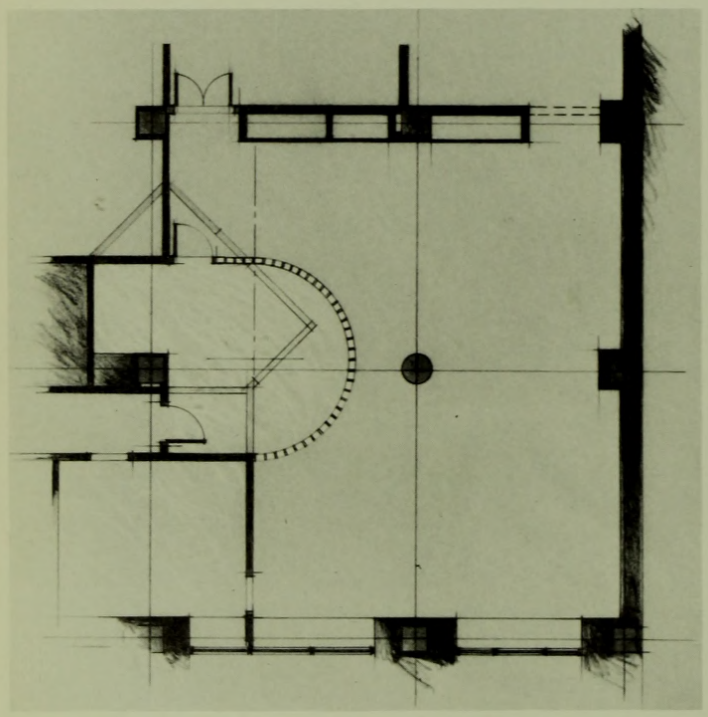
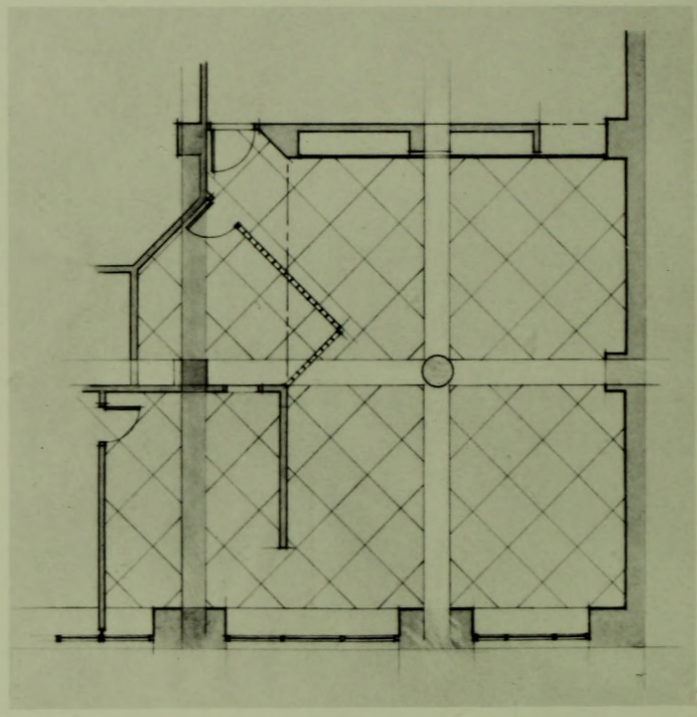








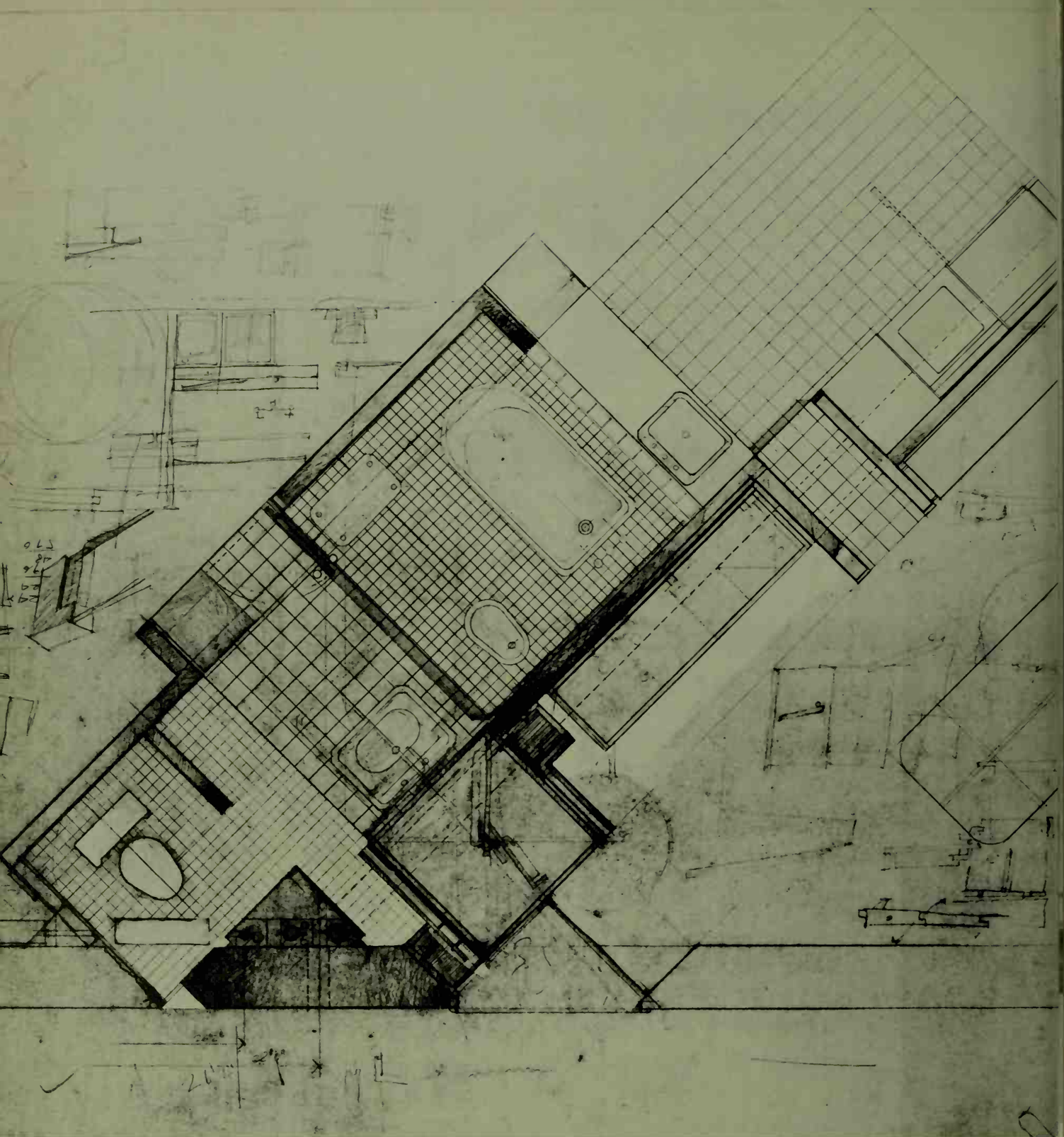
while permitting ideas of a conceptual nature to develop, that is the essence of creative planning. An idea that seems valid and promising should never be frozen; willingness to move and shift with changing ideas, to allow a minor theme to become dominant, to abandon an idea that seemed strong at an earlier phase in order to move to a better concept, is a key to the creative nature of good conceptual planning. The nature of built architecture makes it impossible to develop ideas with constant change and revision in the way that a painter works on a canvas. Change, revision, and development can only happen in the planning process as it evolves on paper. It is this reality that makes drawing so central to architectural and interior design processes—more significant, perhaps, than the comparable sketches that a painter or sculptor may make. They retain a freedom to study and change in the final work—a freedom that the architect and interior designer cannot claim.

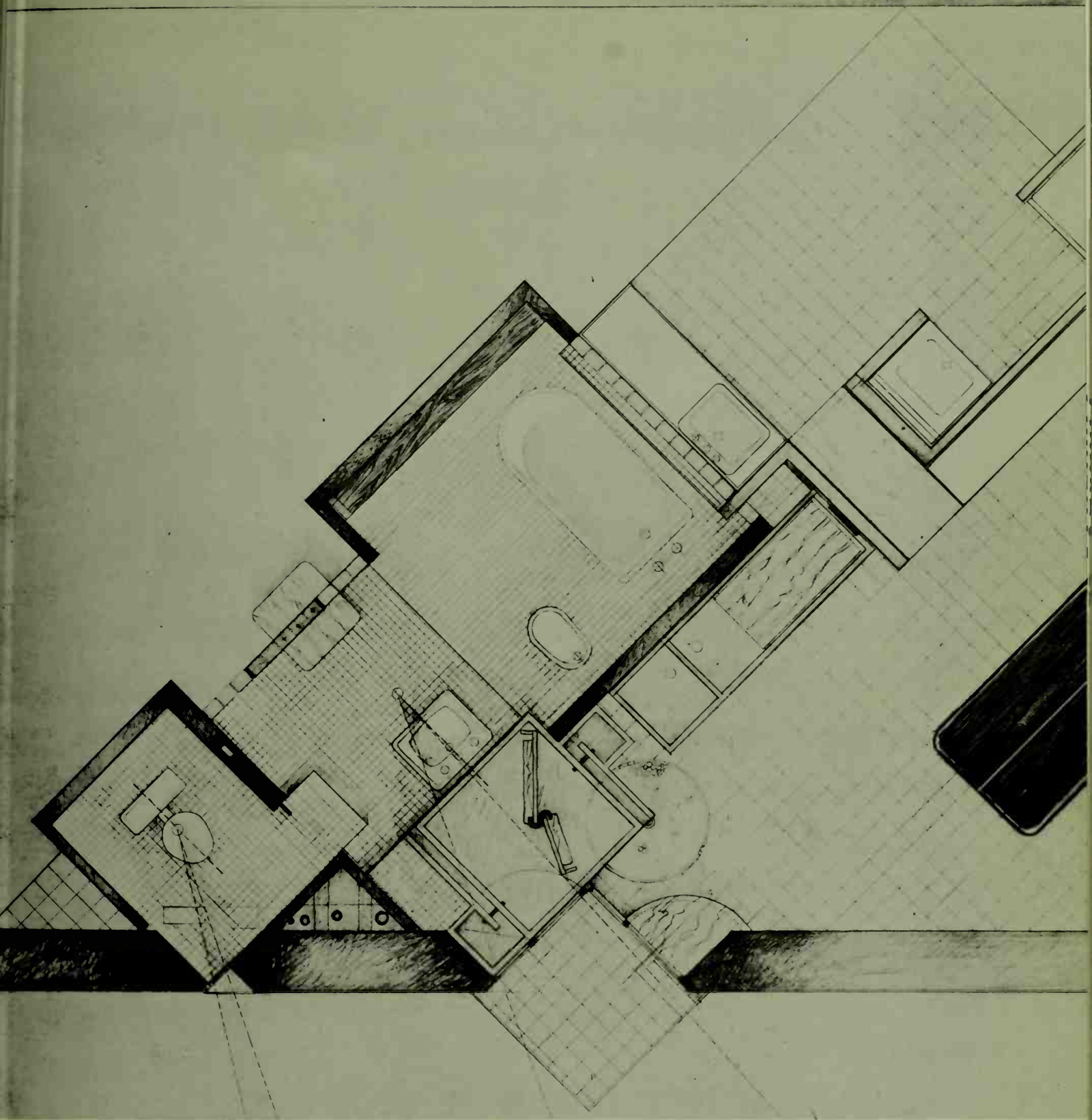
The drawings on the following pages by Giuseppe Zambonini give a glimpse of the design process as it is worked out here by developing plans of a bathroom-kitchen complex that is part of a loft project. The drawing on the left is full of ambiguous forms. Where are openings intended to be? What is the logic of the plan? At the same time, we see all around the plan itself clusters of scribbles, sketches, doodles that indicate ideas in the process of development. On the right, the plan has taken shape and reflects a number of coherent decisions. Note the dotted lines that define sightlines from key positions toward the out-of-doors.

These two drawings represent steps on the route from concept to realized, detailed construction plans. Many earlier, rougher, more sketchy drawings must have come before the drawing on the left, itself drafted with instruments, quite exact and complete except for the unresolved issues still under study. As reworked on the right, concept is finally transformed into a unit of plan quite fully developed and ready for incorporation into a total project plan suitable for presentation and as a basis for construction drawings that will have to follow.

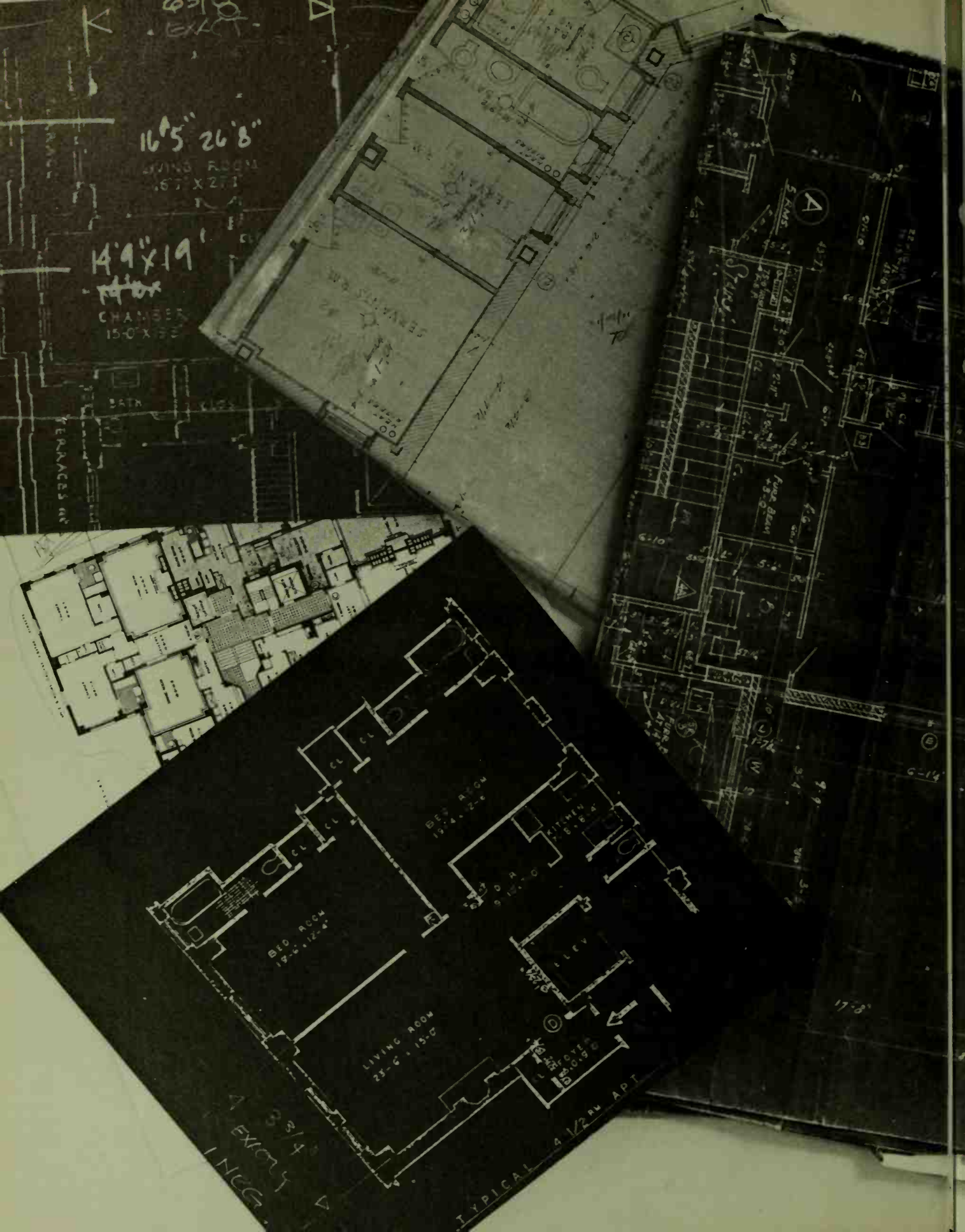
There is a common notion that a designer simply "gets an idea" and then quickly transfers it to paper ready for construction. Such instant production rarely occurs, if ever. The design process is, in normal practice, a matter of many steps from general idea to specific, usually quite complex detail. Drawing is the means by which the designer makes ideas visible and so subject to change and development. It is only in a sequence of increasingly specific drawings that design thinking can move forward in manageable steps, and such a series of sequential drawings make up the creative history of each project.

Plan development may be traced in these four images. In the lower left sketch, a round form can be seen developing into a diagonally placed square element as alternative conceptual sketches are superimposed.





In these drawings concept can alsa be seen in development. "Vistas" expressed in plan can be followed through stages af development in superimpased drawings. (Giuseppe Zambanini, architect)


16'5" 26'8"
LIVING ROOM
14'9" X 19'
CHAMBER
15-0" X
BATH
TERRACES
BED ROOM
KITCHEN
D.R.
ELEV.
BED ROOM
LIVING ROOM
TYPICAL 4 1/2 RM APT

MEASURED DRAWINGS

Every interior design project requires, at the start, drawings that show the space to be dealt with, completely, exactly, and to scale. Satisfactory drawings may be already available, but more often than not the designer must make up these "existing-condition" drawings by taking measurements. Even when drawings exist, it is often wise to do some measuring to check accuracy and to add missing details.

Where design is being undertaken for new construction not yet built, information can only come from the architectural drawings that the contractors use on site. These plans (often called "blueprints" by laypeople) show all the aspects of the project that the architects have designed. In some cases this may include some interior details; in others (in rental office buildings, for example) only basic structural elements are shown since all interior design is left to the tenants' designers to develop. In either case, the designer will have to study these drawings carefully to extract the exact information needed as a basis for interior design. A complete set of construction drawings can seem quite formidable when first encountered, but with experience, it becomes fairly easy to find the needed information. It is often convenient to trace off plan, section, or elevation portions that apply to the areas of concern, simplifying the working drawings to show only the information the interior designer requires.

When the project is in an existing building, it is often possible to find drawings of the existing space. If the building was designed by architects (or engineers), there must have been construction drawings. The original tracings may still be on file in the architects' office, and new prints can be made at small expense. If the architects are no longer in business or cannot be located, sets of prints may be available in the building manager's office or, perhaps, put away in some corner of the building superintendent's or maintenance office. City building departments keep plans on file for every building built with a permit, but these files are often vast and badly organized, and clerks, at least in large cities, are often somewhat uncooperative in finding and lending old sets of plans. If the construction plans can be found, the needed data can be copied just as in the case of a new building. Plans of old buildings are sometimes hard to decipher and, when in the form of old and perhaps faded and torn blueprints, can be difficult to trace. However, this is still the basic source for data on existing buildings.

Rental plans of the sort offered by agents to prospective tenants can also be useful, but they are often small in scale, incomplete, and, in many cases, inaccurate. With really old buildings and for many small buildings (houses, particularly) there may be no existing plans either because there never were any or because all prints have been lost. In this situation "measuring up" the space is the only way to obtain the needed basic drawings of existing conditions. When plans exist, it is still wise to go on site with them to check accuracy and fill in missing information. Plans sometimes have not been followed exactly (particularly in the case of older buildings), alterations may have been made, or plans may not show some needed data. Real estate plans, for example, do not show heights, details of windows, locations of electric outlets, and similar minor features. Even when plans exist, it often turns out to be easiest and most trustworthy to go on location and take all needed measurements.

MEASURING SPACES

Every designer needs to be proficient in measuring an existing space. It has long been a favorite first assignment for the beginner in his or her first office job—a kind of test of skill and reliability, as well as a chore that provides good experience in reading and making basic architectural plans. The task sounds simple: just measure everything and convert the measurements to accurate scale drawings. In practice, doing this efficiently and accurately takes some knowledge and will be aided by proceeding according to some standard rules of good practice. Before going to the site, it is necessary to get together a few simple tools that will be needed. These are:

A carpenter's folding 6-foot rule.

A paper pad (a clip board for support is a convenience). Plain letter paper will serve, but graph paper may help to keep measurements neat. A lined yellow legal pad seems, for no particular reason, to be a favorite.

Some soft pencils and a pocket sharpener.

An eraser.

A pocket flashlight (there may be dark corners).

A 100-foot tape (optional) for taking overall dimensions. A tape can usually be borrowed if not at hand; it will be most useful if an assistant is along to hold one end.

A camera (optional), possibly with tripod or flash. Its usefulness is discussed below.

A ladder may be needed in some cases, but it can then usually be borrowed on site. Most measuring can be done single-handed, but an assistant can be helpful to call off dimensions and to help with holding ruler or tape.

The actual process involves drawing a freehand plan of the space and then measuring each successive unit of wall, opening, or other feature, noting the dimension in feet and inches (or meters and fractions) on the rough plan. Next, all needed heights are measured and noted. A rough sectional elevation can be drawn if there are details that cannot be made clear in plan—all four elevations might be drawn in a complex space. Finally, sketches, dimensions, and notes should be taken on any special details that may be significant. Considerable judgment is involved in this process. There is no point in carefully measuring elements that will be demolished, but it is frustrating to ignore some item and so have to return to the site (especially if it is far away or otherwise inconvenient) to pick up the missing data. Where it is not certain what will remain and what will be demolished, there is no alternative to measuring everything to be sure all needed information has been noted.

The process can best be explained with some typical examples. The accompanying drawings are not the "field notes" taken on-site, but are the drafted scale plans made back at the drawing board from the field notes. The letters indicate each type of measurement and refer to the following comments:

Example 1. A space in a typical older pre-war vintage building:

A. Overall dimensions, wall to wall (or where the bay projects, to the angle where the bay begins). When available, the 100-foot tape is convenient for overall dimensions, but the 6-foot rule can be used by sliding it along the floor with pencil marks. Note that an accurate wall-to-wall dimension requires adding any base projection if taken at the floor and requires that the line of measurement be perpendicular to the wall surfaces (an angled line of measurement will be too long). Later, after smaller measurements have been taken, the overall dimensions should be checked against the sums of smaller measurements. Any discrepancy means that something is wrong, and the conflicting measurements should be rechecked.

B. Each individual wall surface is now measured "plaster to plaster" as one might measure a sheet for wallpapering, *not* including the trim at openings. Note that the surfaces between the windows of the bay are not curved or flat, but two short surfaces meeting at an angle. Note that the line of measurement must be horizontal; a line running up or downhill will be too long. It is convenient to walk around the room taking each measurement in some ordered sequence, rather than measuring all walls first, all openings second, etc. It is easier to keep field notes orderly in this way.

C. Doors should be measured for overall width including the frame (this is sometimes called the "buck" dimension). Also take the total height including the frame.

D. The actual door is measured next, providing a "replacement size" and giving the actual opening dimension as well. Take both height and width.

E. Measure the frame (buck) omitting the stop. Frame times 2 plus clearances should equal buck dimension C. If the frame includes any moldings, a freehand sketch (as illustrated on the right) should be made and important dimensions, such as projection from the wall surface, noted.

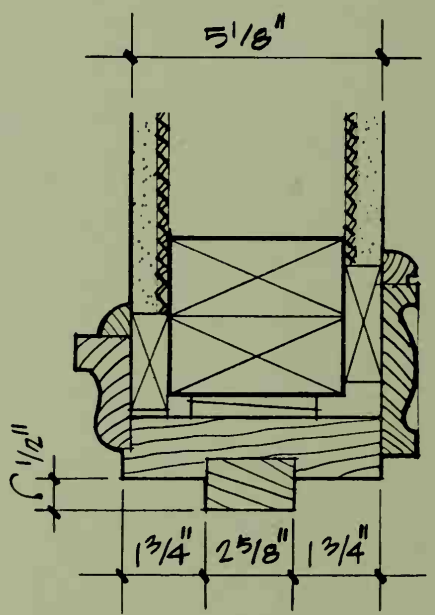
F. As with doors, overall window dimensions are taken including the frame. Take height as well.

G. Take window frame width, sketch profile, and note important dimensions as with door. If door and window trim match, only one notation is required, but be sure that the match is exact.

H. Measure window reveal width frame to frame inside the window casing to obtain the blind or shade dimension to be used in making window coverings. Take the related height dimension also (significant for vertical louver and similar blinds) from top of sill to underside of frame.

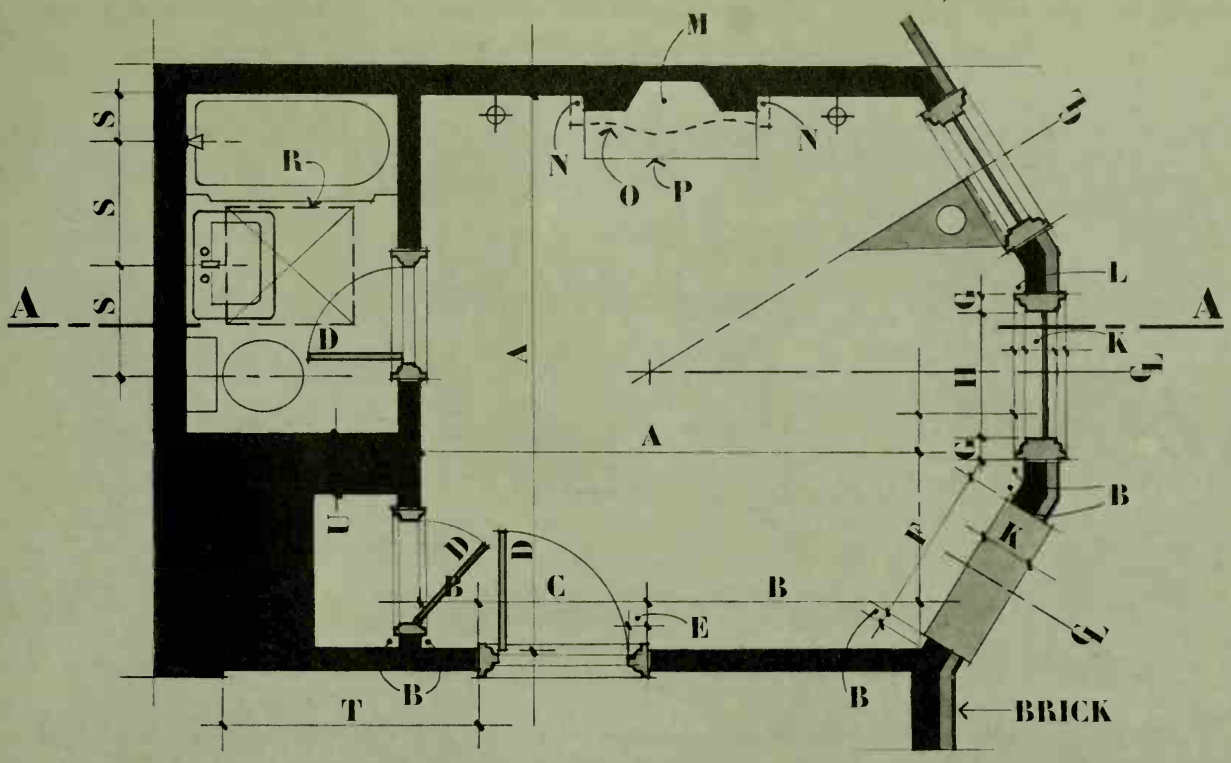
J. Take sill height from floor (easy to forget).

K. Measure and sketch sill profile including sash, as well as exterior sill. This may be significant if new windows, storm windows. or window air conditioners are to be considered. Note profile from floor to sill if it is paneled or recessed.

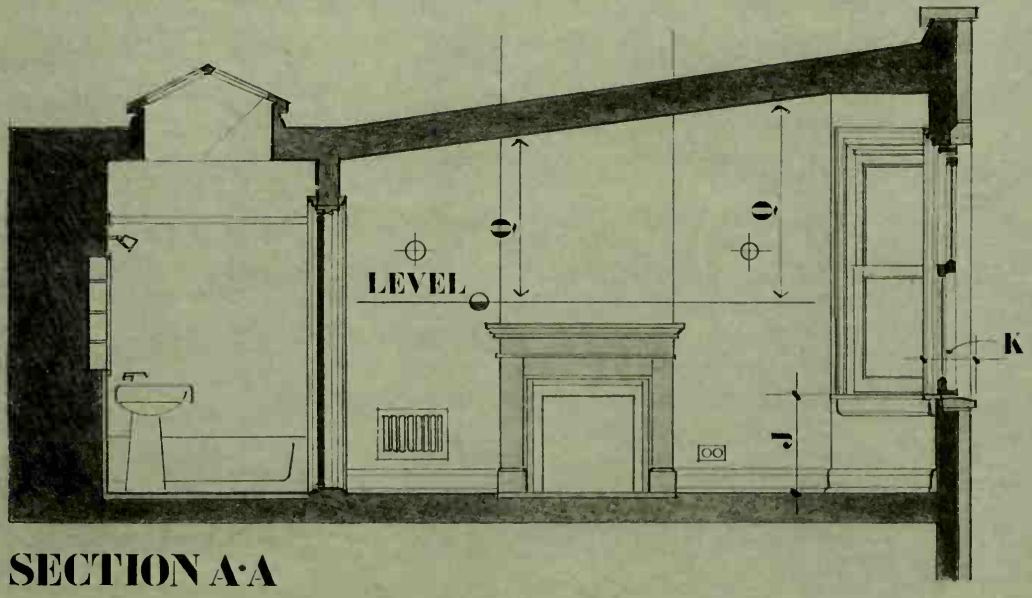


A traditional wood door buck (above) is illustrated in section.

Opposite poge: Typical pre-wor space in o brownstone oportment is shown in plan (top) and section (bottom).



FLOOR PLAN · A



SECTION A·A

L. Measure projection of window frame.
Note: Obtaining the angles of the bay's faces in this example presents a special problem. Here is a simple way to do it: Find the center line of each window by measurement. Lay out a perpendicular to the wall surface with a triangle or carpenter's square from each center point and extend these lines back into the room to their intersection point. Measure the sides of the resulting triangle as a crosscheck. Back at the drafting table, these dimensions make it easy to construct the correct angles, which should be crosschecked against width dimensions B and C.

M. Measure the actual opening width and height of a fireplace where one exists. Note if flue is open and the type of damper if any.

N. Note projection of fireplace masonry (exclusive of trim). This is the solid structure that cannot be removed even if the fireplace and mantle are not used.

O. Measure and sketch details of mantle and fireplace surround. Making a template may be the best way to record complex, especially curvilinear shapes.

P. Take dimensions of the hearth at floor level.
Note: Fireplace and mantle details are sometimes quite elaborate. If this detail is to be removed, there is no need to record it; if it is to remain, general appearance is important, but not every molding profile. An elevational sketch with a few key dimensions will serve. A photograph (see discussion below) is another alternative.

Q. Measure ceiling height, noting any changes of level, projections of beams, or other special conditions. Sloping ceilings require high- and low-point measurements. Measure and sketch cornice moldings. The 6-foot rule will usually serve, but it may be necessary to climb on furniture, window sills, or a borrowed ladder.

R. Note with dotted lines all locations of beams, skylights, or other ceiling features.

S. In kitchens and baths, locate center lines of fixtures, locations and sizes of medicine cabinets, kitchen cabinets, and any data on appliances, fixtures, and accessories (towel bars, for example) that may remain. Make notes on tile floors, walls, and any other special features.

T. In projects of more than one room, take "anchor dimensions" to relate one room to another.

U. Arrive at thicknesses of walls and dimensions of void spaces by subtraction. These "lost spaces" may be columns, bearing walls, chimneys, stacks, or pipe chases. Try to find out what each is to determine whether or not it can be removed or reduced. A check in the basement or attic may give an answer, but sometimes it may be necessary to knock a hole in the wall to check, with flashlight and rule, what is inside.
Note: The lower illustration on page 51 (section AA) shows a sectional elevation with such details as sloping ceiling, skylight, and window cross section drawn in. This is also the place to show the location of wall bracket lights (sconces), wall grilles or registers, and forms of radiators and convectors. Notice that floors and ceilings of older buildings are often not level. To deal with this problem, mark a point about 4 feet up from the floor on one wall and establish a level line running along the wall with a string or chalk line. Use a mason's level to do this. Take heights upward and downward from this line to discover irregularities resulting from sagging or careless original construction.

Mark electrical outlets, switches, and fixtures on the plan if any are expected to remain. Note radiators, air conditioning ducts and outlets, and any such details that may matter. Note any materials or finishes (hardwood or parquet flooring, window sash patterns, decorative or stained glass inserts, paneling, built-in cabinets, etc.), as well as the condition of any items that may remain and require repair or refinishing.

Example 2. A comparable space in a typical more modern post-war building where there is usually less decorative detail and architectural elements are likely to be more standardized (the same letter code applies, so explanations are brief except where the situation requires additional explanation):

A. Overall dimensions to be checked against added totals.

B. Wall surface dimensions. Note that door buck may be flush to a room corner, so that it may be 0 inches in some cases. Note this as "00."

C, D. Measure door openings. Note that sliding doors overlap so that the sum of door dimensions is more than opening width.

E. Buck may be flush with wall.

F. Measure total width of windows including frame.

G. Take frame dimensions, both horizontal and vertical, and note window type, opening or fixed, and style of opening (double hung, casement, awning, etc.).

H. Shade or blind dimensions.

J. Sill height and detail of below-sill cross section.

K. Sill profile, window frame, and exterior sill section.

L. Window mullion details, locations, and layout.

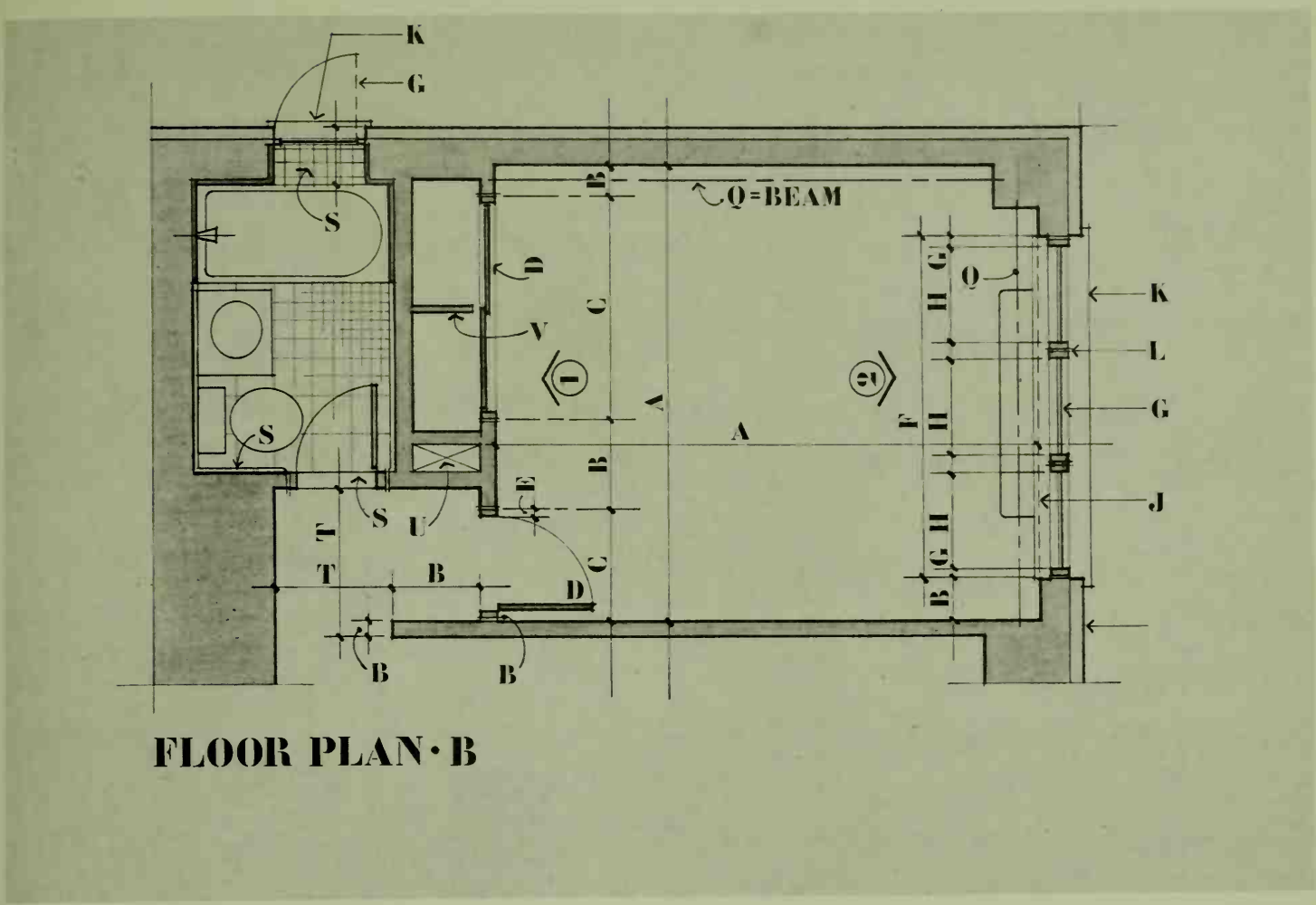
M to P. Fireplaces are rare in modern spaces, but must be measured when they occur.

Q. Take ceiling heights and locations, as well as dimensions of beams, dropped panels, duct or pipe enclosures.

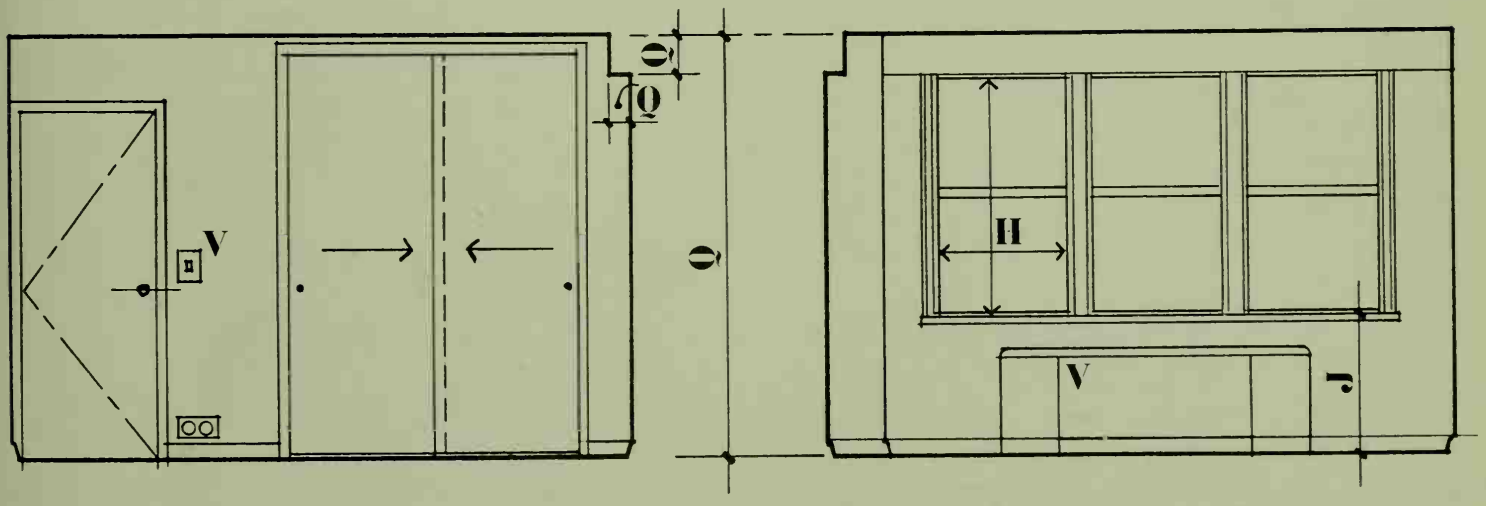
R. Dot in locations of ceiling elements.

S. Bath detail is shown enlarged on top of page 54. Locate fixtures and other details. Note window type, dimensions, and details. Note floor and wall tiling, its color and patterns, as well as door saddle material and color. Note if floor is raised.

T. Take anchor dimensions to relate rooms.



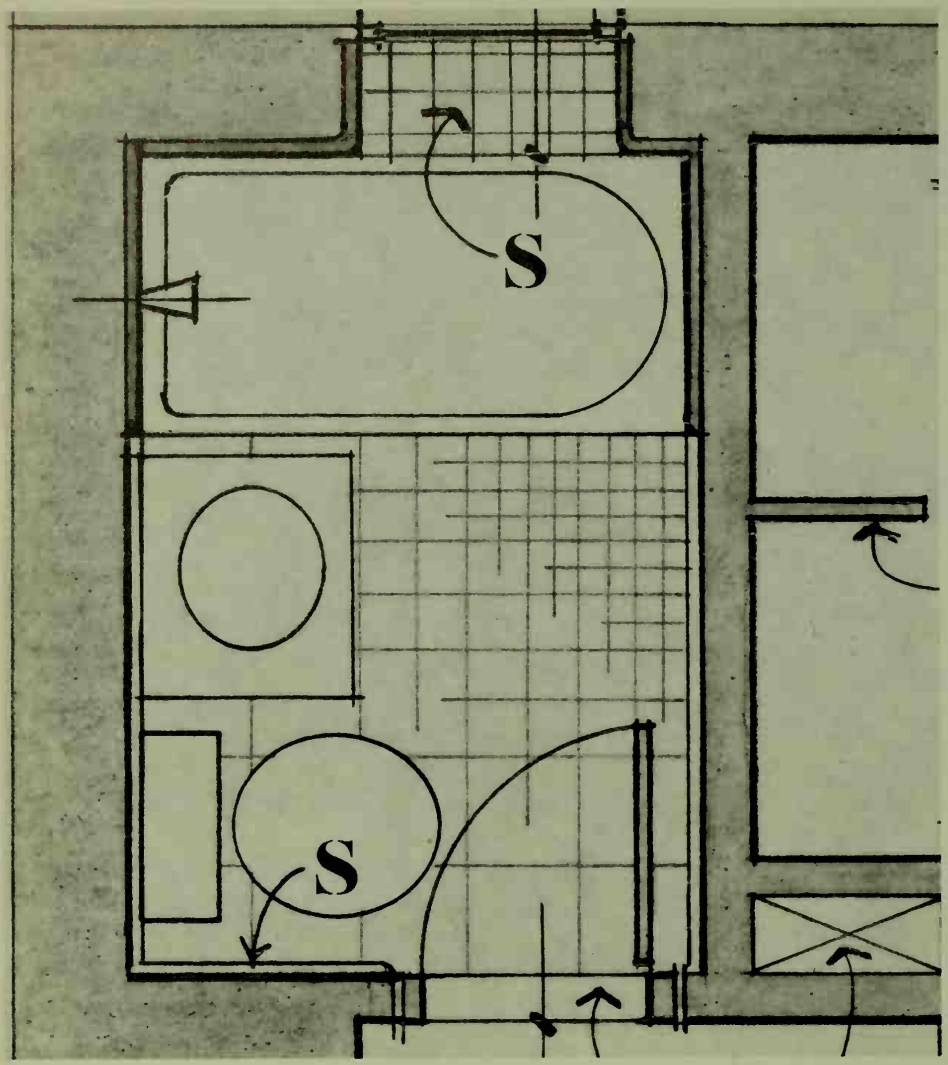
FLOOR PLAN · B

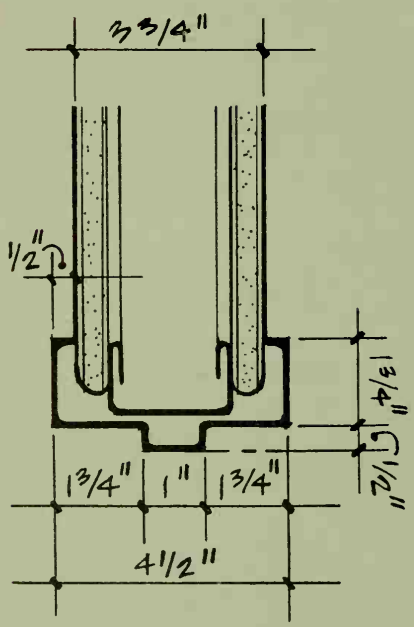


ELEVATION · 1

ELEVATION · 2

A portion of a modern (post-war) apartment is shown in plan (top) and two elevations (bottom).





Bath detail (above) from plan on page 53 is blown up to larger scale. A modern metal door buck (left) is shown in plan section.

Opposite page: The modular plan of a modern office space is shown in measured plan.

U. Note nature of void spaces, columns, pipe chases, etc.

V. Measure closet dividers, shelves, and other fittings. Make note of electrical outlets, switches, radiator or convector enclosures, air conditioning grilles, thermostats, sprinkler heads, floor materials, and any other items that might turn out to be significant in later design steps.

Example 3. Space in a modern building, such as an average highrise office tower (most often this will be typical of rental space in new buildings, perhaps first encountered in drawings when still unbuilt; whether working from plans or measuring the actual space, take note of some typical situations rather different from the two previous examples):

A. Modular planning is usually controlled by a grid of lines establishing column center lines. The resulting "bays" are usually all equal in each direction, although not necessarily the same in each direction. Bays may be rectangular rather than square. Sometimes all bays will be equal at some even dimension except one bay, slightly odd to fit the lot dimension. Note that once grid measurement A is obtained, windows will usually be all equal units, with a center-to-center dimension that divides evenly into the grid dimension. Take column dimensions, window and mullion dimensions, etc., as offsets from the column center line grid lines.

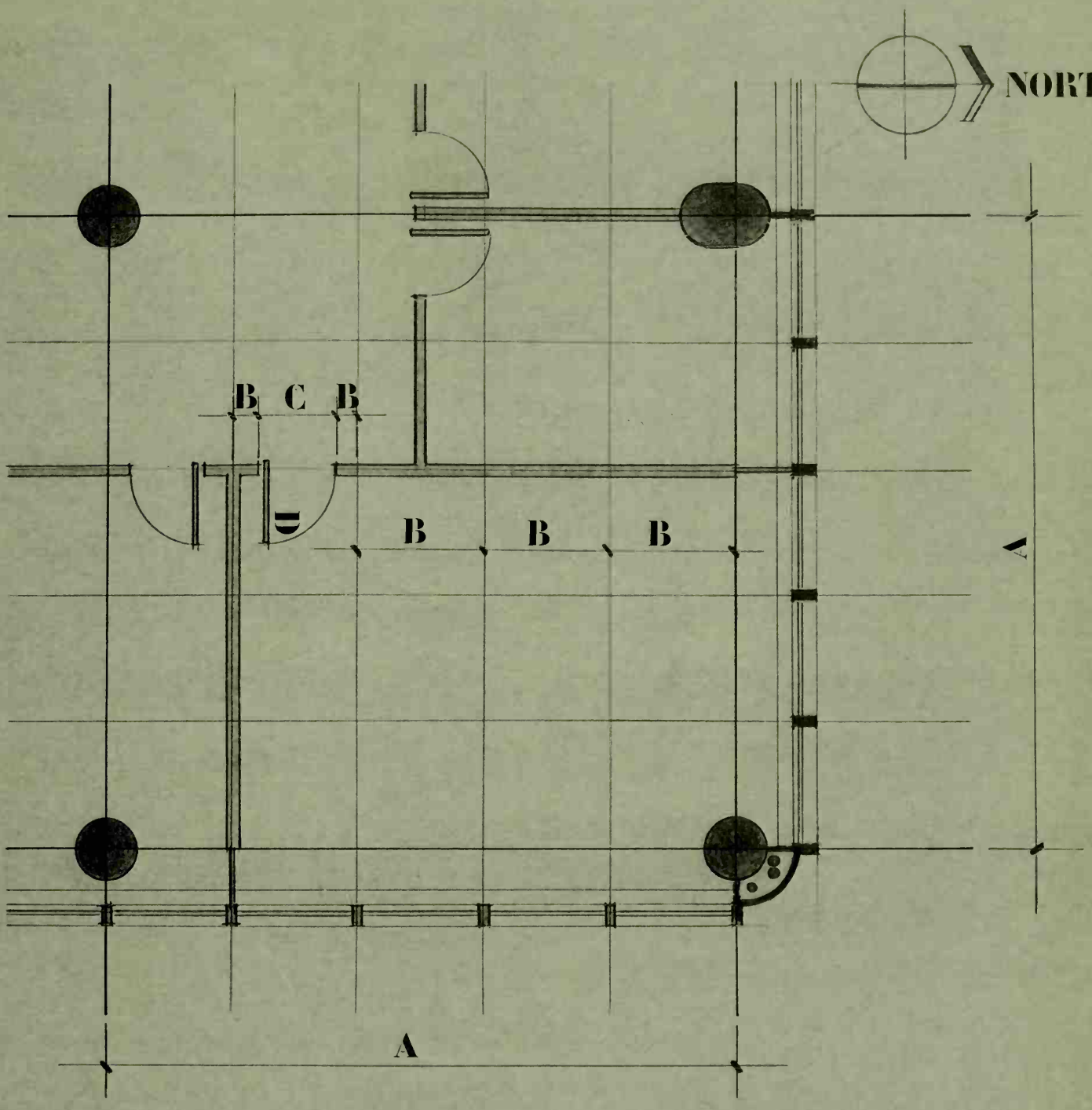
B. Wall panel widths.

C. Opening widths and heights.

D. Door dimensions.
Note: Although columns are normally all alike, outside wall columns, corner columns, and "wet columns" (with space added for water piping) may be larger than the norm.

Make careful note of window conditions, including convector enclosure, usually below the windows, and any pocket at the ceiling. Note details where partitions or columns meet the window wall.

Take ceiling height and note if any ceilings are dropped to contain ducts.



FLOOR PLAN · C

Note the nature of the ceiling system: whether it is coordinated with the plan module or laid out independently. Note ceiling lighting arrangements and when provision is made for changing ceiling panels and lighting. Make note of the partition system used; it may also be modular and flexible within certain limits.

Modular planning is based on the idea of repeated standard units, but be wary of exceptions to the standard. These can occur at exterior walls, near shafts, or at "core" areas where stairs, elevators, and services are located. They can also occur where previous occupants have made special arrangements to carry heavy loads (such as files), provide internal stairs, or have special equipment installed. Even when a rental plan suggests uniformity, a field check is always wise to discover any unexpected variations.

In all cases, note a north point on the sketch plans, as well as the kind of light and view at each window orientation. Such matters seem obvious when on the site, but they may be hard to remember later. Sketch sections are useful to record details such as under window convectors, access panels, etc.

USING A CAMERA

It is common practice today to take a camera on field surveys to take general views and detail photos of any complex conditions that may be hard to remember and troublesome to measure and draw. Various views are held about what the ideal camera for this use may be. Availability may be a sufficient basis for choice, but if a camera is being selected for purchase or rental, consider the following possibilities:

1. A Polaroid camera. Very fast film is available, as well as convenient flash for dark locations. The instantly available picture assures that the results will be satisfactory (after as many trials as necessary) and means that prints are ready at once along with field notes.

2. A miniature 35mm camera, such as Rollei or Minox. Its very small size makes this camera no problem to carry in a pocket or brief case so that it can always be available.

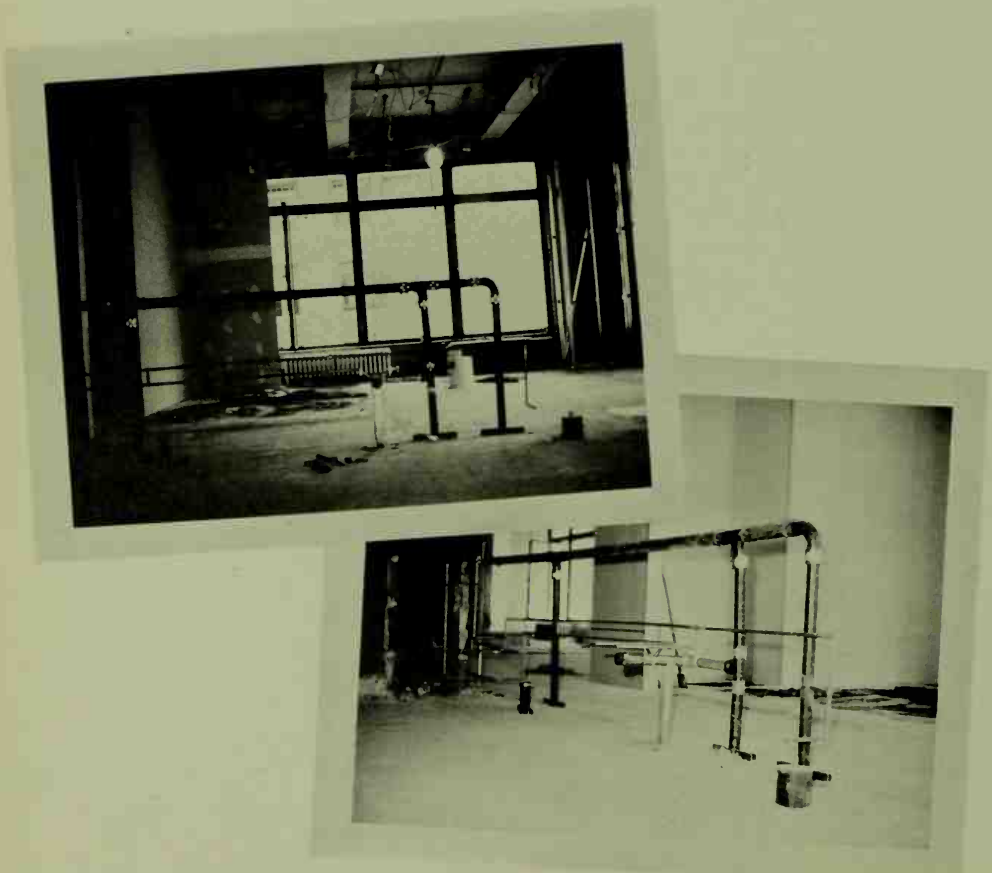
3. A 35mm camera, either reflex or range-finder, with interchangeable lenses, including a wide-angle lens. The value of this lens is that it includes a wide enough field of view to be useful even in constricted interior spaces where other lenses will only take in a small field with each exposure. Such cameras are also favorites for general use, but are usually too bulky for pocket carrying.

Not only are photos good memory aids when drawing up field notes, but they are also often dramatic means of comparing before with after images that show the success of the finished project.

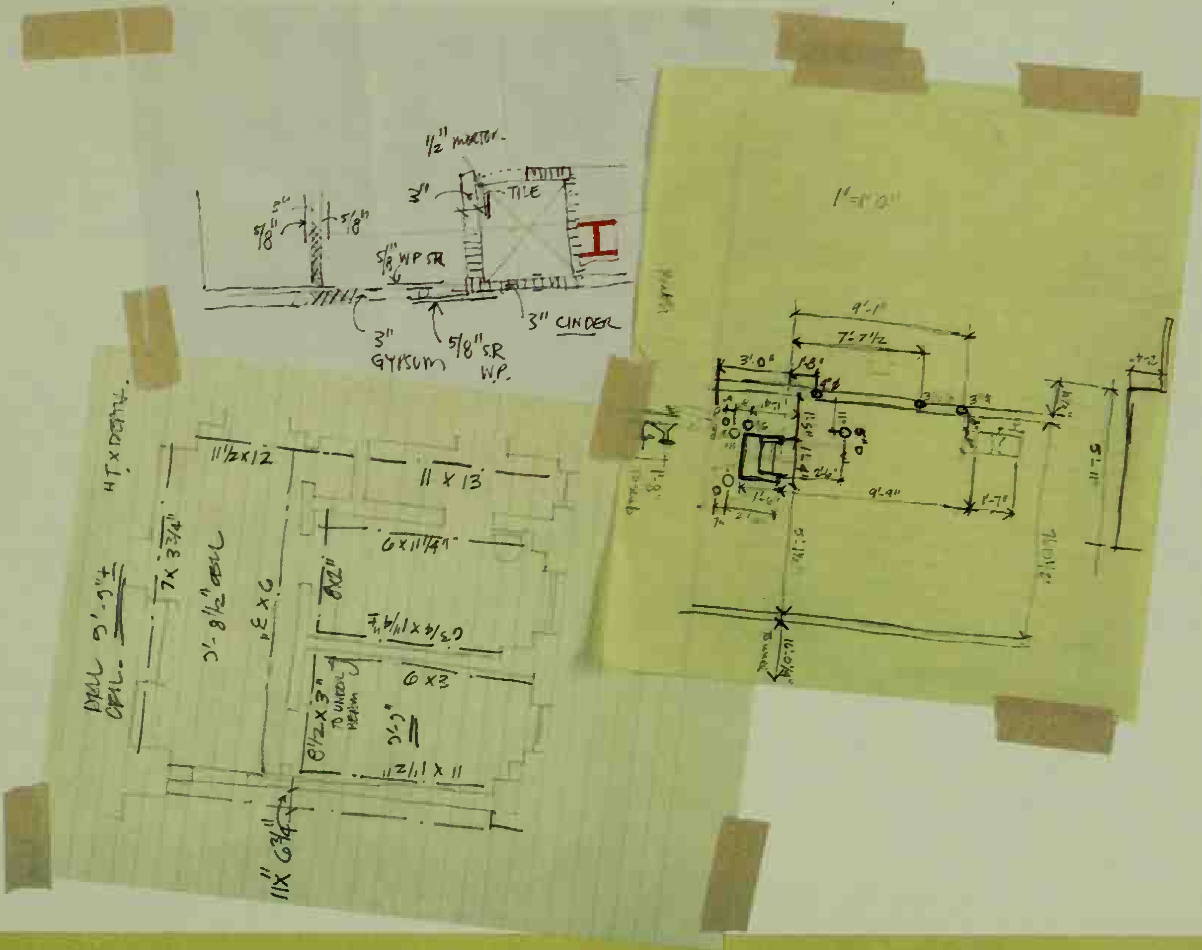
Once field measurements are complete, the notes must be taken back to the drafting table and converted into neat existing-condition drawings that are the foundation for the design studies to follow. These drawings should be made at a suitable scale and should consist of all plans and whatever sections and/or elevations may be necessary to give all information about the space in question. Where field measurement has been done well, there will be no problems, no discrepancies, and no need to go back for any missing items. This is the test of good on-site surveying.

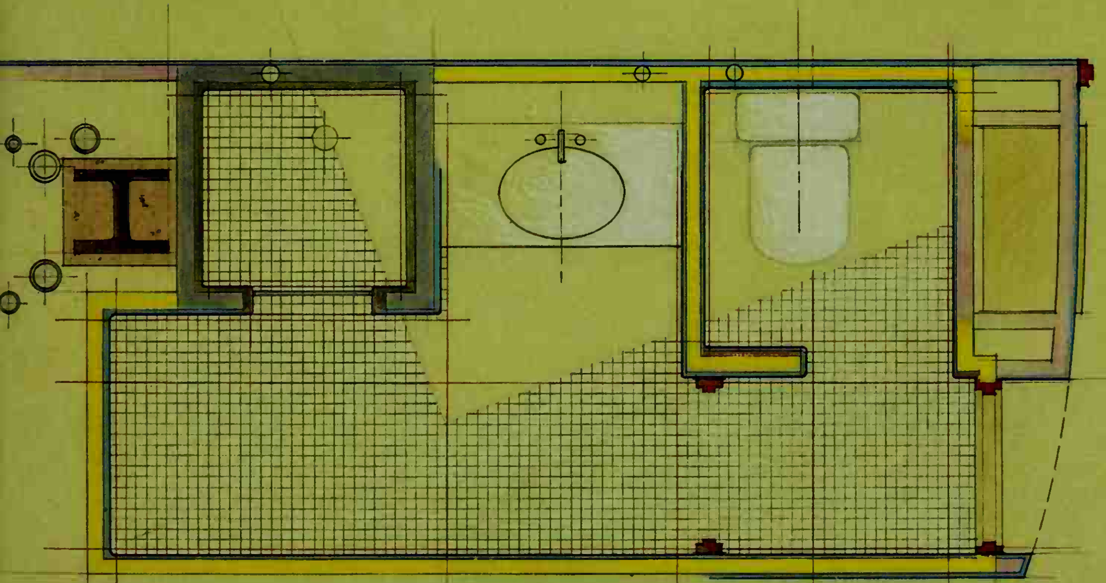
In the illustration opposite, the use of field notes in working out a design is shown. Field notes are shown above the designer's detail drawing in which a tile grid is being worked out in relation to existing elements of structure and plumbing.

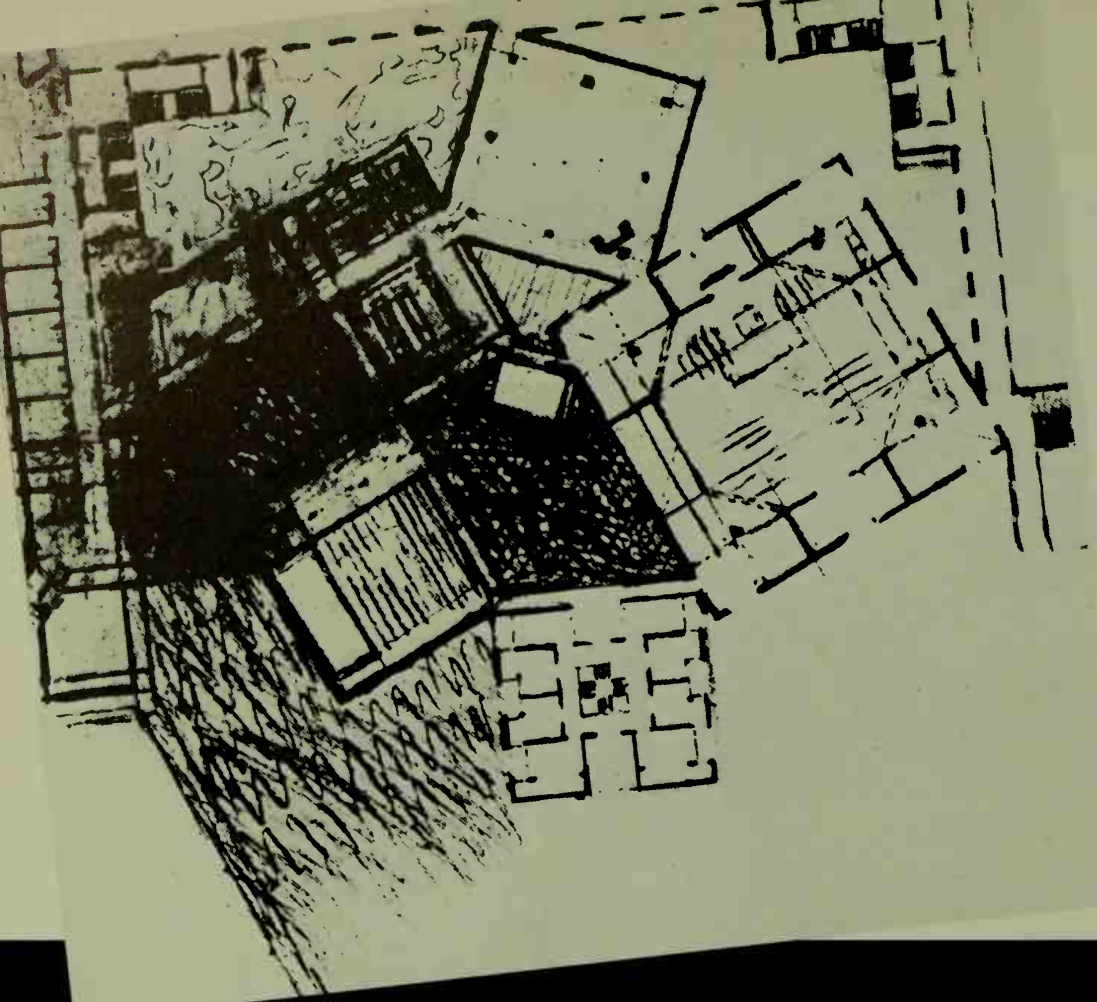
Even after existing-condition drawings are complete, field notes should be filed away, carefully identified as to the location of spaces in case they are required to answer some question or solve some problem that may surface at a later phase of design development.



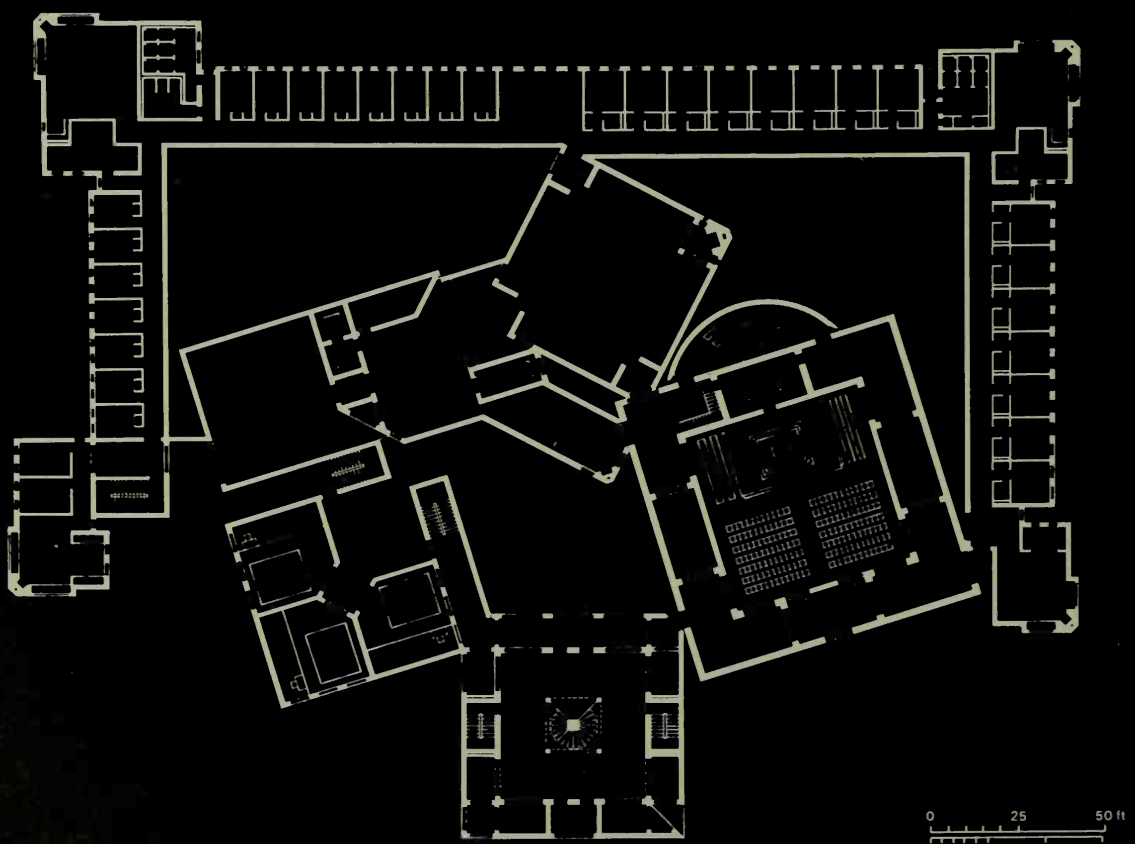
Field sketches and drawings, developed from Polaroid photos (left) and measurements obtained at the job, can resolve problems not foreseen in advance. Color is used (right) to aid in resolving problems of an intricate tile layout.


1/2" MORTAR
TILE
5/8" WP SR
3" CINDER
3" GYPSUM
5/8" SR W.P.
1"=1'0"
11 1/2 x 12
11 x 13
6 x 3
11 x 11 1/2





In drawings by Louis I. Kahn a conceptual drawing (left) shows an in-office study. The same space (below) in carefully developed drafting suitable for formal presentation or publication. (The Dominican Sisters' Convent, Media, PA, 1965–1968. Courtesy: Westview Press)



PLANS

In 1923, in his famous book *Vers une Architecture* (usually translated as *Towards a New Architecture*), Le Corbusier says, "The Plan is the generator. . . . The plan is what determines everything; it is the decisive moment." A later chapter titled, "The Illusion of Plans," begins, "To make a plan is to determine and fix ideas." Architects and designers regard plans as the most important of all drawings. The general public has come to speak of "plans" and "planning" as synonymous with all construction drawings and with all design processes as well. In this chapter we are concerned (as was Le Corbusier) with plans in the more narrow and specific sense of ground plans or floor plans, the maplike layouts that show sizes and positions of rooms and other spaces in accurate relative size, shape, and position.

Almost everyone has some familiarity with plans as they appear in real estate advertisements and brochures and in the magazines that deal with home building and decoration. In spite of the sense that understanding plans is a simple matter, few people think in terms of plans unless they have been exposed to special training. Ask a friend or neighbor to draw a plan of their own home. The result will usually soon become confused, with spaces that do not fit together, rooms with no doors, missing spaces, and blanks that cannot be accounted for. Architects, engineers, and designers who deal with interior space soon learn a habit of thinking in plan terms, generating a mental plan while walking through a space, and come to find that a plan tells more about architectural spaces than a series of photographs or realistic views, more even, in many cases, than an actual visit to the built space.

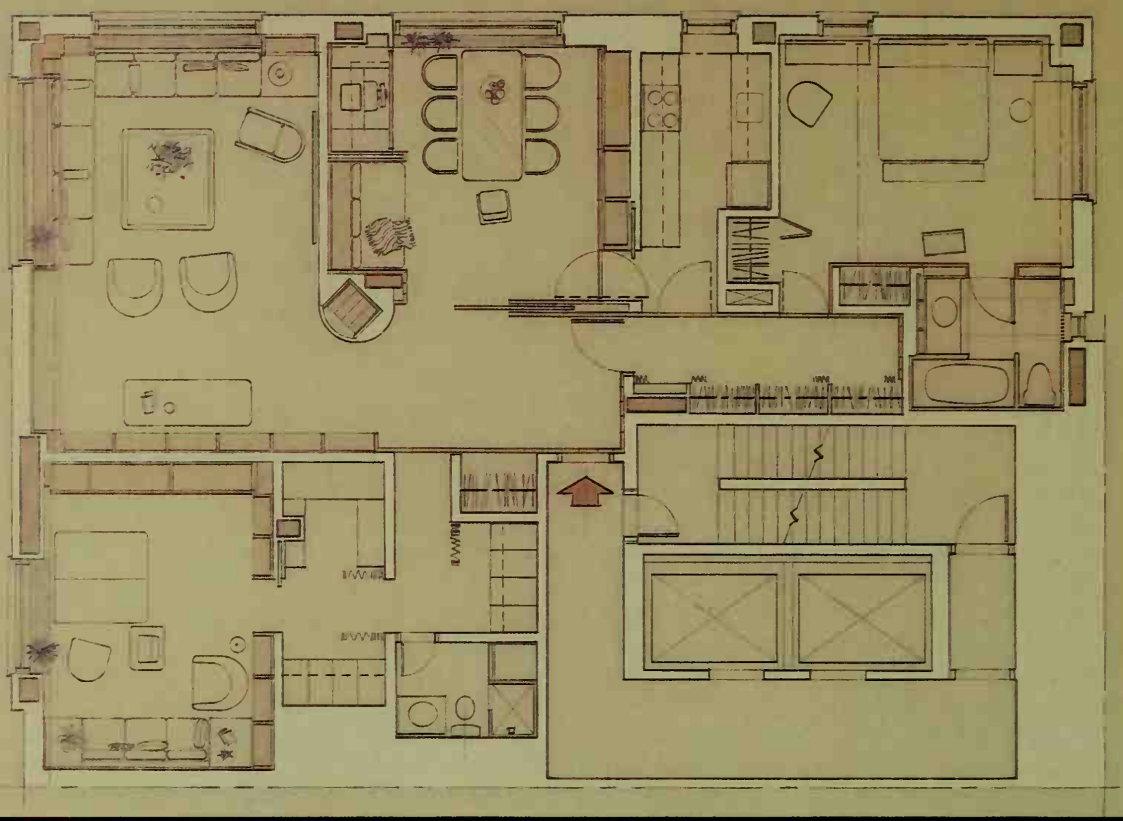
The reason for this devotion to plans is that a plan gives a kind of conceptual overview of a space that cannot be had in any other way. It is hardly possible to imagine designing spaces of any complexity without using plans as the primary drawings. Perspectives, elevations, sections, and details discussed in other chapters in this book are all also useful and informative, but the plan must come first. All other drawings grow out of it, and plans alone, plus a few height dimensions, are often all that is required to give quite full information about architectural spaces.

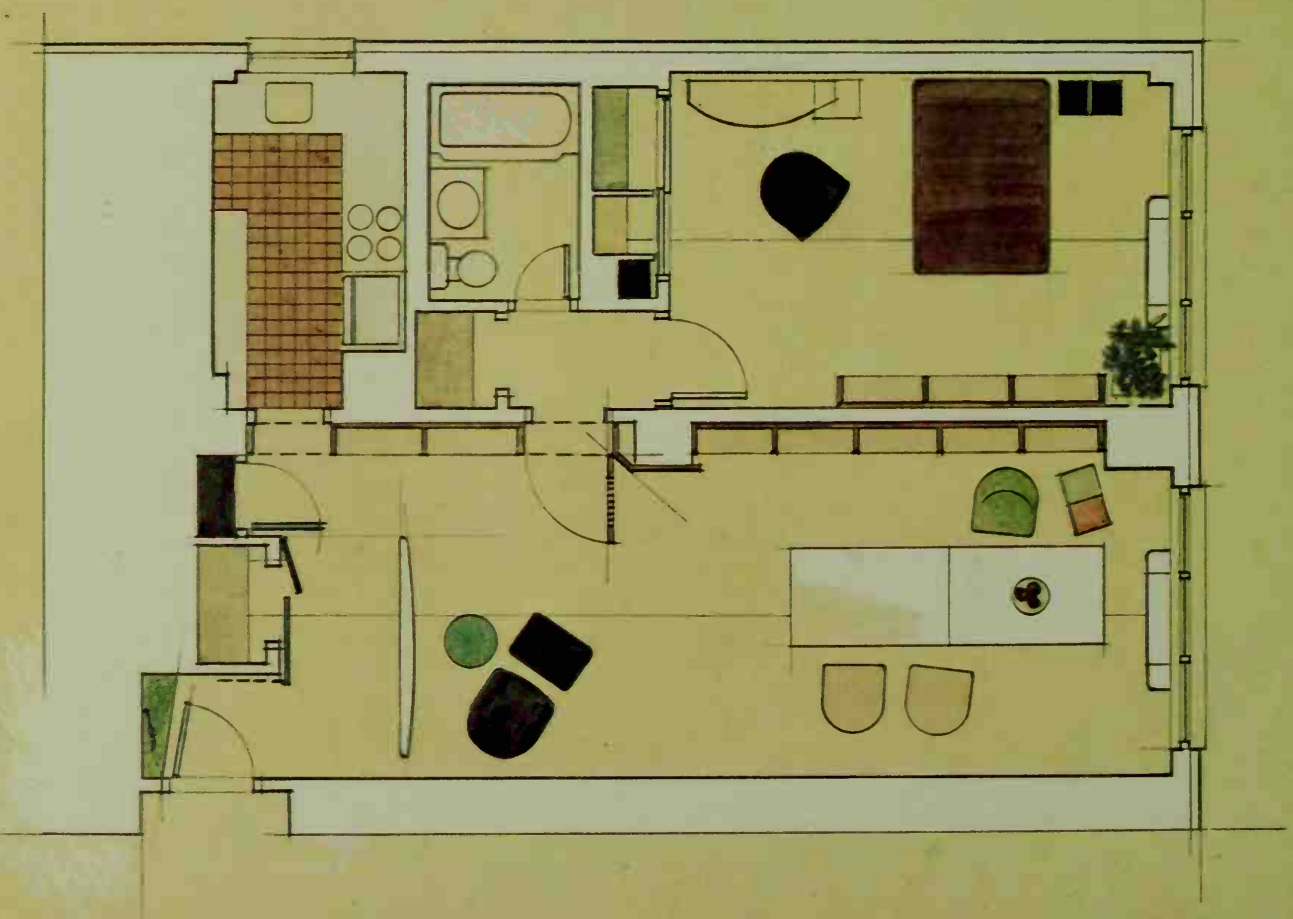
Plans do not, alone, tell us what a building or spaces within a building will look like. With experience it becomes possible to get enough clues from a plan to develop at least some good guesses about general characteristics. The plan of a Gothic cathedral is very different from the plan of a Greek temple, and both are quite unlike the plan of a modern highrise office building. Plans do spell out the sizes, shapes, and relationships of spaces that make up a building.

By strict definition, a plan is a horizontal section, a scale representation of what would result from slicing through a structure at a particular level. While plans are often called "ground plans" or "floor plans," an architectural plan is ordinarily drawn to show the structure as if cut through at about eye level. This means that the drawing shows windows of normal height as if sliced through, while objects below eye level—such as sills, radiator enclosures, floor patterns—are seen, more lightly drawn, as laying below the section plane. Anything above the plan section level (beams, ceiling level changes, skylights, etc.) is shown with dotted lines or not at all. Stairs appear as lines representing the edges of treads up to eye level and are then shown broken off, possibly dotted, as they continue upward. The inside of a room or other space is outlined by the firm section line where wall meets empty space; wall thickness and other solid masses (such as columns) are the spaces enclosed by these section lines. The thicknesses are often filled in with dark tone or black, creating patterns of solid in relation to the open enclosed spaces. The French Beaux-Arts theories of architectural design placed great emphasis on the patterns created by these filled-in masses, referred to as "poché" (from French for "pocket"), suggesting that excellence in planning could be evaluated from an aesthetic analysis of plan forms.

INTERIOR PLANS

Interior plans usually stop with the firmly drawn wall line and only show wall thicknesses when several adjacent spaces are being shown together. Within the space, an interior plan may include furniture, patterns of floor materials or coverings, and (dotted) ceiling elements and lighting. Where ceiling design is significant, another type of plan may be used: the reflected ceiling plan. This shows the





layout of the ceiling projected downward as it might be seen in a mirror (hence the name). A reflected ceiling plan can be drawn as a tracing over a floor plan and is helpful in planning lighting and air conditioning layouts and in controlling the design of a ceiling made from modular materials (tiles or acoustical panels, for example).

Design development, also often referred to as "planning," involves the drawing of many plans, beginning with the roughest of idea or concept sketch plans and proceeding toward more and more precise and detailed plans. The formal "presentation" plan to be shown to clients for approval and the carefully drafted plan suitable for publication represent the maximum of formality in plan presentation. The plans that are part of working drawing sets contain the maximum of detail, although, for that very reason, they tend to be less visually clear in explaining spatial relationships. The plans on page 58 illustrate plan drawings at widely separated points in a project's development. The subject is a convent designed by the great American architect Louis I. Kahn. The upper drawing is his own, a study made in charcoal on yellow tracing paper, full of the rough scratchiness and rubbed-in tones that suggest space study in progress. The lower drawing is a plan of the same building in its final form, drawn here in precise ink line suitable for reproduction and publication.

COLOR PLANS

A high proportion of plan drawings are made entirely in black and white, partly because color is not an important aspect of architectural planning, but also partly because color is not convenient to reproduce by blueprint and other printing processes. In interior design, the importance of color makes it worthwhile, in many situations, to develop color plans, more or less realistic, that can be viewed as originals or reproduced in color slides, as color photostats or Xerox prints, or, of course, through color printing.

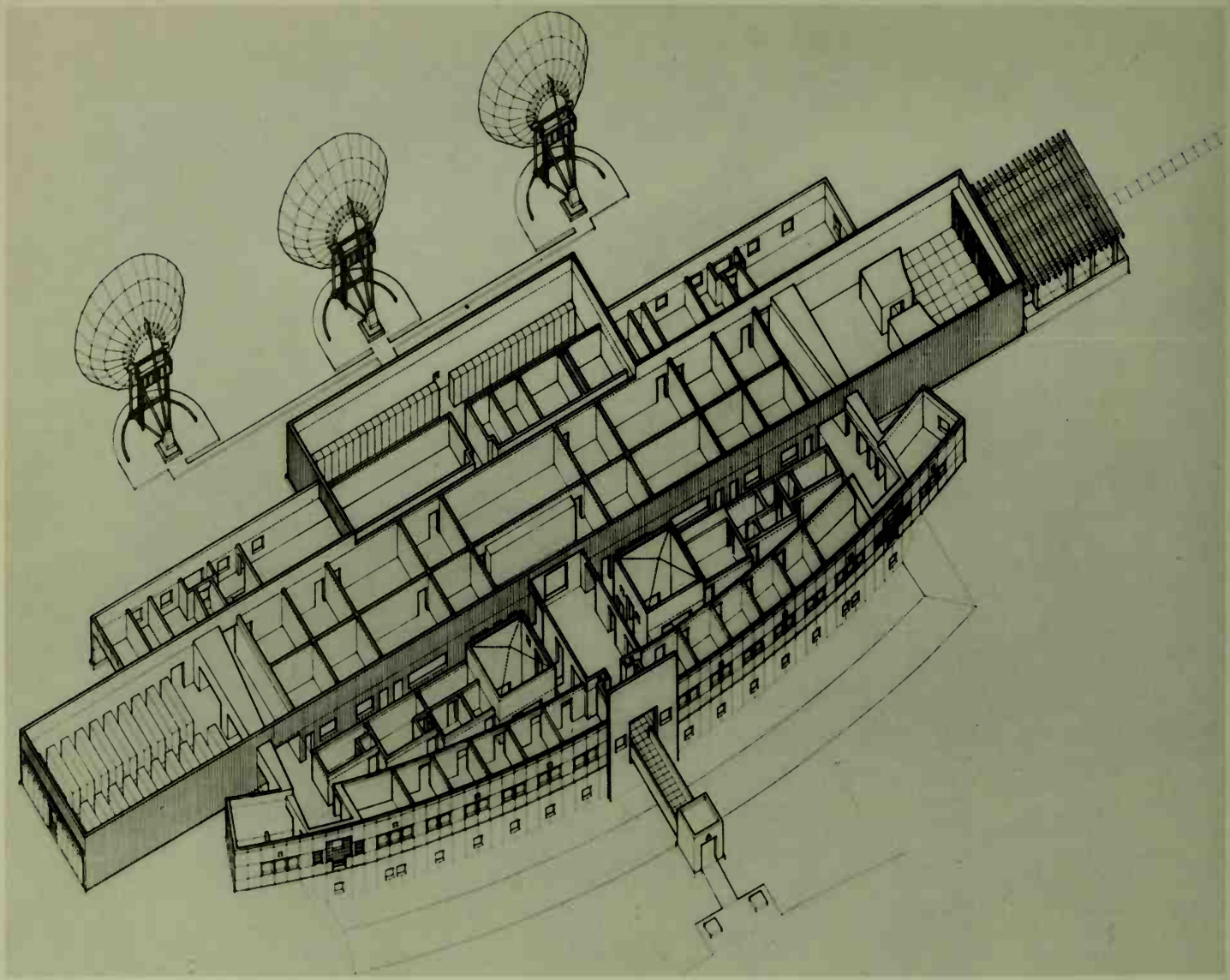
Color is used in both plans at the left. The drawings are on cream tracing paper, its characteristic tone giving an overall medium tonality against which both darker and lighter tones can be developed. In these examples, the lighter tone is soft white pencil used on the top surface of the paper to poché, or fill in, the fixed architectural elements—the sheetrock partition walls and fixed building walls and columns. The white poché is outlined with black line, making these solid elements stand out strongly. It takes some care and special technique to avoid smearing black into white. To manage this, have a working plan blocked out in advance. Place the final sheet over the working plan in order to fill in the white areas *first*. The black outline is added afterward. Color is added on the *back* of the sheet, giving it a slightly muted quality that holds detail elements back in relation to structure. In this example, pink lines indicate fabric-covered walls, beige-tan tones indicate natural wood, and other colors suggest the actual colors of materials to be used. The result is a plan that communicates a sense of what the actual space will look like in a way that strictly architectural plan drawing does not.

In the lower plan, similar techniques are used to show a typical one-bedroom city apartment with emphasis given to the location and character of the furniture. The color used is fairly realistic; green wool on a chair and dark brown for a suede bed cover. The paper itself suggests the sisel mat floor covering, with lines for the joints of the matting. Here also color helps move the plan from its role as a strictly abstract and geometric description of a space into something more communicative, more directly suggestive of the end result.

AXONOMETRIC PLANS

While detail and color can suggest reality in a plan drawing, there is no escaping the fact that plans remain for many laypeople obscure, abstract, and hard to interpret. One device that can be used to bring a plan to life is converting it into a type of special drawing that generates a certain illusion of three-dimensional reality: the plan axonometric. The example on the next

Color is used to express relotionships of materials (top) as studied in the designers' studio. White represents sheetrock; tan, wood; and red, textile fabric. Color used in a developing color scheme with fabrics and finishes (bottom) is suggested in form suitable for client presentation. (William Machodo, Normon Diekman, designers)

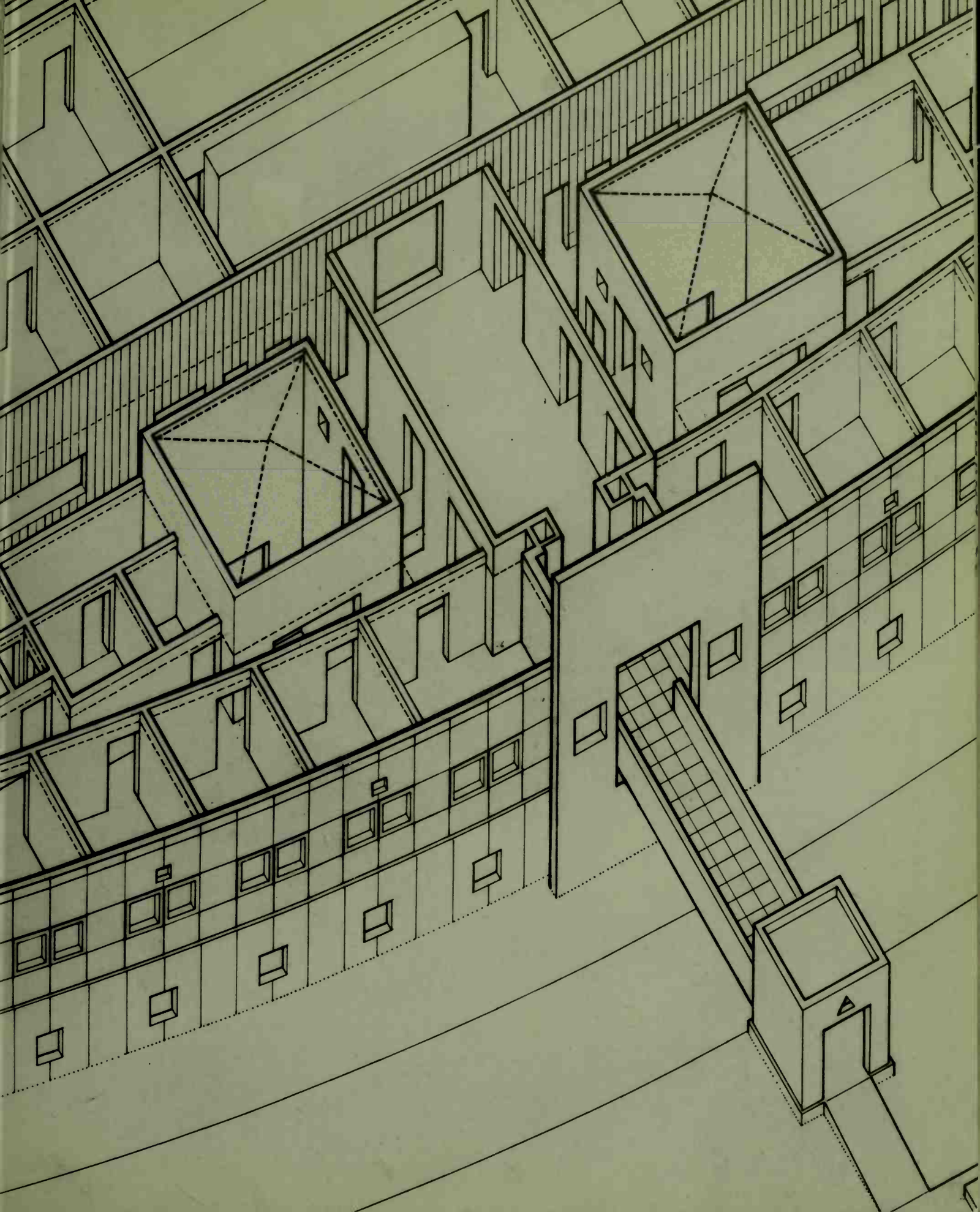


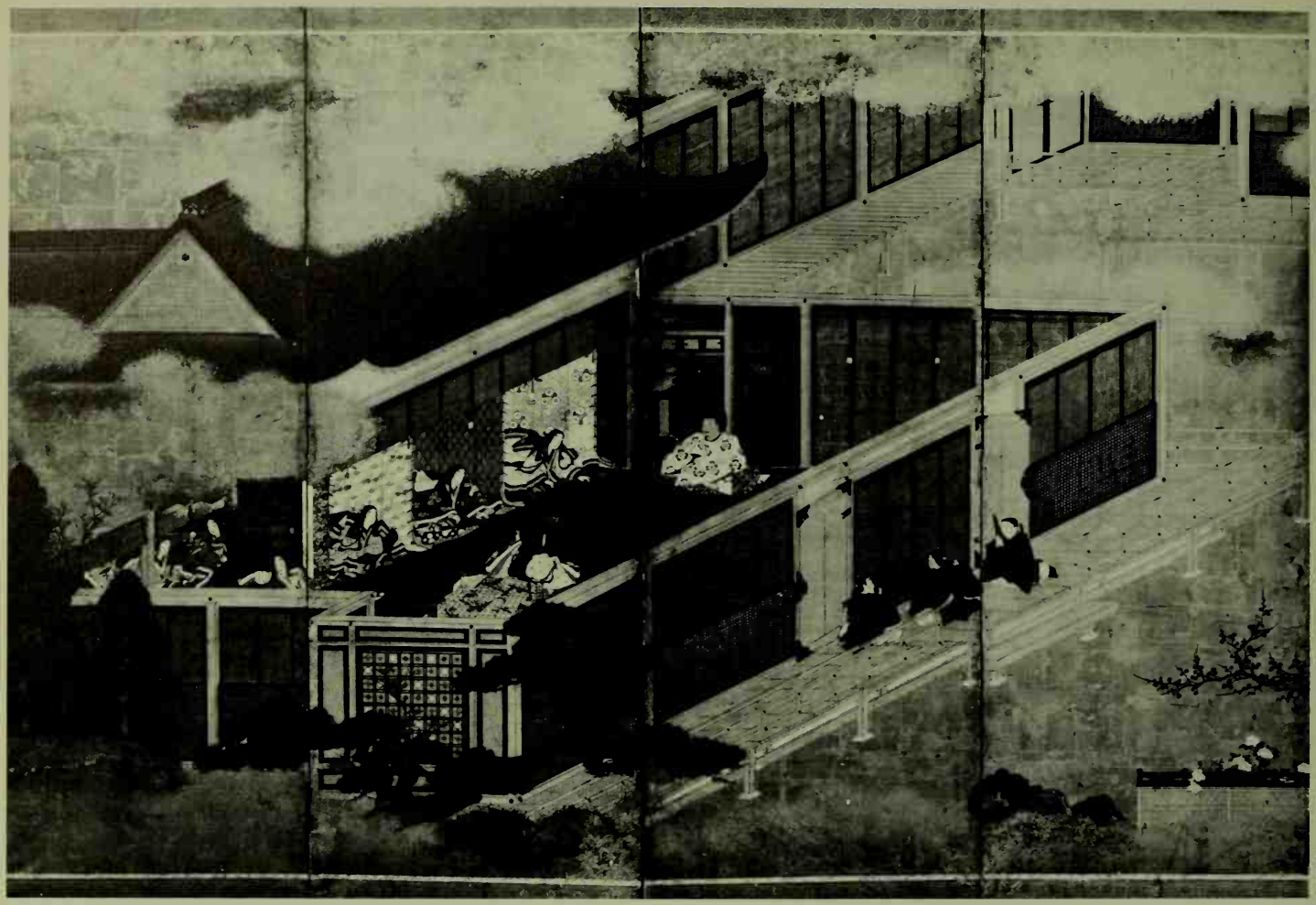
In an isometric drawing (above) a plan is converted into an understandable three-dimensional form. An enlarged detail (opposite page) of the drawing at left shows the levels of intricacy that this technique can make clear and explicit. (Pomeroy Lebduska Associates)

page is a plan for a fairly large building, a cable TV station complex designed by Lee Harris Pomeroy. At first glance it may not seem to be a plan at all, but rather a realistic perspective image.

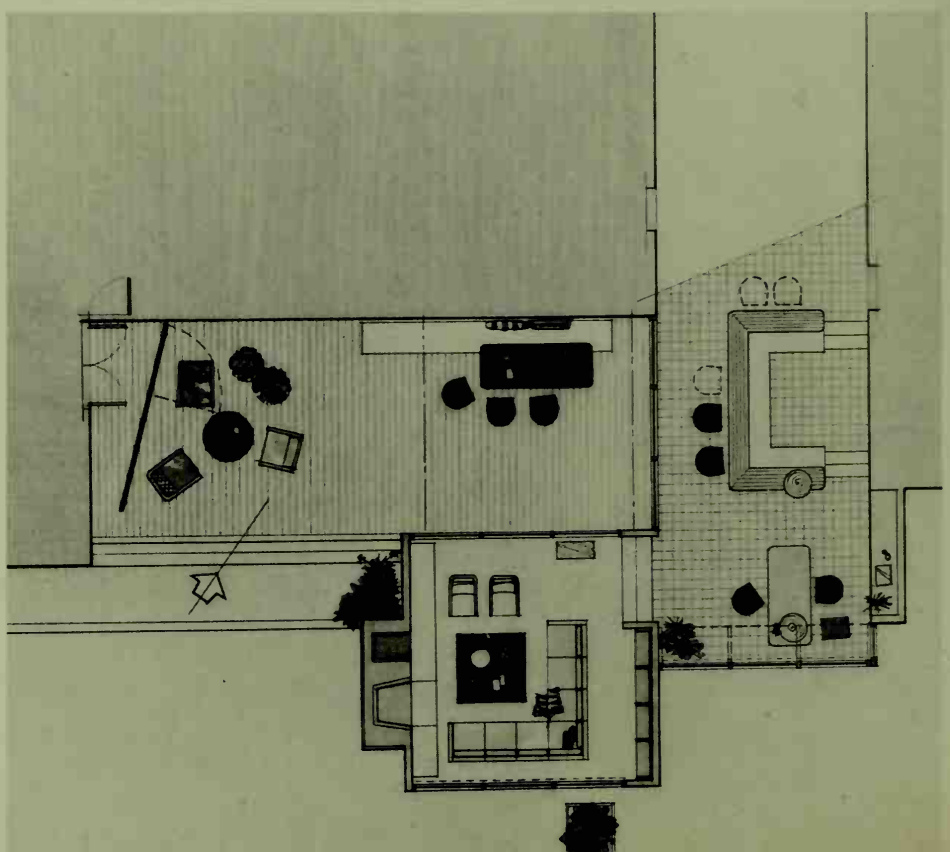
On closer inspection, it will become clear that a plan drawing, to scale and quite conventional in its display of layout, is the basic element of this drawing. It forms the top plane, the level that seems to be cut by the section plane. The conventional plan has been tipped at a 30°/60° angle, but has not been otherwise modified. The illusion of three-dimensionality is created by adding a vertical dimension, drawn to the same scale and extended downward from the level of the plan to a floor or ground level shown dropped to about room height below the plan-section plane. While this process may seem complex, an experiment at the drafting board will show that any plan can be transformed in this way with nothing more than normal drafting skills.

The resultant drawing suggests a highly realistic image of the building or space seen from above with the roof (or upper levels) removed. It is as if the top were lifted away from a scale model to permit viewing of the interior space. The example shown makes no attempt to suggest realistic detail of furnishing and color, but it does serve to convert a rather complex plan into an image that is instantly understand-





In this detail of a Japanese 17th-century screen (above) architectural space is seen in three dimensions of a conventional sort. (Seattle Art Museum, donated by the Friends of the Seattle Art Museum 72.1) A similar visual sense is apparent in a modern presentation plan (right). (Norman Diekman, designer)



able to any viewer. The enlarged detail image at the right may make the details of this kind of drawing clearer. Notice the two square spaces on either side of the center axis that extend below the main floor plane (they are double-height rooms) and are topped with pyramidal ceilings indicated by dotted lines.

Such axonometric drawings suggest a certain technical explicitness that we associate with the illustrations of technical manuals, which often show mechanical devices displayed partly or totally disassembled. However modern and technical such drawing may seem, the technique is not at all new. Before perspective drawing methods were known, artists observed the way in which orthographic projection could be made to simulate reality by the addition of a third dimension drawn at an angle to the geometry of the basic drawing. In a traditional Japanese screen, for example, three dimensionality is very well suggested by this means, although perspective is not used. In the example on page 63, the vertical planes of walls directly faced are shown in scale orthographic projection (that is, in elevation), while floors and walls receding away from the viewer are shown angled back at a 45° angle. Plan is now seen in "isometric," and the verticals added upward seem to create illusionistic space. Medieval artists often used similar means to suggest deep space before the rules of perspective drawing had been developed. It is interesting to notice how well some of these archaic techniques of spatial representation serve the modern architect and designer.

In the lower drawing at left, no such devices are used to suggest space. This is an entirely orthographic plan, but furniture and details of floor materials have been drawn with considerable realism so that there is a suggestion of space generated by conventional means. Making the mind's eye walk through the space will clearly show that a surprising level of realistic information can be conveyed, even within the strict limits of plan drawing.

PLAN SYMBOLS

To create plan drawings that speak with clarity and in details, the designer makes use of a vocabulary of conventional symbols, many self-explanatory, some perhaps not so obvious, until their meaning has been spelled out. The heavy lines that limit spaces and the solid poché that indicates wall thickness are fairly obvious. Windows are shown in a way that is quite realistic, appearing as thin twin (or triple) lines filling spaces where the wall is interrupted.

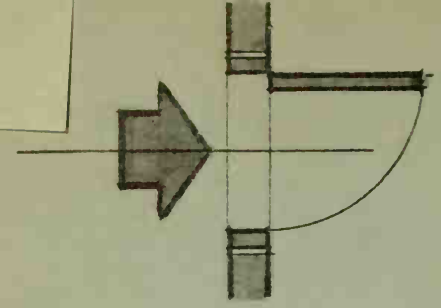
The meaning is, of course, based on representation of glass, sash, and, when they show up, sills inside and out. A door is always shown open at a 90° angle, and a lightly drawn quarter circle indicates the pattern of its swing. Sliding or "pocket" doors are shown realistically, usually partly open with a dotted line to show travel to the closed position. Kitchen and bathroom fixtures appear as rather obvious images of their true shapes. Hanging spaces in closets appear as a dotted line (for the hanging pole), with a number of randomly angled lines for the garments that may hang from them.

Templates have come into wide use as a convenient way to draw items of furniture and fixtures quickly and in accurate dimensions, but because the template always gives a precise, standardized, and generalized image, the thoughful designer will often prefer to draw each item by hand, using the template only to give dimensions, if at all.

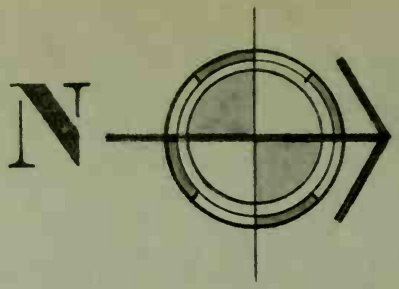
The chart on the following pages includes drawing symbols for the elements that are most likely to appear in typical interior design plans. A hint of the level of precision intended can be shown by line quality in plans. Simple block forms—a square for a chair, rectangles for tables, beds, or sofas—suggest a general decision about furniture type and placement, but not a specific selection.

Specific furniture selection makes it possible to draw a plan that is an exact indication of the real object. Desks, tables, and beds do not always reveal character when shown in plan, but

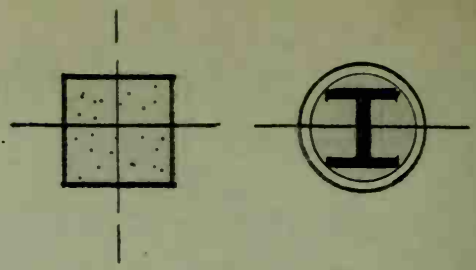
Pages 66–67: Illustrated are typical architectural symbols (page 66) used in plan drawings and furniture symbols (page 67) as used in presentation drawings.



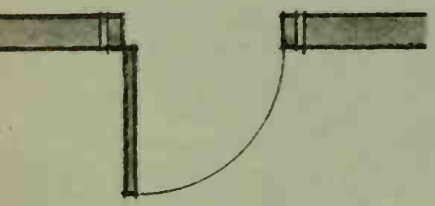
ENTRY ARROW



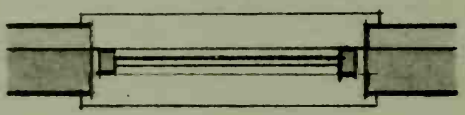
NORTH ARROW



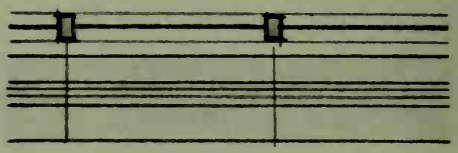
COLUMNS



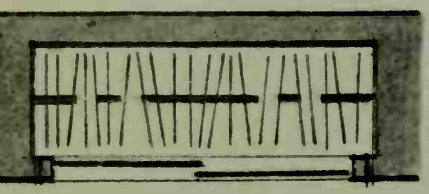
DOOR



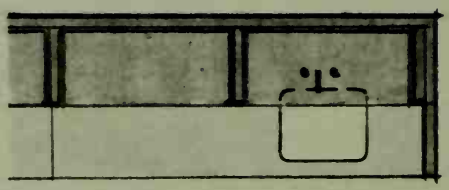
TRADITIONAL WINDOW



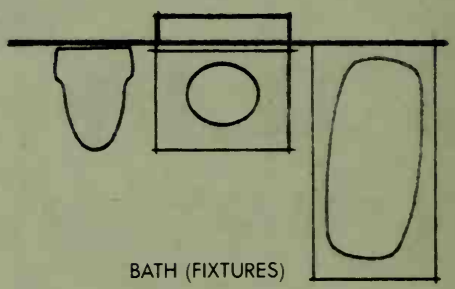
MODERN WINDOW



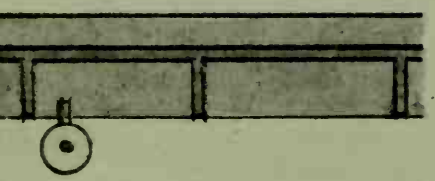
CLOSET



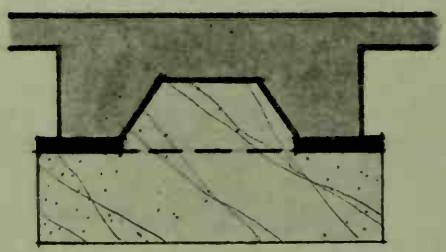
CABINETS



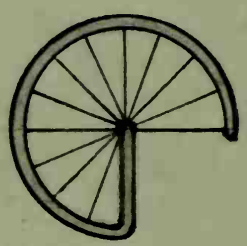
BATH (FIXTURES)



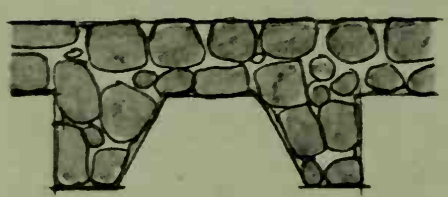
BOOKCASE



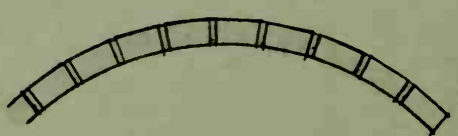
MARBLE FIREPLACE



SPIRAL STAIR

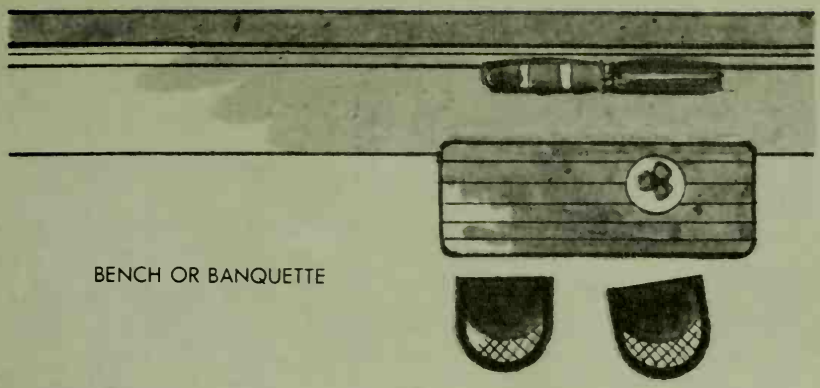


STONE FIREPLACE

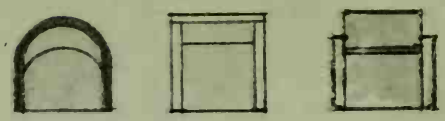


GLASS BLOCK

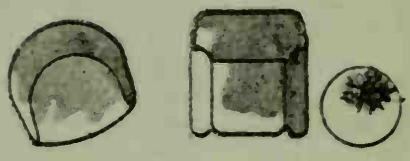
OFTEN USED SYMBOLS FOR ARCHITECTURAL PLANS



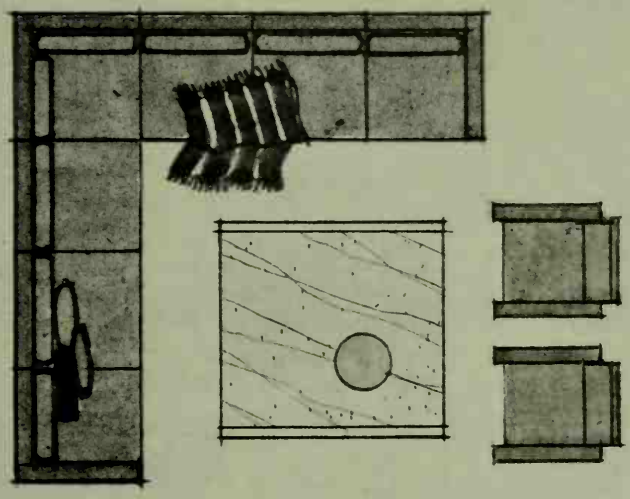
BENCH OR BANQUETTE



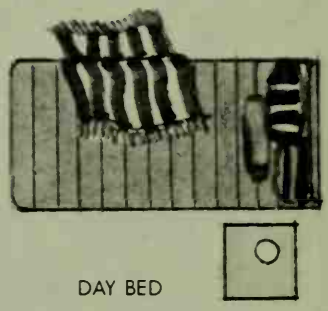
DINING CHAIRS



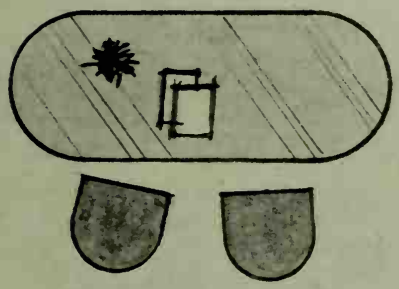
CLUB CHAIRS



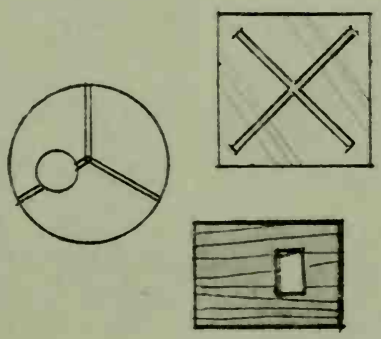
SOFA GROUP



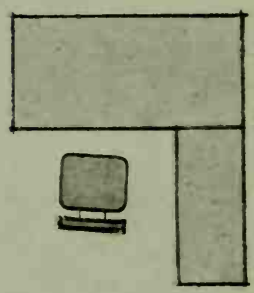
DAY BED



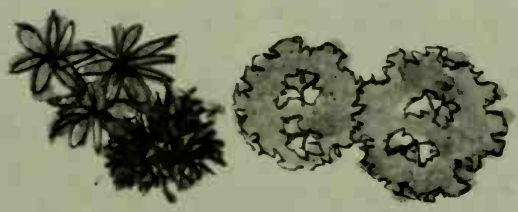
DINING OR WORK TABLE



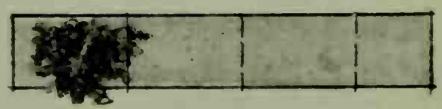
LOW TABLES



DESK

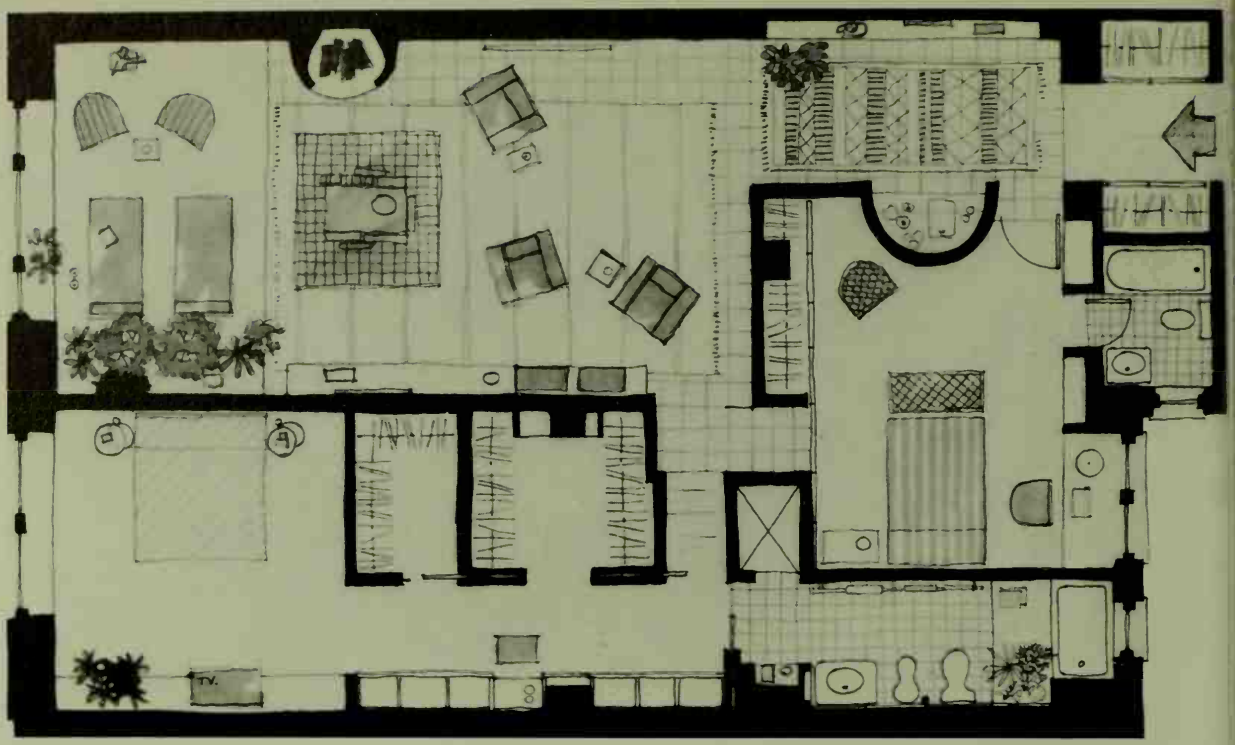


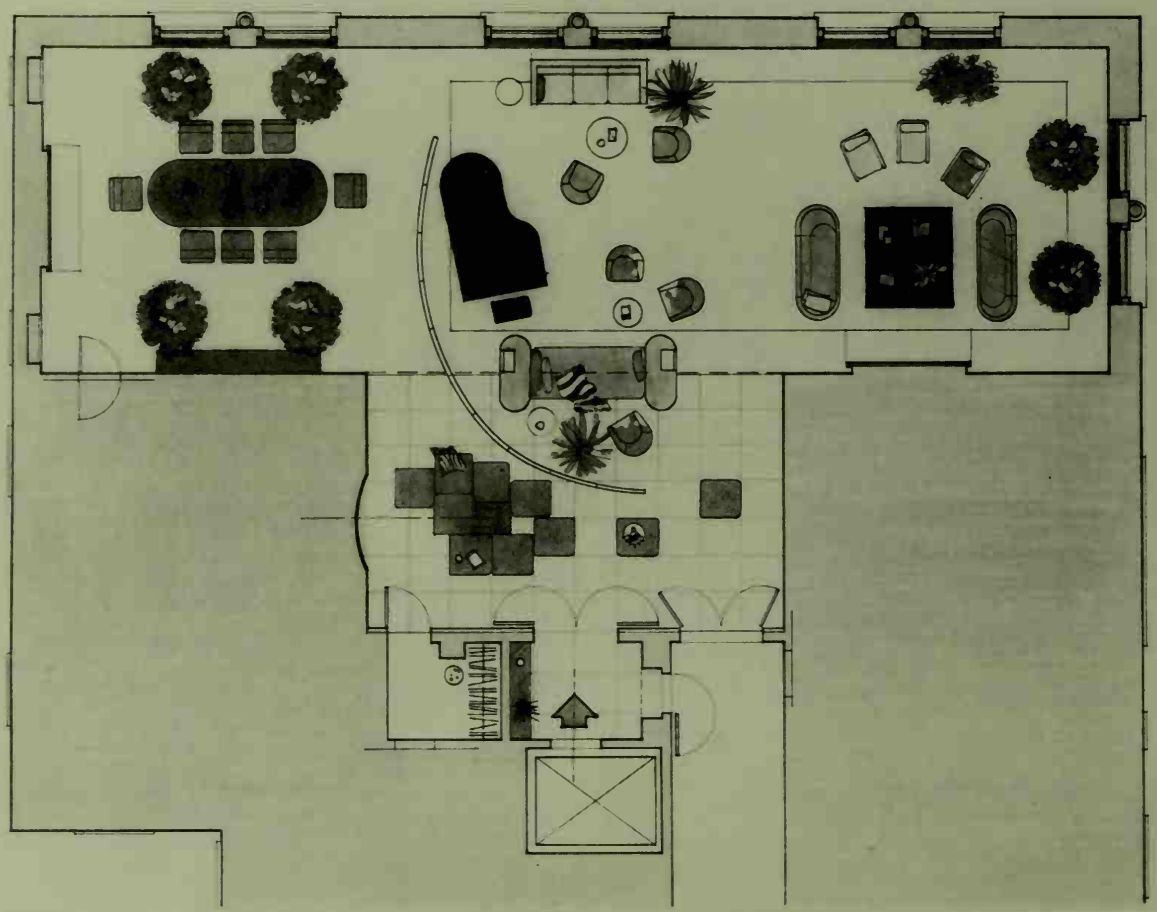
PLANTS & TREES

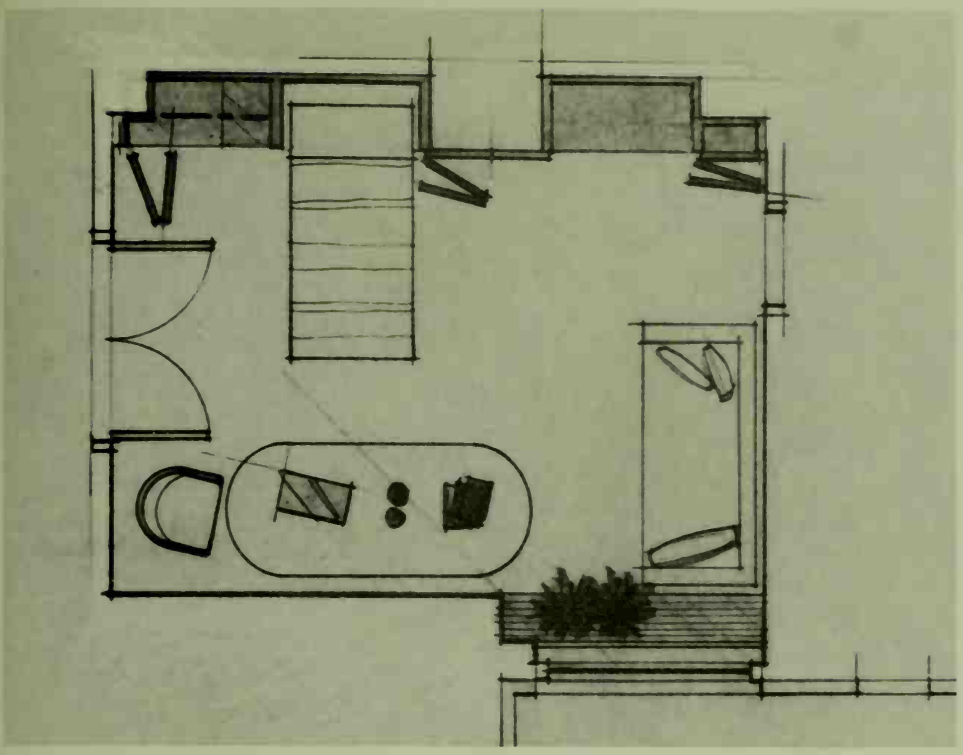


LOW CABINET

OFTEN USED SYMBOLS FOR FURNITURE PRESENTATION PLANS


TV





Plan drawings of three apartments show the variety of styles available using the symbols shown on the preceding pages. (William Machado, Norman Diekman, designers)

chairs and other seating vary considerably in size and shape. A Charles Eames lounge chair is very different from a Saarinen lounge chair in plan, and both are different from a secretarial desk chair.

Some furniture manufacturers supply templates of the plan forms of their own products, but aside from the convenience of having the correct scale dimensions supplied by the template, it is generally better to draw plan forms of furniture in one's own way. Given correct width and depth dimensions (available in catalogs), a top view can be developed from observing a photograph or the actual object.

The character of the line used in drawing plans can also express the intent of the drawing. Drafted lines, drawn with triangle and T-square, convey a sense of precision and finality well suited to construction drawings and general architectural layout plans. A freehand line will have a slight irregularity that is often more appropriate for interior plans because it suggests a somewhat less final and unvarying notion of what is shown. Furniture may and often will be moved. Carpets and rugs, plants and accessories, as well as the clothes hanging in closets are not fixed in place, and the freehand line carries a suggestion of this reality.

Freehand line also makes a plan seem closer to the world of art, less a product of engineering. Of course, drafted and freehand line can be combined in one drawing. Fixed architectural elements may be drawn with a straight-edge, while furniture is shown in freehand line, for example, helping to set apart the different character of these components of the project.

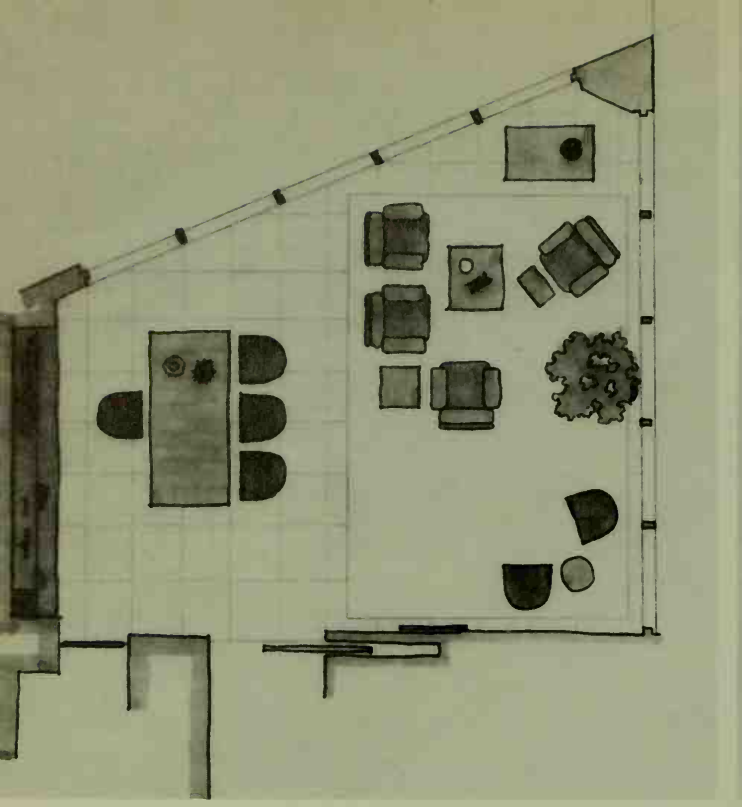
A freehand plan, if it is to be accurate and orderly, must be drawn over a drafted plan base sheet, and the freehand line should have a controlled quality that still suggests precision and competence. In the examples at left, both drawings are focused on furniture selection and placement, but they deal with these matters at different levels of involvement. The upper plan is drawn at small scale to show the layout of a large range of spaces (entrance, living, and dining), with the furniture drawn in simplified form, emphasizing location and arrangement rather than specific furniture.

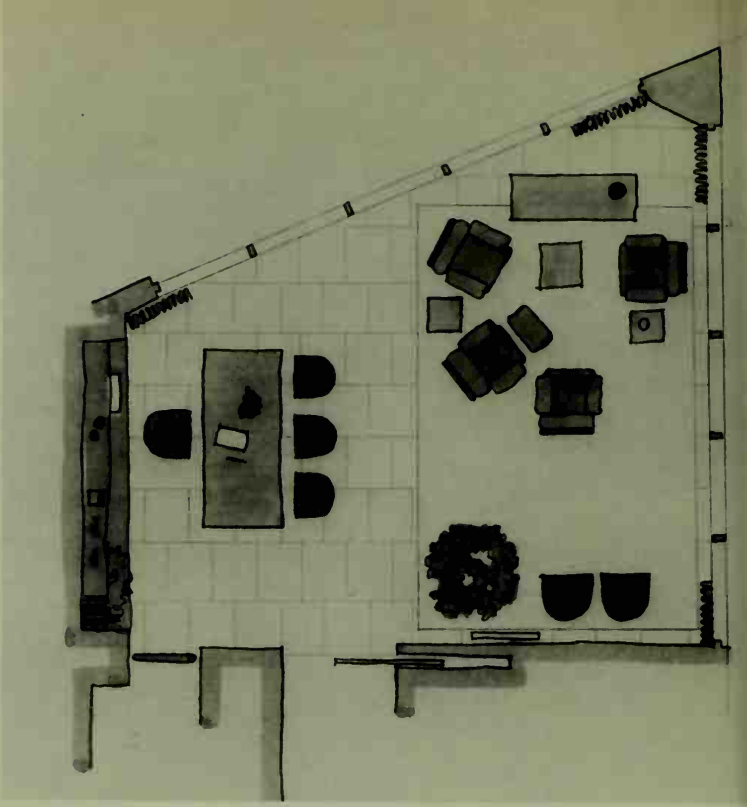
The lower plan is at larger scale and is concerned with a more detailed level of design. Rugs are drawn lightly with actual patterns shown. Furniture is drawn in more detail, and color and pattern are added to give more information about actual appearance. Small movable tables and even small decorative objects are drawn, as are paintings that hang on some walls. In one bathroom, even the towel bars can be seen with towels hanging in place. This level of detail gives the client a strong feeling of what the finished space will be like and promotes a sense of identification with it as "our place" as it is to be.

The plan above is concerned with only one room, a child's bedroom with a fold-down wall bed. In this case all line is straightedge drafted. White tone on the walls and extending onto the surrounding paper makes the actual space feel hollow and contained and helps make the plan communicate a sense of the room's intended feeling of enclosure. Note the indication of folding doors, of cushions on the couch seat, and of a few small objects on the table that help convey scale.

PRESENTATION PLANS

Plans are also a useful means for setting out alternatives that need to be discussed with a client. This can be a matter of actual alternate plan





Various furniture layouts (above) can be explored quickly by drawing on overlays of tracing paper, using a base sheet with an architectural plan below.

Opposite page: Shown are a plan (top) and perspective (bottom) of a bedroom. Plan and perspective are closely interdependent when used for presentation and discussion with the client. (William Machado, Norman Diekman, designers)

schemes, minor variations in plan that are up for decision, or a matter of noting that various furniture arrangements are possible within a particular space—arrangements that may be changed from time to time for variety or to serve different uses. The pair of plans above may appear almost identical at first glance, but they include small differences intended for discussion and decision. The plan on the left shows a floor pattern with staggered joint lines while the informal seating group is arranged in a free, near circular pattern. Curtains ("draw drapery") are indicated as the means of controling the sun, light, and view that the huge window areas imply.

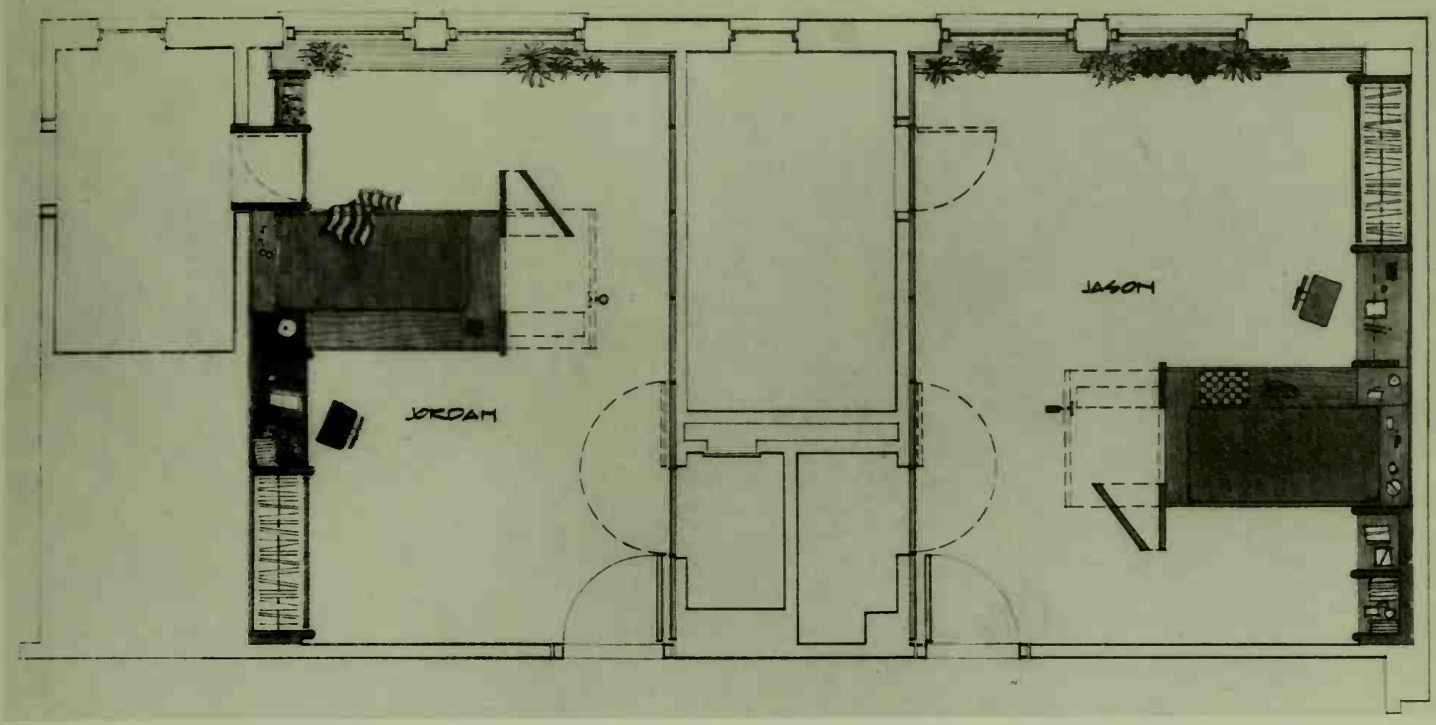
In the plan on the right the floor pattern has become a grid of squares and the seating group has been reorganized in a somewhat more formal pattern. The plant is relocated, the drapery has vanished. The only changes in the objects shown are a few minor exchanges of small tables. We are thus seeing the same space treated in a generally consistent way, but can consider the impact of small changes that might be made on a day-to-day basis.

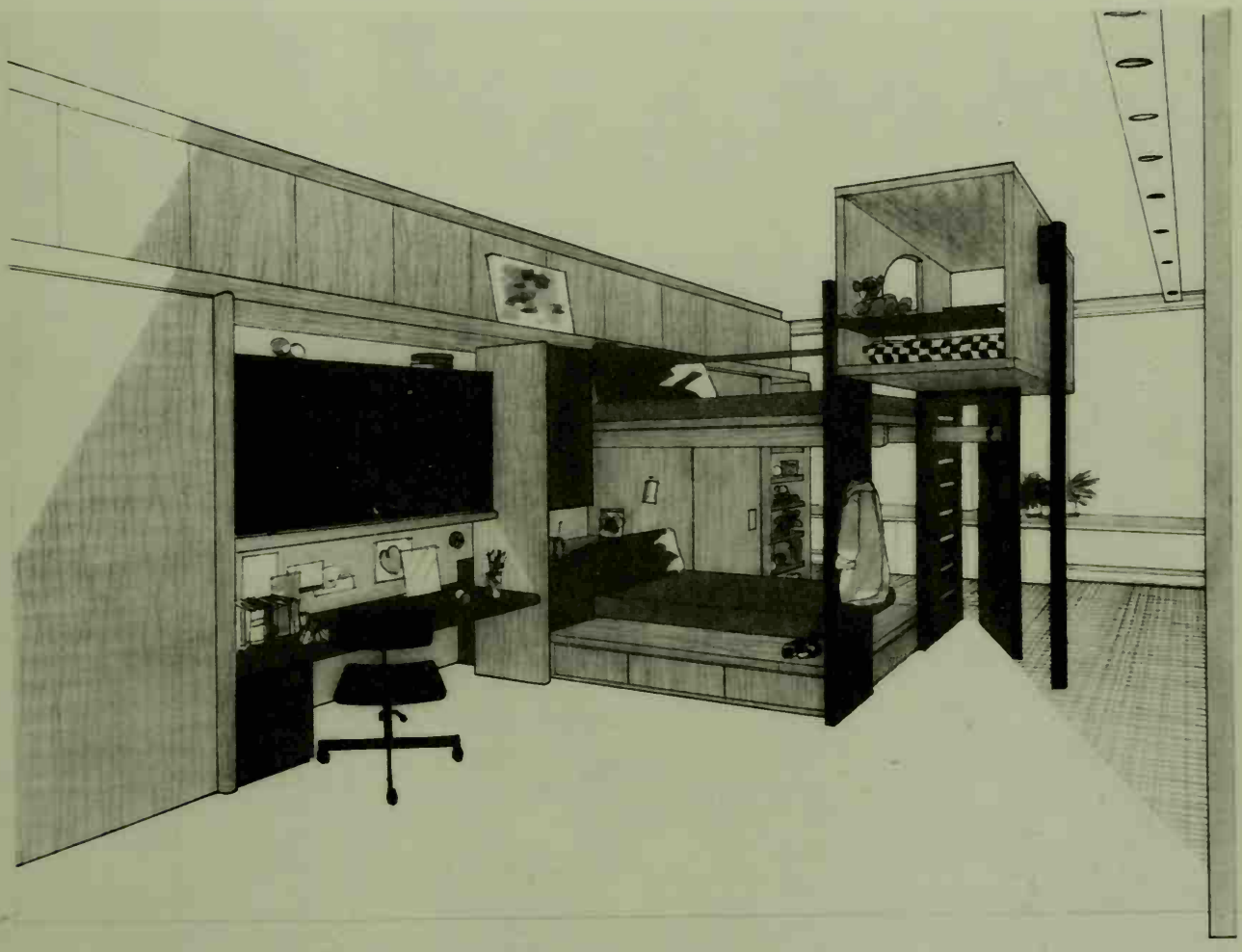
Every plan implies, in some way, normal views—the views in terms of drawing that are called "perspectives," the views that come close to photographs and to the images that we see with our eyes when we are in a real space. The plan above on the right shows two children's rooms, part of a residential project. The plan spells out the elements, sizes, shapes, and locations of the special units of built-in furniture planned, but might well be somewhat unclear to a lay client. The intended upper and lower bunk beds and elevated playhouse are sufficiently unusual not to be instantly suggested by their plan indication. The perspective below makes these arrangements quite clear.

WORKING DRAWING PLANS

For the designer, the plan is, however, a preliminary needed to generate the perspective. The relation of plan to perspective drawing will be explained more fully in the following chapter, but note here that every plan implies realistic perspective views.

The working drawing plan is always the key drawing, however much additional information may come from elevations, sections, and details. The drawing on page 73 is a design plan of a typical residential bathroom. Marble is the dominant material, the tub is


JORDAN
JASON



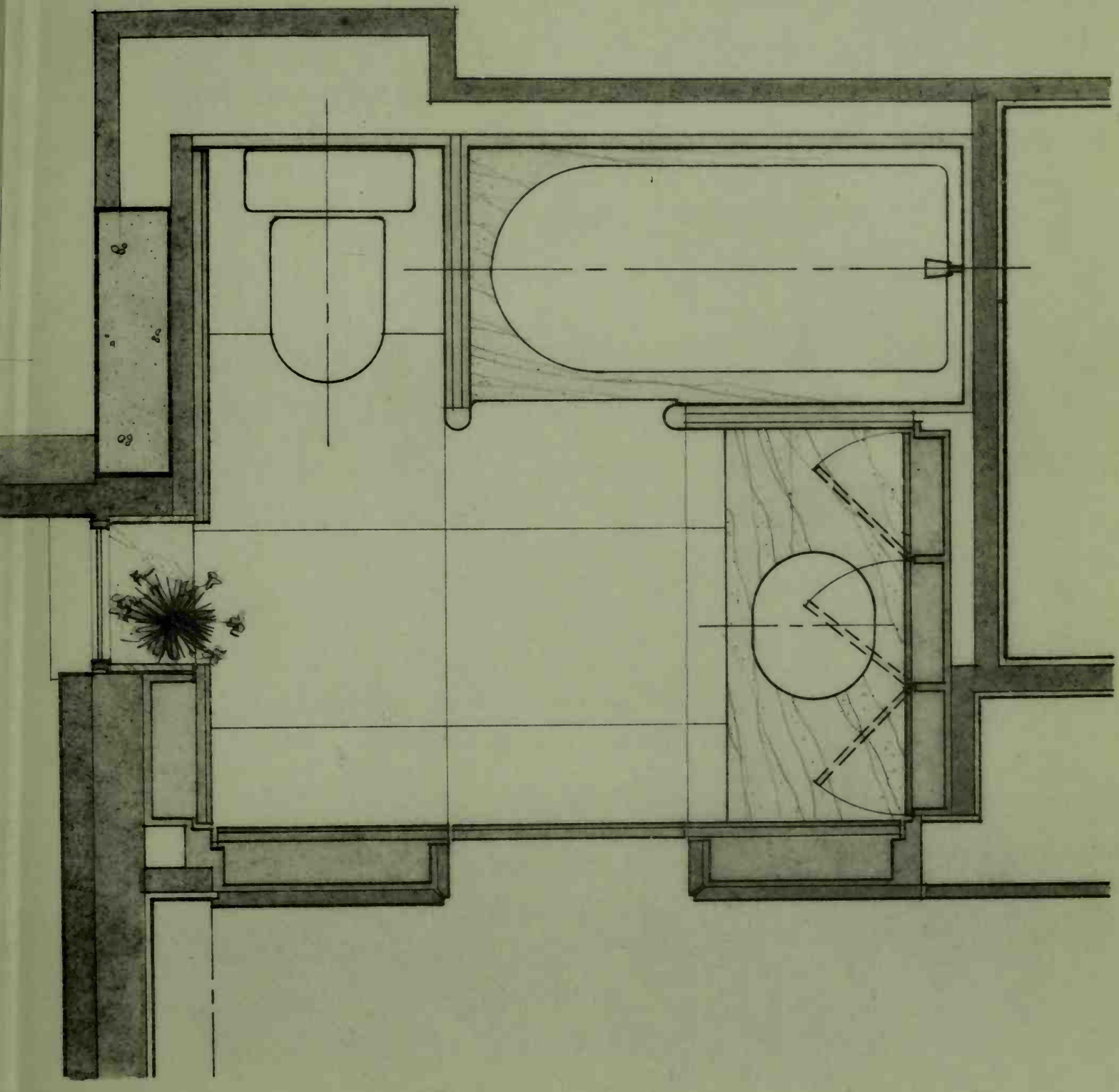
partially enclosed, and there are special mirrored cabinets over the lavatory counter. The wide sill of the small window gives space for a plant. To bring this plan to realistically visible life, the perspective drawing on page 74 was developed. As often happens in making a perspective of a very small space, a front wall has been imagined as removed in order to make possible a view that takes in all the important elements of the space. Such a view could never be photographed in the real space, but it still gives a sense of reality that the viewer's eye accepts as realistic. With client approval, the design plan now becomes the basis for the construction plan on page 75.

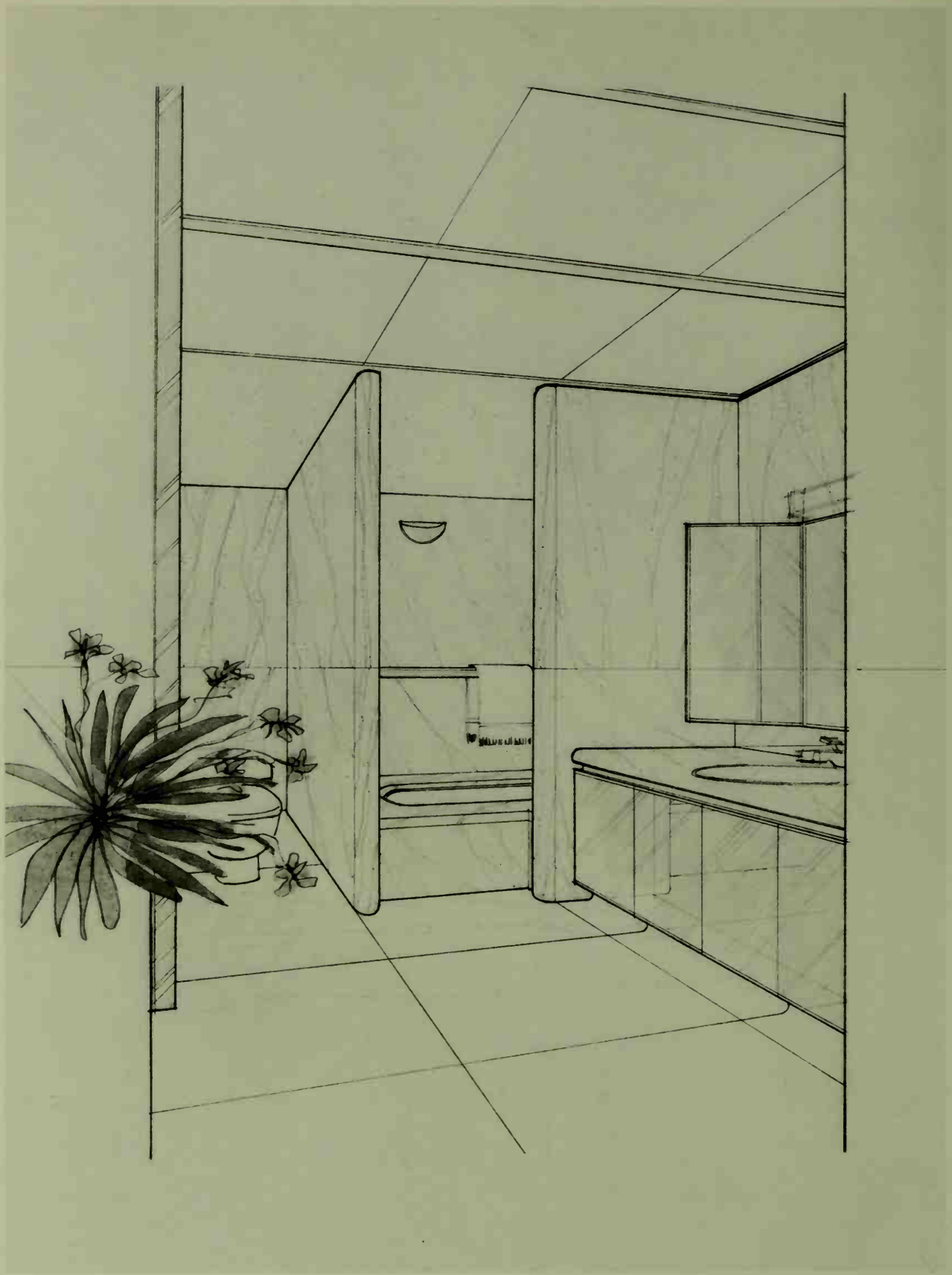
Notice that the plan has been rotated, top for bottom so that it is viewed looking toward the door. This helps the viewer relate it to the perspective since one faces into the space, looking in the same direction in each case. In the working drawing, the space is oriented as it relates to the overall plan of the building. Comparison of the design plan and construction plan reveal a significant material change—the marble has been dropped and ceramic tile substituted. Otherwise, the conversion to a working drawing is largely a matter of adding details (paper holder, towel bars, etc.), dimensions, and lettered notes that explain materials and details.

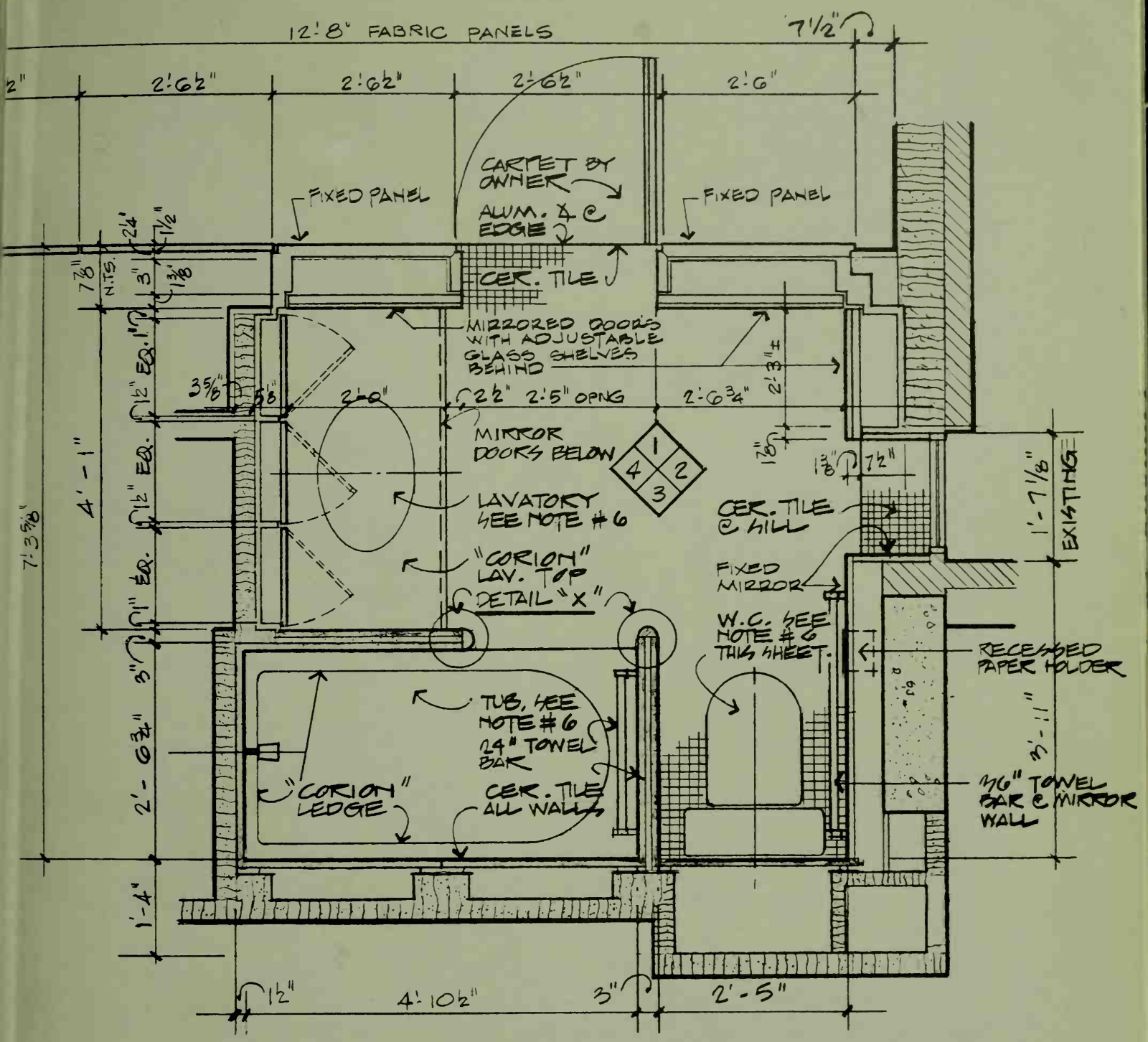
Several references to other drawings also appear. These include the diamond-shaped box in the center of the space holding the numbers 1, 2, 3, and 4. This is a standard way of indexing the wall elevations that appear elsewhere on the same or another working drawing. Each elevation is numbered 1 to 4, and the corners of the box serve as arrows pointing in the direction in which each elevation is viewed. At either side of the entrance to the tub enclosure, the wall is circled with a note indicating "detail X." This refers to another drawing, probably full or half size, elsewhere on the sheet.

Although illustrated here with one small space as an example, the sequence of relationships among design plan, perspective, and working drawing is typical of the interior design process. Development of design at the drawing board, communication of the design to the client who must accept it, and communication of the data for construction to the contractor and on-site workers who will price and build it all depend on drawings developed to suit their special purposes.

A transition develops in steps from the presentotion plan (right) to interior perspective and, finolly, working drowings (following two pages), with constant reference from the first drawing to the subsequent steps vital to the ongoing design process. (Part of o Williom Mochodo–Normon Diekmon design project)






12'-8" FABRIC PANELS
7½"
2'-6½"
2'-6½"
2'-6½"
2'-6"
FIXED PANEL
FIXED PANEL
CARPET BY OWNER
ALUM. & C EDGE
CER. TILE
MIRRORED DOORS WITH ADJUSTABLE GLASS SHELVES BEHIND
2'-3"±
2'-6¾"
2'-0"
2½" 2'-5" OPNG
MIRROR DOORS BELOW
1
4
2
3
LAVATORY SEE NOTE #6
"CORION" LAV. TOP DETAIL "X"
CER. TILE @ SILL
FIXED MIRROR
W.C. SEE NOTE #6 THIS SHEET.
RECESSED PAPER HOLDER
TUB, SEE NOTE #6
24" TOWEL BAR
"CORION" LEDGE
CER. TILE ALL WALLS
36" TOWEL BAR & MIRROR WALL
EXISTING
4'-1"
2'-6¾"
3'-11"
1'-4"
4'-10½"
2'-5"
7'-3⅝"

ELEVATIONS AND SECTIONS

Elevations and sections are, like plans, orthographic projection drawings. The word "orthographic" is made up of "ortho" meaning straight or true, and "graphic" for drawing. All parts of an orthographic drawing are drawn equally in their true size (in a full-size drawing) or at the same scale so that true measurements may be taken anywhere in the drawing. The effects of foreshortening that we see in reality and in perspective drawings are ignored, and all parts of a view are projected onto the paper in their true size and relationship. Mechanical drawings, engineering drawings, and the working drawings of architects are all made up of orthographic projections, plans (or top views), elevations, and sections that taken together give complete information about three-dimensional objects in a form that can lie flat on sheets of paper.

DIFFERENCES AND SIMILARITIES

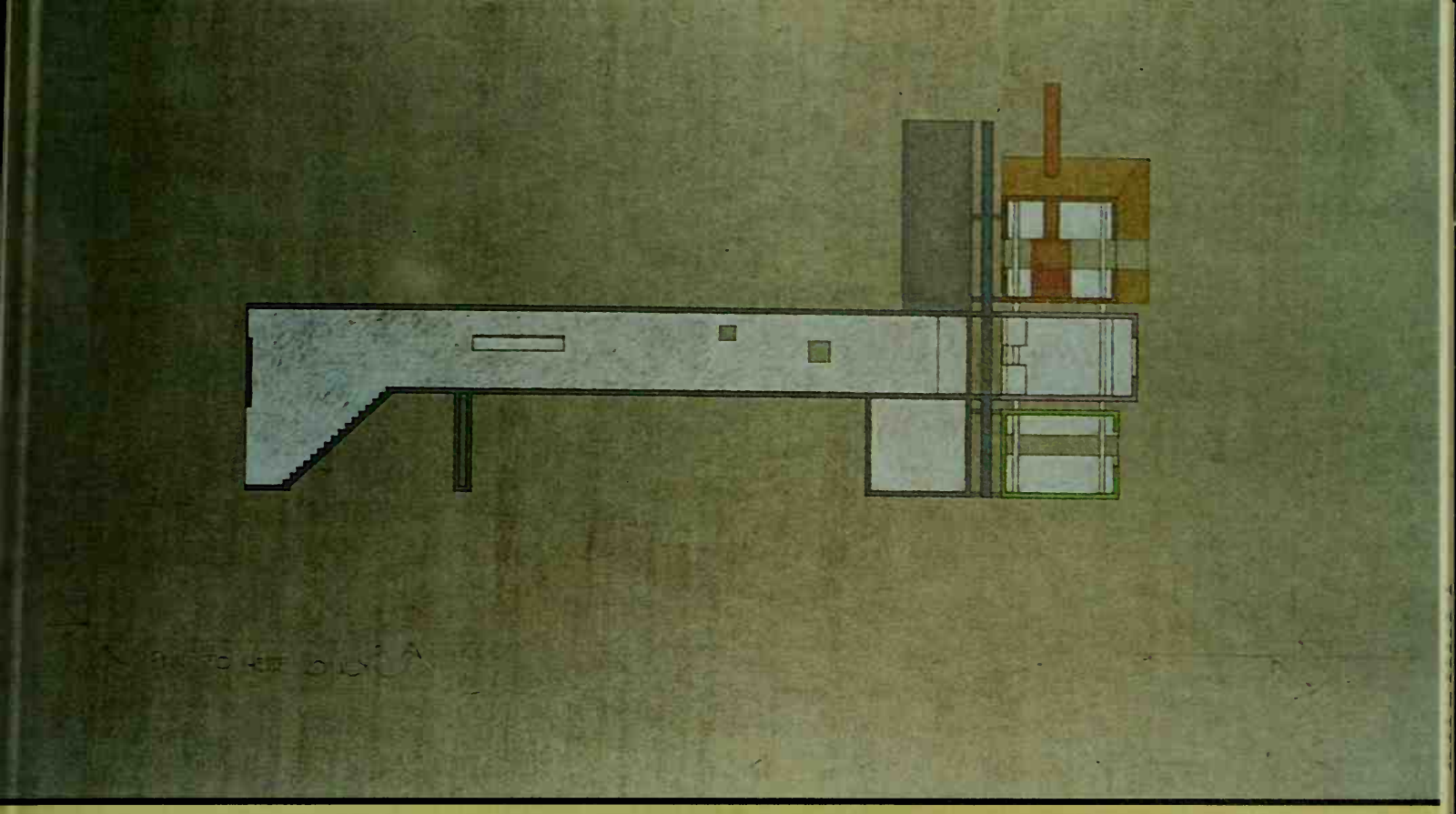
The term "elevation" is used to describe a drawing that is in a sense "lifted up," or elevated, from a plan to show the projection on a vertical plane that will reveal a front, rear, or side view of a building or other object. A head-on view from a distance is an image closely similar to an elevation view, so that elevations can seem quite like pictures of the reality they define.

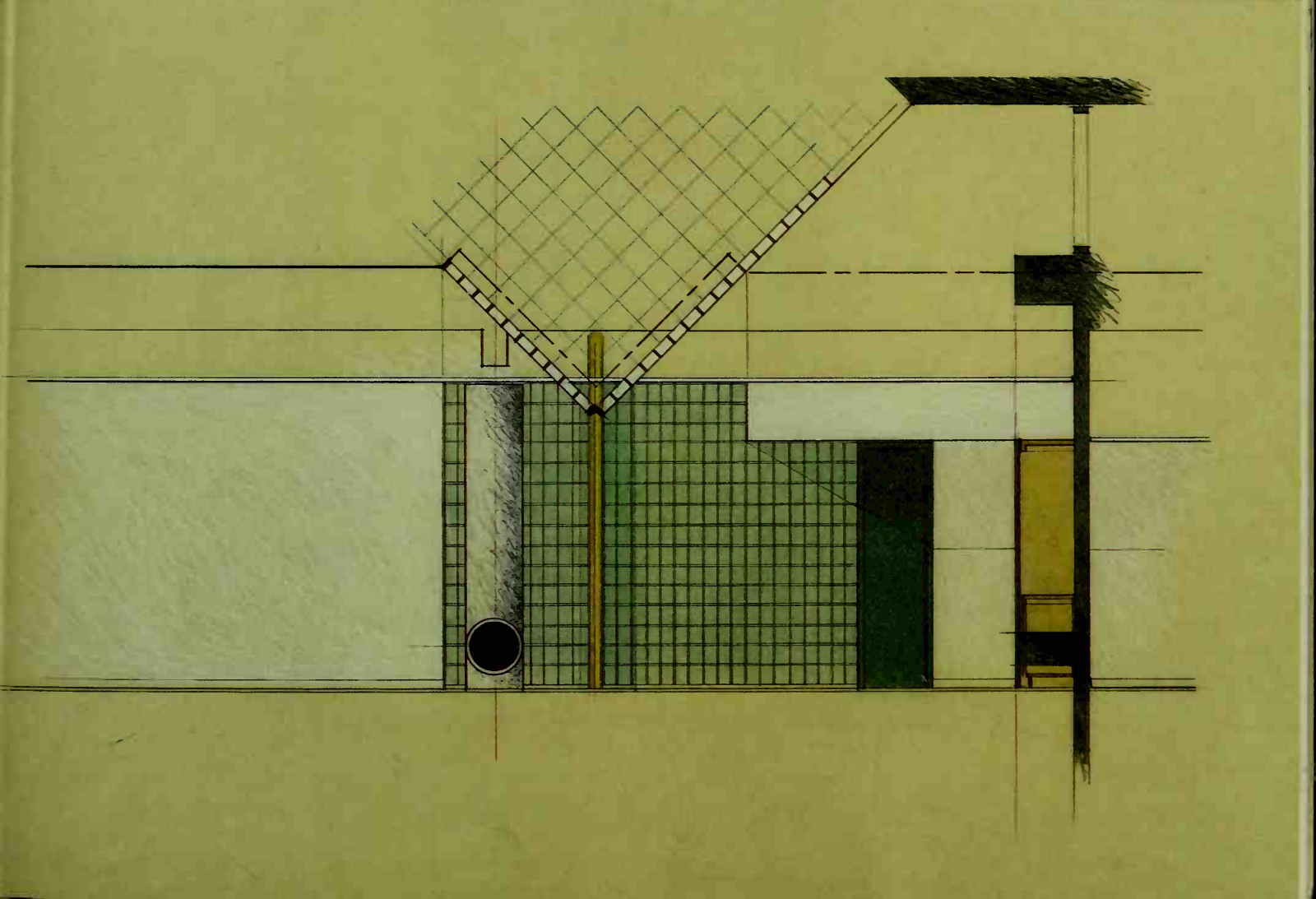
A section is a view that results from cutting or slicing through a building (or other object) in imagination and then projecting onto paper the resulting view that shows thicknesses of walls, floors, and roofs and reveals internal space relationships and, often, constructional details that cannot, in reality, be seen. When suitably chosen, elevations and sections are added to plans, a total description of the design in question is provided.

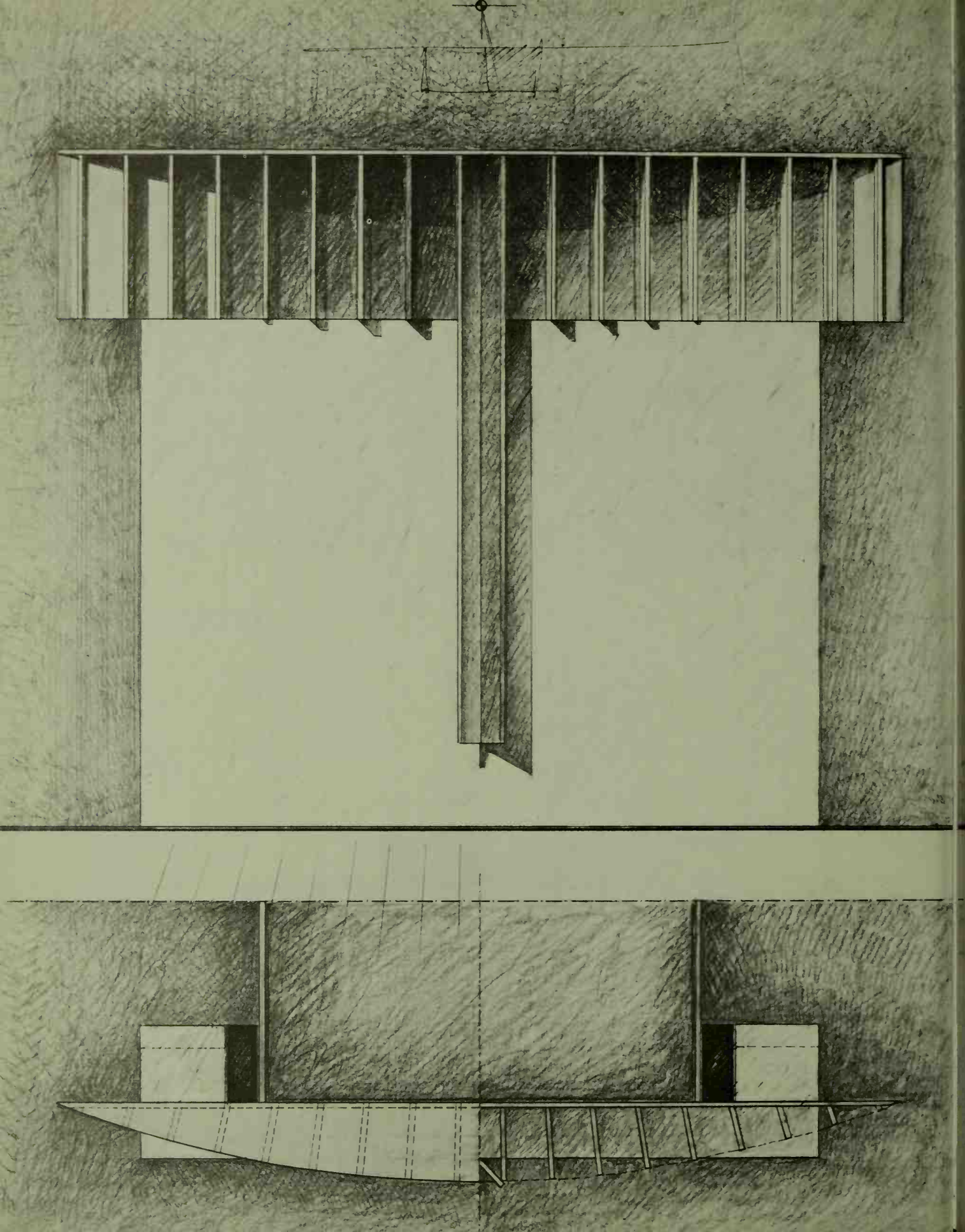
When the subject is an interior design project, elevations and sections may turn out to be quite similar. There is, indeed, some confusion about the meaning of the two terms, which are often carelessly used as if they were interchangeable. When used precisely, the terms describe drawings that are somewhat different, although similar. An elevation of a room or other interior space shows a view of one side of the space that results from looking in a particular direction. A section shows the forms of the solid materials of walls, floors, and ceilings as they would appear if the building had been sliced open along the flat plane indicated by a chosen "section line." It may show the various materials that will be used within the solid elements that have been cut, or it may simply leave these thicknesses blank so as to emphasize the shapes and relationships of the spaces that they form.

In a rectangular space, it is natural to consider four elevations that result from looking in each of the four possible axial directions. Such drawings are sometimes called "wall elevations" since they show one wall with whatever detail features it includes, plus any built-in furniture or other items close to the wall plane. Movable furniture close to the wall is sometimes included. Where walls are straight and flat, it is possible to visualize the four elevations set up around the plan to form a box that is something like a three-dimensional model. Interior de-

This section through John Heyduk's Bly house (top) is a rather poetic drawing in which color is used to express a sense of architectural elegance. (Courtesy Max Protech Gallery) Elevation (bottom) with a portion of plan superimposed is a study for a glass block wedge between two spaces. (Other drawings for this project appear on pages 146–155.)







signers have sometimes used this way of showing a room in a format called a "maquette."

The outermost edge of an interior elevation, the line where the interior space ends, will be, inevitably, a section line, sometimes called the "cut line" where open, empty space meets solid structural material. It is this common line and the resulting similarity of the drawings that give rise to the confusion of terms and that make possible a hybrid drawing in which section and elevation are combined to form a "sectional elevation." An architectural section shows a building (or part of a building) as if cut open and reveals the constructional materials within the thicknesses of walls and floors. An interior section also shows those thicknesses and may include indications of materials where these are part of the interior project.

Where structure is preestablished, indications of materials are usually omitted and the thicknesses left blank or filled in with color or black tone. Sections are particularly useful in showing relationships among spaces, particularly vertical relationships, level changes, stairs, and complex ceiling forms.

The section line is normally drawn very heavily to emphasize the form of the hollow space it defines. The location of this cut is then identified with symbols on a plan, noted with a letter or number key so that the section drawing can be titled for identification as "section AA," "BB," etc. Within the hollow spaces defined by the section line, any elements that can be seen in the distance can be drawn in more lightly. If these are drawn completely, the elevation of the space in question will be created, hence the "sectional elevation" of interior space that combines both forms. Thus, an elevation shows one side of one space, and a section can show relationships of spaces and solids and can include elevation elements as well. A sectional elevation combines these forms.

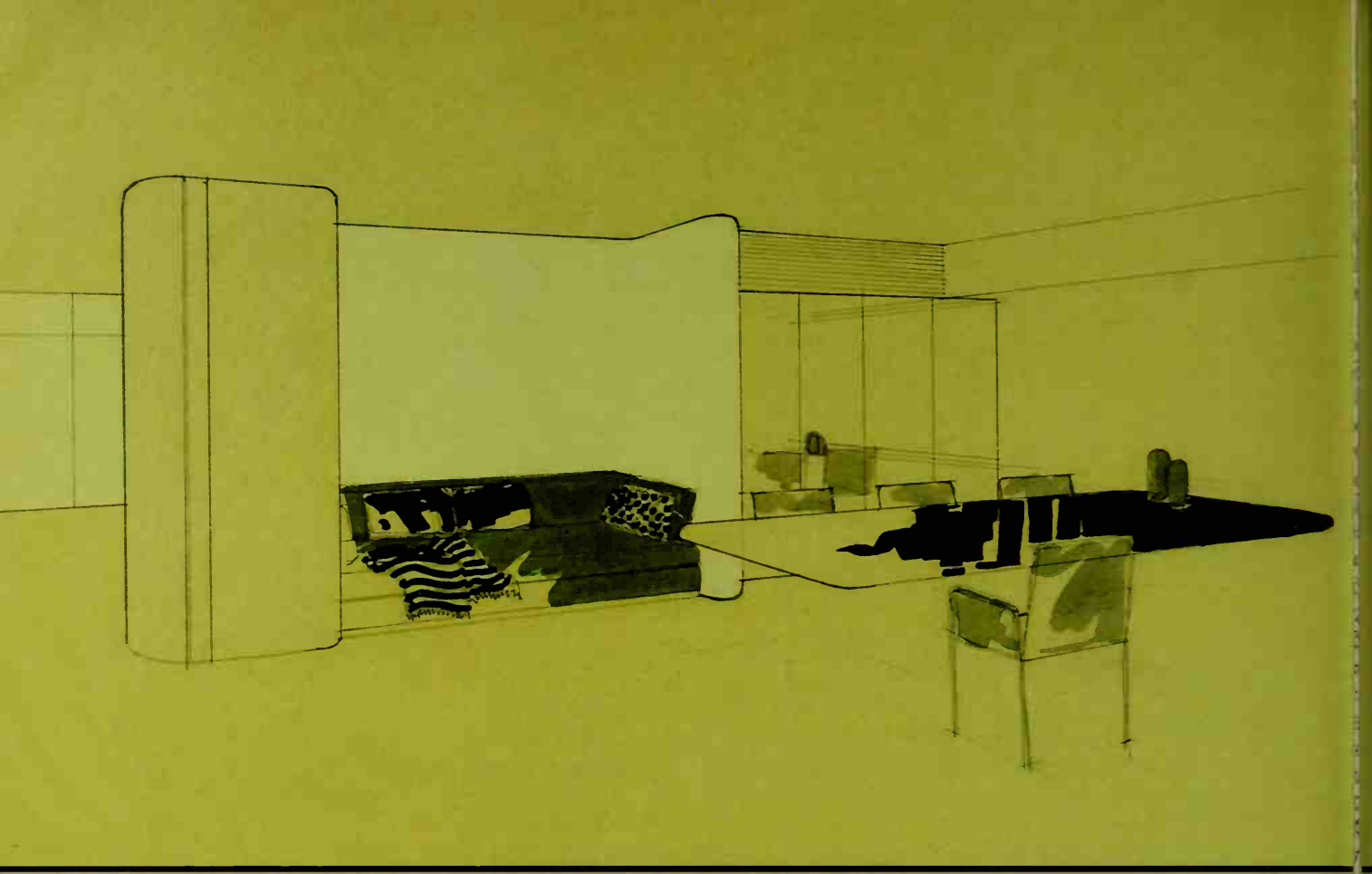
Elevations and sections do not show things as they appear to our eyes. We do not see one side of a space at a time, nor do we look at buildings sliced open, and yet, paradoxically, these drawings show things as they *are* in a way that the more realistic-seeming perspective does not. Because these are orthographic drawings, they show sizes and shapes in true relationships and are thus the ideal drawings for the study of proportions of elements, proportions that involve heights that are not visible in plans. Elevations and sections have the effect of bringing plans to life and converting them into something closer to their three-dimensional realities.

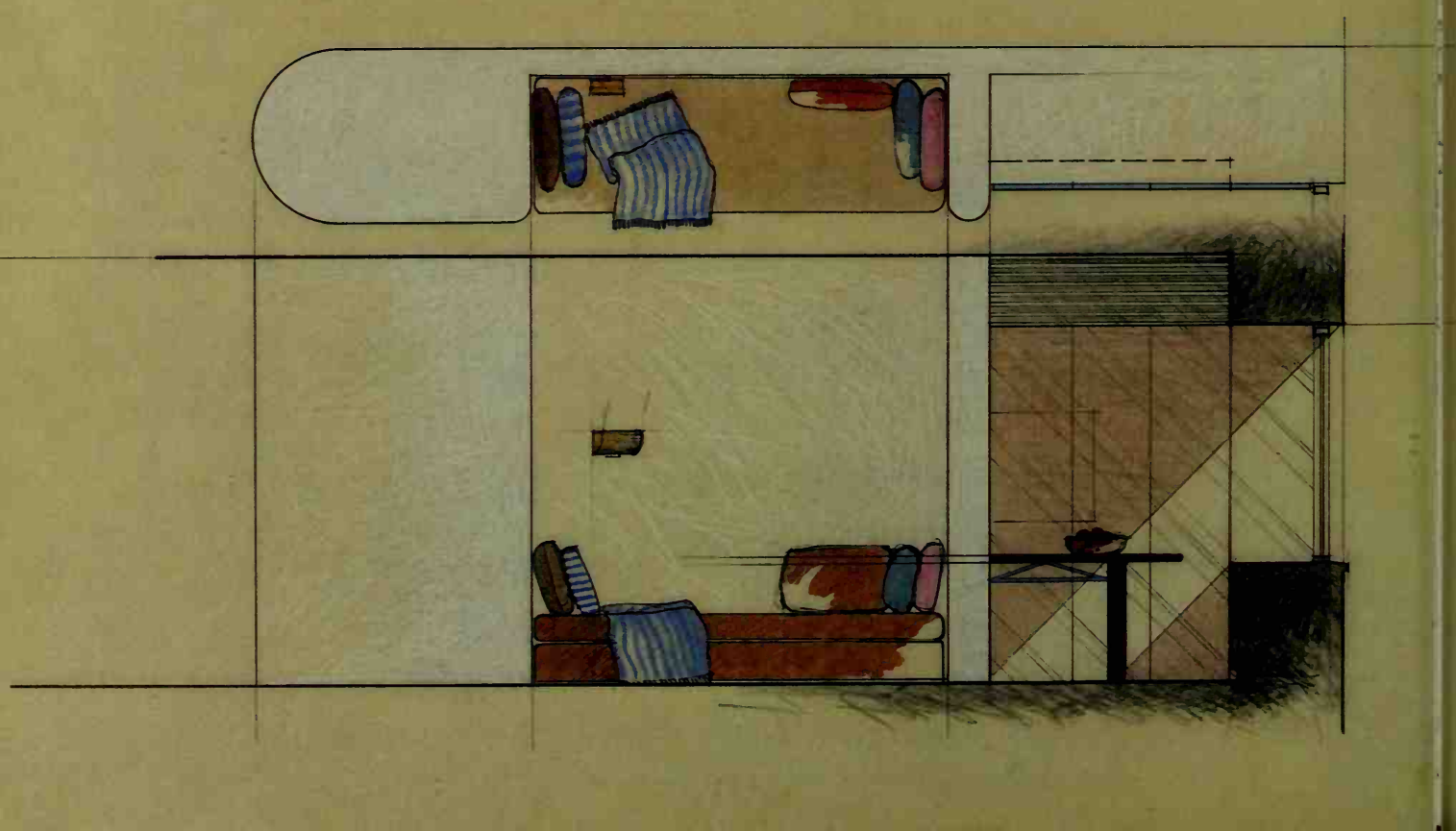
COLOR SECTIONS

While their usefulness as construction drawings is without question, elevations and sections, just as much as plans, can be key drawings in the creative design process. The upper drawing on page 77 by John Hejduk shows his design for the extraordinary Blye house in longitudinal (lengthwise) section. Neither plan nor elevation nor perspective could reveal the essence of this scheme so well. While other drawings are needed for a full understanding of the project, this section stands as the *key* drawing of the project. This drawing has been set out with a formality that makes it a presentation drawing in the best sense and invites us to consider it as a work of art in its own right as well. The drawing below it is more of an in-process study. In it, portions of plan, elevation, and section are combined, and its purpose is to explore the relationships of materials, colors, and textures as they will relate in the completed space.

Plan development of this space has already been discussed (see page 44). In this drawing, significant parts of the plan are superimposed on the developing elevation. The glass block walls at 45° angles that appear above and the round column with its lightly drawn center lines that appears near the floor line are a portion of the plan. Color is used realistically in this elevation to convey the sense of the various materials: the yellow of the angle corner, the dark green of the entrance door, the white of the wall surface, and, particularly, the soft greenish tone so

Elevation combined with top view and plan show headboard unit that is part of a loft project. Architectural information is combined with an almost whimsical sense of style and atmosphere. (Design and drawing by Giuseppe Zambonini, architect)





characteristic of glass block make us feel the way in which these materials will relate. The drawing also becomes a section as it shows the relationship of the hung ceiling to the slab and beam above and at the right where it slices through built-in storage and the partition wall behind.

In interior design, furniture elements also call for careful study. Giuseppe Zambonini's drawing on page 78 is a design study for a bed headboard unit that is also a space divider within an open New York loft. The upper portion is an elevation showing the side of the unit that will face the adjacent dining space. It is given a sense of three-dimensionality by the introduction of cast shadows. In this convention of traditional architectural design, a light source, presumably the sun, is imagined in a position that will cast shadows to the right and back or away from the viewer. The resulting shading and cast shadows reveal depth relationships in a quite realistic way. In an interior, such sharp and unified lighting does not ordinarily occur; yet the viewer tends to accept conventional cast shadows which suggest that the subject has been taken out of doors into direct sun. In this elevation, the cast shadows make the pattern of radiating fins above and the center spine understandable in a way that they would not otherwise be.

The portion of the drawing below the elevation is divided on the center line into a top view on the left and a plan-section on the right. The plan-section is a special kind of drawing in which an object is sectioned on a horizontal plane. All plans are in a sense plan-sections since they assume a building or room sliced through, but the usual floor plan presents objects in top view and does not show internal structure.

This plan-section slices through the unit at a level that passes through the arrangement of radiating fins. In fact, a careful look at the very top of this drawing (above the elevation) will reveal the center point that was used in laying out these fins. The plan-section was needed, not only to explain these elements, but also to serve as a basis for the construction of the accurately cast pattern of conventional shade and shadow. Such a furniture unit, in itself almost a work of architecture or sculpture, calls for this kind of study in development and also as a means of explanation to the client, who must understand in order to approve.

The drawings at the left deal with a fragment of another residential interior project. In the upper drawing, a perspective concept sketch (above) lets us see a sofa built into an architecturally massive recess. A table in the foreground is shown without base or legs. In the drawing below, a plan and elevation shown together, the same grouping is explored in a more specific way, with color shifted and with the role of the window (on the right) revealed as a primary light source.

DESIGN ELEVATIONS

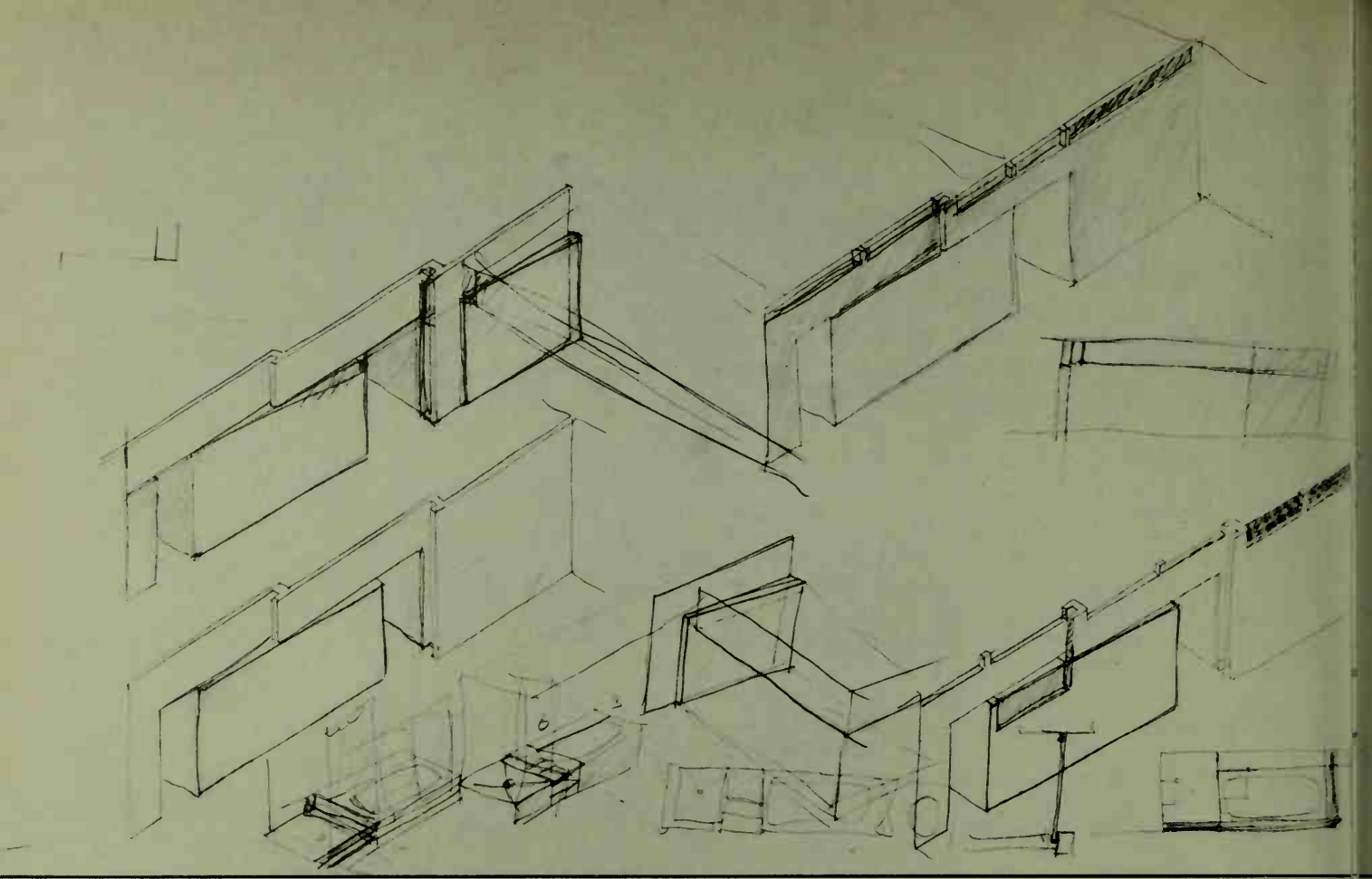
On the following page, the upper drawing, also by architect Zambonini, is typical of the endless sheets of rough sketching on tracing paper that are involved in the study of a developing project. A bathroom is being taken from the conceptual stage to the specific, with concern for the way in which partitions are to relate to the beams above. Most of the sketching is in perspective (or isometric), but plans (below) and an elevation (at right) also appear. Sketching of this kind is often a preliminary step in visualizing the relationships that will then be pinned down more exactly in the drafted elevations and sections that follow.

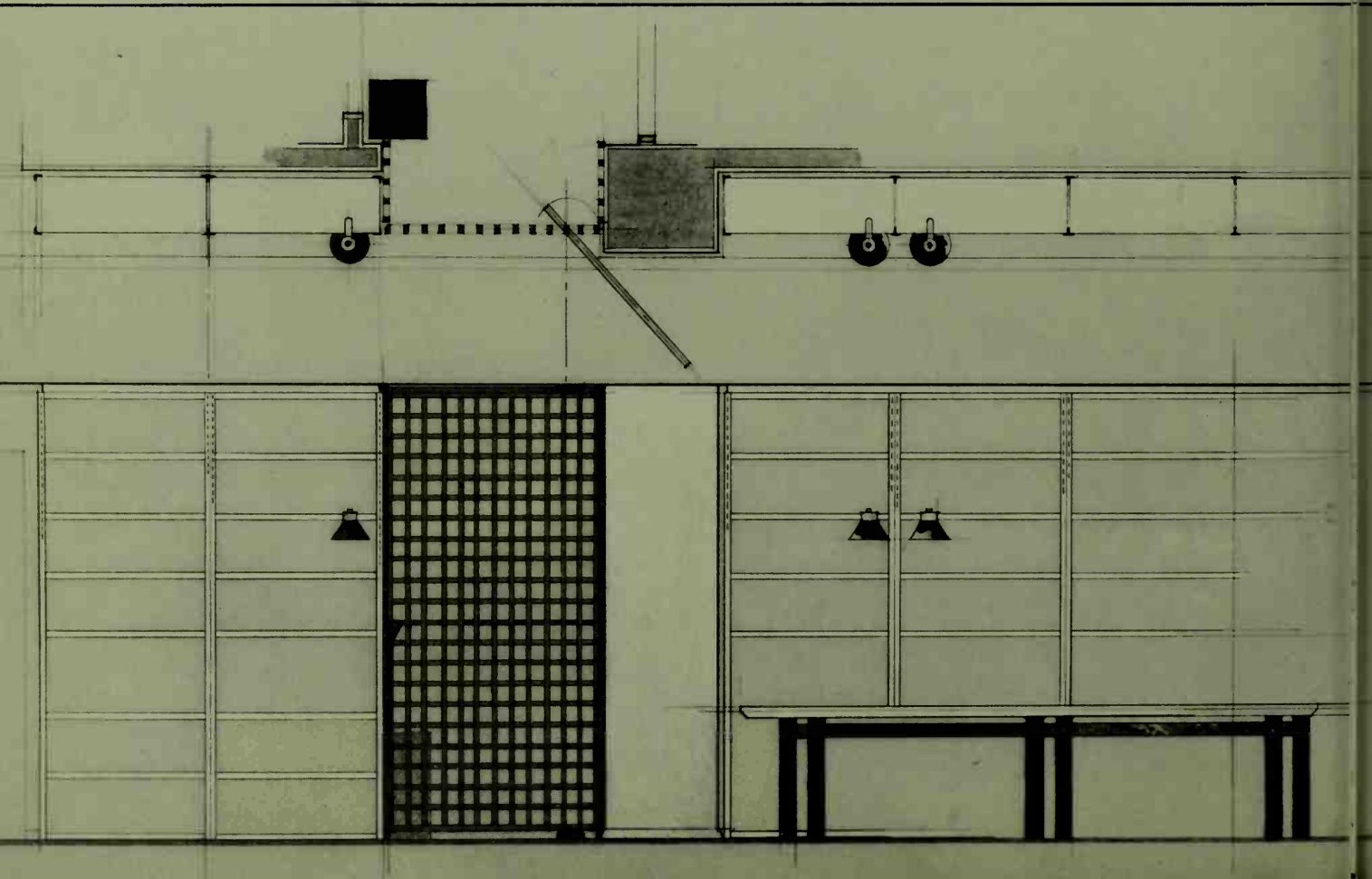
The lower drawing, from a Norman Diekman project, uses a fragment of plan (above) to generate an elevation which incorporates the key elements that will establish the character of a particular room. A grille door adjacent to an existing column is flanked by book shelving of standard steel components with clamped-on lighting units. A large table stands in the foreground. This drawing represents one step in a total project that is reviewed in more detail in Chapter 8 (beginning on page 136).

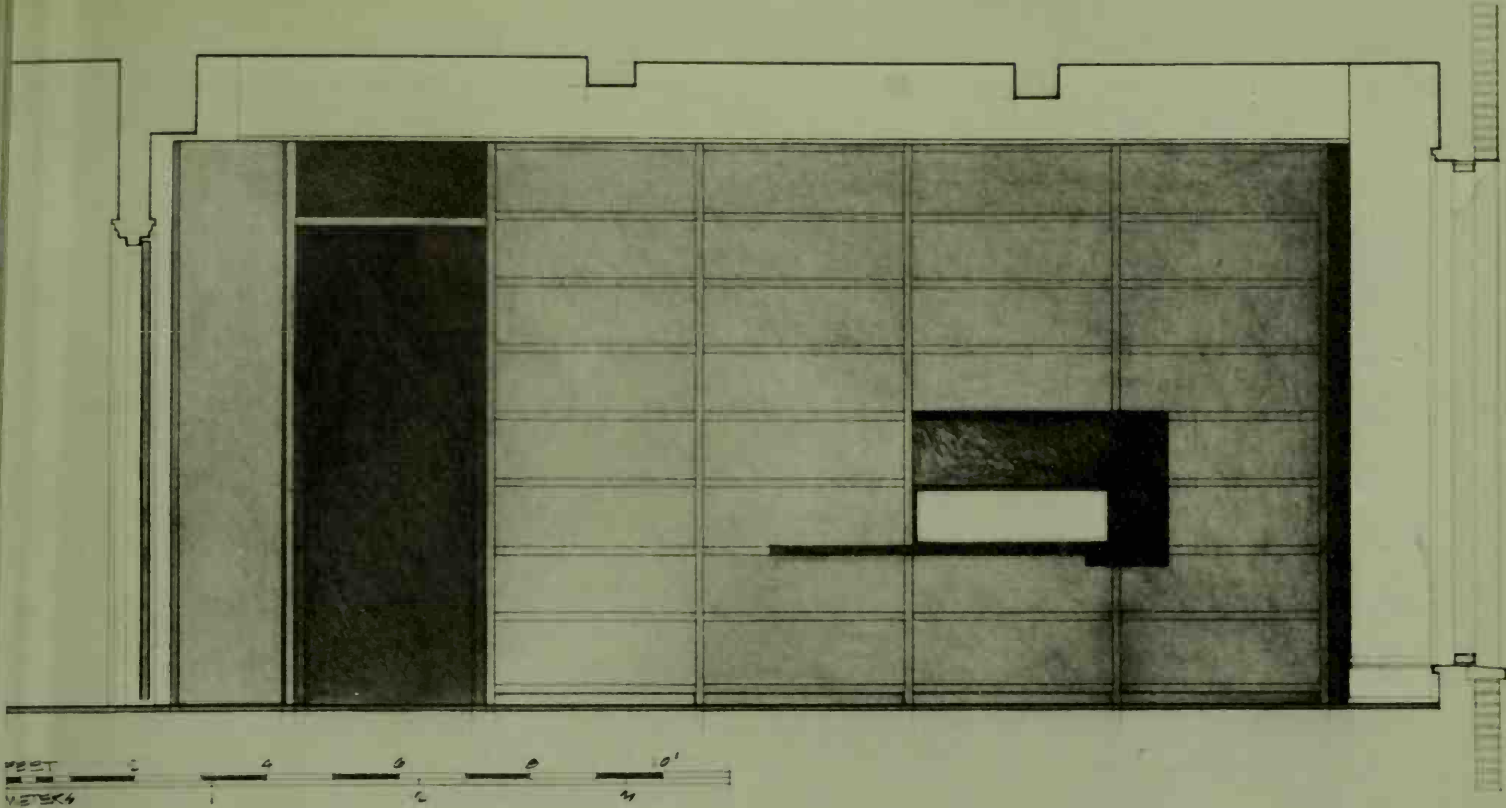
The drawings on page 83 are concerned with the steps in which the designer's thinking moves from the

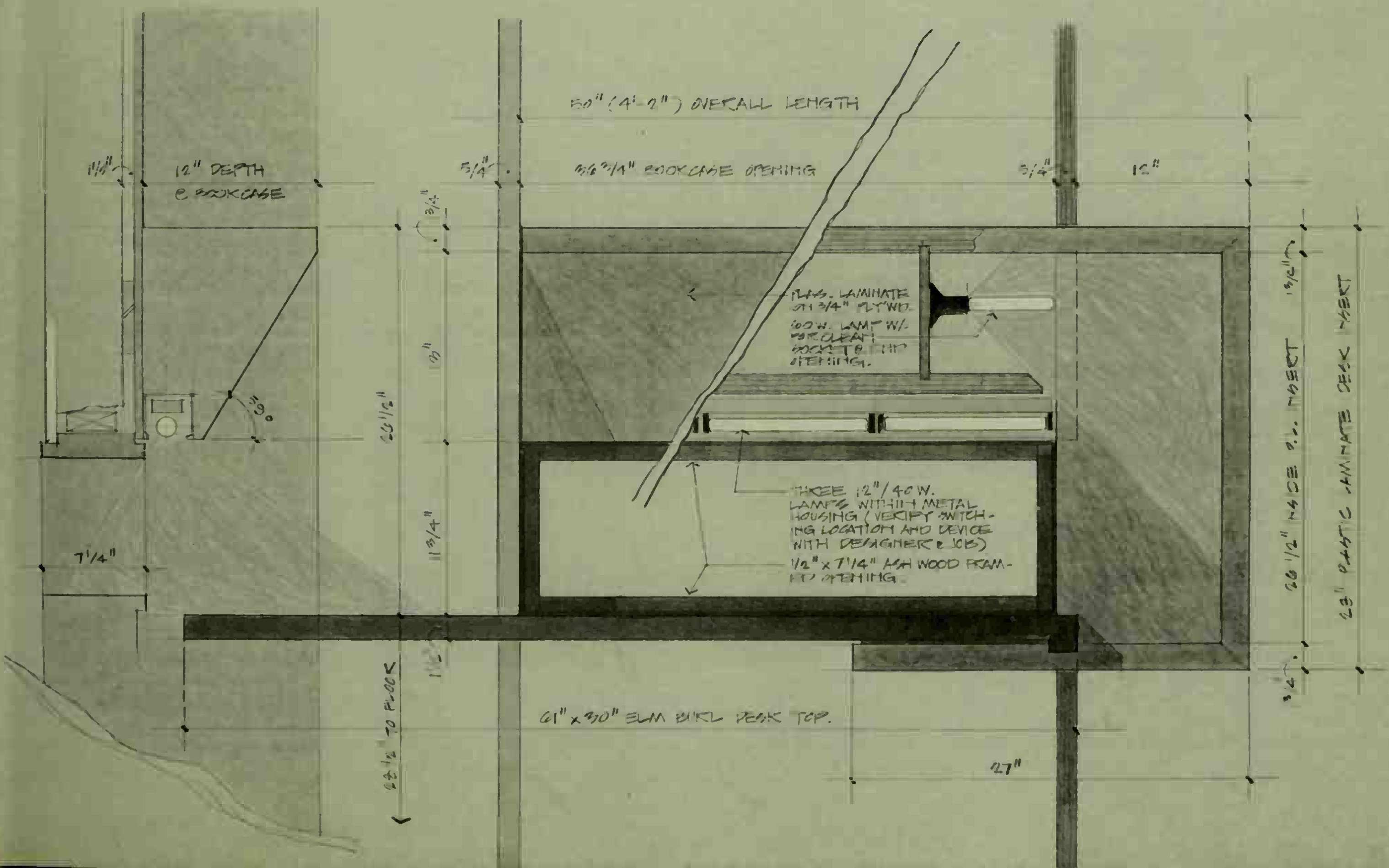
The initial concept sketch contains a design study (top) for a corner seating-reading alcove in a co-op apartment. Plan and elevation (bottom) of the above are used as steps leading to construction drawings and details. (William Machado, Norman Diekman, designers)

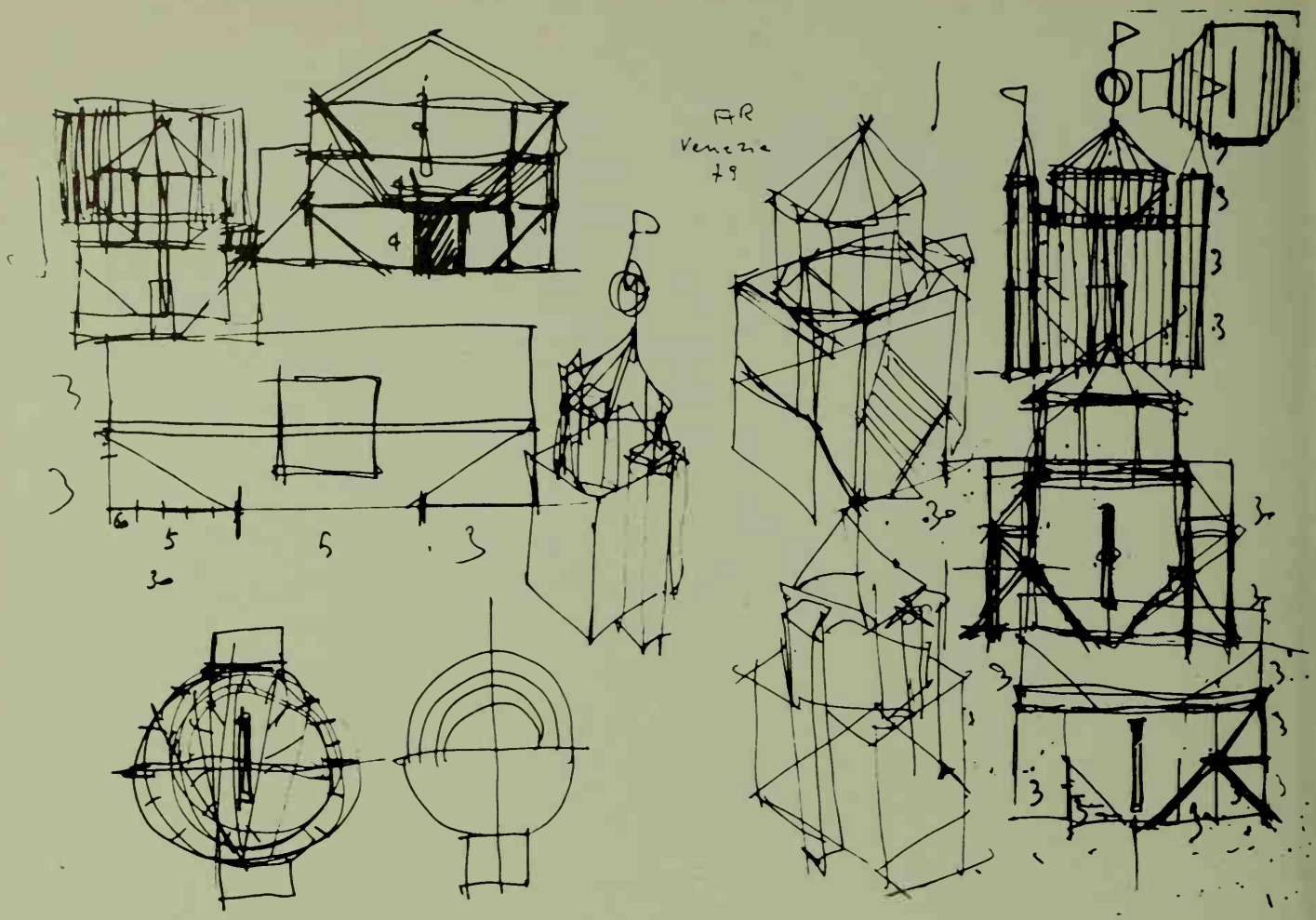
Pages 82–83: Shown is a quick sketch (page 82 top) for a bath-dressing area inserted under the beams of a New York City loft. (Giuseppe Zambonini, architect) A straightforward elevation (bottom) of a metal bookcase unit with grille door is combined with a plan on the same drawing. Another elevation illustrates a built-in bookcase (page 83 top) and development of a smaller area within the same unit, a pass-through desk area (bottom).






FEET
METERS


50" (4'-2") OVERALL LENGTH
12" DEPTH
@ BOOKCASE
THREE 12"/40 W.
LAMPS WITHIN METAL
HOUSING (VERIFY SWITCH-
ING LOCATION AND DEVICE
WITH DESIGNER @ JOB)
61" x 30" ELM BURL DESK TOP.
27"
7 1/4"
39°



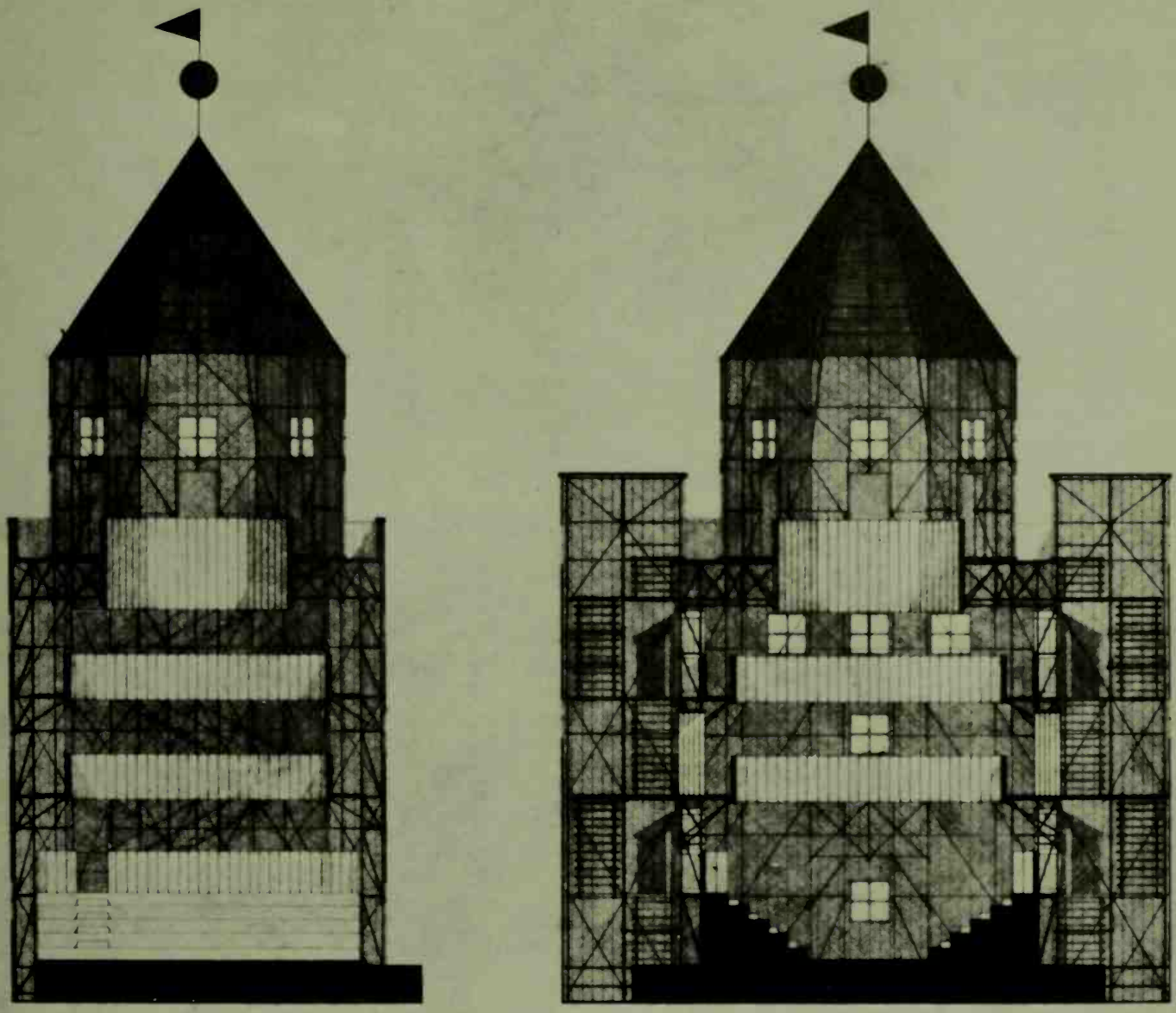
In the Teotro del Mondo project there is o consistent progression from the eorly sketch (obove) to the finished section (opposite poge). Note how eoch stoge continues the study of spoce ond light. (Design ond drowings by Aldo Rossi, orchitect. Courtesy Mox Protech Gollery, New York)

overall treatment of one side of a space toward development of a key detail. The upper drawing is a sectional elevation in which we see a library sliced through, with the section line spelling out the specifics of window, door, and existing beamed ceiling. The side of the room shown is taken up by a door and floor-to-ceiling shelving—so far, a not unusual combination of elements. The shelving, however, includes a pass-through desk area that connects to the adjacent space, which is to become the unique element giving character to the design. In the lower illustration, this detail is more clearly visible, ready for translation into construction drawings. Notice the graphic scale in both feet and meters drawn below the sectional elevation.

Aldo Rossi's drawings above and right for the project known as "Teatro del Mondo," constructed for the Venice Biennale of 1979, follow similar steps for a whole building. The sketches, ink on Mylar, explore concepts in plan, perspective, and elevation-section as the ideas surface and are spelled out in graphic terms. As the design intentions become more specific, it becomes possible to move on to the carefully drafted combination elevation-section drawings that follow. The medium is now crayon on a print made from a line drawing tracing. Here again, the finish of the drawing makes it an appropriate presentation form, and the quality of the drawing in aesthetic terms makes it a work that can stand on its own regardless of whether the building it illustrates is ever built.

SECTIONAL PERSPECTIVES

The drawings illustrated on page 87 may help to bring home the relationship between section and three-



dimensional space. The upper drawing is of the kind usually called a "sectional perspective." It begins with a front plane that is a drafted section, an orthographic mechanical drawing in which all parts are drawn in their true dimensional relationships. A vanishing point is then established, often, as in this case, on center and on a horizon line placed at a normal eyelevel on the main floor interior. Depth dimension is then drawn according to the usual perspective methods (see Chapter 7) so as to create an illusion of looking into a model or actual structure that has been cut open along the section line. In this case, the drawing has been kept abstract—details of furniture and finish have been omitted so that the relationships of spaces will stand out uncluttered by incidentals.

Architectural cast shadows have also been added in this case, preserving the illusion of an actual structure cut through but standing in the illumination of normal sunlight. This is an ink line drawing with various patterns of ink line hatching used to create the tones of shade and shadow that add to the illusion of three-dimensional reality. A few minimal indications of surround—grass, trees, and sky— are added to place the building in a setting in a way that presents a minimum of visual distraction.

The lower drawing is strictly a section showing a building in which a skylit central stair court ties together a one-story portion on the left and a two-story portion on the right. The sectioned structure has been filled in with a gray tone, while elements beyond the section plane (such as the stairway) are shown more lightly. To give a sense of scale, a few figures have been drawn diagrammatically, along with an indication of plants and the large tree that is intended as a key element in the stair court. A shaded area is lightly hatched on each floor to the right to emphasize the significance of the skylit court in bringing natural light into the entire structure.

Try to visualize (and, as a useful exercise, try to draw) each of these sections in the drawing vocabulary of the other. The upper drawing would become a simple section with a few scale figures, a few plants, and a tree and with minimal indication of light and shade. The lower drawing would become a sectional perspective in which one could see into the space and sense its depth relationship more fully. Each sort of drawing has its particular kind of usefulness.

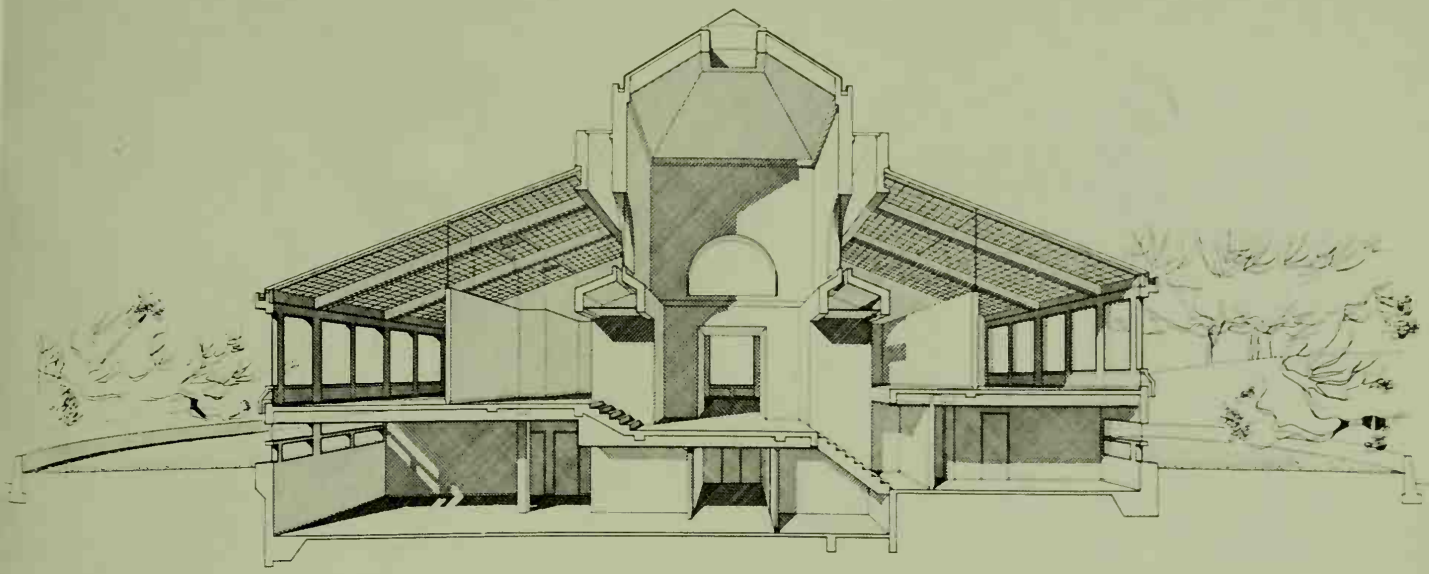
PRESENTATION ELEVATIONS

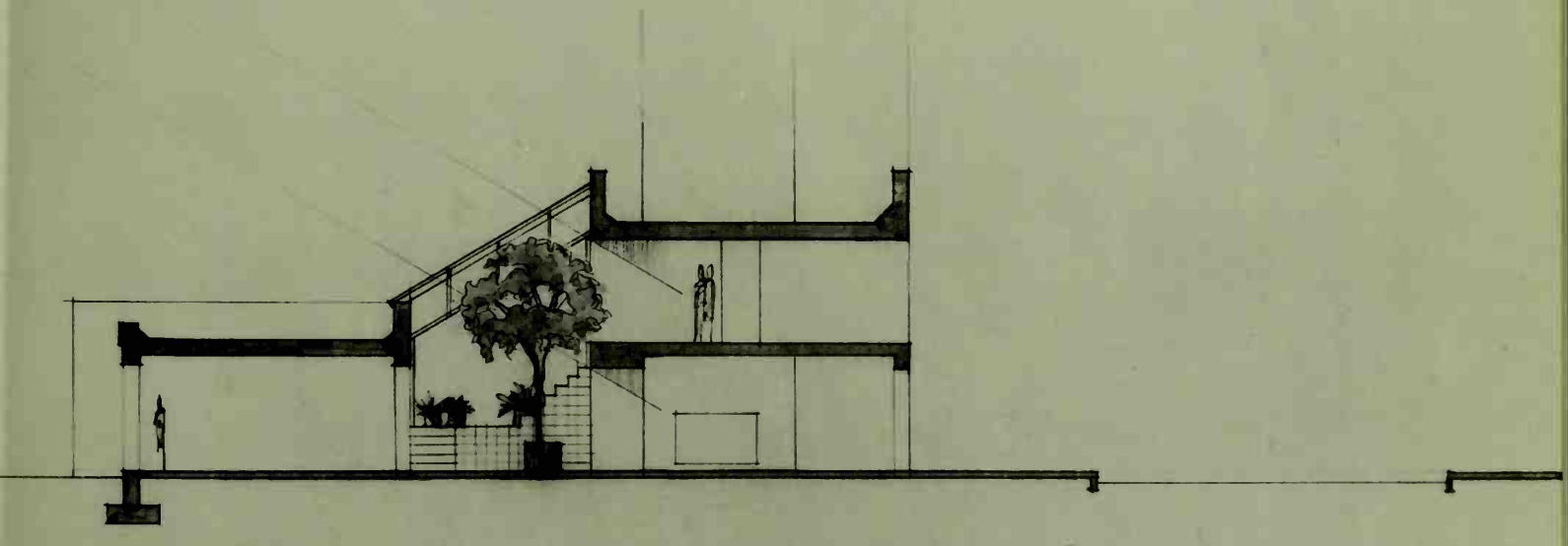
The drawing across the top of pages 88–89 is a sectional elevation taken through a range of spaces as a basis for a precision study of scale, materials, and colors. The original is drawn on cream tracing paper, and color tones are built on both the front and back of the paper. It is an ordinary habit to draw only on the upper face of paper, but with the good transparency of thinner tracing papers, use of the back surface makes it possible to produce a much fuller range of tones. Soft tones on the back become even more misty and delicate as seen through the paper. Rich tones are made all the more rich and deep when backed up from the back face of the sheet. Students are often told, "If paper had six sides, one could use all six," so with only two sides to take advantage of, it is a mistake to ignore one.

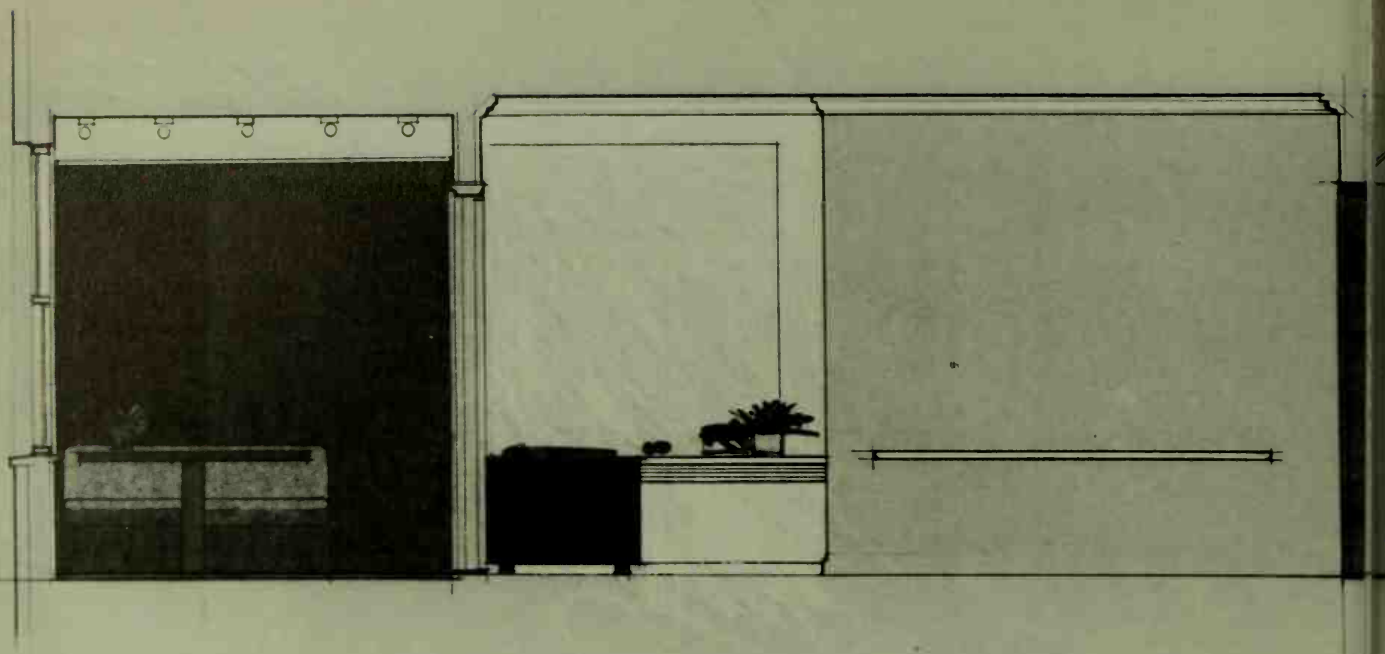
The purpose of such a drawing is to help bring about a synthesis of the decorative elements—color, furniture, and accessories—and the constructional items that are to become part of the working drawing. It is all too easy (and too commonplace) to separate these concerns—to detail construction with little thought for finish and furnishing and then to deal with color, finish, and details on the basis of construction materials that have been preselected. While it is not necessary to pin down every small item before working drawings are started, drawings that include furniture, lighting equipment, indications of finish and colors, and some ideas about accessories make it possible to produce working details that will support elements which are to follow. The color plan that the painter will need can be made much more easily if color has been part of the earlier developmental

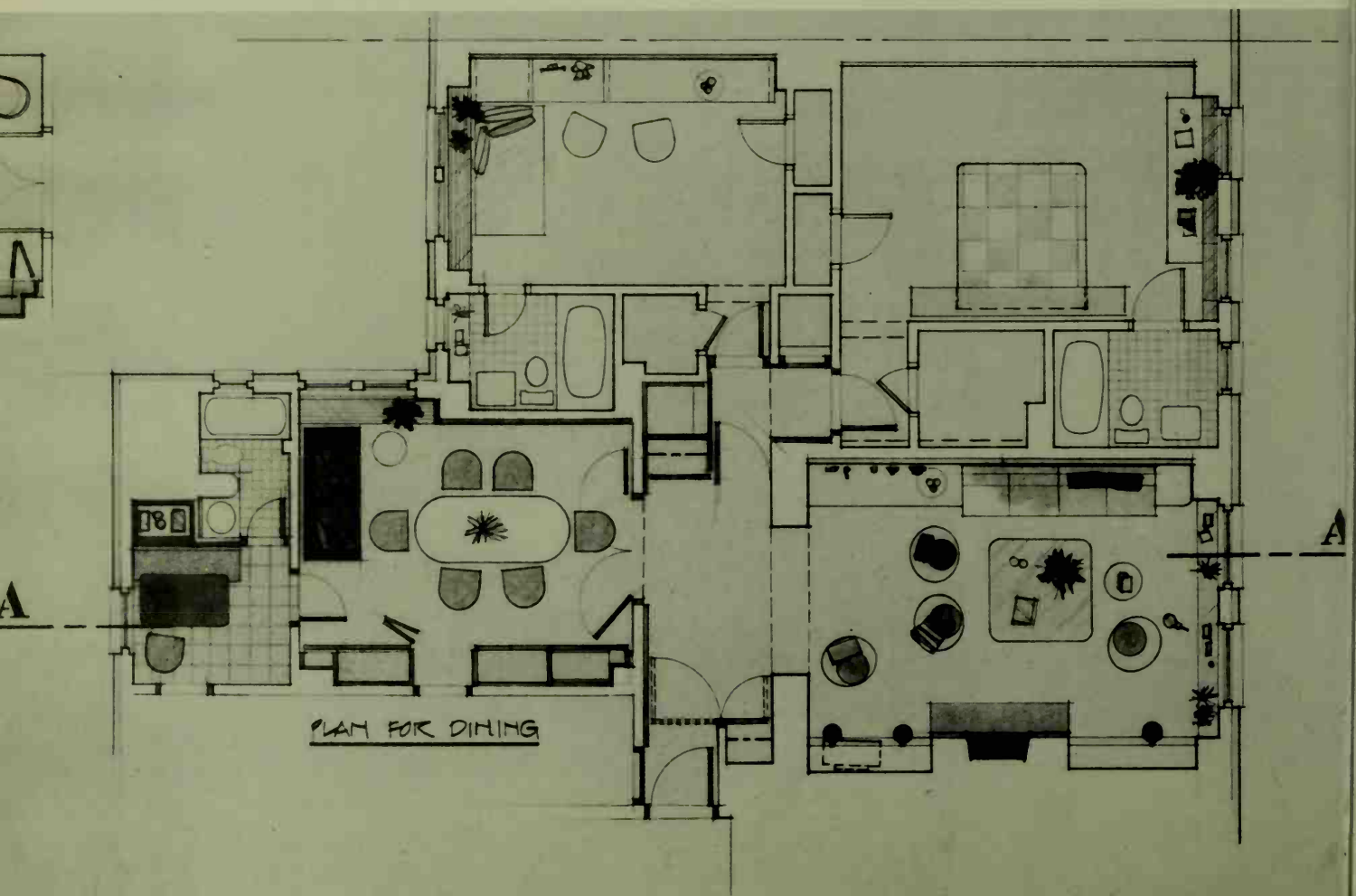
Sectional perspective (top) shows administration building for the Academy of the New Church at Bryn Athyn, Pennsylvania. (Drawing by Fred L. Foote for Mitchell/Giurgola, architects)

In house project (bottom) shown in section, depth is implied by simple indication of sunlight and tree. (Norman Diekman, designer)





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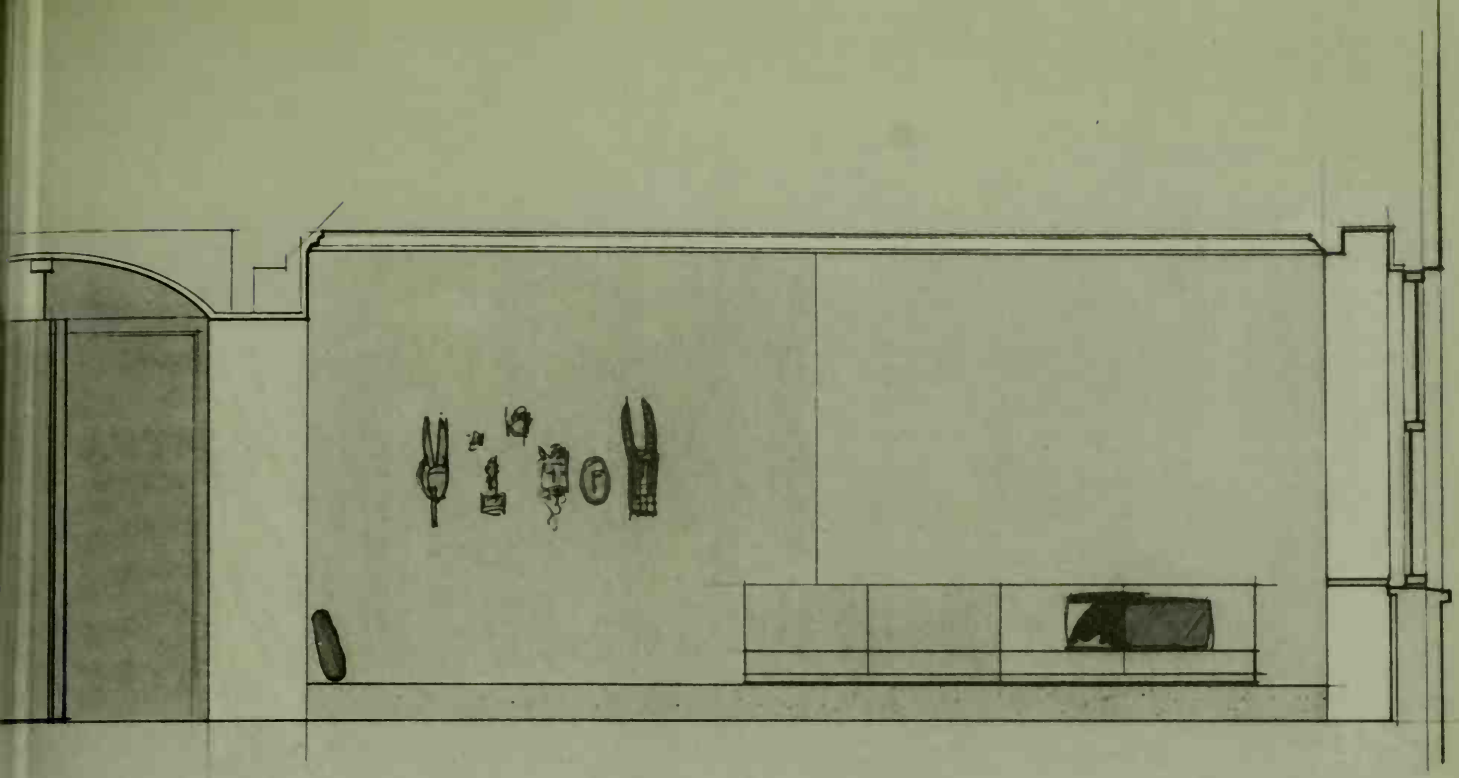


Multiple color schemes for presentation to client are shown in section (above) and plan (left).

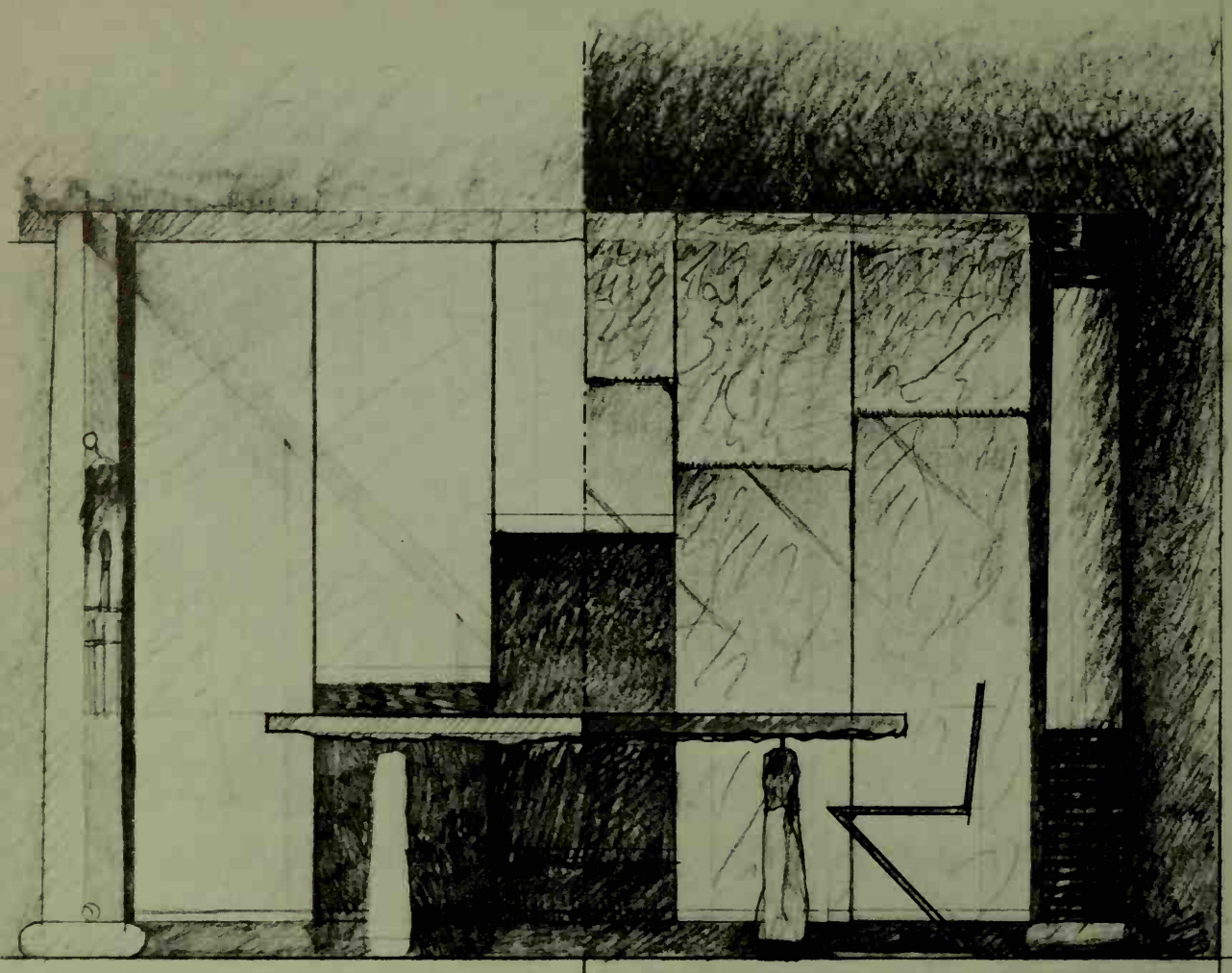
studies, rather than a last-minute afterthought.

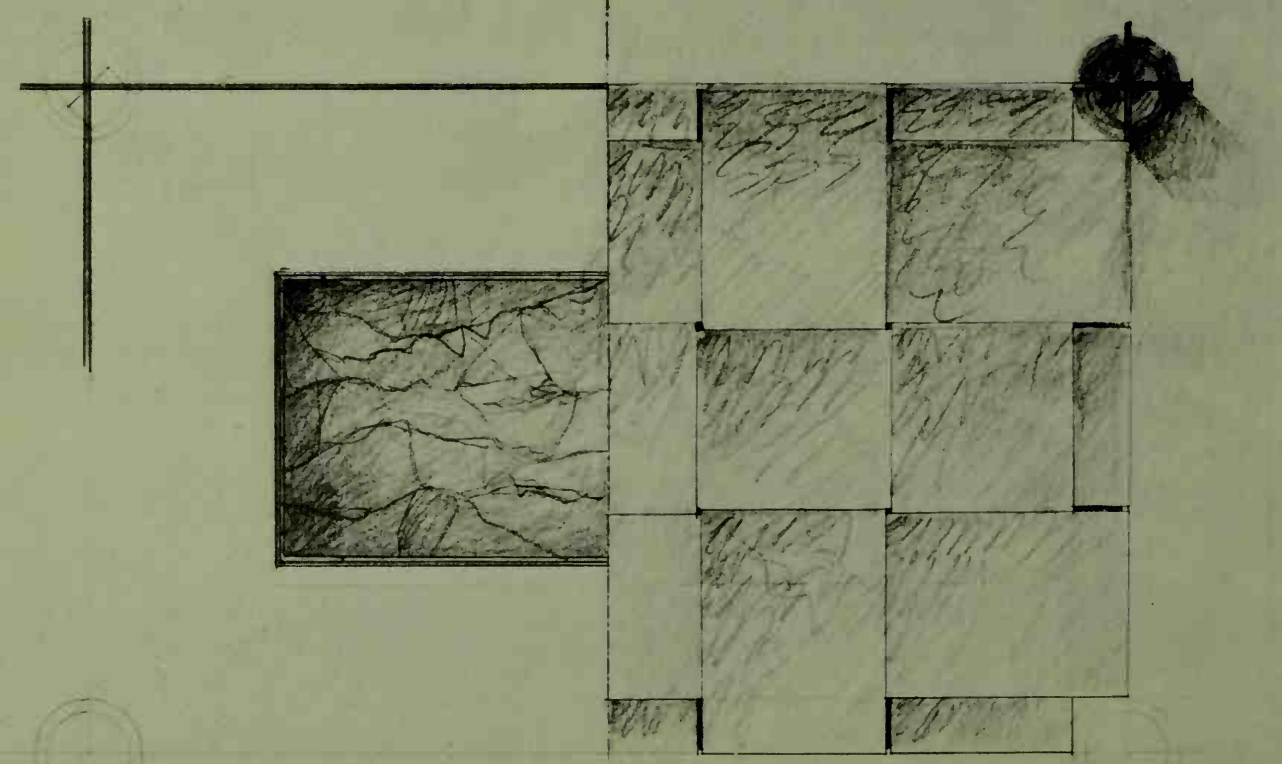
Page 90 illustrates another interior study for a unit that stands in a middle ground between architecture and furniture. It is part of an open loft living space and consists of a kind of pavilion or tent defining a dining area—in a sense a little building within a larger space. The lower drawing is a plan, divided on the center line to show an interior plan on the left and a reflected ceiling plan on the right. The table appears on the left while the right shows the patterning of ceiling material.

The upper drawing is also split on the center line—the left side a section in which the table has been cut through and the right side an elevation where we see the corner column, the table, and Rietveld chair in elevation against the pattern of back wall material. Sketches in the right margin reflect thought about the details of the table's understructure design.

There is some indication of shading in both plan and elevation: not a complete development of architectural shade and shadow, but a minimal indication to enhance the sense of solid form, particularly the roundness of the column on the right. The use of scribble tone to suggest depth and texture of material is quite personal, but suggests the wide range of techniques that can be used to express intent.

As with every other type of drawing, elevations and sections can, in addition to their usefulness in the design process, offer the possibility of being works of art. Historically, particularly before the invention of photography, publication of architectural drawings was the primary way of making architectural design known to a geographically widespread audience. The work of the Adam brothers became famous through their publications of sets of engraved reproductions of drawings in *Works in Architecture.* The sectional elevation reproduced on page 91 shows the "Great Apartment" or hall of Syon House in England from this collection. Cast shadows are used to give an illusion of depth, as in the modern drawings discussed above, but





the Adams have also used a theatrical device rarely allowable in architectural drawing. In the central archway opening, they have foresaken elevation drawing for perspective, giving us a glimpse of the room beyond as it might be seen from an angle and letting us see the thickness of the wall by giving the arch depth in perspective. In modern practice, including perspective inserts in elevations is viewed as awkward and amateurish, but one can hardly quarrel with the Adams' successful stretching of the laws of geometric drawing.

ISOMETRIC ELEVATIONS

While modern architectural drawing avoids the realism of stage scenery, students and professionals alike have become adventurous in exploring drawing techniques that step beyond the conventional limits of plan, section, and elevation. Isometric, in which a three-dimensional illusion is created by drawing horizontal lines in a 30°/60° angle relationship (with all dimensions at true scale—hence "iso" for "equally" and "metric" for "measured"), and axonometric, in which each main axial direction of line is given its own direction, have become newly popular in serious design drawing.

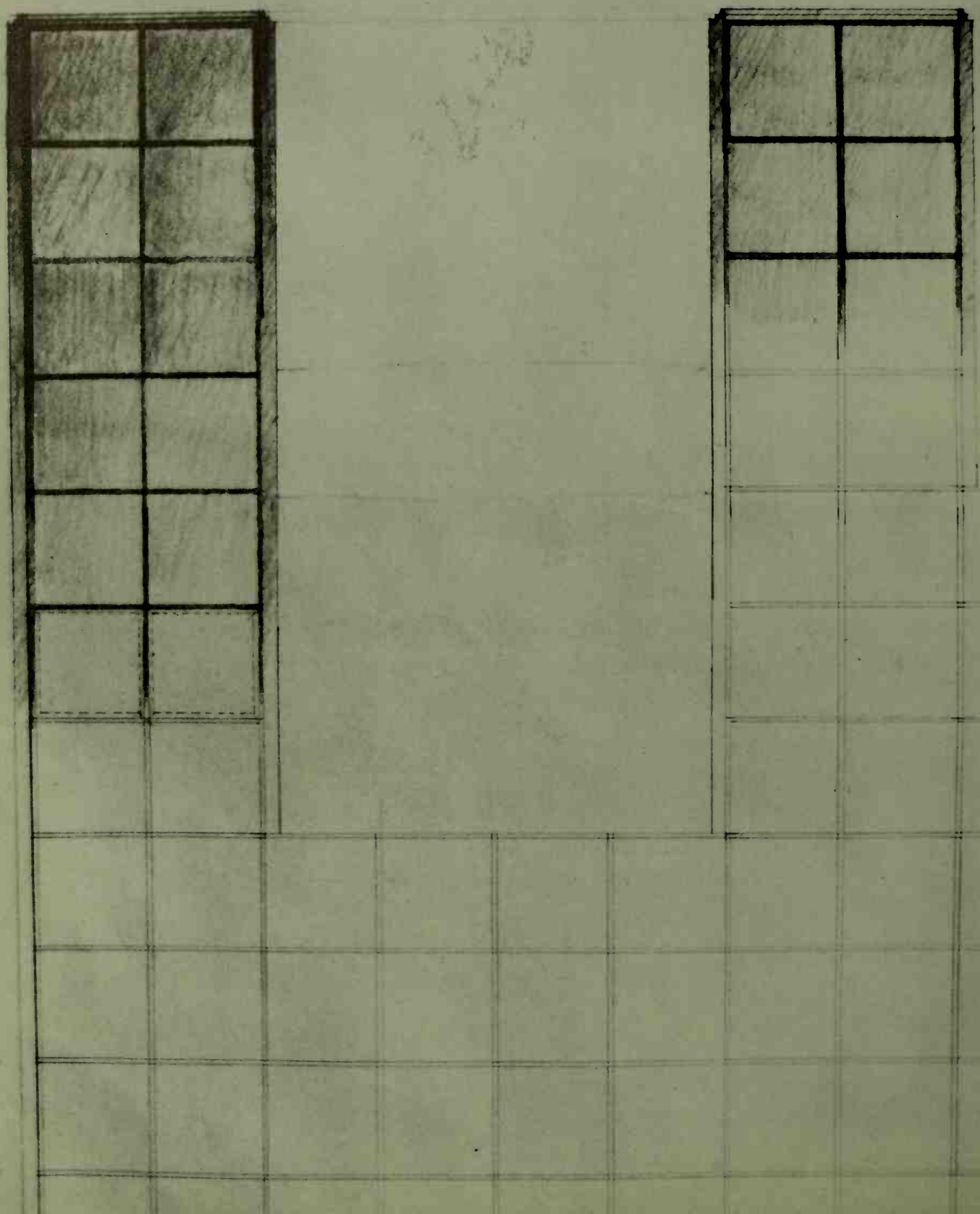
On the following pages a design for a shop ("The 1st of August" boutique) is shown in a group of drawings by the architect George Ranalli. The drawing on the left is a portion of an elevation in which the basic concept of a grid of squares with stepped, cut-out, angled surfaces is set forth. The upper drawing on the right is a detail study exploring the way the metal framing of glass will be organized at the key intersection where the angled plane meets the main verticals.

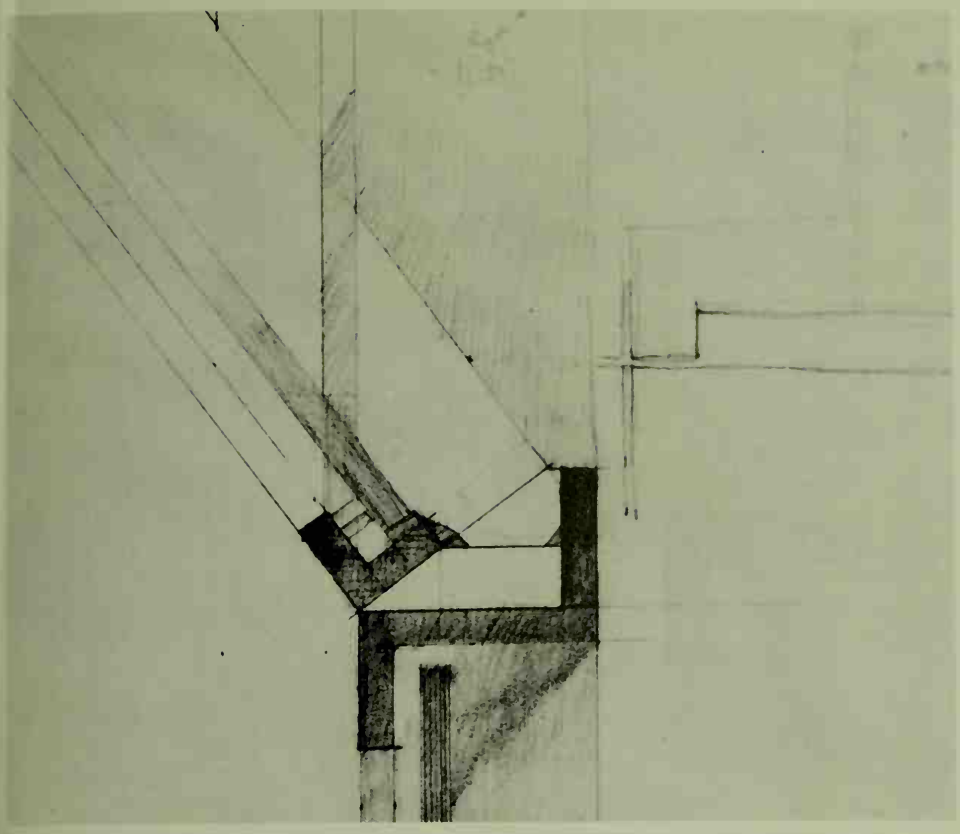
The lower drawing is an axonometric in which an illusion of three-dimensional form is developed. The front elevation plane has been drawn with horizontals horizontal, but with verticals angled out to the right at a 45° angle. The receding side elevation planes therefore also have their verticals angled at 45°, while their horizontals become vertical in the drawing. The top plane becomes a true top view. All dimensions in all three planes are in true scale. It is interesting to turn such a drawing about and observe the various illusions of form that it generates.

Elevations and sections can, each in their own way, be means of realistic representation. The new interest in exploring other drawing devices, such as isometric, axonometric, and plan-perspective views, is an indication that drawing offers endless ways of suggesting reality. Moving from plan to elevation and section, from section to sectional perspective, from elevation to axonometric covers all the appropriate means for exploring the ways in which architecture interiors can be seen through drawing.

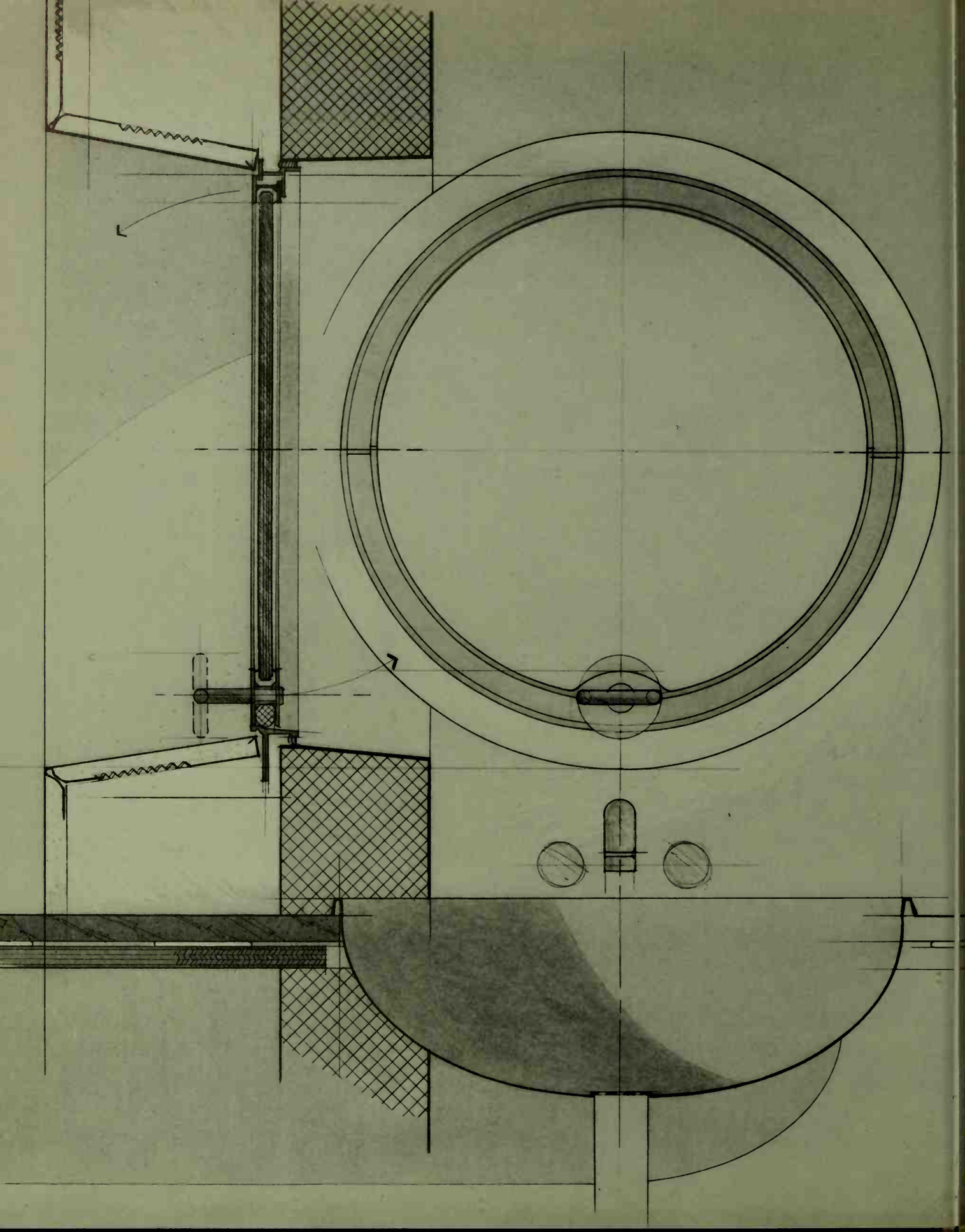
This formal section (above) is on engraving from Works in Architecture of Robert and James Adam. The cost shadows and glimpse of background space seen in perspective are devices seldom used in modern drawings.

A dining oreo (opposite page) in a loft is drawn in o style that is both serious and highly personal. (Design and drowing by Giuseppe Zambonini, architect)





Elevation and closely related detail are shown in drawings for the 1st of August Shop. (Design and drawings by George Ranalli, architect)



FURNITURE AND INTERIOR DETAILING

Details are of key importance in interior design. We live in spaces in close contact, often direct physical contact, with surfaces of floors and walls and certainly in the closest of contact with surfaces of seating and bedding. Table edges and door knobs are things that we must touch and grasp in order to use. Our sense of pleasure and comfort in being in a space comes both from the general sense of shape and color and from the closeup awareness of details that we see and feel, quite literally.

It is unfortunate that so much routine interior design concerns itself with layout and decorative scheme, but treats matters of detail as unimportant—to be left to standard details and standard products of indifferent or at least unexceptional quality. The greatest designers and architects have always understood that small details support general concepts and have often gone to great trouble to develop furniture and architectural detail to support their overall intentions. It is no accident that so many great modern (and historic) furniture designs are the work of architects. Frank Lloyd Wright, Mies van der Rohe, Le Corbusier, Marcel Breuer, Alvar Aalto, among many others, designed furniture because their interiors required kinds of design that the manufacturers of their day did not offer. The special pieces that they developed to solve specific problems of individual projects have become classics, still in production even after many years.

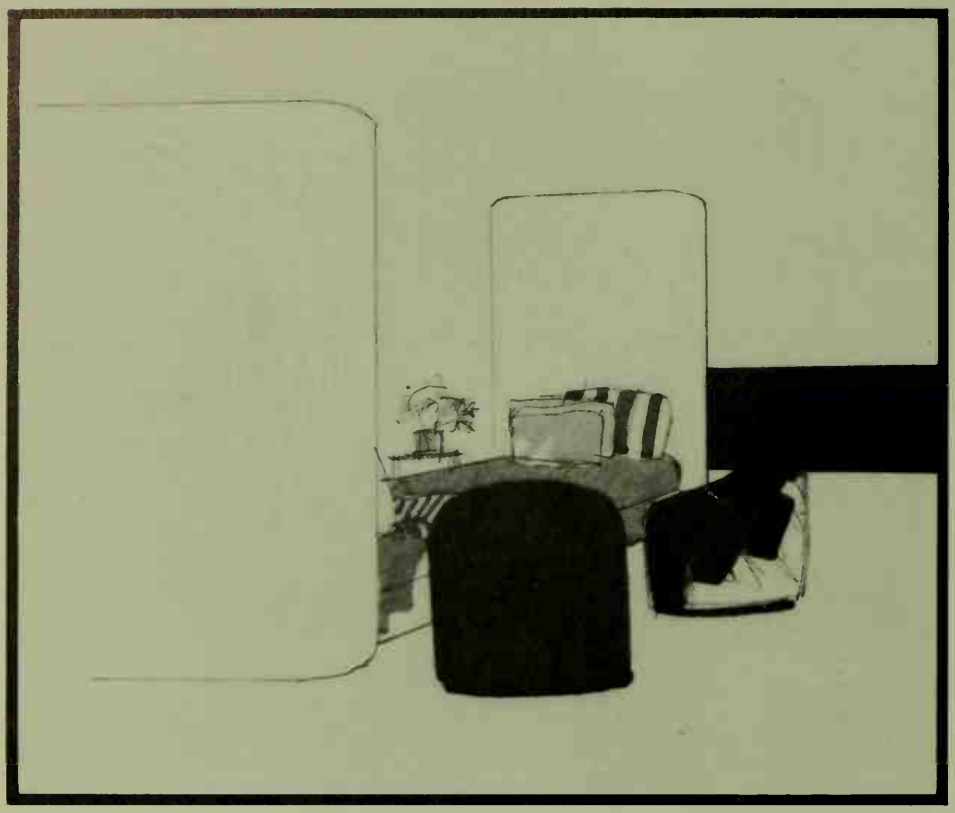
Historically, the Adam brothers, Victor Horta, and Hector Guimard produced interiors complete with unique detail and unique furniture as central to their thinking as any larger aspects of their work. Although we may not have names to associate with the achievements, the choir stalls and altar carvings of the great cathedrals, paneling and ornamental detail of Renaissance palaces and eighteenth-century houses are vital elements in those structures.

We live now in a world largely equipped with factory-produced readymades, and it becomes easy to forget that, at least in the world of architecture and interior design, it remains possible to develop special designs, special products, and special details for a particular interior. Economics imposes certain limitations, of course. Designing a special and unique dishwasher, sink, or toilet may hardly seem worth the trouble and costs involved; still, it is possible to consider a special kitchen in which the mechanical appliances are housed and subordinated to a imaginative concept expressed in special details. A special window in a special bathroom is not impossible (see illustration opposite); special tables, chairs, desks, and storage furniture are quite within the realm of the possible. A special lamp or light fixture may also be a key element in giving character to an interior space.

DESIGN DETAILING

The process of developing details is a matter of proceeding from the general to the specific; from concepts and big ideas about the organization of parts to the smaller and, in a way, more personal elements that we experience at close range. To leave these matters unconsidered, to turn over detailing to

Interior detailing may be influenced by awareness of the other arts. For example, the form of a wash basin below a round window is suggested by a Balthus painting of 1977. (Norman Diekman, designer)



A first design sketch (above) introduces a pivotal idea that will guide developing detail.

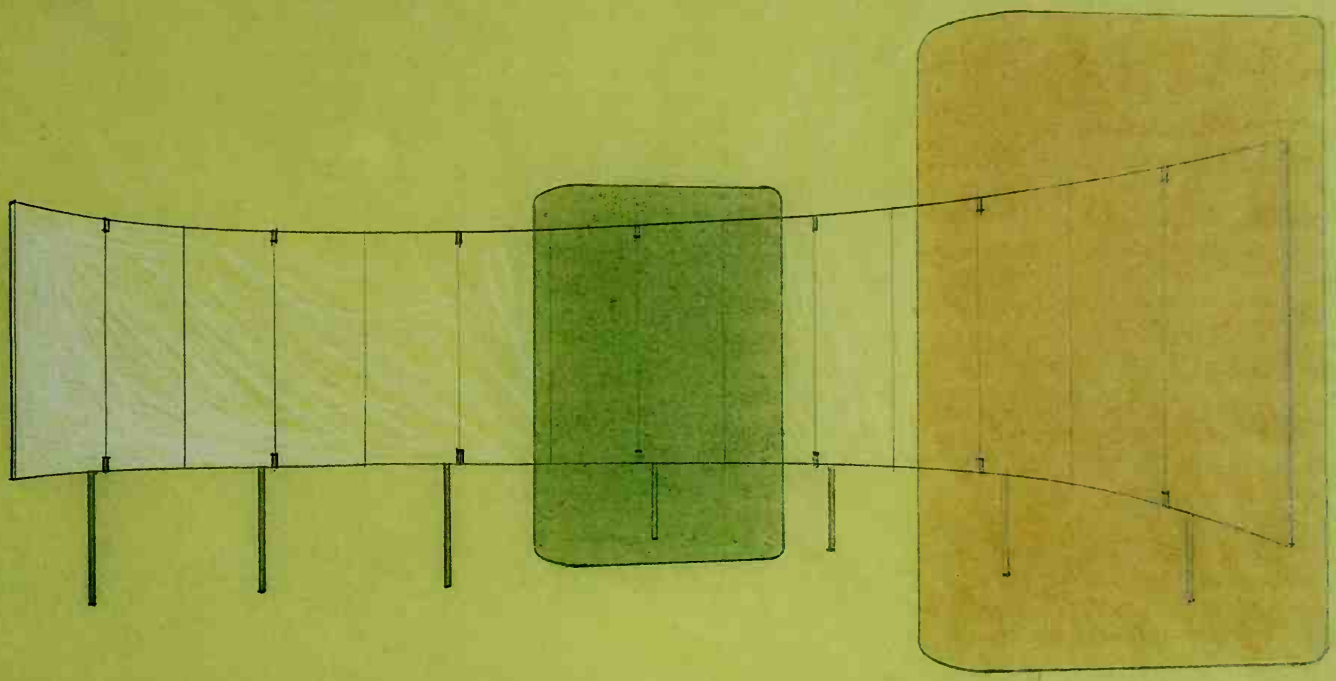
Opposite page: Shown is an enclosing screen of white glass. Red and green masses do not indicate final color selections but serve to emphasize separation of elements (top) and (bottom) a totally different, much more literal and precise study of the relationship among built-in seating, table, and chair. (Drawings on this and facing page for a William Machado, Norman Diekman project)

strictly technical drafting help, to accept all standard details as a convenience is to miss the most interesting of possibilities for making a space comfortable, exciting, and aesthetically satisfying. Some large architectural firms treat detailing as a specialized activity to be separated and isolated from design. That view robs the designer of one of the most important elements of communication—the ability to move from the general to the particular in a smooth continuum.

This is a key point in developing detail. It is not something to be forgotten when planning and developing general concept, something to be left for later consideration. Rather, detail can be in mind from the first; sometimes it may *be* the first thought, with the larger concept growing from it. The drawing at the left is an early sketch, not yet identifying detail as it might be developed later, yet the concept illustrated—the lounge daybed closed at each end by a broad columnlike element and the relationship to the adjacent chairs—is, in fact, a *detail* concept, one which will lead to furniture and construction details that will later emerge as detail drawings in the literal sense.

In the drawings on the right, color is part of the detail concept under development. The curved glass screen and the massive red and green elements are all that is shown. The total space is not even indicated, and yet these elements, destined to be developed as details, establish a character and approach that will set the design direction for the space in question. The lower drawing moves toward still more specific detail in another project. The profile of the banquette seen in section and its relation to table, chair, and other detail elements are seen here in preliminary form, but it is again such detail that is moving the design of the space in a particular direction.

Built-in furniture is an element of detail that is a particular concern of the interior designer. Most interiors are furnished with whatever items the occupants bring in or choose to buy, most often with indifferent results in



terms of both comfort and aesthetics. Built-ins require development of detail of a particularly sensitive sort. The forms must be functional (a most demanding problem in the case of seating), and the details must give constructional information adequate to provide the craftspeople who will make the units with data on materials and techniques of manufacture. The interior designer, by developing such details, can give interiors special character and special comforts not to be had in any other way. Built-in storage furniture, cabinets, radiator enclosures, and the like involve detailing similar to architectural details of millwork and other woodwork.

DETAILING SYMBOLS

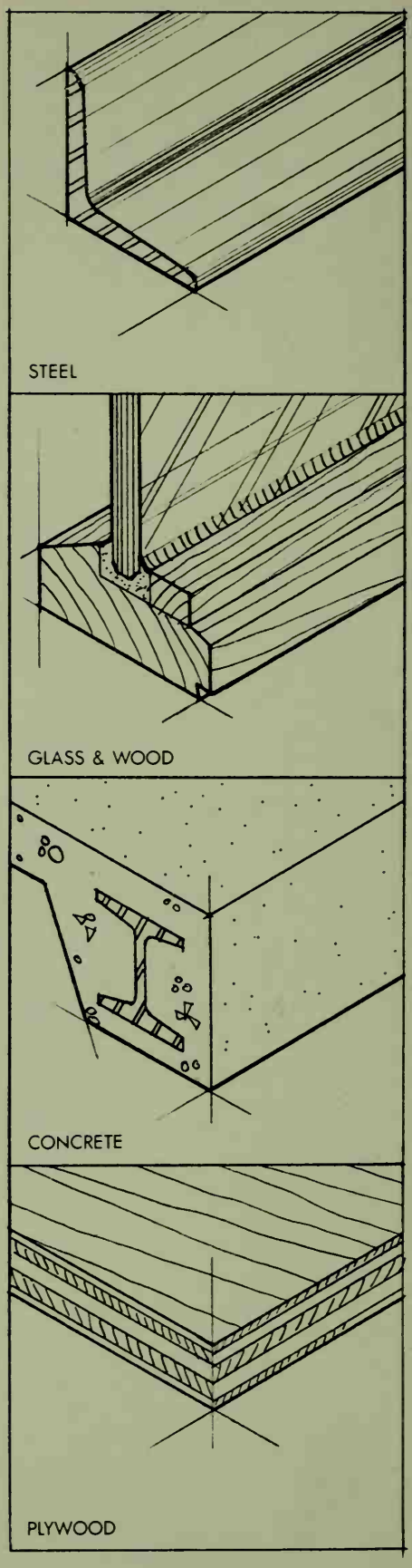
Most detail drawing must, without the use of color, identify materials through other symbols that reproduce satisfactorily in black and white. Notes can also be used to identify materials, but in section drawings in particular, where materials of various parts are best shown and explained, drawing symbols serve best to identify steel, glass, wood (solid or ply), concrete, or whatever other materials are specified.

The symbols used have become well standardized and are generally almost pictorial in their recall of the nature of real materials. In the illustrations at the right, some typical materials are shown as they commonly appear, but are also sectioned with the standard drawing symbols used where the section cuts through.

Steel is symbolized by 45° hatch lines in pairs, the resulting pattern suggesting the texture that one might find at the end of a steel member that has actually been saw-cut. The homogeneous quality of glass, shown set with caulking in a wood frame, is suggested by the uniform gray tone used. The I-beam, steel again, is shown enclosed in concrete fireproofing (standard practice in older highrise buildings). The concrete is shown with dots and irregular loop forms suggesting the pebbles, sand, and cement that make up actual concrete. Solid wood appears with grain lines to suggest its structure, while plywood is shown quite realistically as a series of layers with wood grain in opposite directions.

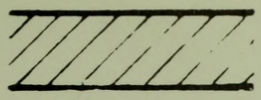
When first becoming accustomed to making section drawings, it is helpful to have a chart of standard symbols (such as the one on the opposite page) at hand. With experience, using them becomes second nature, and to a surprising degree, a sense of aesthetic satisfaction in their use develops. Drawing a section, even a complex section with a variety of materials and parts, can be an experience in which the quality, the feel of each material, is sensed. As the familiar symbols are drawn to indicate wood, metal, glass, stone, and the other parts being put together on paper, the way in which those real materials will be assembled in construction can be visualized.

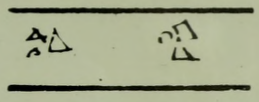
Pages 100–101 show a complete east/west section through a large living room. The important features are the window treatment on the left and the fireplace at the right. Superimposed for additional design study is a partial elevation of the window and fireplace, with the detail key numbers and basic dimensions necessary for detail development. They are shown fully developed on pages 102–103.

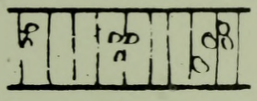


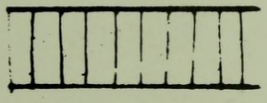
Pages 100–101: Sectional details, o window sill, and the area below the sill (poge 100) are superimposed on on elevatian. The section (poge 101) olsa includes the right side of the room cut thraugh the fireplace. Note floor and ceiling lines complete full width of room. (Williom Machada, Norman Diekmon, designers)

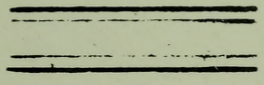
SYMBOLS FOR DETAILING

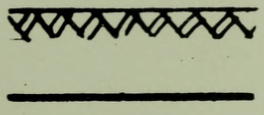

BRICK

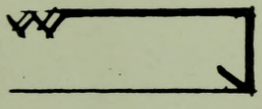

CONCRETE

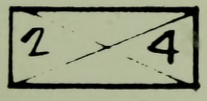

CONCRETE BLOCK


GYPSUM BLOCK

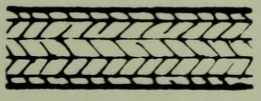

GYPSUM BOARD


PLASTER

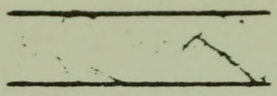

PLASTER BEAD

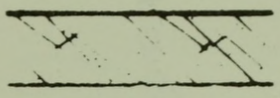


ROUGH LUMBER

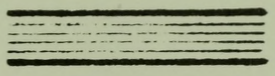

PLYWOOD


HARDWOOD

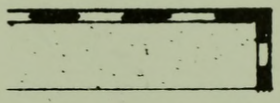

MARBLE

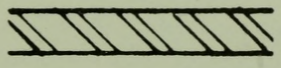

GRANITE

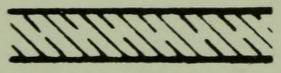

STONE

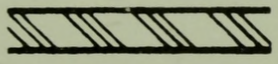

GLASS


PLASTIC

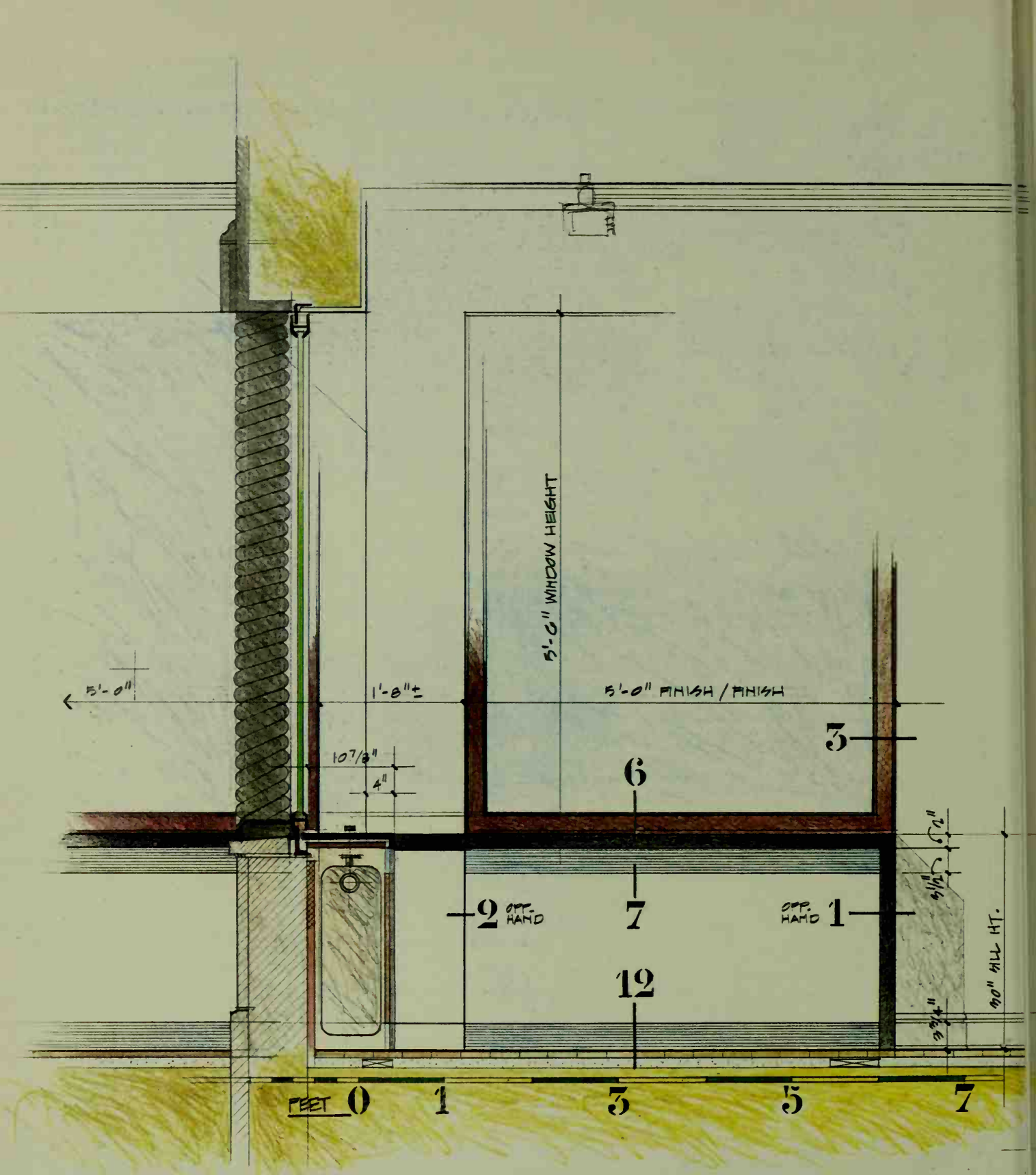

PLASTIC LAMINATE

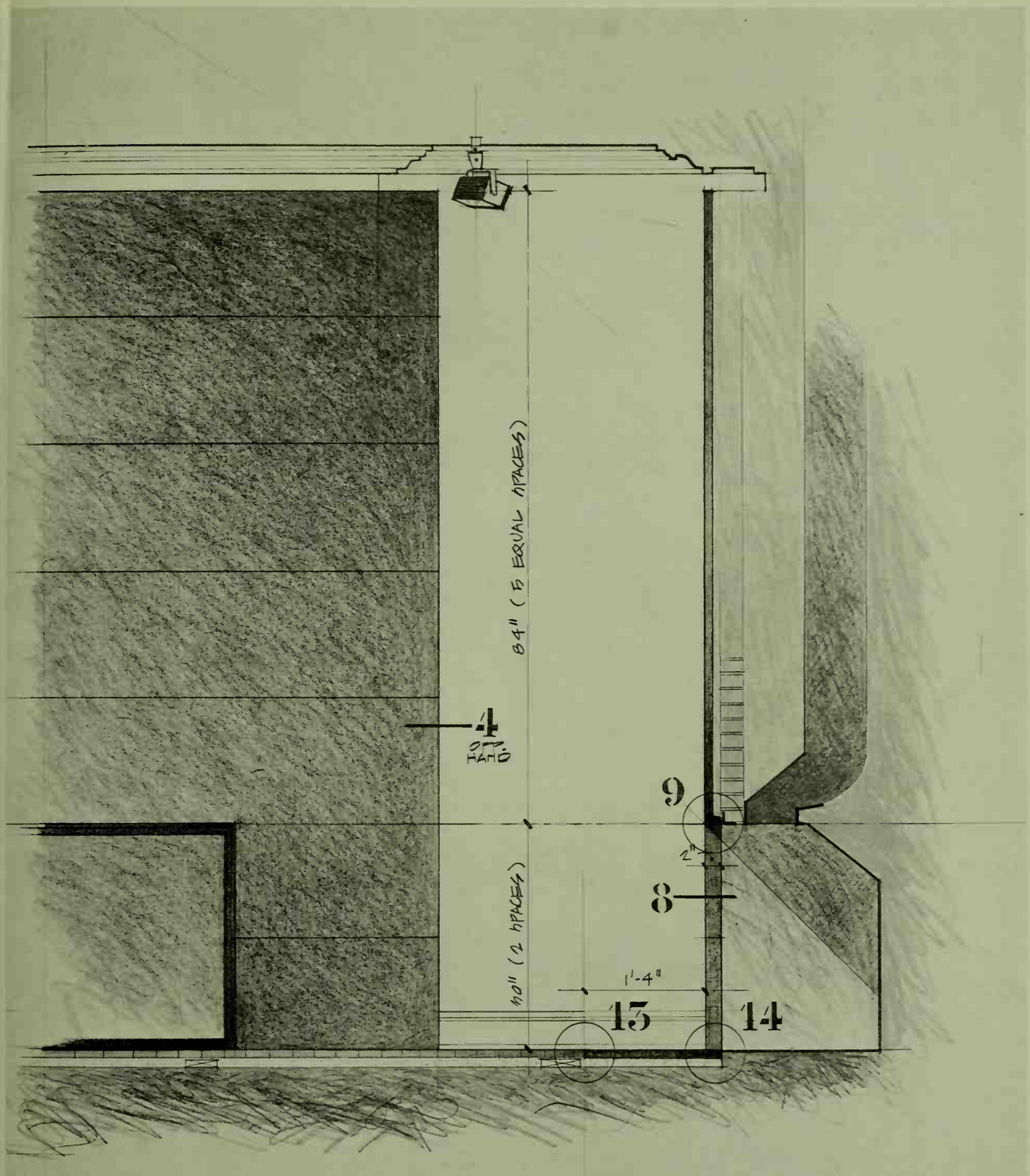

STEEL

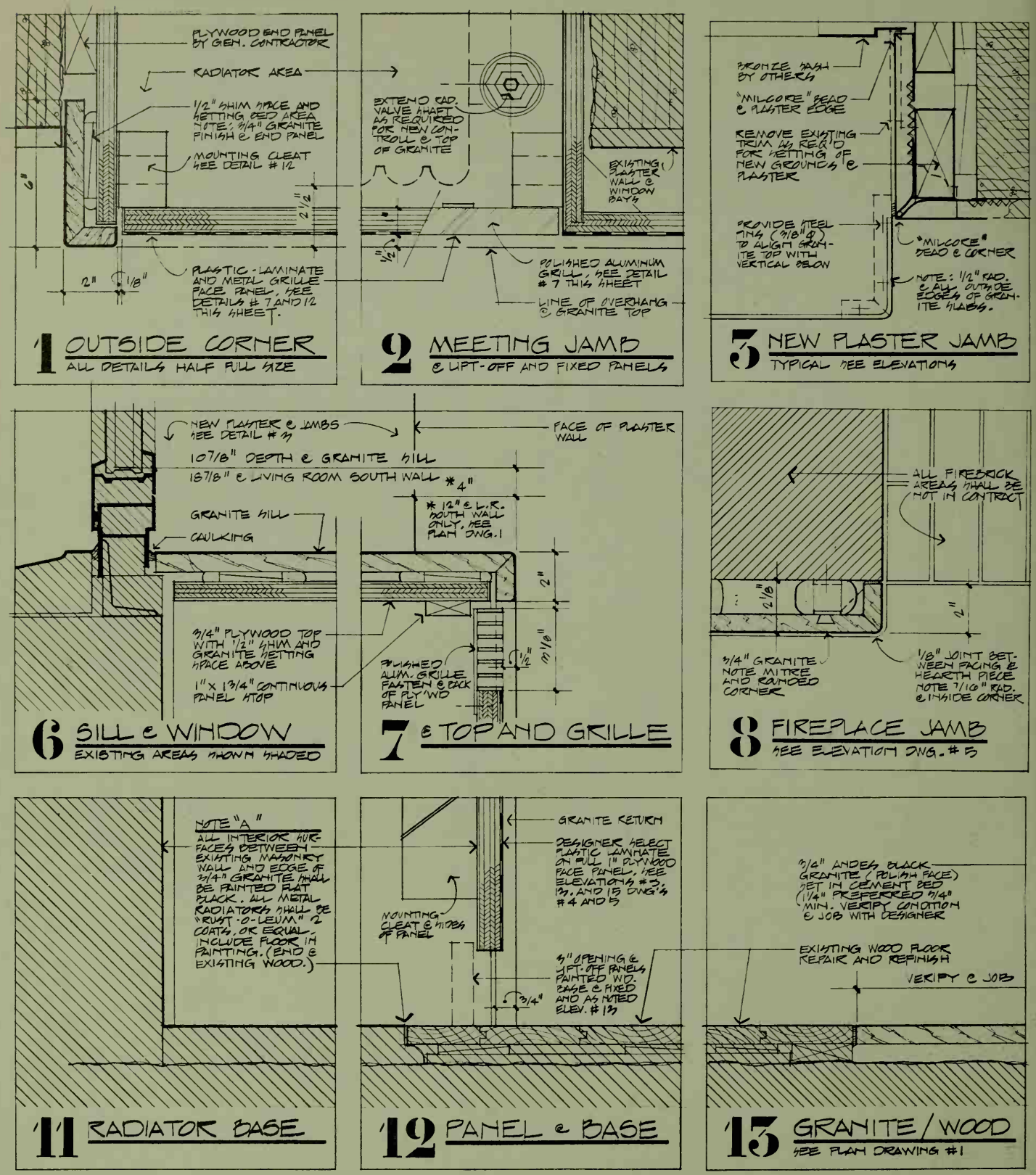

ALUMINUM

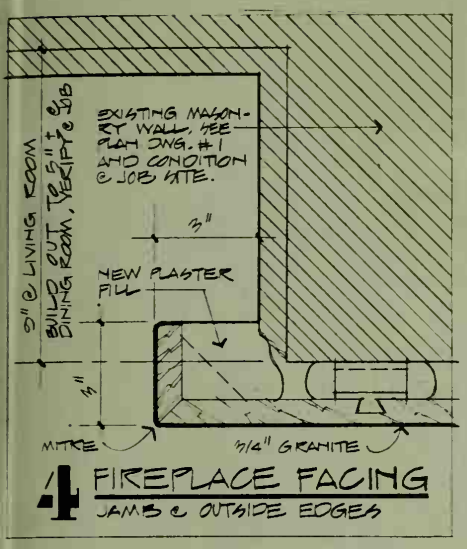

BRONZE

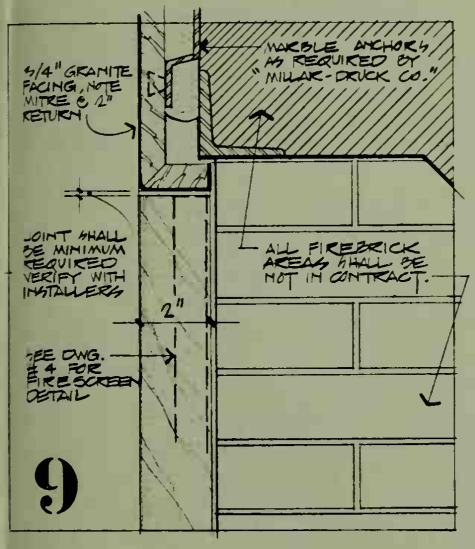

CARPET

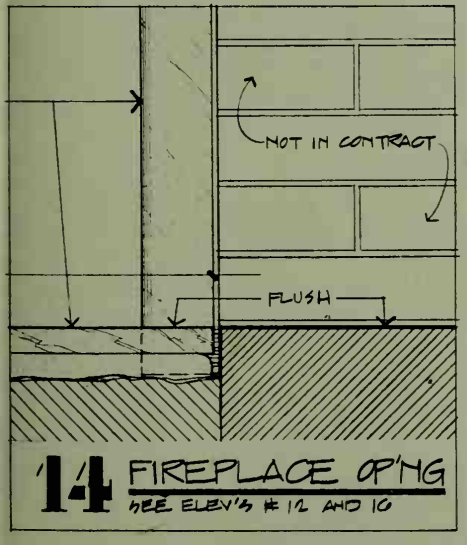

5'-0" WINDOW HEIGHT
5'-0"
1'-8"±
5'-0" FINISH / FINISH
10 7/8"
4"
3
6
2 OPP. HAND
7
OPP. HAND 1
12
2 1/2"
4 1/16"
3 3/4"
40" SILL HT.
FEET 0 1 3 5 7


84" (5 EQUAL SPACES)
4
TO LAND'D
9
2"
8
10" (2 SPACES)
1'-4"
13
14


PLYWOOD END PANEL BY GEN. CONTRACTOR
RADIATOR AREA
1/2" SHIM SPACE AND SETTING BED AREA NOTE: 3/4" GRANITE FINISH @ END PANEL
MOUNTING CLEAT SEE DETAIL #12
6"
2 1/2"
2"
1/8"
PLASTIC-LAMINATE AND METAL GRILLE FACE PANEL, SEE DETAILS # 7 AND 12 THIS SHEET.
1 OUTSIDE CORNER
ALL DETAILS HALF FULL SIZE
EXTEND RAD. VALVE SHAFT AS REQUIRED FOR NEW CONTROL @ TOP OF GRANITE
EXISTING PLASTER WALL @ WINDOW BAYS
1/2"
POLISHED ALUMINUM GRILL, SEE DETAIL # 7 THIS SHEET
LINE OF OVERHANG @ GRANITE TOP
2 MEETING JAMB
@ LIFT-OFF AND FIXED PANELS
BRONZE SASH BY OTHERS
"MILCORE" BEAD @ PLASTER EDGE
REMOVE EXISTING TRIM AS REQ'D FOR SETTING OF NEW GROUNDS @ PLASTER
PROVIDE STEEL PINS (3/16" Ø) TO ALIGN GRANITE TOP WITH VERTICAL BELOW
"MILCORE" BEAD @ CORNER
NOTE: 1/2" RAD. @ ALL OUTSIDE EDGES OF GRANITE SLABS.
3 NEW PLASTER JAMB
TYPICAL SEE ELEVATIONS
NEW PLASTER @ JAMBS SEE DETAIL # 11
FACE OF PLASTER WALL
10 7/8" DEPTH @ GRANITE SILL
18 7/8" @ LIVING ROOM SOUTH WALL * 4"
* 12" @ L.R. SOUTH WALL ONLY, SEE PLAN DWG. 1
GRANITE SILL
CAULKING
3/4" PLYWOOD TOP WITH 1/2" SHIM AND GRANITE SETTING SPACE ABOVE
1" x 1 3/4" CONTINUOUS PANEL STOP
6 SILL @ WINDOW
EXISTING AREAS SHOWN SHADED
2"
3 1/8"
1/2"
POLISHED ALUM. GRILLE FASTEN @ BACK OF PLYWD PANEL
7 @ TOP AND GRILLE
ALL FIREBRICK AREAS SHALL BE NOT IN CONTRACT
2 1/8"
2"
3/4" GRANITE NOTE MITRE AND RAMOED CORNER
1/8" JOINT BETWEEN FACING @ HEARTH PIECE NOTE 7/16" RAD. @ INSIDE CORNER
8 FIREPLACE JAMB
SEE ELEVATION DWG. # 5
NOTE "A"
ALL INTERIOR SURFACES BETWEEN EXISTING MASONRY WALL AND EDGE OF 3/4" GRANITE SHALL BE PAINTED FLAT BLACK. ALL METAL RADIATORS SHALL BE "RUST-O-LEUM" 2 COATS, OR EQUAL. INCLUDE FLOOR IN PAINTING. (END @ EXISTING WOOD.)
11 RADIATOR BASE
GRANITE RETURN
DESIGNER SELECT PLASTIC LAMINATE ON FULL 1" PLYWOOD FACE PANEL, SEE ELEVATIONS # 3, 13, AND 15 DWG'S # 4 AND 5
MOUNTING CLEAT @ SIDES OF PANEL
3" OPENING @ LIFT-OFF PANELS PAINTED WD. BASE @ FIXED AND AS NOTED ELEV. # 13
3/4"
12 PANEL @ BASE
3/4" ANDES BLACK GRANITE (POLISH FACE) SET IN CEMENT BED (1 1/4" PREFERRED 3/4" MIN. VERIFY CONDITION @ JOB WITH DESIGNER
EXISTING WOOD FLOOR REPAIR AND REFINISH
VERIFY @ JOB
13 GRANITE/WOOD
SEE PLAN DRAWING #1







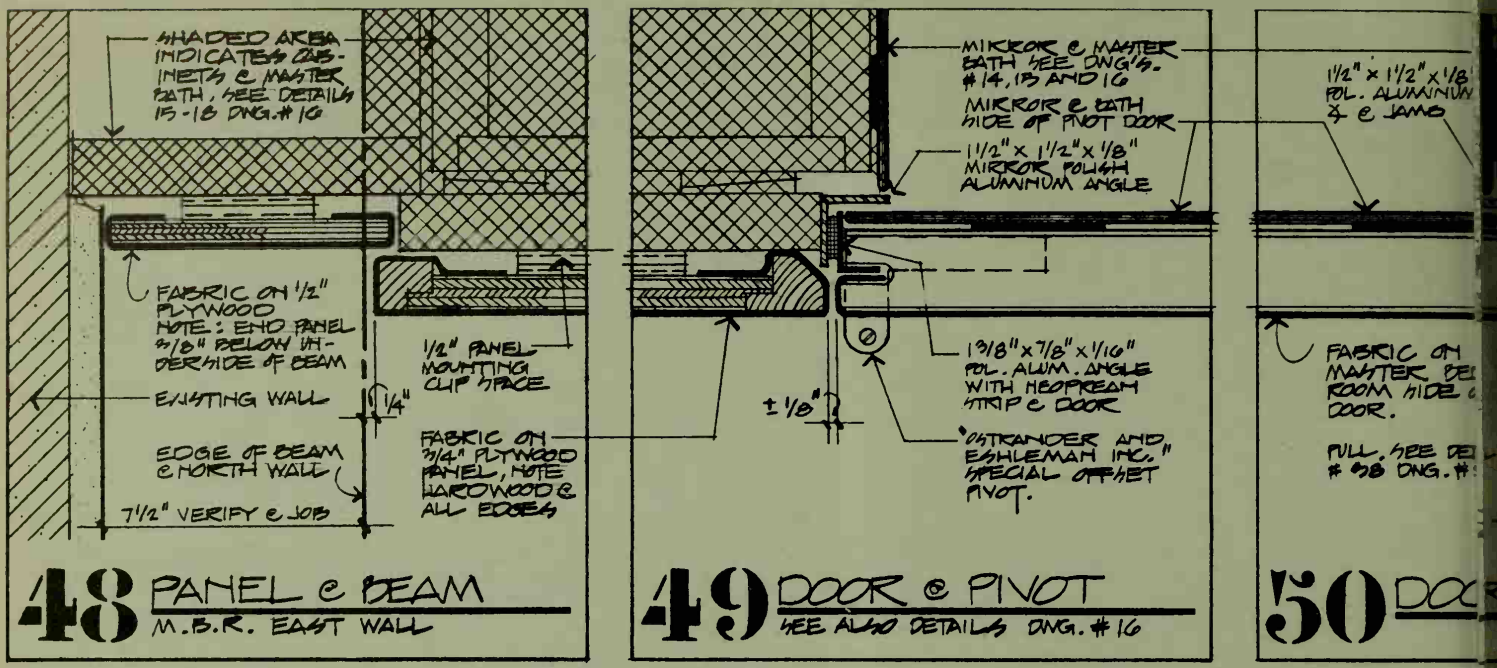
The array of details at the left is typical of the many drawings that make up portions of a complete set of construction working drawings. All are sections; 9 and 14 also include some elevation portions where elements seen in the distance, beyond the sectionally cut surface, are also visible. In the original, all the details are exactly half size. Titles and notes are largely self-explanatory. Each detail is enclosed in a box whose outlines cut or break the detail, limiting it to the significant element, corner, or intersection that it explains. Notice that the boxes are, in many cases, related in a horizontal or vertical sequence so that elements carry through from one box to the next. The plywood in detail 1 continues in matching position in detail 2 so that we understand that we are seeing the same element at a different intersection. Details 6, 7, 11, and 12 show both horizontal and vertical relationships and make up, taken together, one complete detail of a radiator enclosure—the very one that had been studied in a preliminary way on pages 100–101. The material of the floor in detail 12 is changed in detail 13 as it approaches the fireplace in detail 14. Details 9 and 14 together make up a section of the fireplace opening.

CONSTRUCTION DETAILING

Beginning designers often ask how anyone can know how to draw detail sections. This question does not have an easy answer. The best beginning is to study well-drawn details, such as those illustrated here, until they are fully understood. Going through sets of working drawings again and again, reading every note, checking every relationship of the drawings is a good beginning.

Then begin to make details, starting with one of a similar situation, changing dimensions, material indications, and other elements as necessary to make the new detail explain what is required in the new project. Some standard details can simply be traced from a reference and may be used over and over, but more often the creative designer will want to make changes that make the detail conform

Typical working drawing details (left) are arranged in a sequential order with window at left and fireplace at right, making it possible to follow around the room in order. Details are keyed to drawings on preceding pages and were drawn at half full-size (shown here reduced).



Horizontal sections across a storage wall are shown in order from left to right. Note the section line with balloon number circled with detail number (top), drawing number (bottom) appears on the elevation. (William Machado, Norman Diekman, designers)

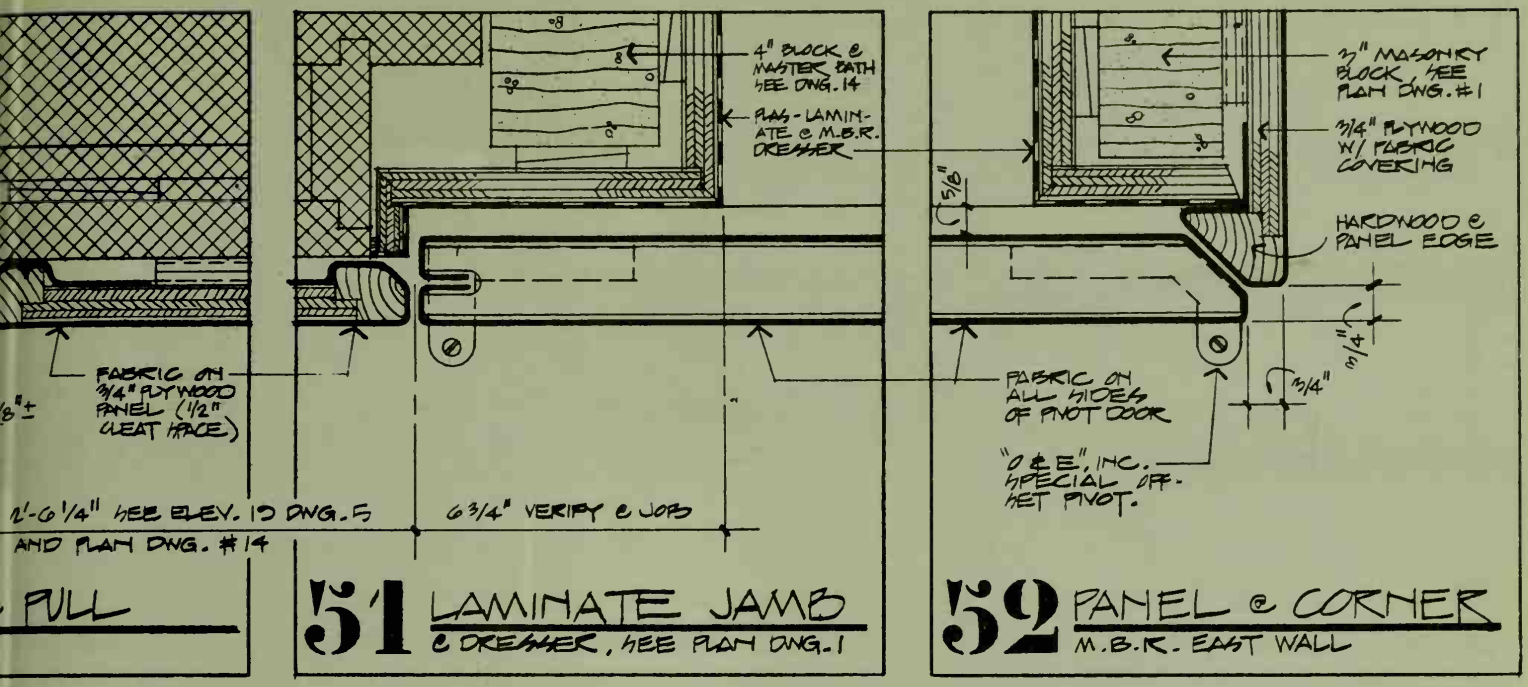
to the new project at hand. As more details are drawn and converted into built reality, confidence will grow in the ability to detail anything and everything clearly and skillfully.

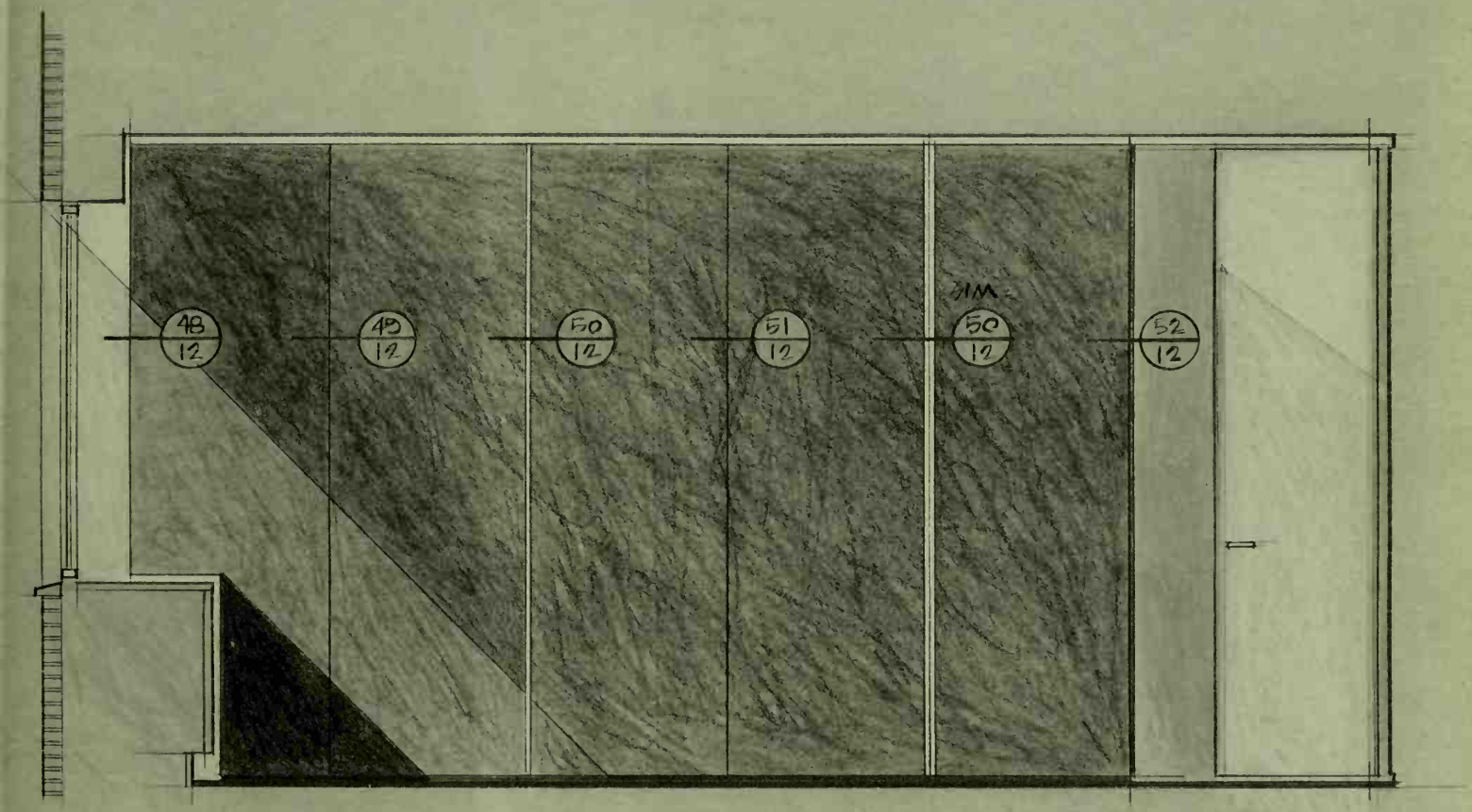
Many design offices and individual designers develop details that can be used again and again and become part of the vocabulary of elements that make up an individual or office style. There is nothing wrong with this practice; reinventing and redrawing a door frame, a radiator enclosure, or a closet shelf over and over gains nothing, and there is no reason why good details, once developed, should not be reused. A file of stock details used with discretion can save drafting time and ensure proven results. However, too much emphasis on standard details may involve giving up chances to improve and vary design.

The mechanics of using standardized details begin with simply tracing old drawings, but more modern techniques involve assembling elements physically to make up new sheets that can be printed as a unit. In large organizations, there is increasing use of computer-aided drafting techniques (see Chapter 9) that make it possible to hold details in computer memory to be called up as needed, modified to suit a new project, and assembled onto complete sheets of drawings to be automatically printed out by plotter or printer.

The illustration at the lower right shows an elevation drawing of a group of built-in storage cabinets. This is more a design elevation that a working drawing as can be seen from the absence of dimensions and material indications and the development of light and shade patterns coming from the window. On it, however, are indicated horizontal (plan) section locations identified by numbers 48 through 52. Construction details for each of these sections are shown above in boxes with corresponding numbers. Notice that the five panels visible in elevation are a sequence of fixed panel, door, fixed panel, and two doors. One can recognize doors by the conventional indication of a dotted V pointing toward the edge that is hinged.

Detail 50 shows the edge of the door with a pull and also reveals its relationship to a column that is the reason for the fixed panel on the right. Detail 51 shows how the extra width


4" BLOCK @ MASTER BATH SEE DWG. 14
PLAS-LAMINATE @ M.B.R. DRESSER
FABRIC ON 3/4" PLYWOOD PANEL (1/2" CLEAT HACE)
2'-6 1/4" SEE ELEV. 10 DWG. 5
AND PLAN DWG. #14
6 3/4" VERIFY @ JOB
PULL
51 LAMINATE JAMB @ DRESSER, SEE PLAN DWG. 1
3" MASONRY BLOCK, SEE PLAN DWG. #1
3/4" PLYWOOD W/ FABRIC COVERING
HARDWOOD @ PANEL EDGE
5/16"
1 1/4"
3/4"
FABRIC ON ALL SIDES OF PIVOT DOOR
"O & E", INC. SPECIAL OFF-SET PIVOT.
52 PANEL @ CORNER
M.B.R. EAST WALL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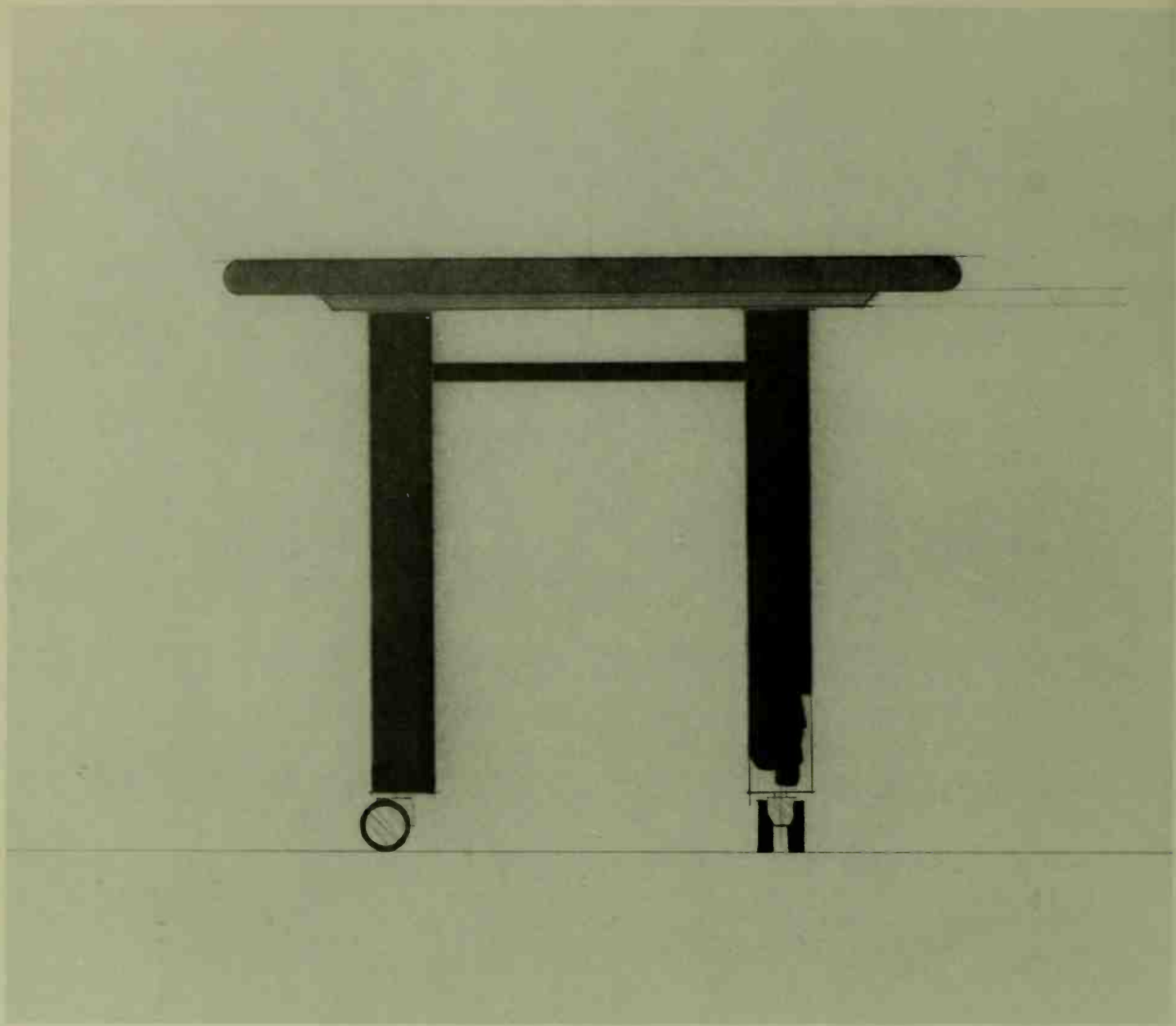
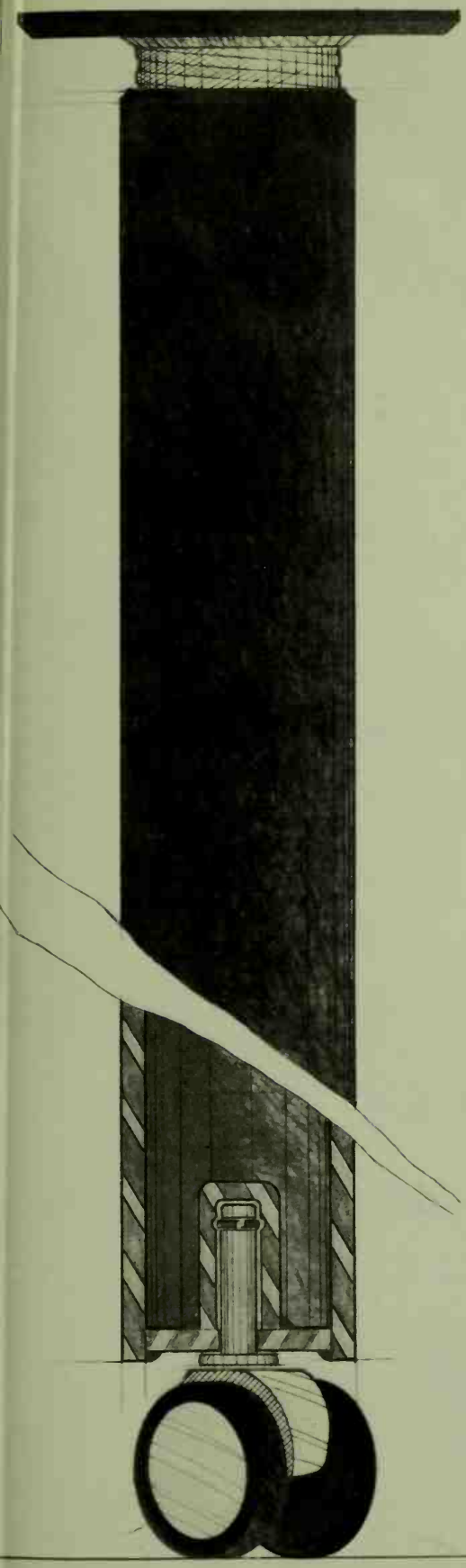


An end elevation (above) of a rolling table is part of an early design sketch. Study at larger scale (opposite page) permits further study of leg construction and detail.

of the column in relation to the door is dealt with. At the meeting of the pair of double doors, detail 50 is marked with the word "similar," leaving it to the millwork shop to understand that the door edge with pull is to be repeated, reverse hand, for the right-hand door. Detail 52 explains the end of the group.

As drawings take up increasingly specific and small detail, they are usually made at increasingly large scale. While ¼″ = 1′0″ is a useful scale for showing a whole building or sequence of rooms, 1″ = 1′0″ is better suited to more detailed development of a particular room or part of a room.

Furniture can be roughed out at 1½″ = 1′0″, but 3″ = 1′0″ makes it possible to see and refine more specific detail. These last two scales are, of course, one-eighth and one-quarter full size, respectively. Half full size is the next step upward, which is often used in furniture detailing, but full-size drawing has a tradition in the world of furniture as the most useful of all scales.



FULL-SCALE DRAWINGS

Beginners are often shocked at the idea of full-size drawings, thinking that drawing board and paper large enough will never be available. In practice, full-size drawings are not as unmanageable as might be thought. We tend to think of furniture as larger than it really is—an average chair, laid on its side will usually fit on the drawing board quite readily.

When used to detail tables, desks, or cabinets, full-size drawings are usually broken or cut to omit portions that give no information, while significant joints, intersections, and details are shown full size in logical relationship. Only one half of symmetrical furniture need be shown, and drawings can often be overlapped (plan or section over elevation, for example) to reduce drawing size. Often a general drawing at smaller scale will serve if augmented by a full-size drawing of critical elements, parts, or details.

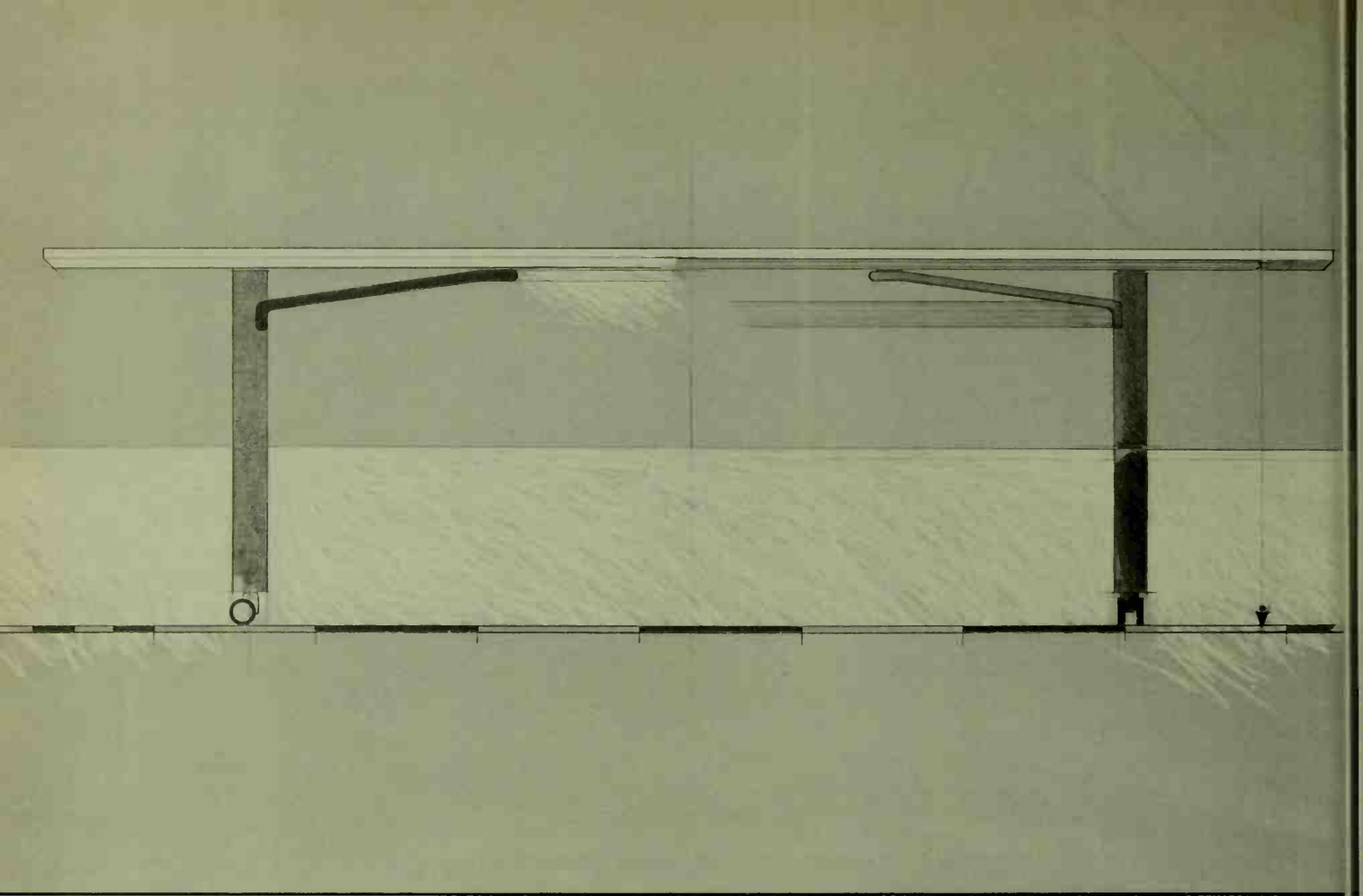
The drawing on page 106 is an end elevation of a table that will roll on casters. It will become a key element in the room for which it is designed, and the details of its proportions—for instance, the thickness of the top, the shape and spacing of the legs—will give it the special character that will set the tone of the room. While this sketch is itself a detail, the detail of the individual leg with caster is developed next.

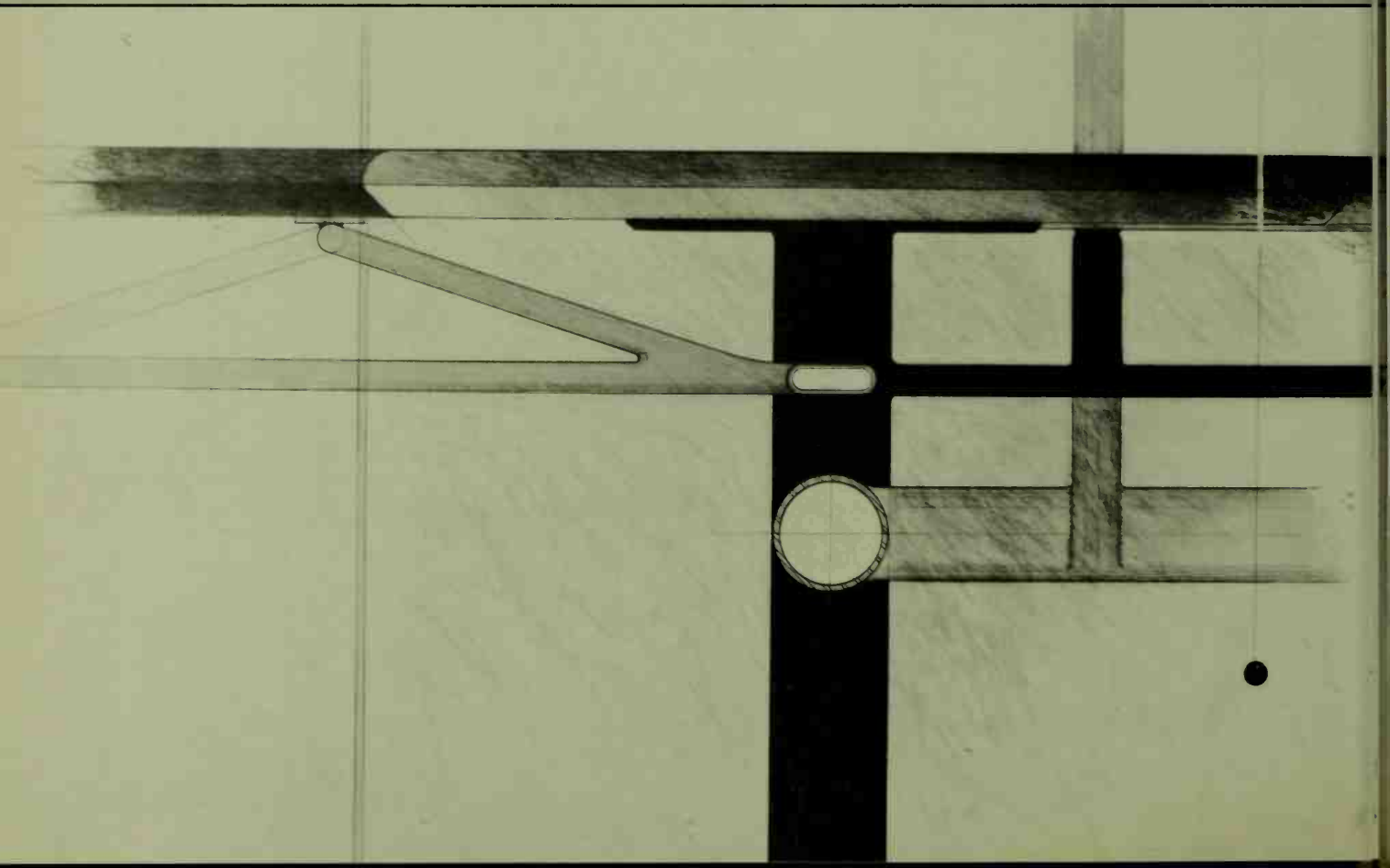
The table leg detail on this page was studied at full size, although the elevation of the whole table was studied at a scale of 1½″ = 1′0″ and also at full size. The special value of full scale is that it makes the designer more aware of the actual sizes of the elements being drawn. In furniture, very small dimensional differences become critical; a 1½-inch diameter tube has a character totally different from a 1¾-inch diameter. When drawing at full size, it is easy to pick up, look at, and bring to the drafting table actual elements for consideration and comparison with what is being drawn. A sample bit of tubing (even a dowel or cardboard tube of the right size) can be laid on the drawing and considered for appropriateness of size. Casters, hinges, even bolts, and screws may be looked at critically as their forms and places are being established on the full-size drawing.

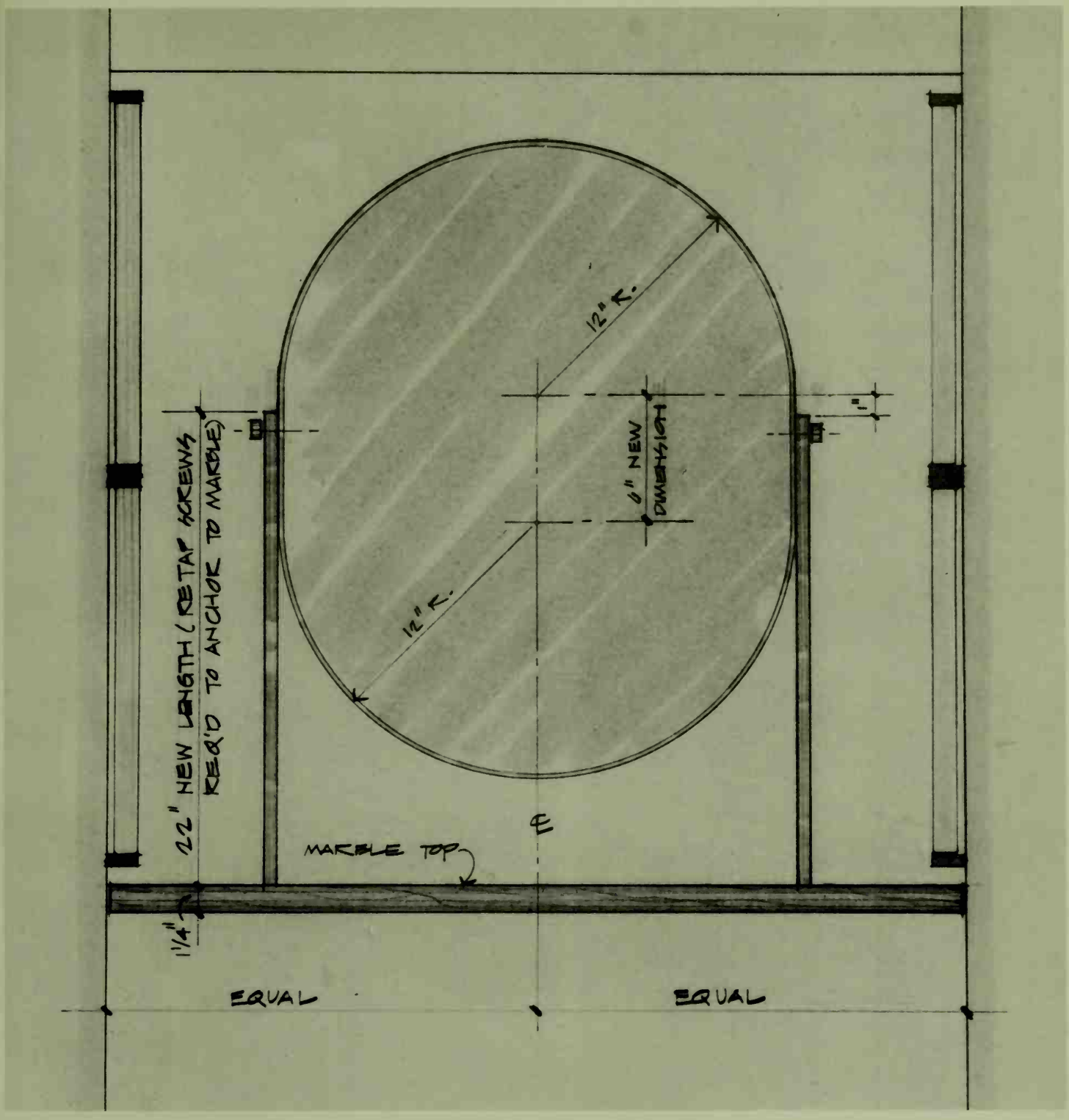
Finally, when the design sketches and more finished drawings have been made, converting them into working drawings at full scale becomes easy. Full-scale working drawings of furniture and cabinetwork have the advantage of being usable as templates. The maker can place actual parts on the print to check dimensions and forms, ensuring that errors and confusions are less likely.

Irregularly curved forms, often present in furniture and particularly in seating, when shown at small scale, are often distorted when reproduced at full size. A full-scale drawing eliminates the process of enlargement and therefore the possibility of transfer errors. Full-scale drawings can always be reduced through reproduction processes for convenience in mailing or filing, and will remain highly accurate. The reverse—enlarging a scale drawing by reproduction—enlarges any errors or imprecisions it may contain and is not, therefore, a reliable way to convert a small-scale drawing to full size.

The following pages illustrate a variety of detail drawings, progressing from design study details to the details on pages 108 and 111. These are part of a working drawing set in which a number of related details in a luxury bathroom are developed in form suitable for bidding and construction.

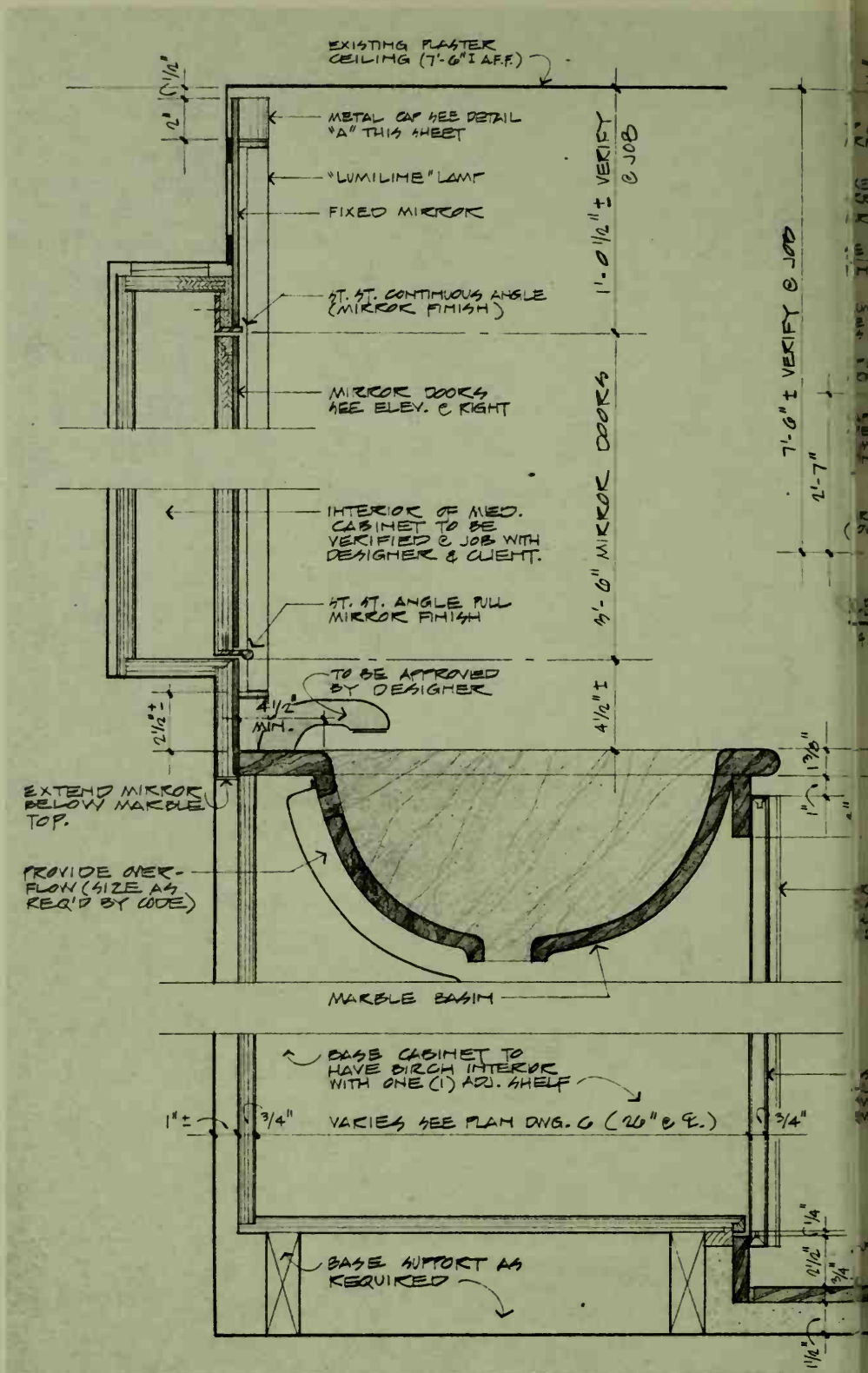




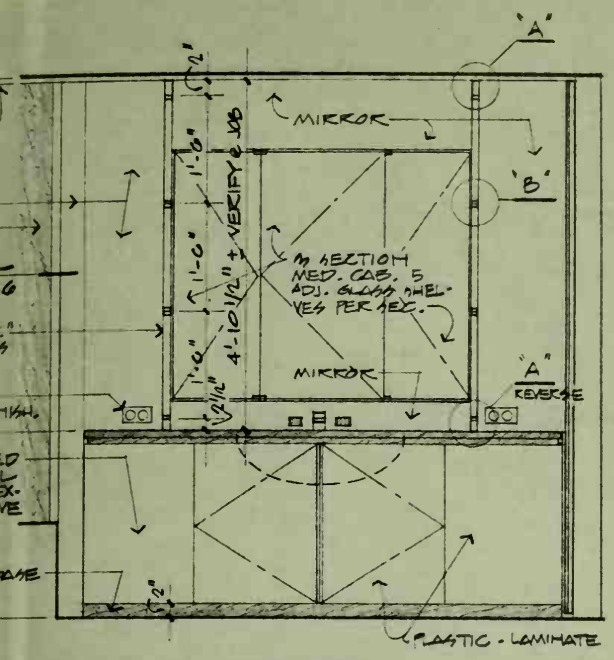


Detail study of table (top) is shown in context of complete room. Side and end elevations (bottom) have plan view superimposed to permit construction detail study. Note that if the white area were covered, you would be able to see the same design in proportion as a low table.

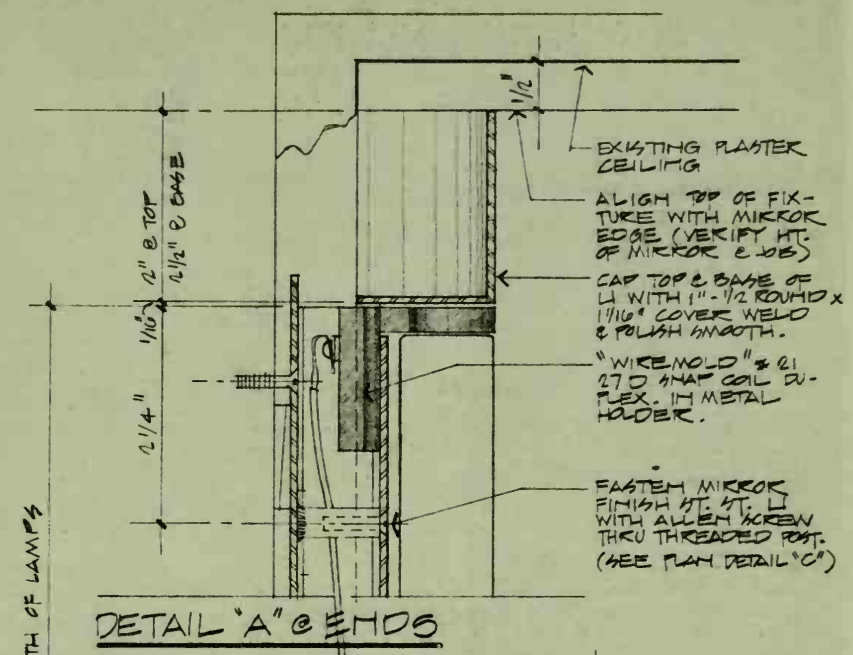
Above: Design study for mirror is developed for client approval, leading to incorporation into construction drawings.



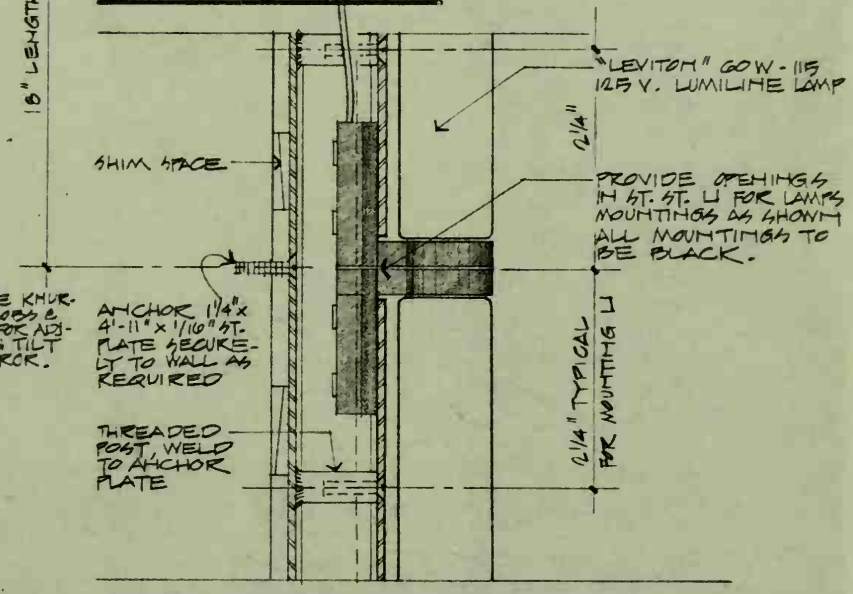
Illustrated is a full progression from concept to detail. (William Machado, Narman Diekman, designers)



TION LAV. CABINET

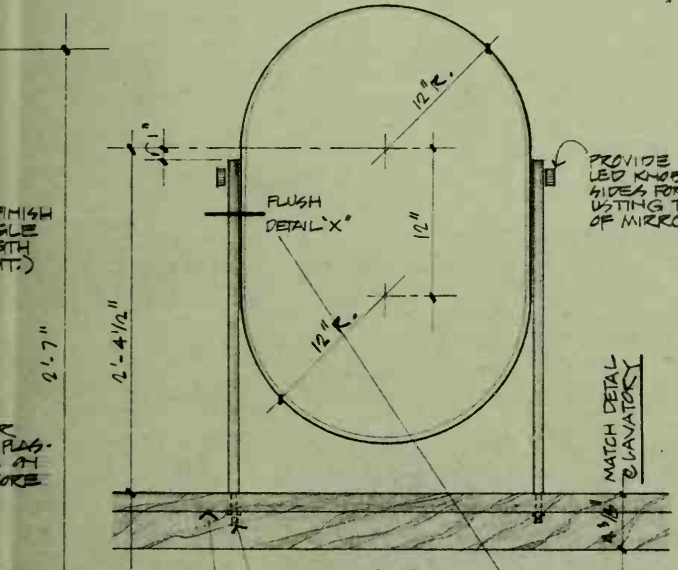


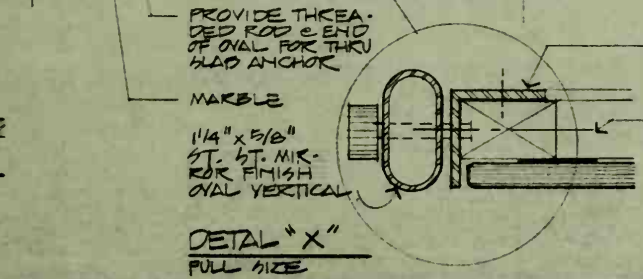
DETAIL "A" @ ENDS



DETAIL "B" @ LAMP ENDS

"A & B" FULL SIZE





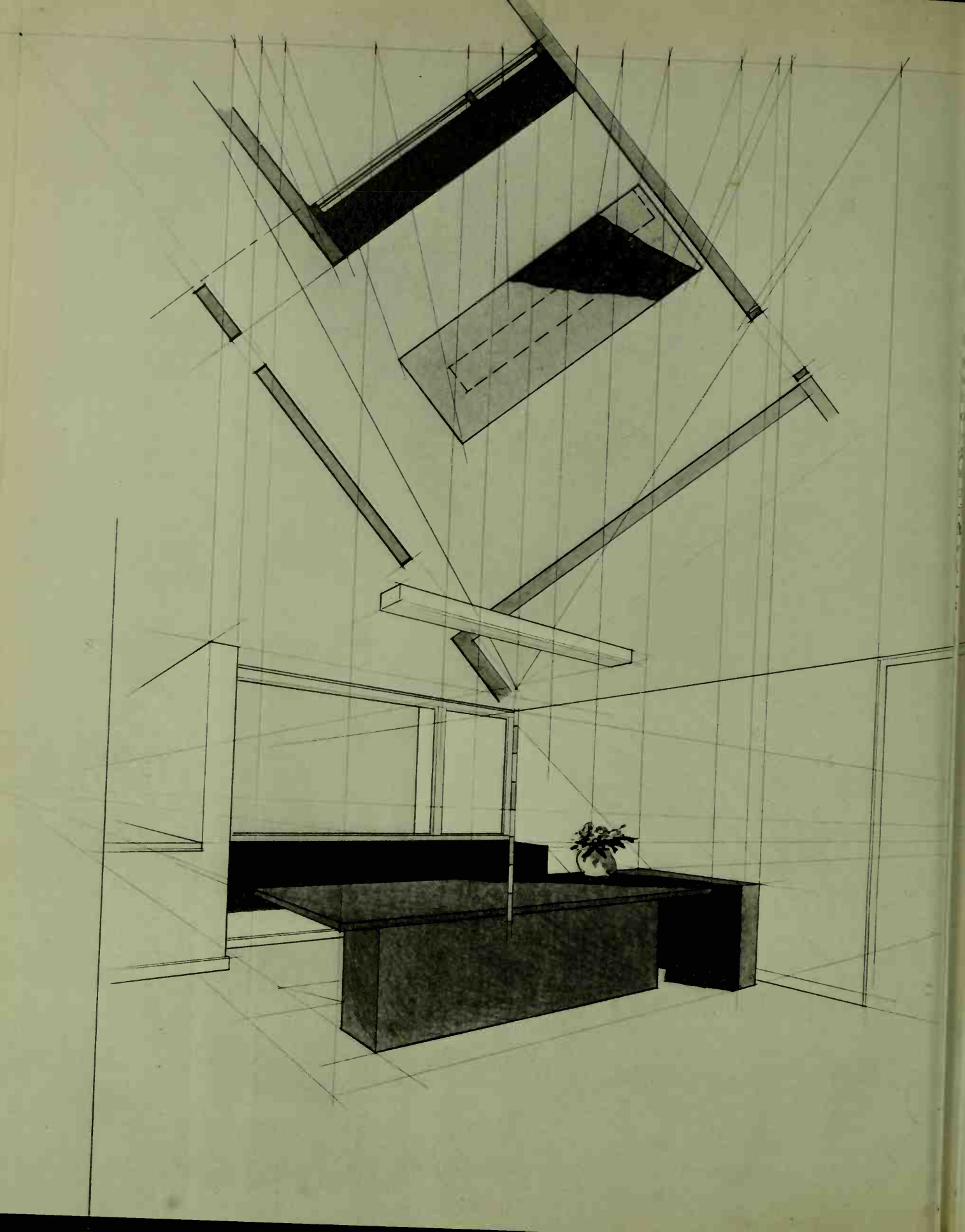
DETAL "X"
FULL SIZE

MIRROR @ DRESSING TABLE

1 1/2" = 1'-0"

REVISIONS JUNE 13, 77

ANGLE FULL @ MIRROR DOOR REVISED. 4 1/2" MIN. NOTED @ BACK OF BASIN. MIRROR SHOWN BELOW MARBLE TOP. DUPLEXES NOTED AS MIRROR FINISH. LUMI-LINE FITTINGS NOTED AS BLACK. KNURLED KNOBS ADDED TO MIRROR @ DRESSING TABLE.



PERSPECTIVE

Of all the ways of showing interior space in drawings, perspectives give the strongest illusion of reality, the clearest sense of actually being in and looking at a real space. It is not surprising that a perspective drawing has become the most favored way of showing an interior design to a client or future user, and it can also be useful to the designer in helping to see how the project under development will actually look when completed. Perspective drawing was not used in early art forms; it does not occur in ancient Egyptian or Greek art nor in medieval work, and it is still not known to most primitive and non-Western art traditions.

The geometric theory and practical system for making perspectives were developed in the Renaissance and made possible the effect of naturalistic realism that has been a common key feature of painting ever since. While art in the twentieth century has turned away from realism, perhaps in recognition of the ease with which photography can generate realistic images, perspective remains a vital tool for realistic representation in every field of design.

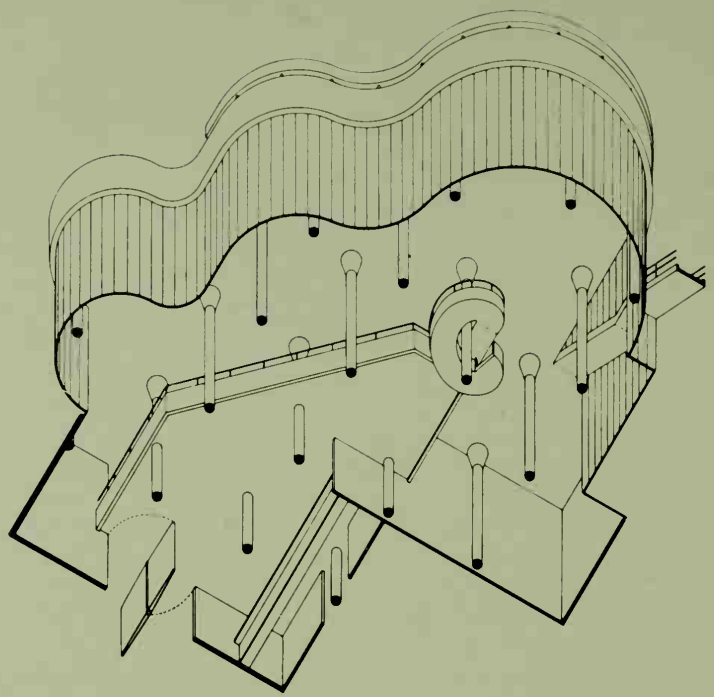
The making of an accurate (so-called measured) perspective involves the mastery of some geometric techniques that may seem almost magical until they are understood. A good perspective can also be made by direct observation, but the ability to do this well often depends on mastery of the geometric method of the constructed perspective. Once you develop confidence in making constructed perspectives, making freehand perspective sketches will become easier, allowing you to draw a planned interior by eye as a means of aiding and explaining design in the process of development. There are many texts that describe geometric methods of perspective drawing, but most emphasize drawing objects or buildings seen as a whole from some distance. While the same methods apply, an interior perspective may be a bit confusing at first, seeming to turn routine methods inside out.

In general, it is probably easiest to learn to make perspectives with an able teacher offering demonstration and criticism as actual drawings are developed at the board. It is possible to learn from a book, but it takes some persistence to follow instructions that often make a fairly simple process seem confusing. It is suggested that all short-cut methods—charts, tricks using graphs of squares, and other supposed aids—be avoided, at least until the basic, general method is understood.

REVOLVED PLAN METHOD

In this chapter, measured perspectives will be made by what is usually called the "revolved plan" method. The drawing at left illustrates this method used to construct an accurate image of the space that has been planned. A scale plan has been placed near the upper edge of the drawing board and rotated until the direction in which the viewer is to look is positioned straight upward on the board (hence the term "revolved plan" method). A "station point" is chosen where the viewer is assumed to be standing, and this point is marked on the plan. A horizontal line representing a "picture plane" is drawn through a rear corner of the

In a mechonicolly constructed base sheet a rototed plan above is used to generate on interior perspective needed for study of o mojor furniture element.



Axonometric (right) and perspective view (opposite page) illustrate the restaurant area in the Olivetti Headquarters, Milton Keynes. (James Stirling, architect)

space in plan, and two "vanishing points" are located by carrying construction lines through the station point, parallel to the walls of the space until they reach the picture plane. The left vanishing point is visible here; the right vanishing point is off the page to the right.

The actual perspective is now begun below the plan (it may overlap somewhat, as happens here). The far corner of the space is drawn at the same scale as the plan and becomes the "height line" on which true heights can be measured. A horizon line is drawn across the drawing at the height of the viewer's eye, as measured up along the height line. The two vanishing points are now brought down to the horizon, and the drawing can proceed with the characteristic foreshortening established by horizontal lines radiating from the appropriate left or right vanishing point. Horizontal dimensions are arrived at by carrying construction lines in plan back to the picture plane and dropping vertical construction lines down from the point of intersection, a process easier to trace in the illustration than to describe in words.

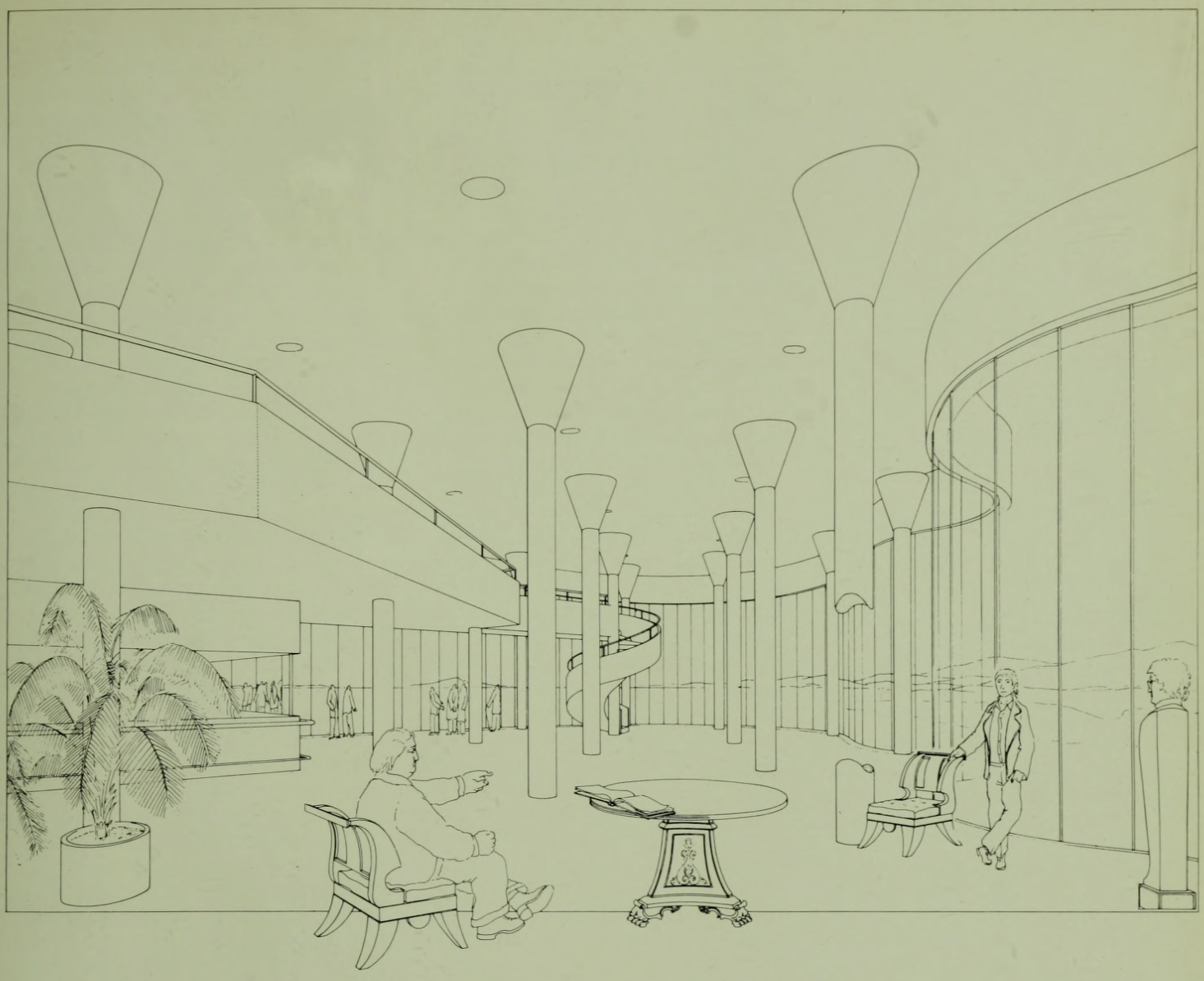
OTHER METHODS

Architects and designers can use several other ways of representing three-dimensional space; isometric and axonometric drawing, for example, can be very useful, but the images they create are not realistic and so often seem puzzling or confusing to lay-people. The drawing above is an axonometric showing part of a James Stirling project. The scale plan of the space has been tilted at a 30°/60° angle, and vertical dimensions, at true scale, have been carried upward from the plan to create an image that suggests a model with the floor removed as viewed from below. Since we are not accustomed to seeing space from below, such a view is often hard to grasp at first, although it may be simple and useful to the designer who made it.

In contrast, the constructed line perspective of the same space will seem a realistic image to almost every viewer. Thus it becomes a better means of communicating design ideas to a client or other interested people. Making a constructed perspective of such an irregular space, with its curving walls, angled mezzanine, and spiral stair can be difficult and time consuming. The process involved is no different from that used to draw a simple rectangular room in perspective, although dealing with various angles and curves introduces some special variants on the basic method.

It is interesting to notice how readily we accept a drawing made up entirely of thin black line on white paper as being realistic, although reality is never, of course, seen in this form. Even the column at the right that has been broken to give us an uninterrupted view is a fiction that we accept as quite understandable. The logical placement of abstract lines is enough to make us feel that we see the space, filling in color and tone entirely in the mind.

Despite their effect of realism, perspectives show only one aspect of a space—the view from a particular spot looking in a particular direction. Even a number of perspectives taken from different points and looking in various directions, like a series of photographs, can give only a partial idea of what actually being in a space will be like. In reality, our eyes move to sweep various views, our heads tilt



and turn, and we walk about looking in various directions in order to build up a total visual impression in the mind. Before a real space is constructed, the designer must use various means to synthesize this kind of mental image of something that does not yet exist. It is too much to hope that any one drawing will do this job totally.

In practice, especially in presenting designs to clients, several kinds of drawing can support and explain one another as they build on each other and supply a full understanding of a proposed project. In the drawings at the right, the plan above, although it might seem somewhat abstract and technical to a client, gives basic information about proposed layout and about color and materials as well. The perspective below shows a portion of the same space in a way that seems more photographically realistic, and so it becomes a key to understanding the plan, although it actually contains less information about the total project. It becomes easy to explain that, in relation to the plan, "you are standing *here,* just behind this chair, looking toward the window. Here is the fireplace on the right. . . ." After a perspective is viewed in this way, the plan will begin to come to life for even the least-technically minded of clients.

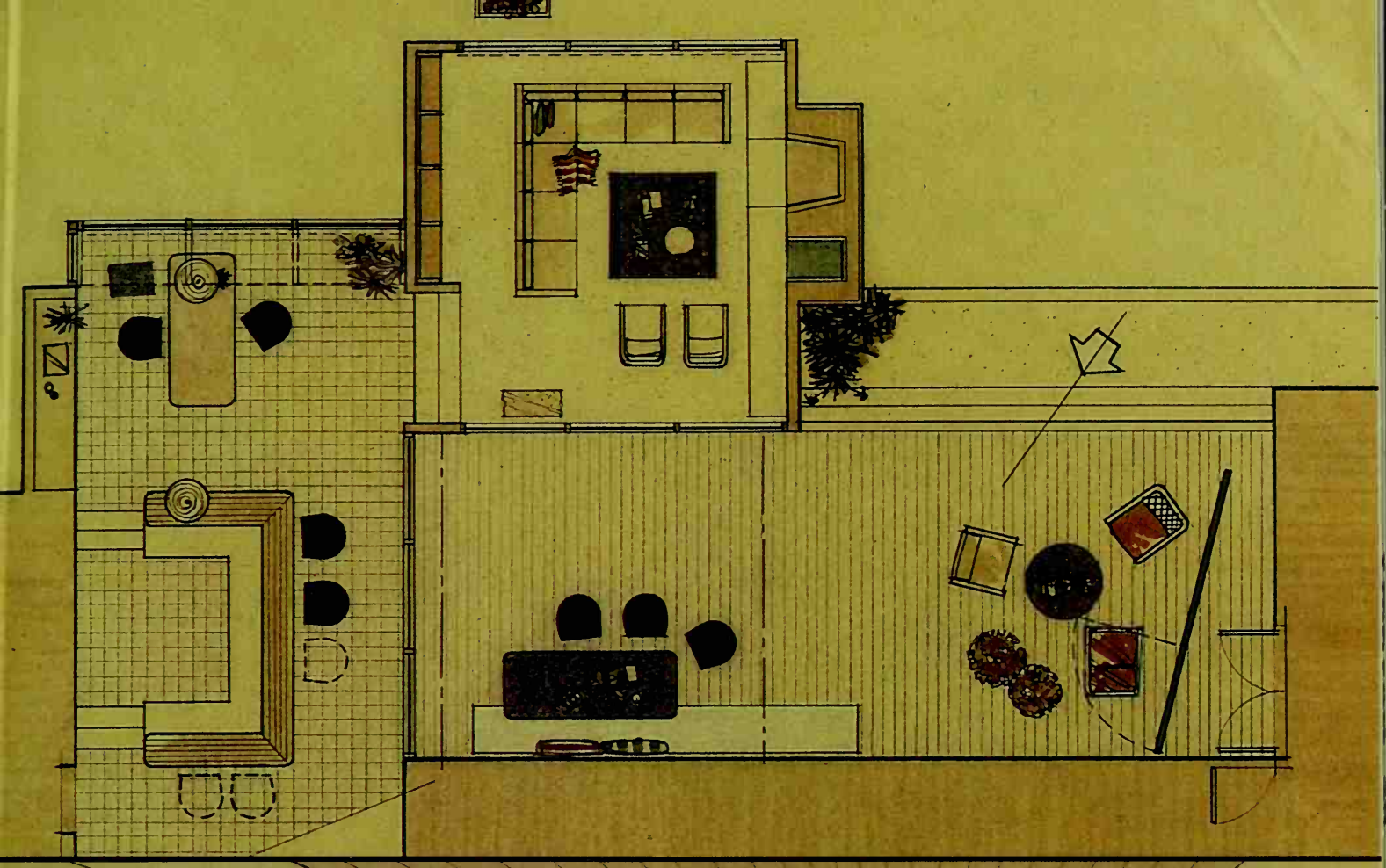
Elements that can only be dimly understood in plan become, in the perspective view, most real. The wood of the bookcases at the left, the wood color and texture of the ceiling, the character of matchstick blinds at the windows straight ahead are all real in a perspective view in a way not possible in plan or not so clearly real in elevation or section. The soft and quiet color, present in both drawings—beiges and grays with small touches of greens and reds—provides a hint of how the real space will be.

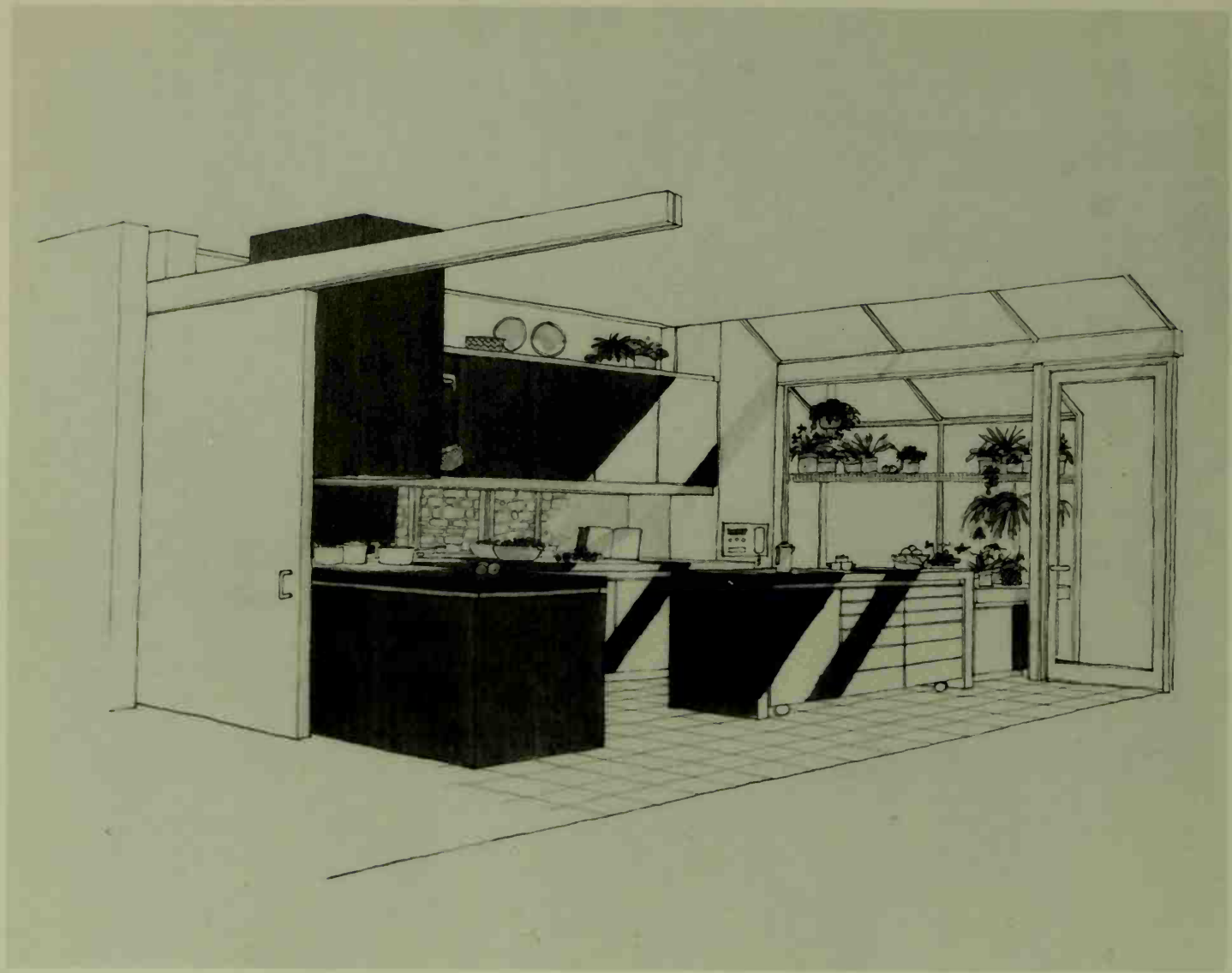
Perspective drawing is also particularly suitable to communicating the effects of light that are such a vital part of real interior spaces. Plans hardly at all and elevations and sections only through the conventionalized devices of cast shadows can give any sense of how light will affect the visual experience of a space. In a perspective, window openings can appear bright, and the patterns of sun casting beams and shadows into interior space can be represented quite realistically. In the drawing on page 118, we see an all-glass window wall at the far side of an interior space. The impact of the drawing comes from the representation of sunlight pouring in, revealed by the pattern of shade and shadow cast by the window framing and by the envelope of the space itself. Color is used in the original drawing, but even as reproduced in black and white, the sense of sun and light dominates.

The construction of interior perspectives frequently confronts the designer with another problem: the space is too small to permit locating a station point that will generate a reasonable view. This is a problem all too familiar to photographers—one backs into the far corner of a room and still finds that the camera will only take in an opposite corner, a mere detail of the space to be shown. Photographers resort to wide angle lenses in interior architectural photography, but are still often defeated by this problem. The designer can turn to the equivalent of the wide angle lens, an overwide cone of vision (see discussion on page 123), but the same problem that occurs in wide angle photography will result—distortion of foreground images.

In drawing, another device, not available to the photographer, is useful. This is to simply remove a near wall or walls and move the station point outside the space to be shown. This is sometimes called cheating, since it generates an image that will never be seen in real life. When the device is made obvious by some indication of the wall that has been removed or shown as transparent, it is generally understood as a useful technique for showing what would otherwise not be accessible. We accept this kind of perspective as an allowable fiction just as we accept the convention of section drawing. The mental image of a space developed through actual experience is not limited to what can be seen from a particular fixed point of view. Imagined viewpoint perspectives should be thought of as another way to

Plan (top) and perspective (bottom) together serve to make a design proposal intelligible to a client. (Norman Diekman, designer)





Perspectives with near wall amitted permit a view inta the space as one might loak inta a stage set. (William Machado, Narman Diekman, designers)

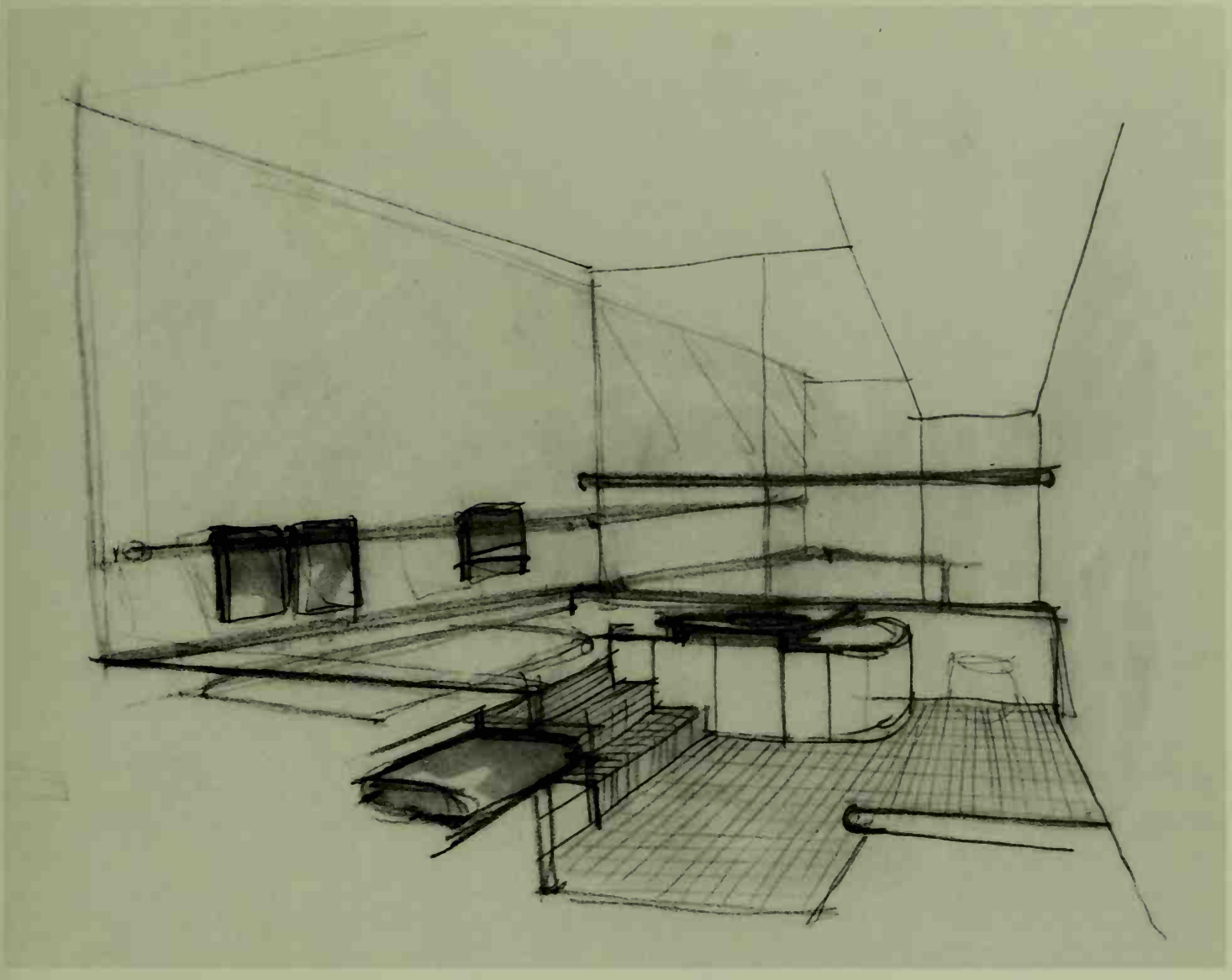
aid the viewer in sensing reality as it might be experienced rather than as merely seen from a fixed point.

The upper drawing on page 120 is an accurately constructed perspective of a kitchen—a space too small to be readily seen in total from a station point within the space. The sliding panels of the wall to the left are rolled back, and the wall to the right is simply omitted, although the edge of the floor pattern tells us where it will stand. The resulting image is rather like a view of a scale model with near walls removed; we find it easy to accept this as a convention, allowing us to understand the space better than would otherwise be possible.

FREEHAND PERSPECTIVE

As skills in making constructed, measured perspectives are developed, it becomes natural to exploit all such devices in freehand sketch perspectives as well. The drawing on the next page is a freehand sketch made without a mechanical layout, but with full awareness of horizon, vanishing points, and the other elements of the constructed perspective, even though they are available only in the mind's eye rather than on paper.

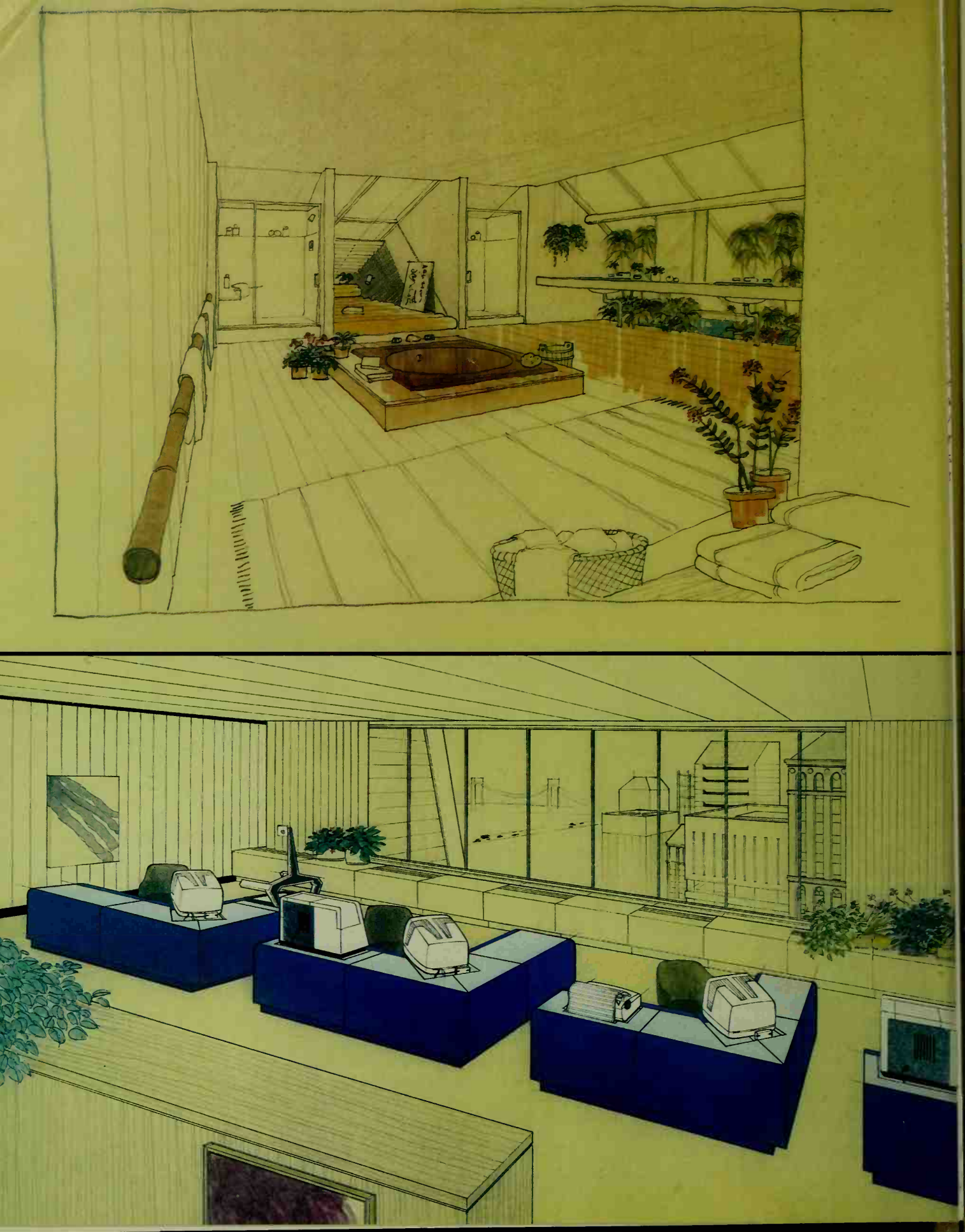
As in the above example, the space, in this case a bathroom, is again too small to locate a station point within that will permit a reasonable view of the whole space. The near wall is



therefore omitted, and we look into the space as if it were a stage set without a front wall. The rear wall is, in this case, a mirror, so that there is an illusion of doubling of the space. The mirrored space appears in the same perspective as if it were a duplicate room, reversed and seen through a window that is the mirror itself.

In this drawing some amusing liberties have been taken. The wall that has been omitted to let use see into the room appears in the mirror image with no opening that would permit the view which we are seeing. Details drawn, albeit sketchily, in the room itself are barely indicated in the mirror —for instance, the towels that hang on the towel bar at the left have vanished. Such liberties are perfectly natural in the rough sketch made to explore ideas of developing form, but not to record the sort of reality that might appear in a photograph or in a finished presentation perspective.

Notice that the drawing on page 118 includes cast shades and shadows that suggest an effect of light pouring through the window, greenhouse, and glass door complex that form the far end of the room. This effect is not developed in a totally realistic way—the light and shade pattern is visible on walls and cabinet, but not on the floor—but the intended effect of light flooding in is still felt.



A similar contrast in style is apparent in the pair of drawings at the left. The upper drawing is loose and lyrical, the lower more precise and formal, more a rendering than a drawing. Choosing technique and style is a matter of considering the purpose for which drawings are made, the kind of audience they are to address, and, to some degree, the nature of the subject matter as well. In professional design circles, there is a tendency to be more interested in the rough, the freehand, and the conceptual drawing or sketch that seems to communicate the direct thought of the designer as it is developed. Finished drawings or renderings seem to be too slick or too much sales oriented, and are, in reality, often the work of specialists who have had no role in the creative design process but are rather commercial artists or illustrators.

However, most designers' clients often mistrust rough drawings, feeling that they fail to give detailed information and so may lead to unfortunate surprises when construction is complete. When it becomes necessary to sell a design to a client or particularly to a client committee, a political group, or some wider public, most designers find it best to turn to the specialized renderer who can produce a colorful image that will seem believable to an audience with no special knowledge of design techniques. Commercial renderings of this sort are not illustrated in this book. It is rather suggested that there is a middle ground of drawing that is thoughtful, expressive of design intent, and still sufficiently realistic to engage the confidence of nonprofessional viewers.

The lower drawing here shows an office computer room, a space that calls to mind mechanical precision and order rather than free creativity. The drawing is not in the style of the commercial rendering, but still conveys this sense of mechanical order through its precision and finish. It is the designer's own drawing, not a production of a rendering studio, and so stands between the freer drawing of design thought and the more literal representation that a public may require as an aid to comprehension.

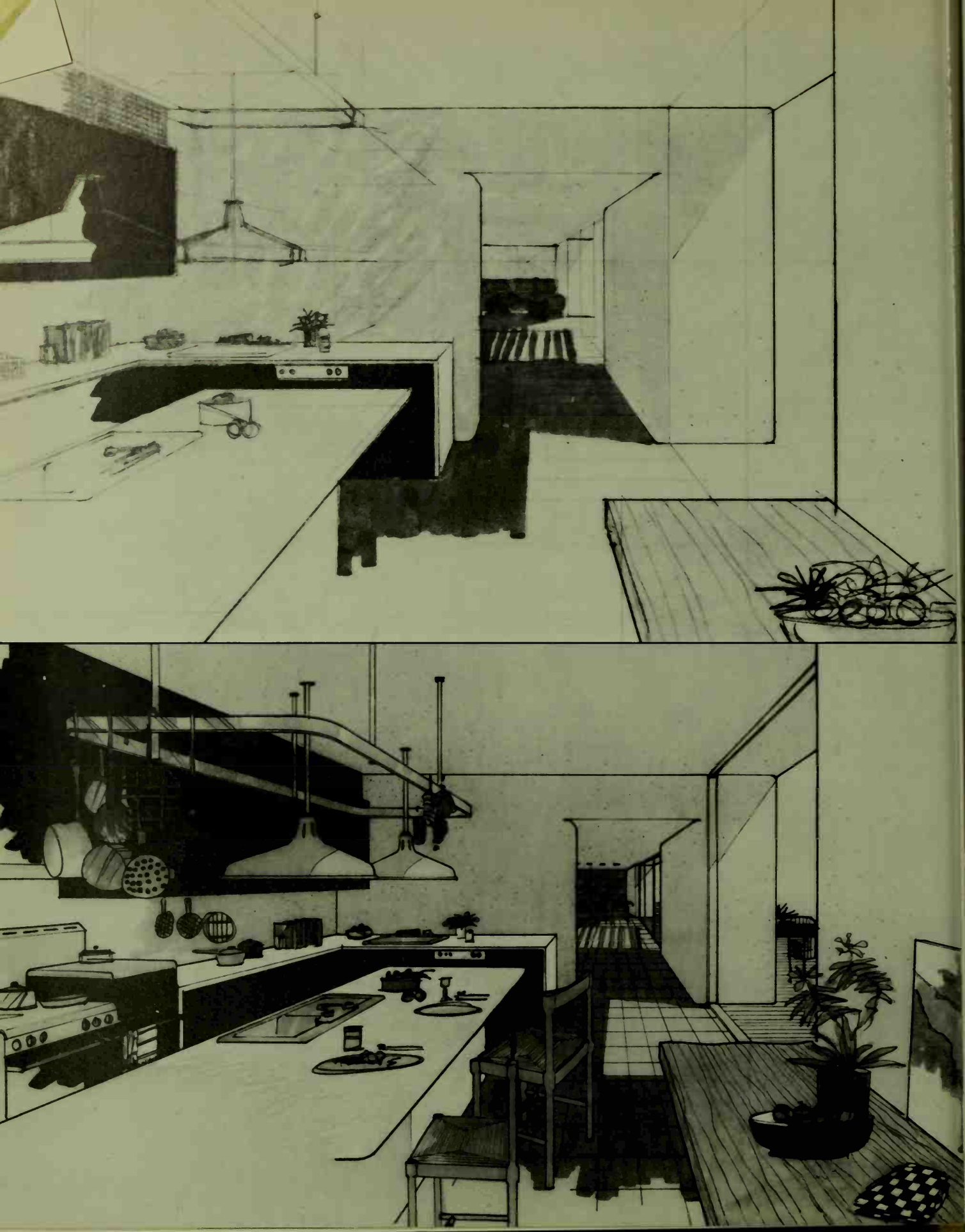
The pair of drawings on the following page demonstrate a different kind of contrast. They represent a sequence dealing with the same space and the same view of the same space. The subject is a residential kitchen with a view beyond into living spaces and a glimpse of the out-of-doors to the right. The upper drawing is the one that was made first, the base sheet or layout in which the perspective is constructed from the plan (not shown) as discussed earlier. In this layout, many construction lines—the horizon and the light lines extended outward from the vanishing point—remain visible. Color tones are laid in roughly and experimentally, and small details, added to give scale and a sense of identification (utensils, flower bowls, etc.), are sketched in roughly.

MAKING THE BASE SHEET

The finished drawing below was made on an overlay on top of the base sheet. It shows the same space, but includes more foreground to allow more of the kitchen equipment to be visible. It is not strikingly different from the base sheet, but all construction lines are omitted and many details have been added or refined. The overhead pot rack is shown in its entirety, chairs appear at the sink counter, more accessory details are visible, and the outdoor space seen through the opening at the right is made more realistic. These details convert the first drawing from its status as a professional working study into a drawing suitable for client presentation or even for publication. The introduction of a few small, realistic details, such as the places set at the counter, the pots hanging from the rack, and the pot holders in the right foreground, are usually highly successful in helping viewers identify with and mentally move into the space they see illustrated.

A working base sheet can be used again for several finished drawings, making it possible to discard any effort that does not turn out well without having to start construction of the layout afresh. It can also be a conven-

A "super-bath" (top) for House and Garden magazine is drawn with an easy and casual freehand style appropriate to the project. In contrast, a drawing of a computer work station (bottom) communicates a sense of efficiency in a business environment. (William Machado, Norman Diekman, designers)



ience if there is a need to study alternate color schemes, furniture arrangements, or other matters that may still be in the process of study and development.

On the four pages that follow the process of constructing a perspective base sheet is explored in additional detail. The subject is the same dining space that appeared on page 112 at the beginning of this chapter. The upper drawing on the left is the scale plan as drawn on a separate sheet. It should be clean and simple, free of any unnecessary construction lines, showing clearly the basic elements of walls, openings, and significant furniture. Given this plan, the key decisions are positioning the station point and deciding on the angle of view. In dealing with this problem, consider the so-called cone of vision, the arc within which it is reasonable to show images realistically.

Through direct observation we see clearly only in a limited cone directly in front of our eyes. We enlarge this angle of view by rolling our eyes and turning our heads, but a single image of the reality in view is quite limited. If one takes a center line down the angle of view at any time, images can only be seen in a range of about 20° to 30° on either side of this line. In fact, the 60° cone of vision (30° on each side of the center line) probably exaggerates what we really see without turning our heads (and so changing the perspective of the image we perceive). A wide angle view can extend this cone a bit, possibly up to 45° on either side of the center line, but at the price of introducing some distortion, as in extreme wide angle photography.

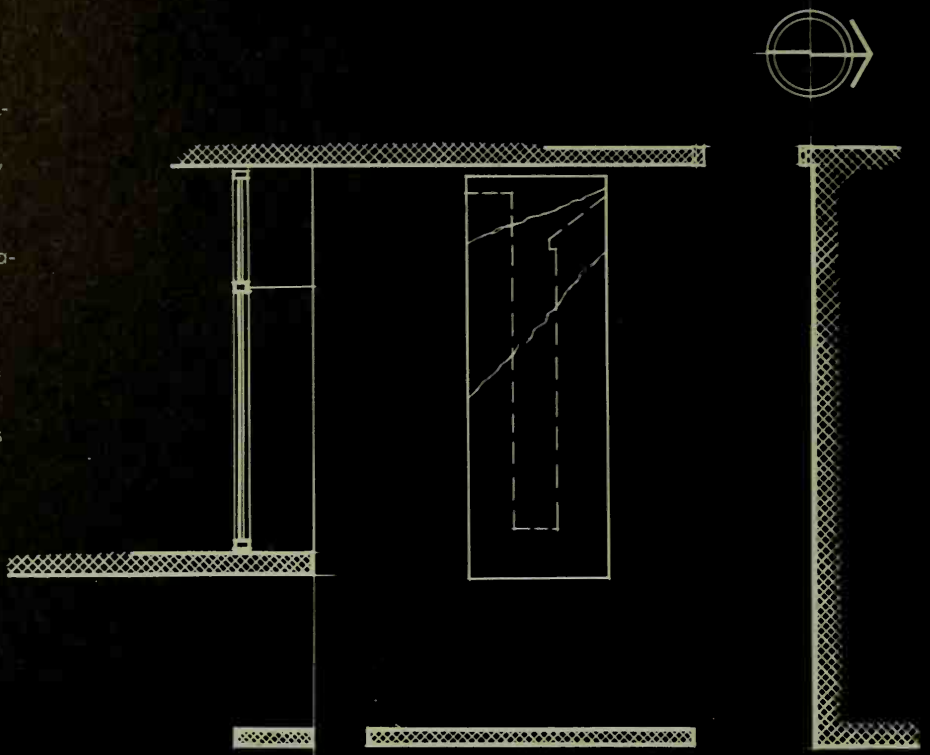
If we accept the 60° cone of vision as a reasonable norm, a next step is to experiment with placement of a station point on the plan as illustrated on page 125. The space is too constricted to permit a satisfactory view with a station point within the space, so it is reasonable to try locations outside the room, omitting the near walls as discussed above. A station point at location A is set up. Establishing picture plane A (indicated as PP-A) will generate the image illustrated on page 126. In this case the height line is not at a corner of the space, but at an arbitrary point in the far wall where the picture plane intersects it. The right-hand vanishing point appears on VPR; the left-hand vanishing point is off the page to the left. Following through with construction develops the base sheet as shown, with the table somewhat foreshortened in end view.

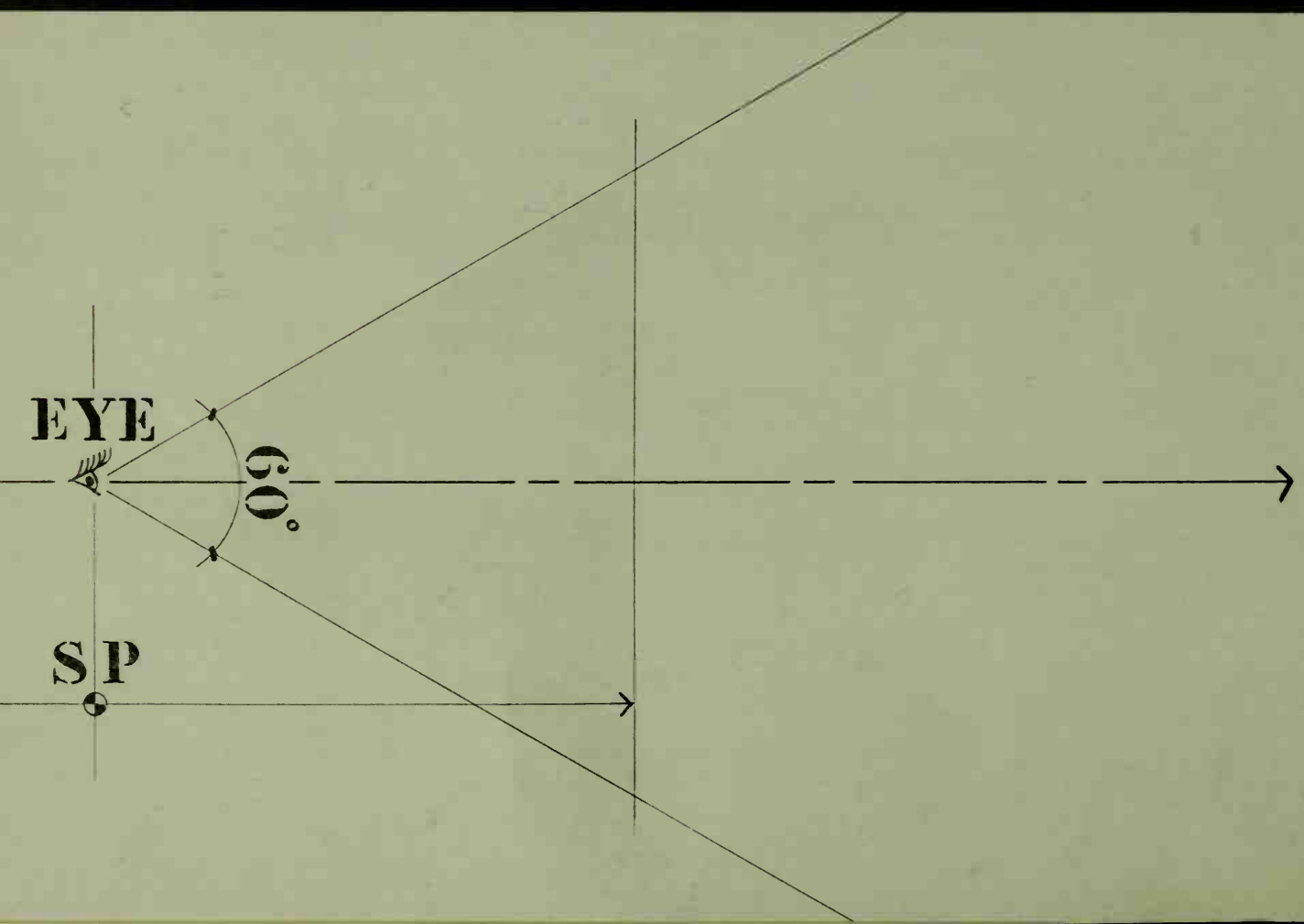
Moving the station point to B, rotating the plan slightly to adjust what the cone of vision will include, and passing a new picture plane (PP-B) through the far corner of the room make it possible to generate a different view, as shown on the right (page 127). In this case the left vanishing point is on the page; the right vanishing point, off the page to the right. This image gives more emphasis to the table, seen more nearly broadside, and since this is intended to be a key element in the space, this view was chosen as the base sheet for development of the more detailed drawing that opened this chapter on page 112.

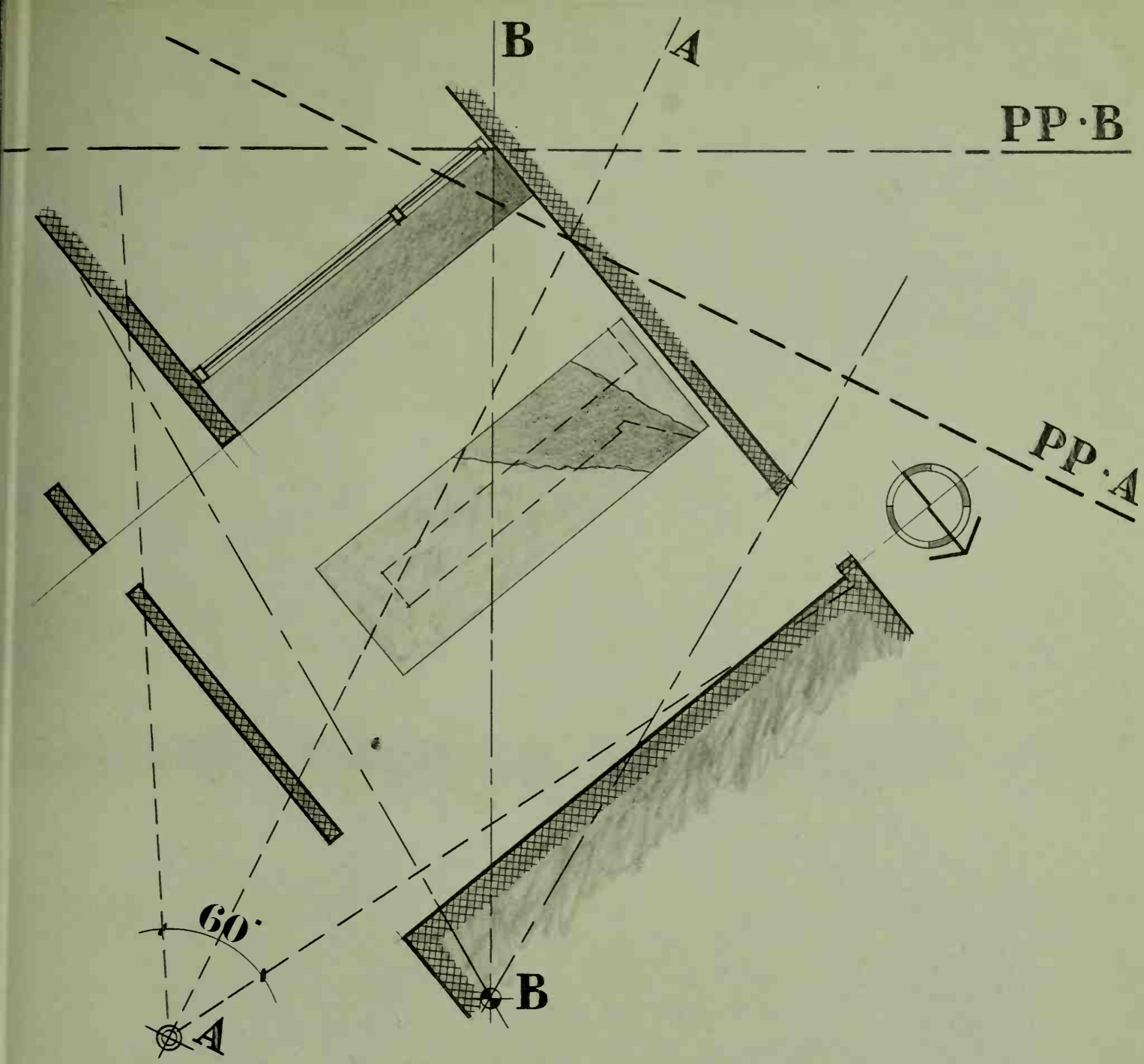
Use this kind of experimentation with station point location and angle of view to arrive at the best layout of the drawing to be constructed. While it may seem time consuming, with some experience, it becomes possible to run up a rough layout in a matter of minutes. Making three or four such trials is far wiser than pushing ahead in detail with a first attempt that may turn out to be a disappointment. With a plan on one sheet, a cone of vision diagram on another sheet of tracing paper, and a third sheet for a trial layout, which can also be placed on top of the other two, it becomes easy to move plan and station point in relation to one another and make trial rough layouts quite rapidly.

A base sheet (top) with a kitchen space is shown in layout form. The some drawing is developed in detail (bottom) with accessories shown to heighten the sense of reality. (William Mochodo, designer)

A clear and uncluttered floor plan (right) shows only the architectural elements establishing the shell space (chairs, rugs, and similar details are omitted). The north arrow is a reminder for establishing sun angle when light and shadow patterns are added. The cone of vision in plan and elevation (bottom) is laid out on a separate overlay sheet. Note that shaded triangle represents "area of distortion," in which any objects will tend to be distorted. As a rule of thumb the area from station point (SP) to base of triangle should be not less than 14 feet.

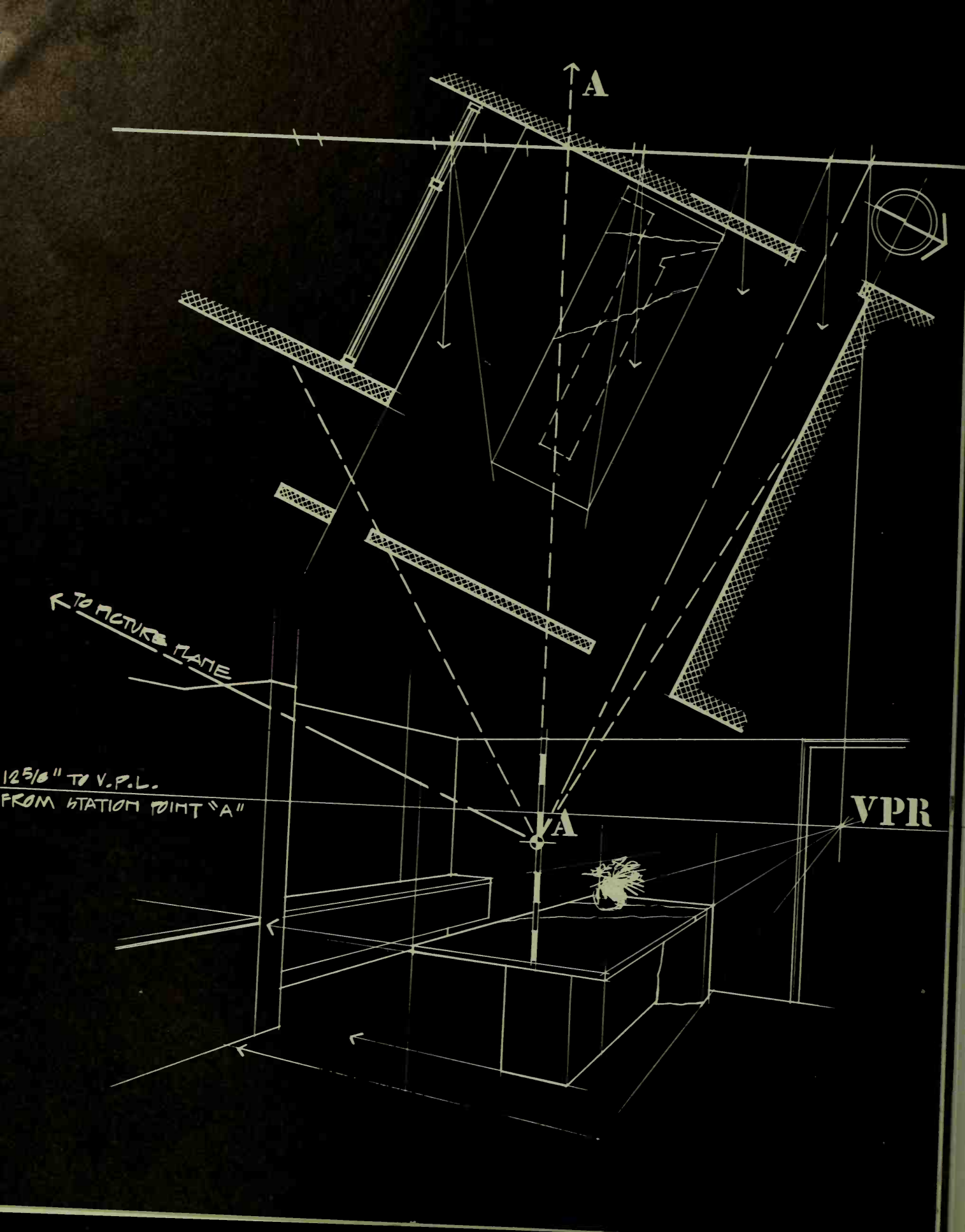


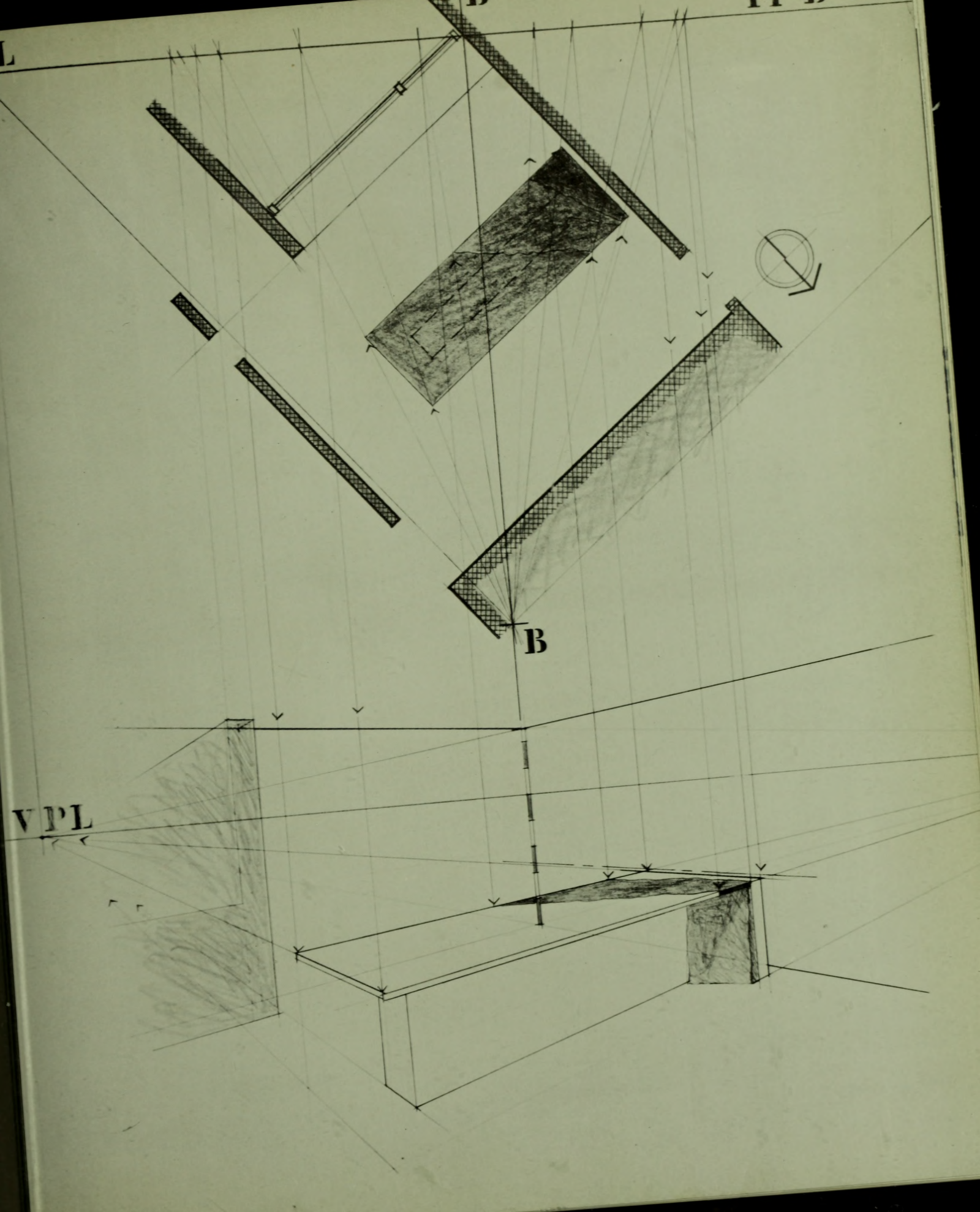




The plan is rotated and the cone of vision sheet is superimposed to permit trial construction of possible views. Two trials are illustrated. In A, the angle of view strikes the end of the table. This makes it appear foreshortened. In trial B, the length of the table appears in the foreground.

Pages 126–127: Development of drawings based on the trials illustrated on the previous page generate A, a view in which the total room appears as a pleasant setting with the table a minor element, while B, in contrast, may diminish the charm of the room as a totality, emphasizing the table as a focal element. Since the designer's intention here was to concentrate attention on the table, the B layout has been chosen for the base sheet developed on page 112.


A
TO PICTURE PLANE
12 5/16" TO V.P.L.
FROM STATION POINT "A"
VA
VPR


B
V PL

ONE-POINT PERSPECTIVE

Many texts and many teachers, in presenting perspective, start with one-point perspective views, regarding them as simpler and easier than the two-point layouts discussed here. In fact, the one-point perspective is simply a special case of two-point layout, and a full understanding of two-point construction will make one-point layouts easy. The reverse is not always the case, leading to a kind of block in which one-point layouts become a fixation, hard to escape. If the plan is oriented so that its main lines are horizontal and vertical (as plans are normally drawn) when selecting the station point and angle of view, you will find that only one vanishing point will be within reach, lying directly ahead, on a vertical drawn upward from the station point to the picture plane. The second vanishing point will lie, theoretically, at infinity to either right or left, and all lines in that system of parallels can therefore be drawn as horizontals.

This means that the back wall plane of the space becomes virtually an elevation with true heights to be measured anywhere within it, as well as true width measurements. All lines in the other system of parallels radiate from the one vanishing point. When you draw a symmetrical space, if symmetry is to be emphasized, place the station point on the center line of the space to produce a fully symmetrical perspective. There is no reason not to locate the station point to the right or left of center, and in most cases this will produce a less formal, but more interesting view. Once you are at ease making two-point perspectives, you will find drawing one-point views no easier and no more difficult; your decision should be based entirely on what view will be most informative. Looking back through this chapter, note that the drawings on pages 115, bottom 117, and 122 are one-point views.

ADJUSTING ANGLE OF VIEW

In two-point layouts, note that an angle of view at a small angle with one of the main systems of parallels will result in one vanishing point lying near the center of the drawing, while the other will be far out to right or left, inconveniently off the drawing board. It is not unusual if such a view is selected to start by constructing a one-point view with the vanishing point placed near the center as intended. The one-point view is then modified by angling the horizontal lines slightly toward the imagined far-away vanishing point. It is important, while trying this, to have a clear idea where this second vanishing point is, so that you will draw lines radiating from it consistently. This is a very legitimate technique of faking that can produce useful results with a minimum of inconvenience.

SPECIAL PROBLEMS

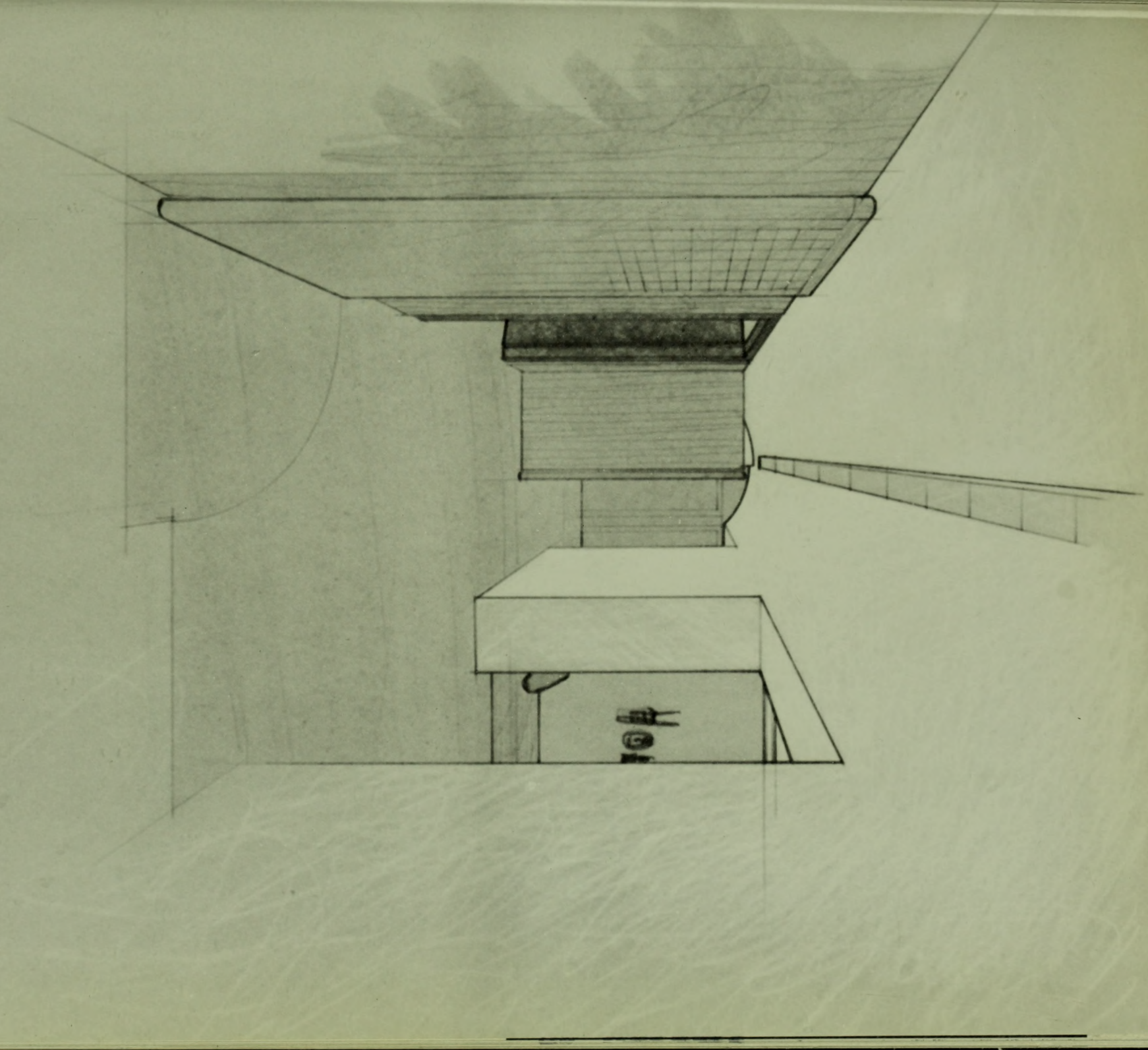
Several special problems of perspective drawing sometime seem troublesome when first encountered. These include:

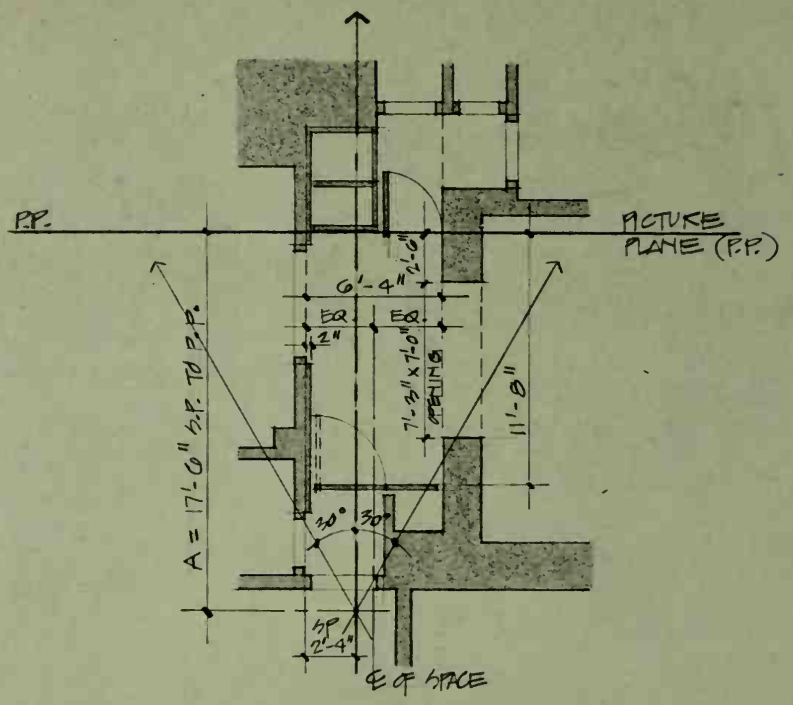
Objects at an angle. Sometimes pieces of furniture may be at an angle to the main axial system of the space, or walls may be oblique to most of the lines of the plan. There are two ways of dealing with these problems, both leading to the same result. The end points of the oblique form (in plan) may be located by construction lines as any other points would be. Connecting these points establishes the oblique line at floor level. Extending the line to the horizon will establish a new vanishing point for use with all lines in this system of parallels.

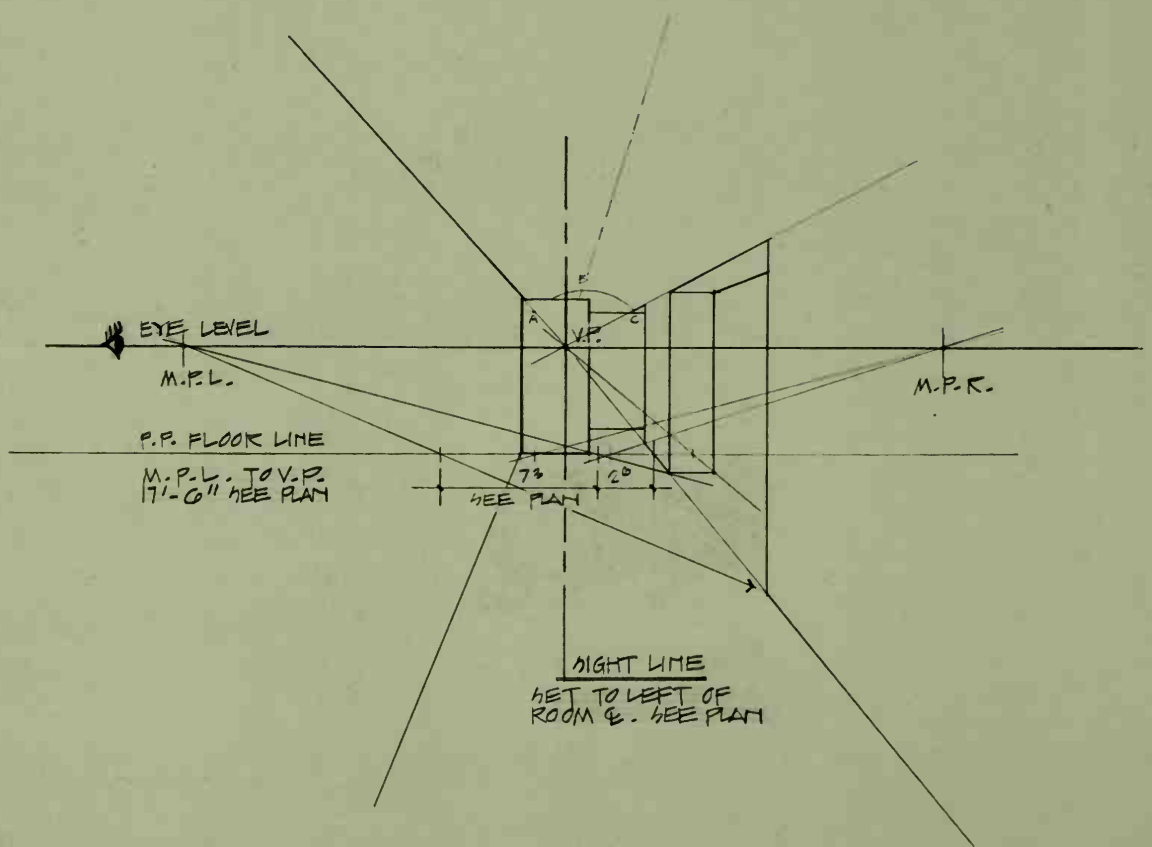
The other method starts with locating vanishing points for the axial line systems of the oblique objects by drawing lines in plan through the station point to the picture plane parallel to the oblique lines and bringing these points down to the horizon with vertical lines just as the main vanishing points are established. Points are located to begin and end lines as usual.

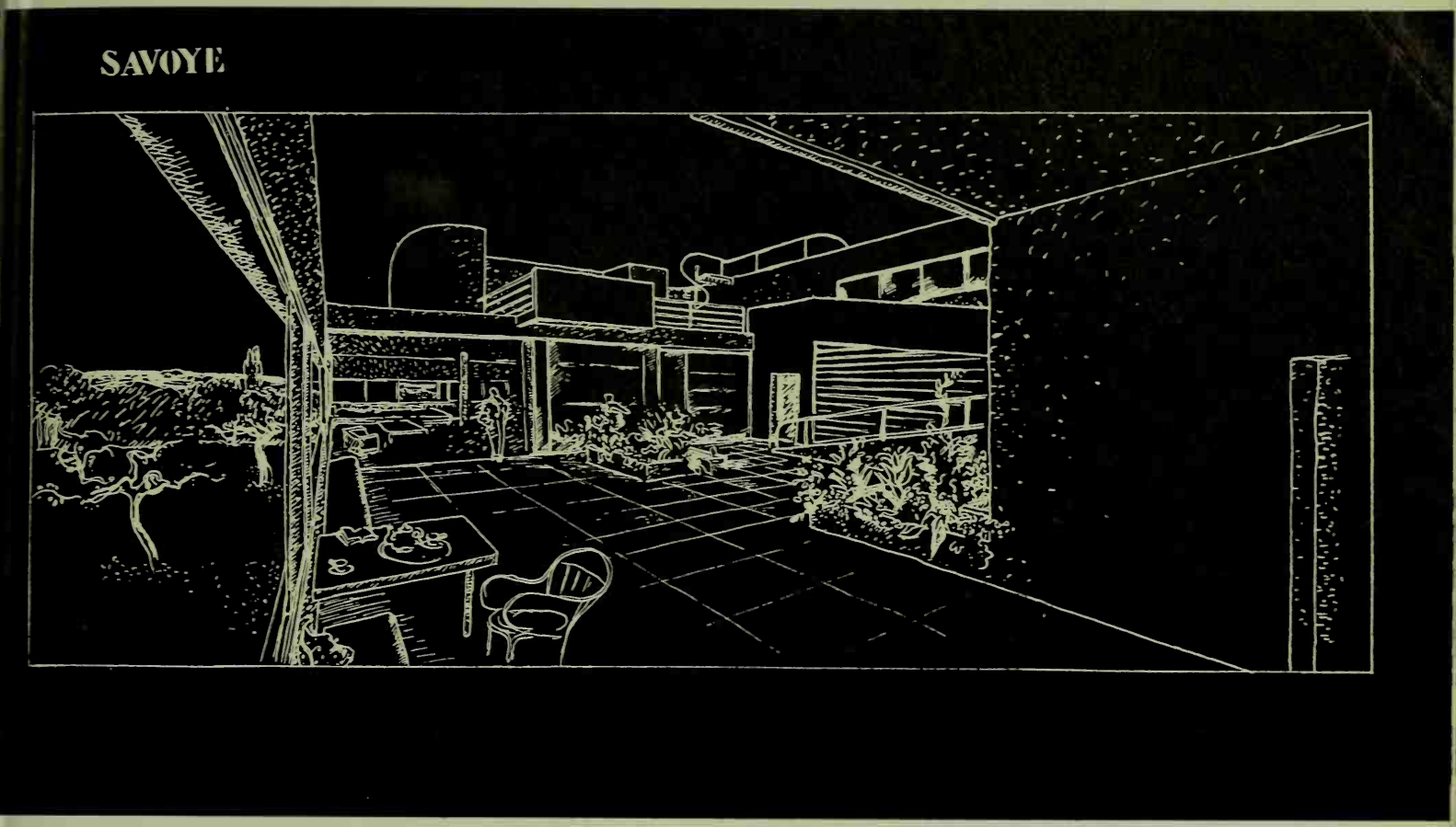
When this is done, the oblique perspective is really an independent entity, a drawing within a drawing, with its own perspective system. It is often convenient to construct this portion of a drawing on a separate overlay sheet of tracing paper in order to mini-

Opposite page: A one-point perspective shows an entrance area of an apartment. Color and details of accessories have been added over the constructed base sheet. (Norman Diekman, designer)



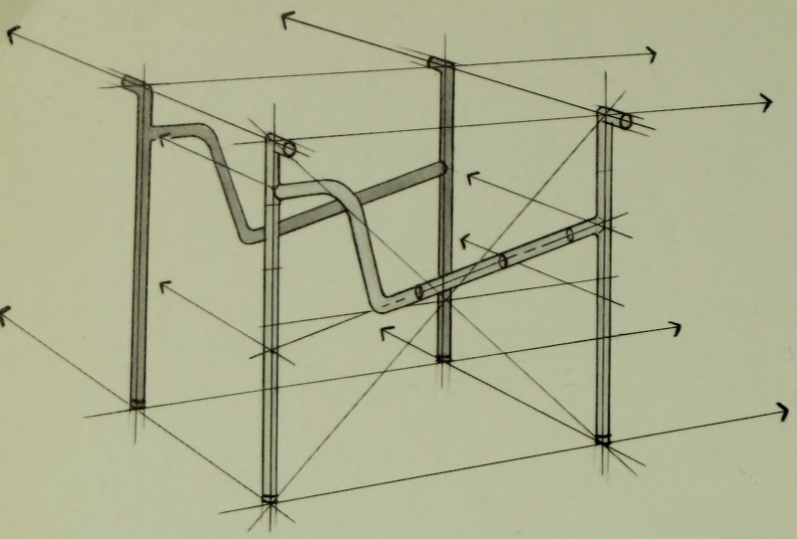

P.P.
PICTURE PLANE (P.P.)
6'-4"
2'-0"
EQ.
EQ.
2"
7'-3" x 7'-0" CEILING
11'-8"
A = 17'-6" V.P. TO P.P.
30°
30°
SP
2'-4"
℄ OF SPACE


EYE LEVEL
M.P.L.
M.P.R.
V.P.
P.P. FLOOR LINE
M.P.L. TO V.P.
17'-6" SEE PLAN
7'
2'
SEE PLAN
SIGHT LINE
SET TO LEFT OF
ROOM ℄. SEE PLAN

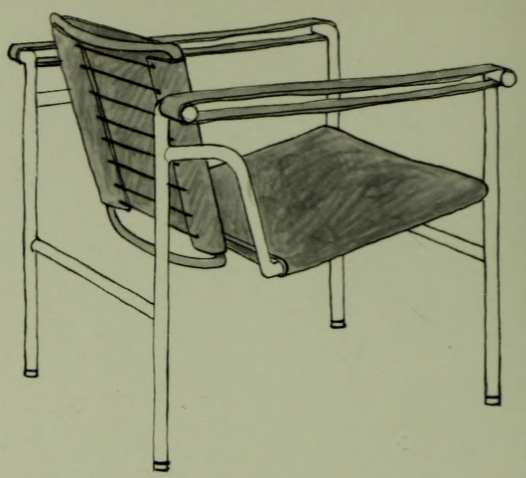


Opposite page: The plan drawing (top) is shown with critical dimensions noted, leading to the constructed layout base sheet (bottom) for the one-point perspective on page 129.

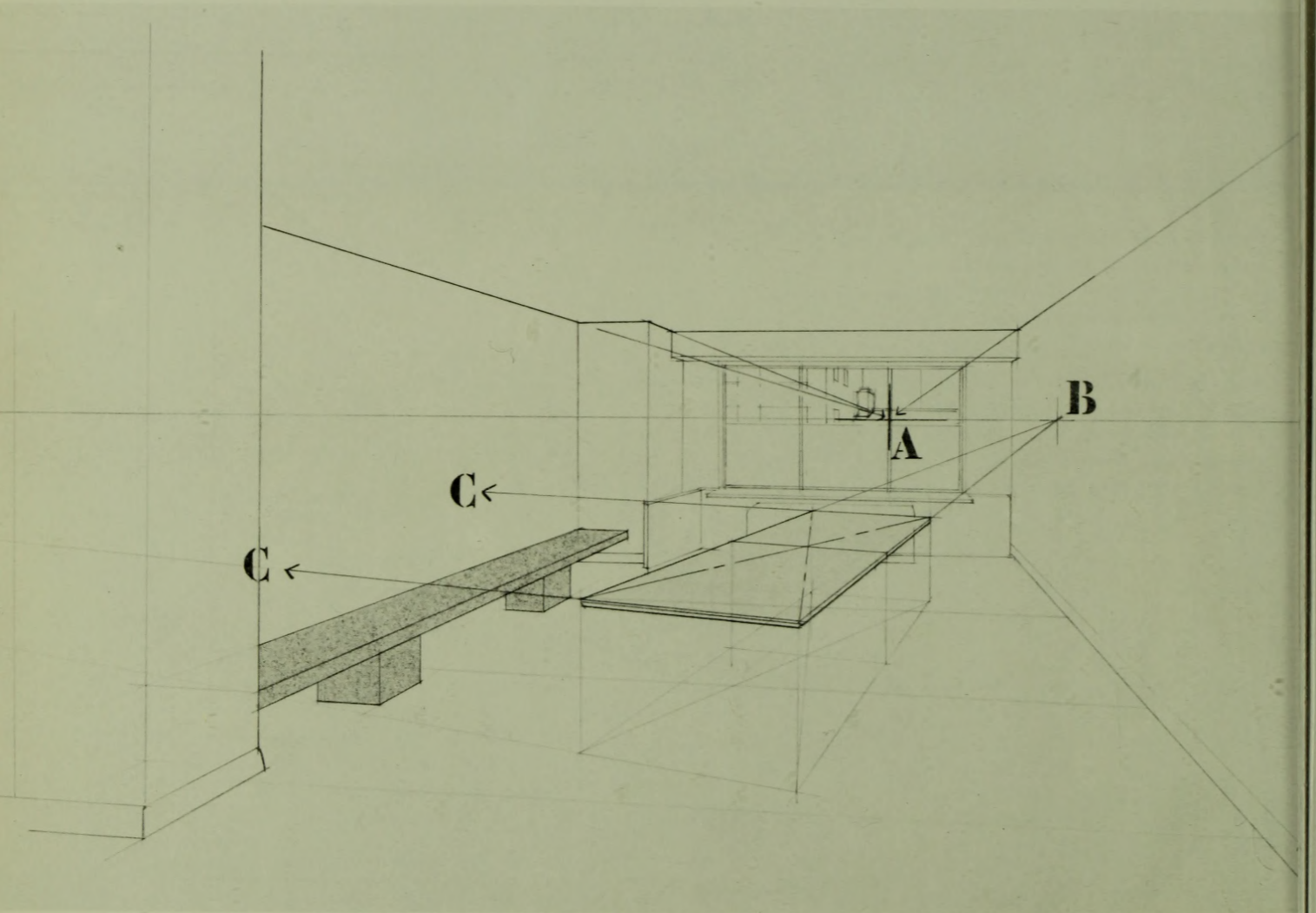
A Le Corbusier drawing of the Villa Savoye (above) is a one-point perspective with a slight modification to produce the effect of a two-point view. (From a 1928 issue of Architecture Vivante, author's collection)



A



B



mize confusion of lines and points. Thus furniture standing at an angle in a room becomes a separate drawing that could stand alone, although related to the main perspective of the space, so that it can be drawn accurately and convincingly.

Circular forms. Problems with circular forms may require special consideration. The usual method of dealing with them is to enclose the circle in question (completing it if only a portion is present) in a square box. The square is put in perspective in its proper position and its center found by intersecting diagonals. The centers of the four sides of the square are now located and an ellipse drawn into the square tangent to the centers of the four sides of the box. When circular forms are near the edges or corners of a drawing, this method may lead to a distorted ellipse that will appear odd, even if correct. In such cases it is best to substitute a true ellipse (a set of ellipse guides can be helpful) that makes an approximate fit into the constructed square box. The minor (short) axis of the ellipse must be vertical if the circle lies in a horizontal plan (a table top, plate, or bowl), but must be angled toward the appropriate vanishing point if the circle is in a vertical plane.

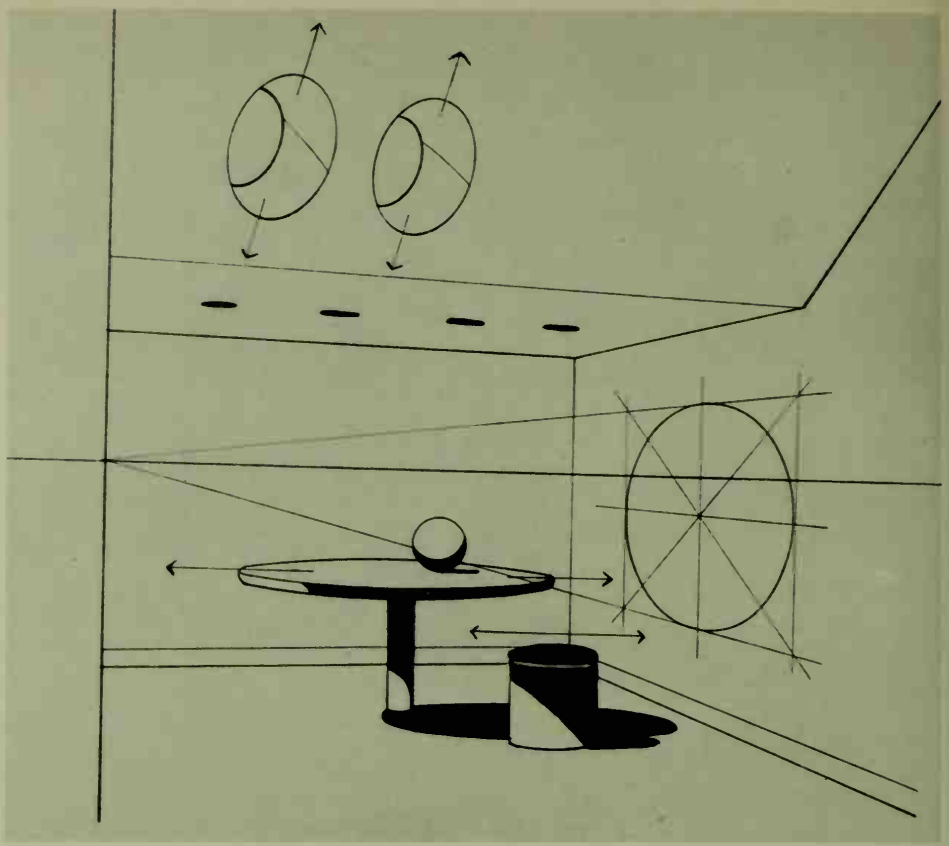
Reflections. Reflections in mirrors, in polished surfaces, and in water were touched on in connection with the mirror wall on the bottom of page 134. One must imagine a mirror-image space, identical to the real space lying beyond the reflective surface and seen in perspective as if it really existed in that location. This means, of course, that the drawing of the real space cannot be simply turned over and reused. Instead the mirror-image space must be constructed with the same vanishing points used for the space itself. A reflection in water or in a reflective table top or ceiling will be upside down. Reflections in vertical surfaces will be reversed right to left. A reflection in a small mirror is simply the appropriate part of a total reflection of the space; it can be thought of as a window looking into a twin space, reversed right to left.

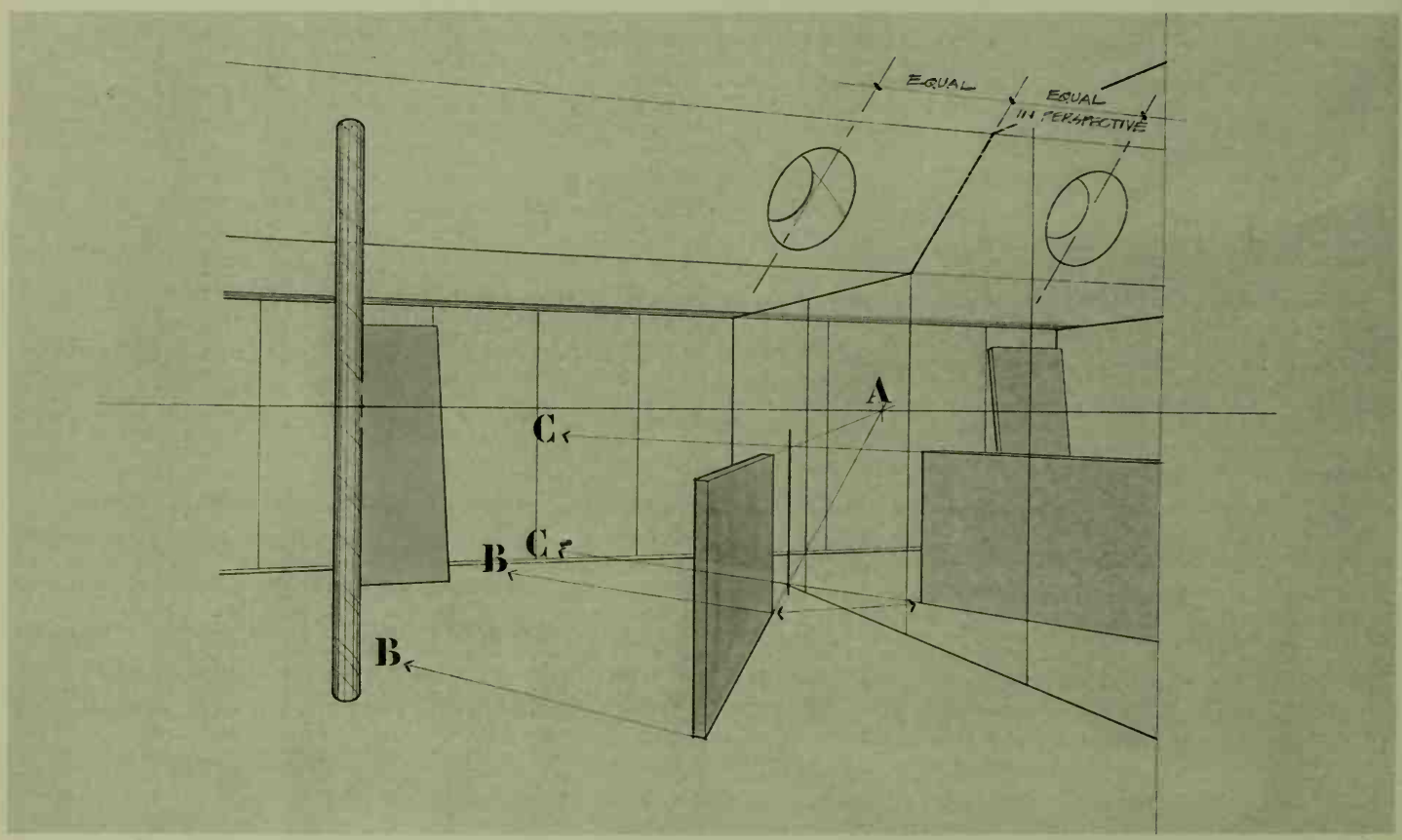
Perspective from above. A space or group of spaces with the ceiling removed so as to resemble a view looking down into a model is a type of view often helpful in explaining plan layout. Such a drawing is a one-point perspective in which the plan is a picture plane with the height dimension extending forward. It is also possible to use a ceiling plan as a starting point and project the height dimension away from the viewer, seemingly downward from the plan. In either case, selection of a vanishing point somewhere within the space (usually but not necessarily near the center) must be made and vertical lines drawn radiating from it.

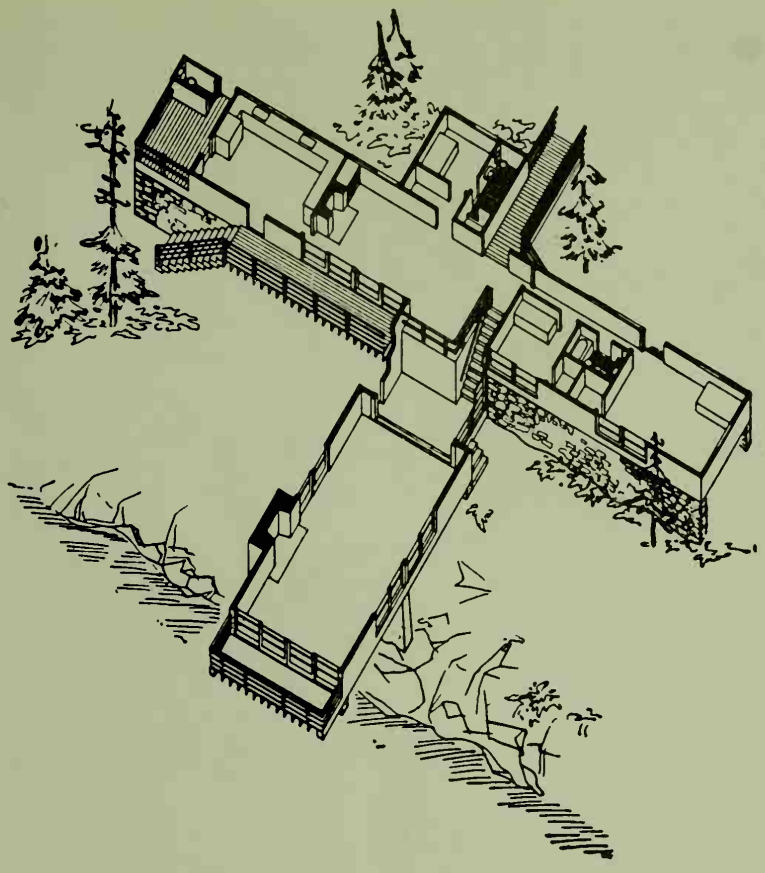
In practice, it is unusual to construct every detail of a perspective drawing mechanically. It will usually serve to set up a base sheet establishing the main volume of the space and locating key elements, such as doors, windows, and major pieces of furniture and equipment. Details can then be developed freehand or by eye. Make sure that such freehand drawing still respects the main perspective system by keeping in mind where the vanishing points are located. A chair that seems to have one leg floating above the floor or some small object that seems strangely angled will reveal a failure to grasp the basic geometry that must underlie every convincing perspective drawing.

One approach to drawing furniture is in perspective (top). A side view is developed in perspective A and projected into the width dimension. At first on a separate sheet, the upholstered seat section hos been drawn in B in darker tone. In combinotion, the complete object emerges. A table (bottom) placed at an angle within a room shown in one-point perspective establishes a new two-point view (with vanishing points B and C while the bench is based on vanishing point A). In this way any piece of furniture not aligned with the axis of the room may require its own vanishing point system. An additional chair at another angle might call for new vanishing points D and E.

Circular elements are shown in horizontal, vertical, and angled planes (right). Circles in horizontal plane all must have a horizontal major ellipse axis. Circles in a vertical plane are enclosed in squares in perspective so that crossing diagonals can be used to find their centers. The minor (short) axis of the resulting ellipse will be a line directed toward the appropriate vanishing point; the major axis is at a 90° angle to the minor axis. A sphere (the ball on the table) will always appear as a true circle, its three-dimensionality suggested by shading. Shades and shadows follow related rules. Mirrors (bottom) are shown here. The right wall is mirrored, and the skylight is visible, reflected in equal distance (in perspective) beyond the mirror plane. The leaning panel at the left is visible at the far right on the opposite side. Note that its edge shows at the right (in the mirror) although it is concealed in the direct view at the left by the intervening column. The low-angled wall is based on vanishing points A and B for its real image, its reflection on vanishing points C and D (out of the picture). The angles to the mirror are equal, creating an isosceles triangle in perspective.

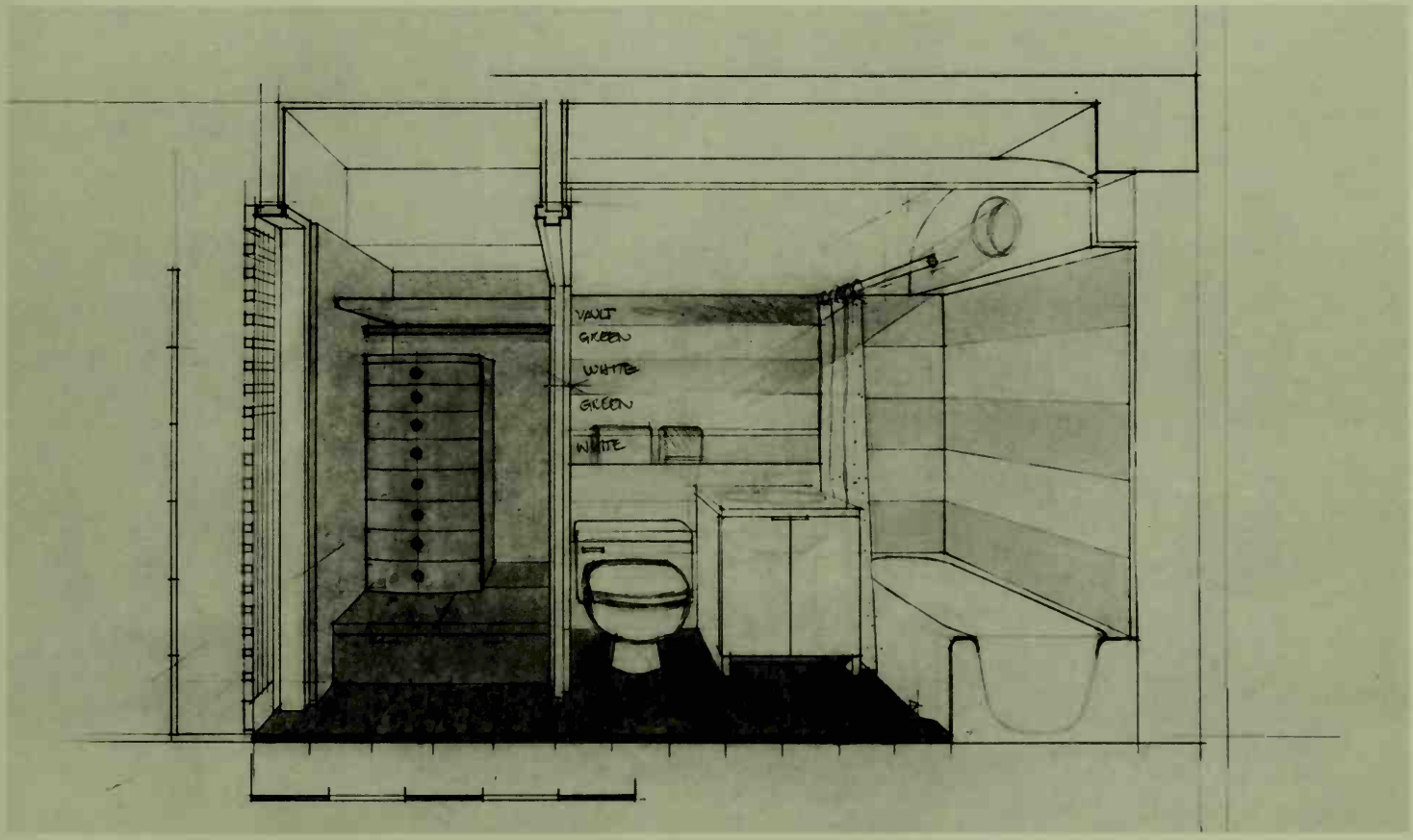






A base sheet for a sectional perspective (left), this is a section with projection back toward a single vanishing point. For the completed rendering, see page 145.

A bird's-eye plan view (bottom)—actually an isometric—is a form of two-point perspective in which the vanishing points are at infinity. This makes the lines in each system of parallels truly parallel, so they are drawn with 30°/60° triangles.



PROJECTS

Earlier chapters of this book have been concerned with the various kinds of drawing that can be useful in the design of interior architecture. In this chapter, three projects will be studied in order to note the kinds of drawings useful in each and to observe how these drawings relate to the project's progress. The three projects are quite different in character. The first is a one-bedroom apartment in an existing building, a study in the ways in which refinement of detail can make something special of an ordinary space. The second project involves planning a typical modern office interior, the sort of job that is processed every day in every major city. Drawings are in no way theoretical, but immediate means to an urgently needed reality. The third project is a theoretical study, an exercise in which a famous architect's design for a building never built has been used as a basis for an imagined interior completion, which, like the building itself, will never be realized beyond drawings.

Drawings from the first and second projects appear in some earlier chapters where they illustrate particular drawing types. The third study is dealt with only in this section.

The three projects were designed by Norman Diekman and completed in 1982. They reflect the types of drawings most often done in his studio. Generally, the design process is as follows: Initial concept sketches are made with Pentel pens, charcoal pencils, and/or Prismacolor pencils in sketch books or on whatever paper is at hand. Once the concept drawings look interesting, scaled drawings are developed. These are usually drawn in scale on 18- or 24-inch cream tracing paper with a combination of soft lead pencils, marker ink on the back of the drawing for general tone, and Prismacolor pencil on the face of the drawing for gradation, shading, and surface texture.

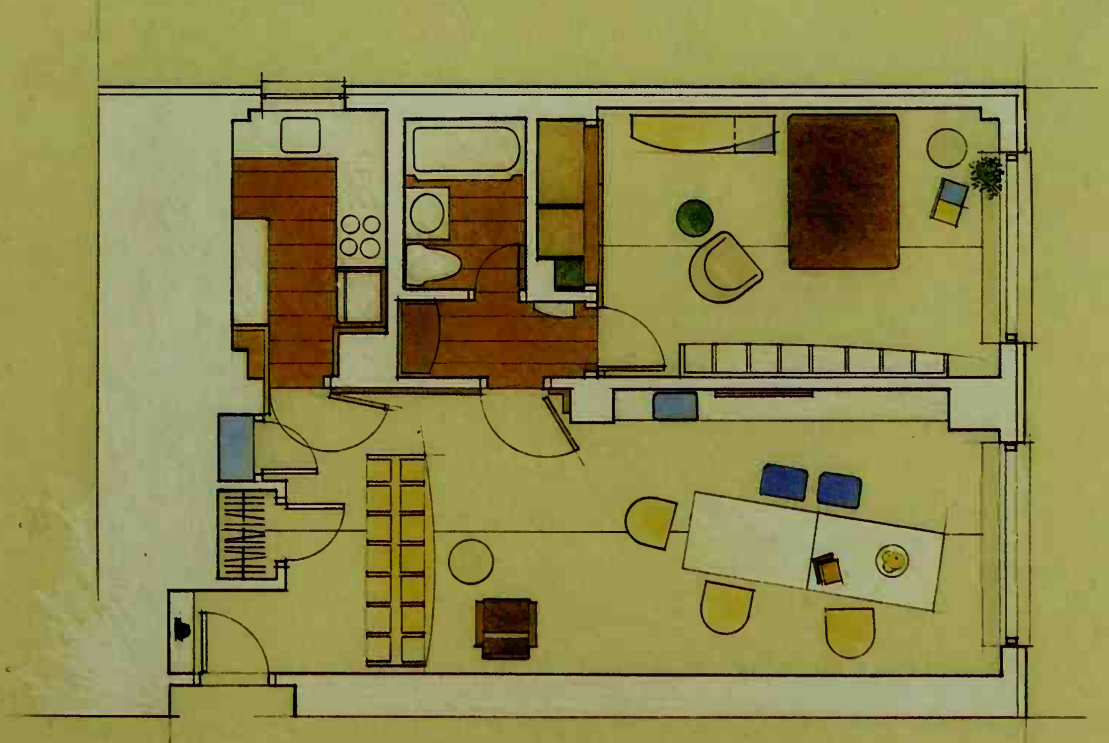
All developed drawings are laid out, refined, and corrected on an undersheet (the base sheet) before tracing presentation drawings are made on a cream overlay. The drawings that show white areas on the face of the paper require special care and skill in execution because the soft graphite pencil smudges and smears easily into the white. Because of this, the technique is usually reserved for fully rendered presentation drawings.

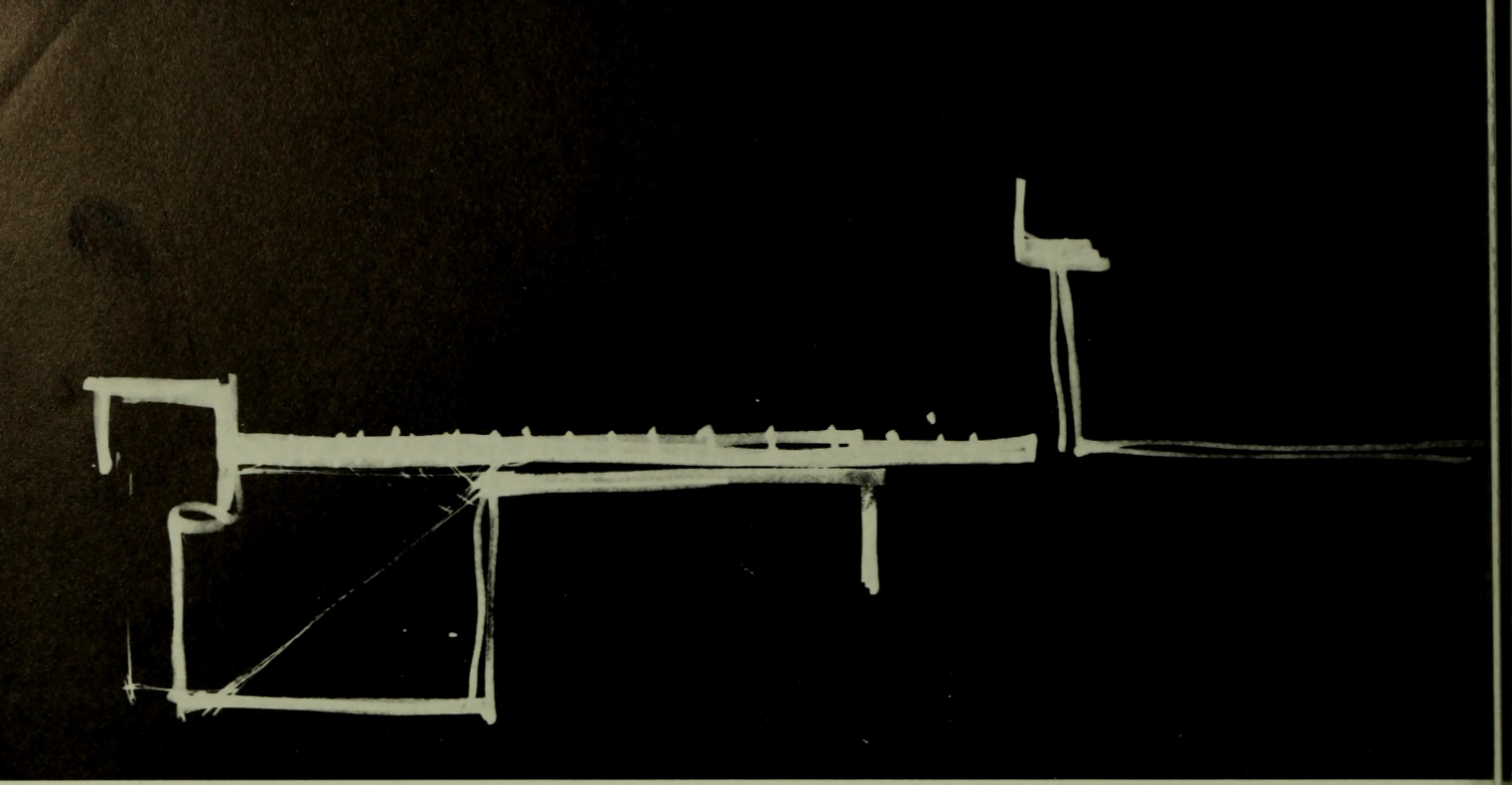
PROJECT 1: A CITY APARTMENT

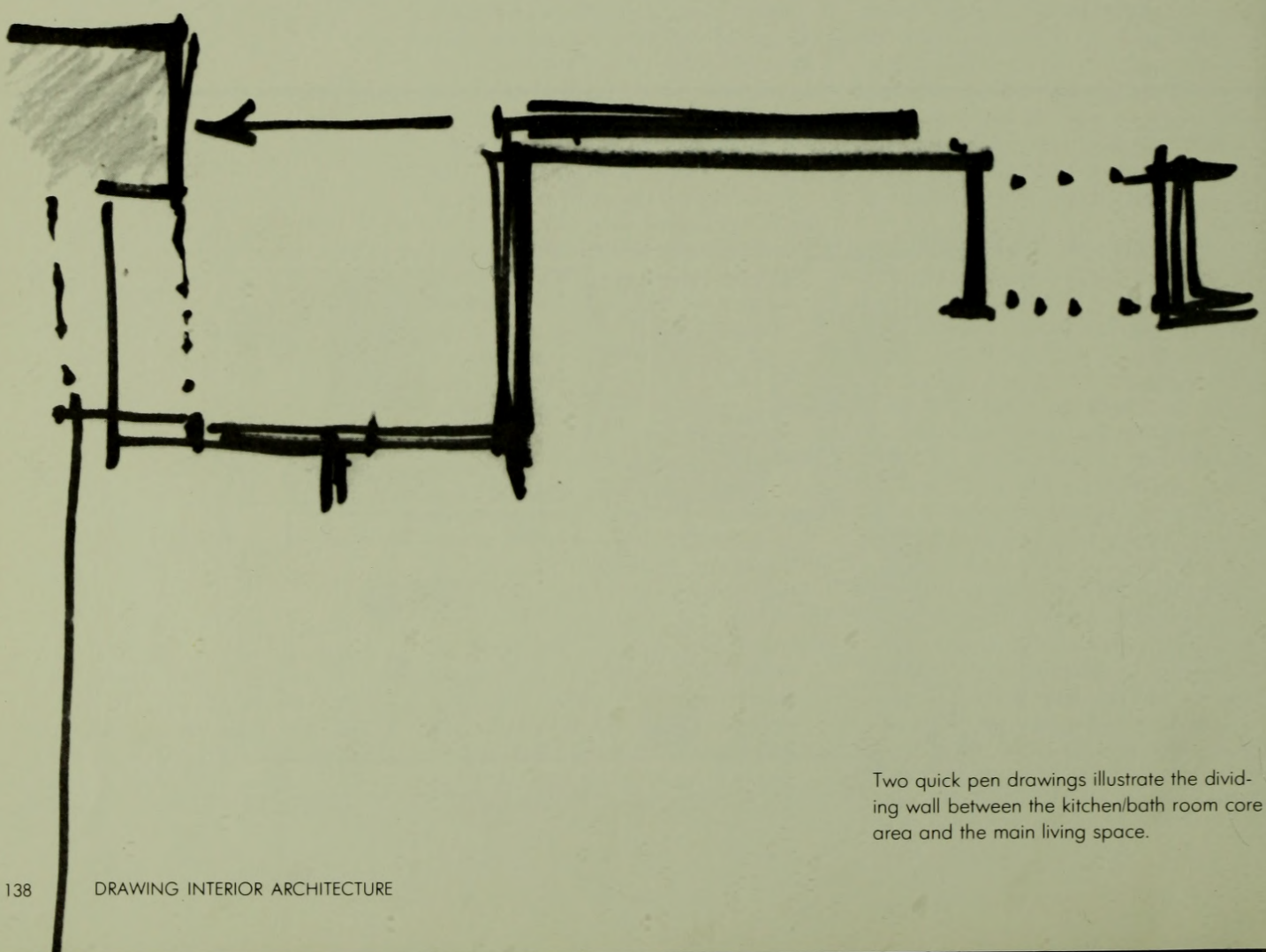
The space presented here is a one-bedroom apartment in a modern (postwar, 1950s or 1960s) highrise building of the sort of nondescript character commonplace in almost any large city. Views from the windows are not extraordinary, although the quality of light from the windows is an attractive feature. The kitchen and bath do not require any major change; however, the structural beams at ceiling level and the columns that pass through the space are realities that cannot be neglected during the design process.

The clients, a business couple, have some special requirements. The living space is to be treated more as a studio than a conventional living room—a space where an art collection can be studied and worked over and where some creative work, at modest scale,

A final design study of table and bench area (top) is shown in perspective. Note that construction lines (bottom) are visible in the final drawing, giving a hint of its studio origins.







Two quick pen drawings illustrate the dividing wall between the kitchen/bath room core area and the main living space.

can also be done. Books are a major interest; some 3,000 are to be accommodated, calling for 27 linear feet of shelving in 3-foot wide, 8-foot high units. There is a small collection of art objects to be displayed, and the main living-studio area must serve for occasional entertaining in some style.

Out of these realities, certain thematic ideas develop. The cramped access to kitchen, closets, bedroom, and bath is a problem requiring some special attention. The studio function of the main living area suggests a second theme relating to the idea of a large, movable table that will dominate this part of the space. The need to provide for the large collection of books becomes a third theme. Ways of dealing with these three issues became the essence of the project.

An early concept proposal focuses on kitchen, bath, and closet areas. A storage core is projected into the living space as a way of resolving the confusion where all the spaces converge. This scheme calls for a major construction effort, which will involve inevitable major costs. A second design study centers on a sliding door or grille that will clarify the spatial relationships between core and living-studio areas.

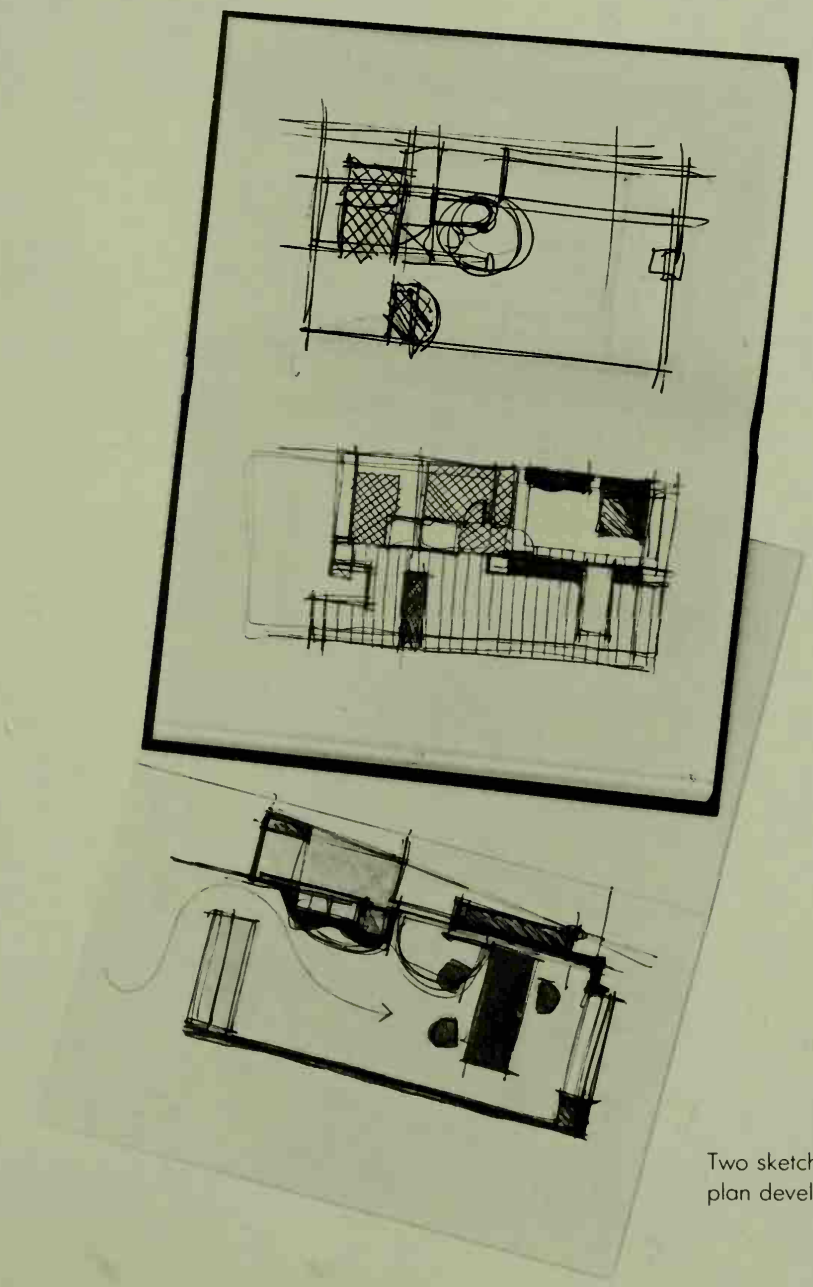
One of the major assets of the existing space is the flux of light—light of special and beautiful quality. This leads to a search for ways to preserve awareness of this light penetration while still sorting out space relationships. This concern leads to the idea of a grille door, by which to articulate space, but not cut off flow and visibility of light from one space to another.

Once this idea has surfaced, studies turn to an exploration of grilles—grilles with hinged door portions and grilles than can relate to book storage. First, the use of standard steel book shelving was investigated, and then the possibilities for special treatment of the door to the kitchen.

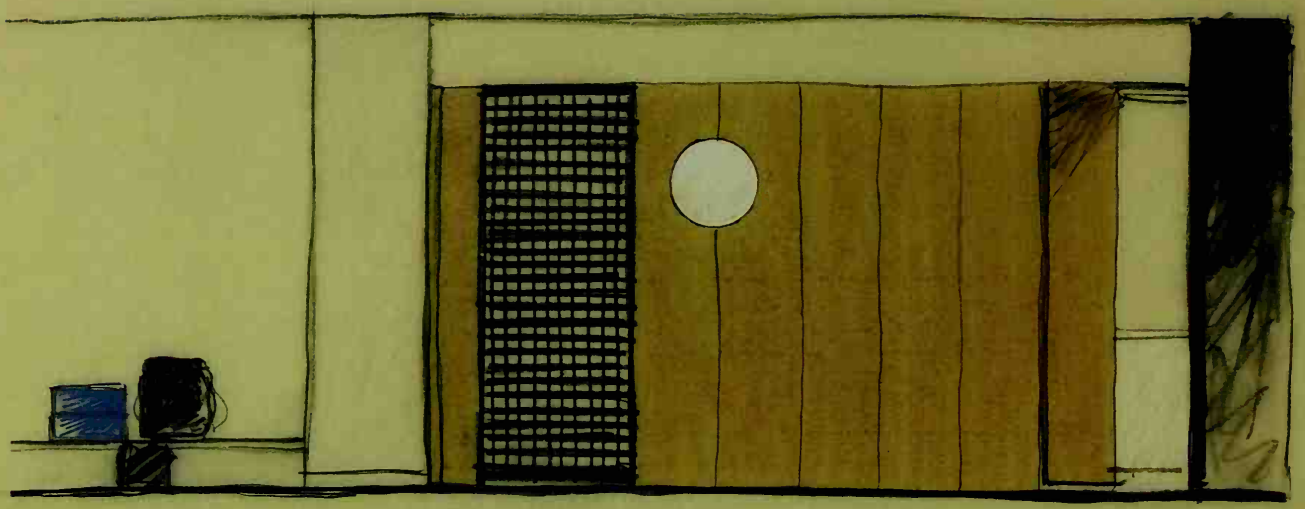
A split kitchen door was developed to let light through while cutting off direct view into the kitchen. Attention is thus shifting, more and more, from a study of objects to a concern for the impact of light and patterns of vision. The idea of a quiet, soft space suffused with a light that could also be described as quiet and soft emerges as the concept that dominates this project.

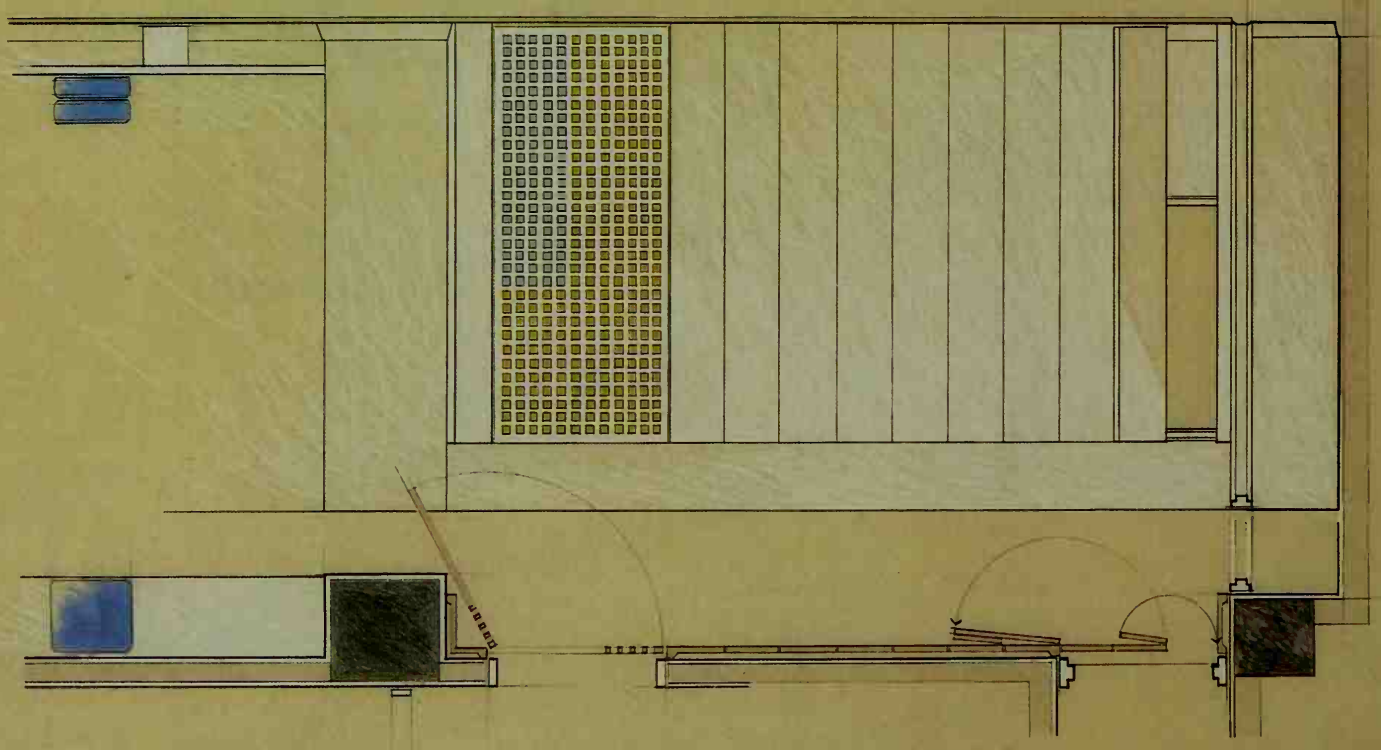
The large table that is to be the focus of the main living space is now developed in relation to the grille wall. This table is always placed at a slight angle to the main axes of the room, an angle that implies mobility. The table is, indeed, intended to be mobile as its big caster wheels suggest, but its mobility is also an idea going beyond the actual reality. The dividing wall with its grille pattern remains the central theme of the space and connects with the treatment of the shelving in the bedroom space beyond. This is a simple grid of square box spaces in white-lacquered wood—a grid or grille in larger scale containing storage and whatever other objects and elements are to appear in this room.

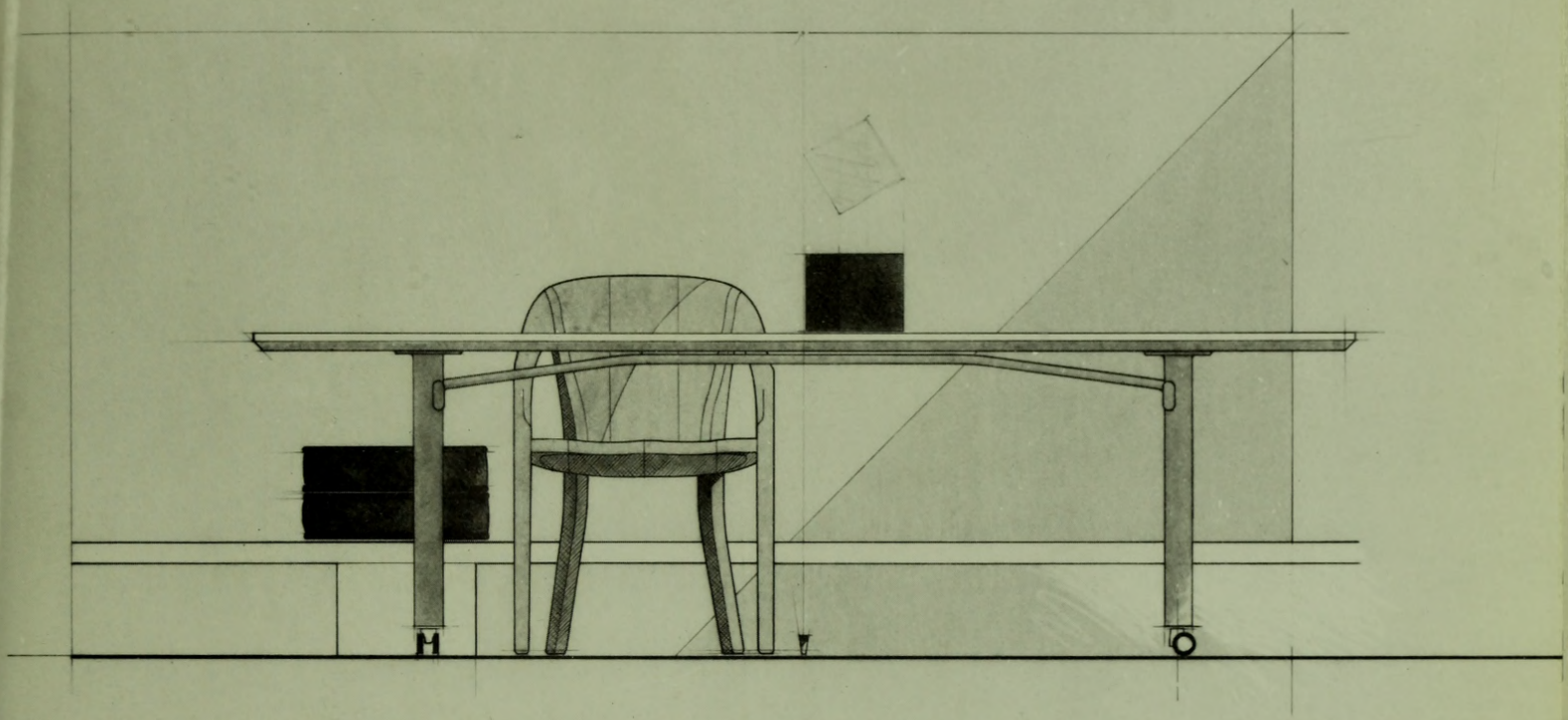
The island book storage unit at the left of the main living space is functionally useful, but also acts as a foil in relation to the grille-storage wall next to it. A modest bench, intended for stacking, displaying, and studying books, is added to complete the relationship of elements making up a simple, but still subtle and complex space.



Two sketch books contain plan development studies.

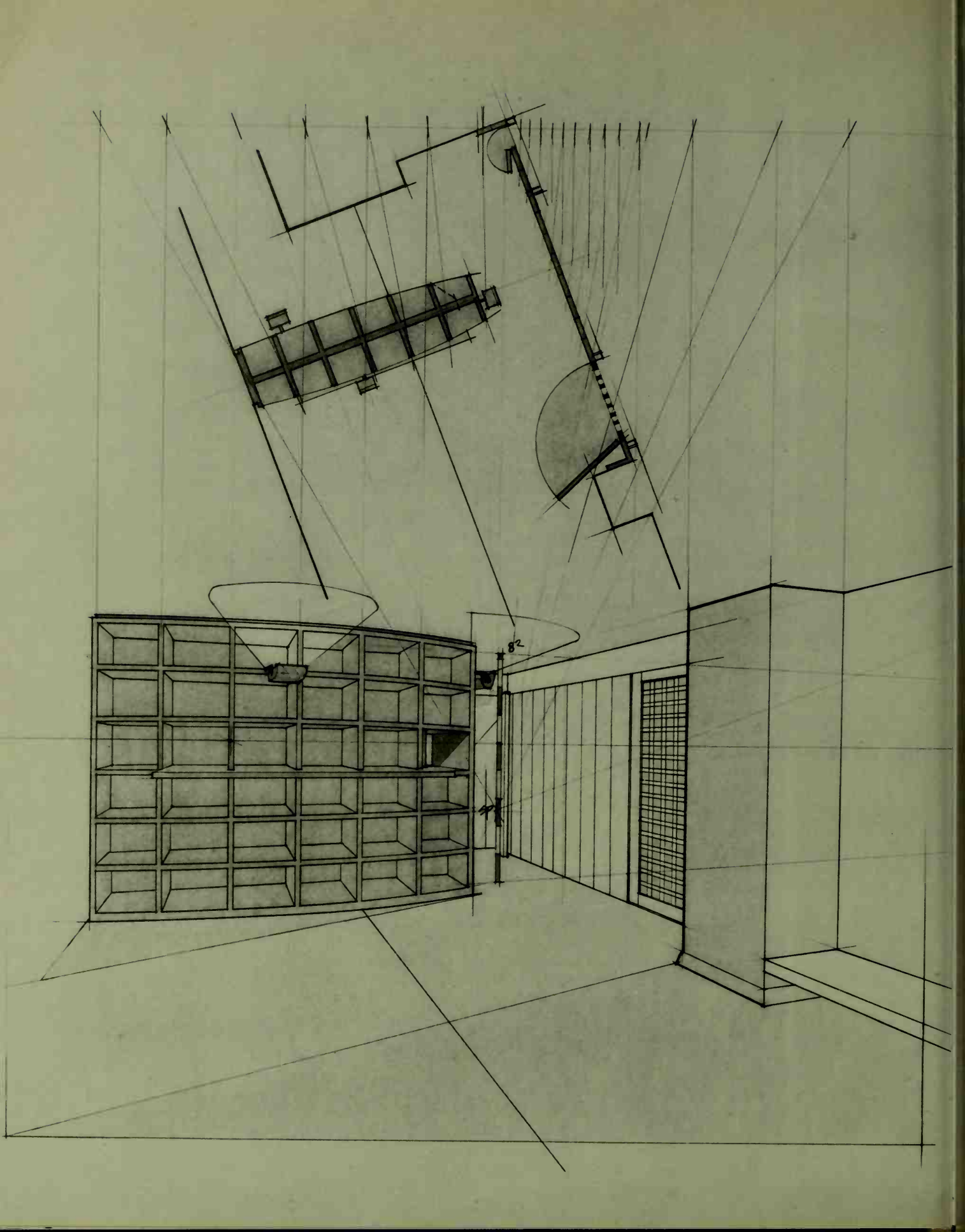






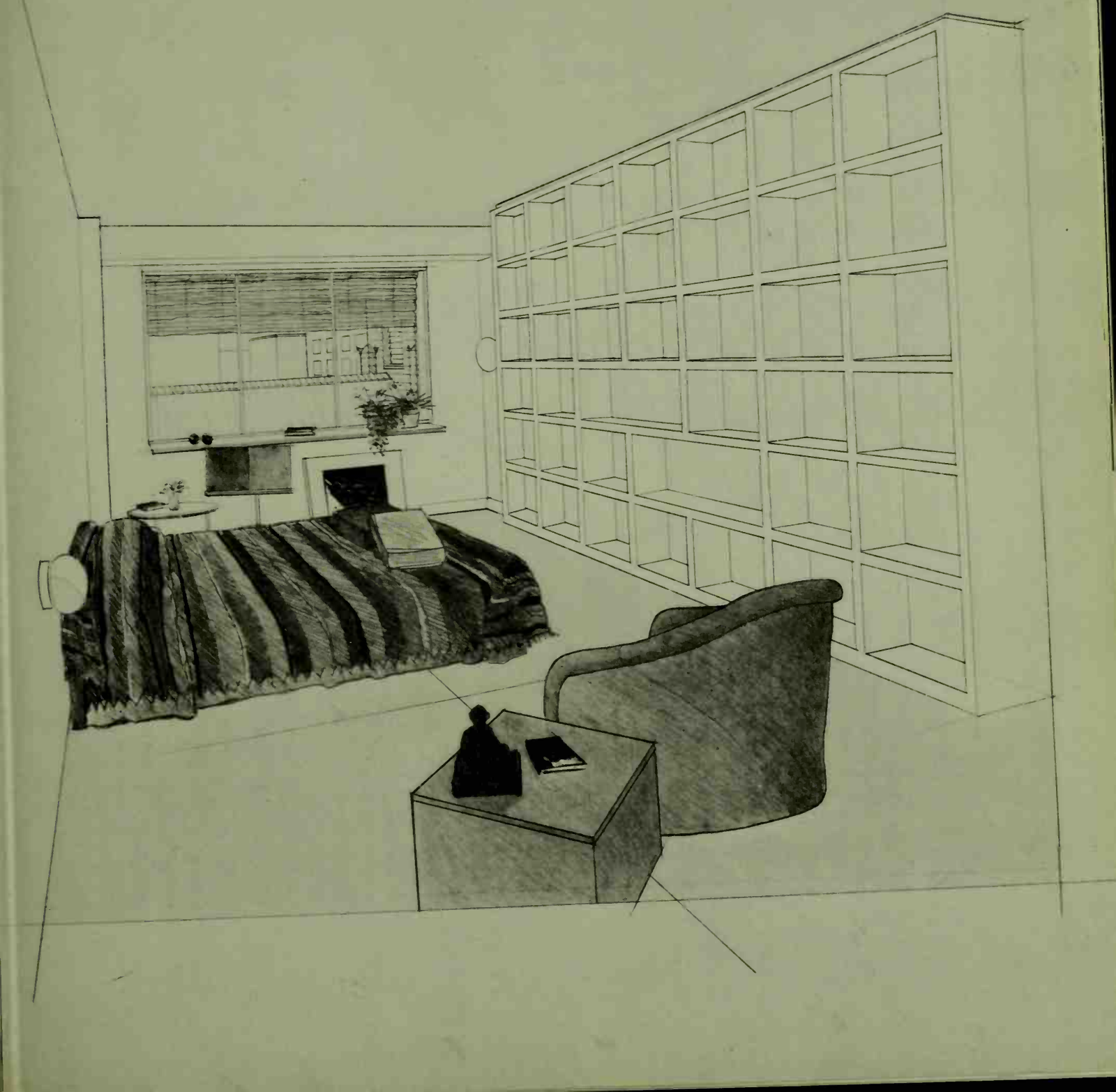
Opposite page: In the first charcoal study (top) of the wall panel system the grille and light fixture are featured. More fully developed design drawing (bottom) is derived from the sketch above.

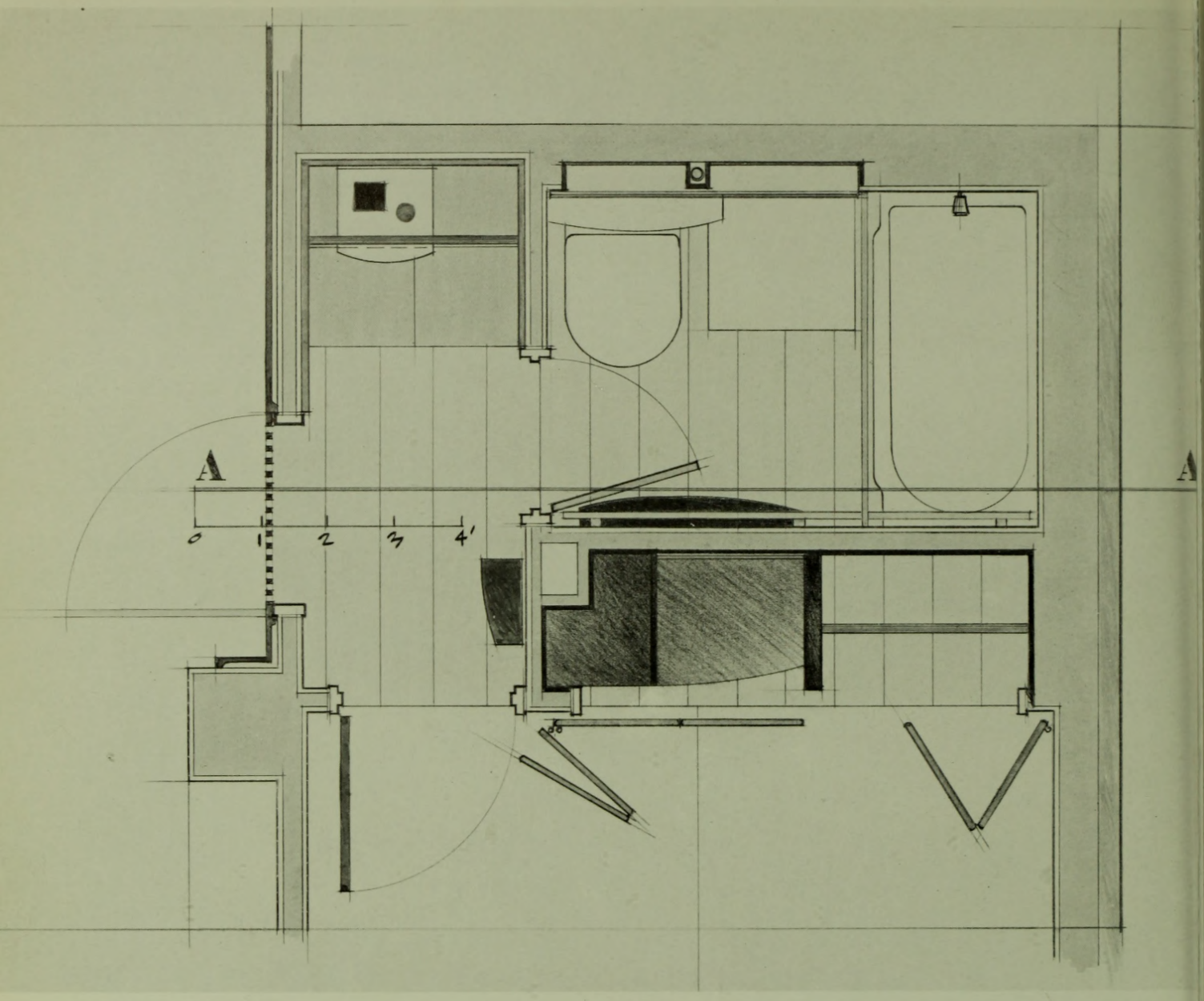
A study (above) concerns subtleties of proportion in the relationship of living room furniture elements—table, bench, and chair.



A studio working layout (opposite page) has the final form of grille, dividing wall, and bookcase shown in perspective projection.

A drawing (below) for final presentation shows bedroom area with fabric, color, and materials plus the grid bookcase superimposed.




A
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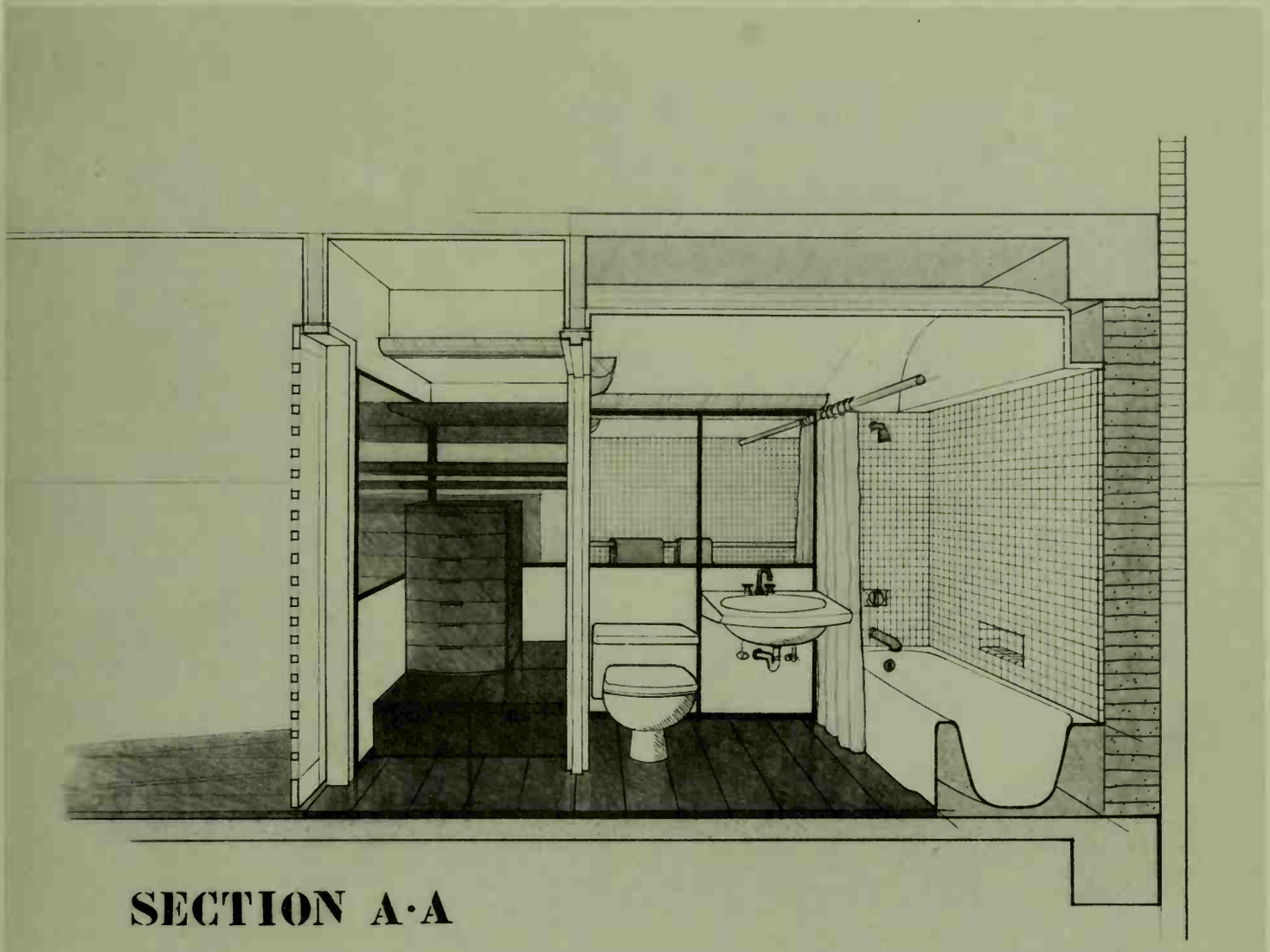
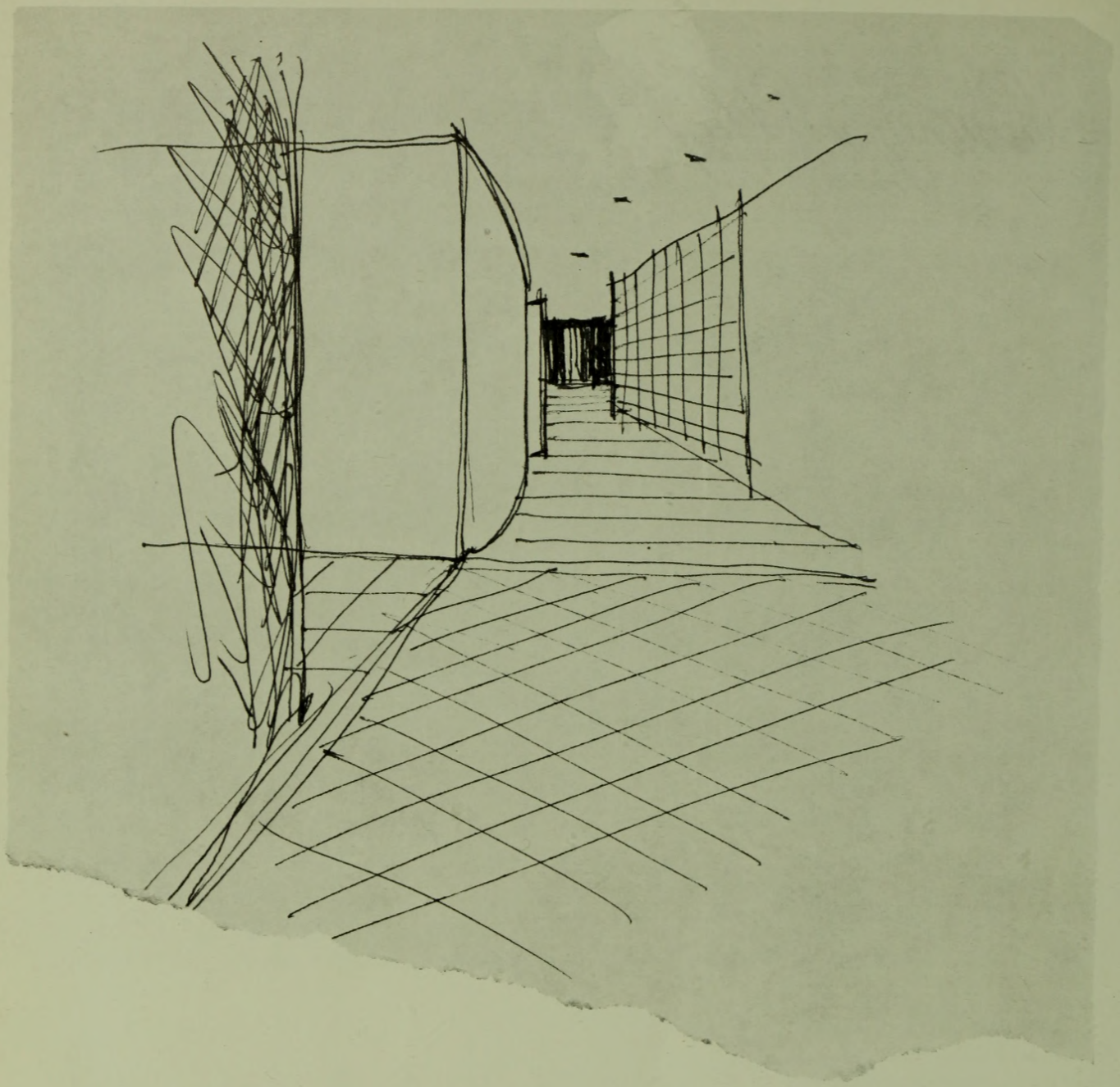


SECTION A·A

Here are the bath-storage core areas (left). Note visible scale and Section AA locating line. This remains a design study although the level of detail considered is quite precise. Fully rendered perspective section AA (above) is shown. See page 135 for the base sheet used to construct this drawing.



The first design sketch, a freehand drawing in pen and ink, captures the spirit of the space and hints at possible materials.

PROJECT 2: OFFICES IN A MODERN HIGHRISE

This project is an example of an assignment that is typical of modern urban interior design practice. The space is part of a floor in an older mid-Manhattan highrise office building. The client, Brickel Associates, Inc., produces and distributes the well-known quality furniture designed by Ward Bennett and has occupied showroom and office space in this building for some years. Expansion of the business made the present space inadequate, and an opportunity to rent more space on an adjacent floor made it possible to create spacious offices for the firm.

The space totals about 10,000 square feet in a long rectangle with large windows on two sides. As so often happens in modern real estate dealings, the space became available on very short notice, and since rental begins with availability, not occupancy, design and construction came under extreme time pressure—every lost day meant rent paid for space not yet usable. This has led to a practice, sometimes called "fast track," in which some drawings are prepared in a rush to permit construction work to be priced and to begin. Drawings are then revised and details added as needed while construction work is in progress. This leads to drawing practices very different from normal routine. The drawings used in this case for estimating and as basic construction documents are simply a floor plan, a reflected ceiling plan, and basic elevation sheets, each with notes and symbols to give a maximum of information with minimal drafting. These plans are drawn at a scale of ¼″ = 1′ to show maximum detail on the plans. The size and shape of the space mean that, at this scale, each plan is too large to fit on a normal sheet; each is therefore split at a center point and drawn on two sheets. The heavy match line marked AA shows where the two half plans join. The working drawing practice described here is quite usual and includes the following:

Each room or space is given a number, shown in a small ellipse to make identification easy in notes and conversation.

Each room contains a 45°-angle small square box divided into four smaller squares, each with a number. The corners of the box are arrows pointing to the side of the room that will appear in an elevation drawing, which will be prepared later, when needed.

Where elevations will be required for parts of open space (not a room), a V arrow points to the surface that will be shown with a small circle split to hold two numbers, the elevation number above and the number of the drawing where it will appear below.

Each door is labeled with a box with rounded corners that will contain a number referred to a door schedule to be prepared later.

Typical partition construction is shown by a section line with a circle enclosing a letter (A, B, C, etc.) that identifies the section drawing on another sheet.

Revisions made as the project progresses are described in notes and located by a small triangle containing the revision number.

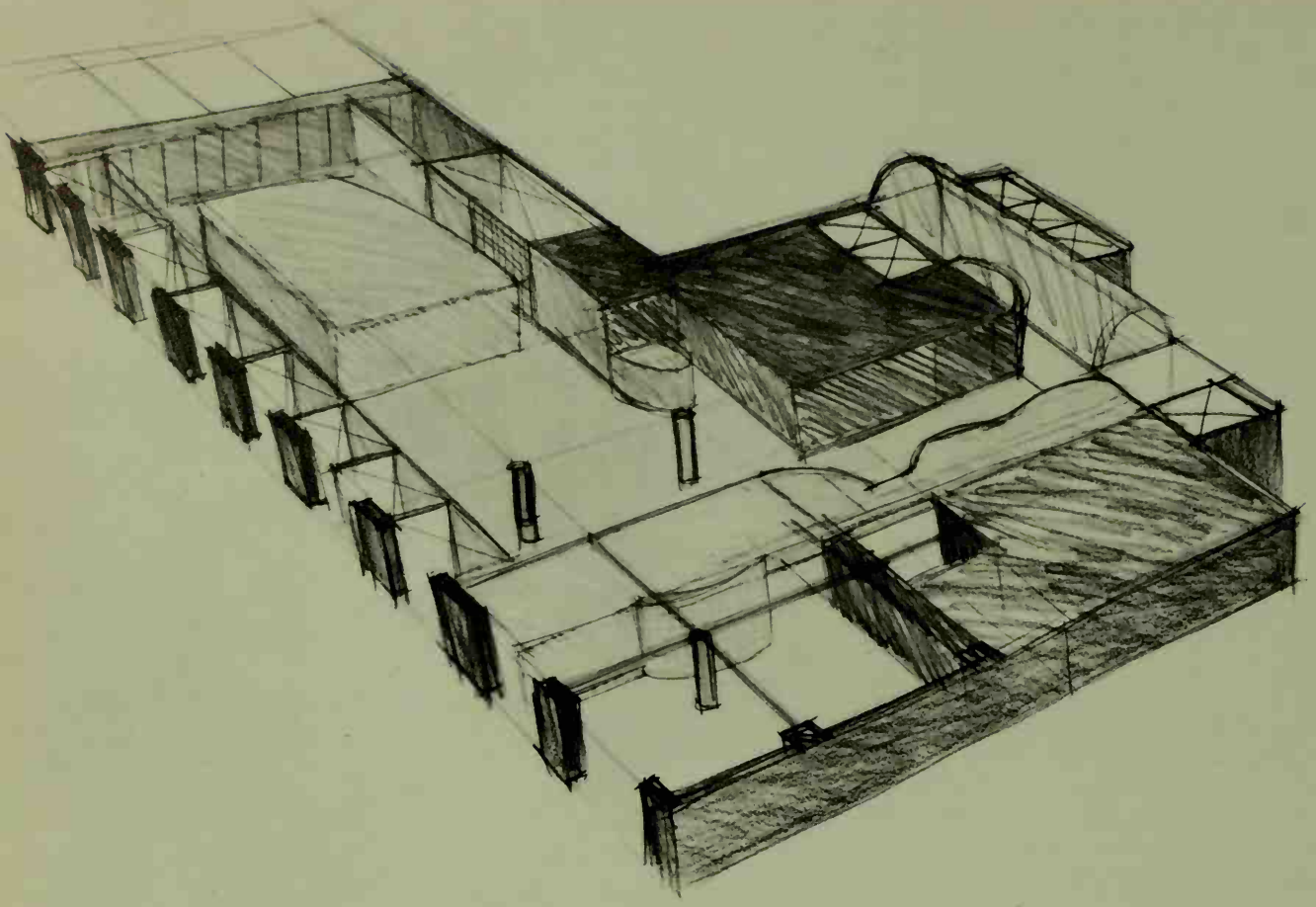
Various types of wall construction are identified by standard hatching techniques.

Below each room number on the reflected ceiling plan (pages 152–153), a second ellipse contains the ceiling height in feet and inches.

Ceiling tile is normally laid out starting from the center line of the space. In open space when it is not clear where the start should fall, a center reference point, called the "working point," is shown as a circle, quartered by lines and blocked with black and white in opposite quarters.

Light fixtures, air conditioning grilles, and other ceiling features are shown with standard symbols or with symbols listed at the right of the drawing.

In office space planning, a reflected ceiling plan is a particularly important drawing because ceiling material, lighting, and other overhead elements (grilles, sprinklers, etc.) are major parts of the project and require coordinated placement if an orderly and organized appearance is to result.

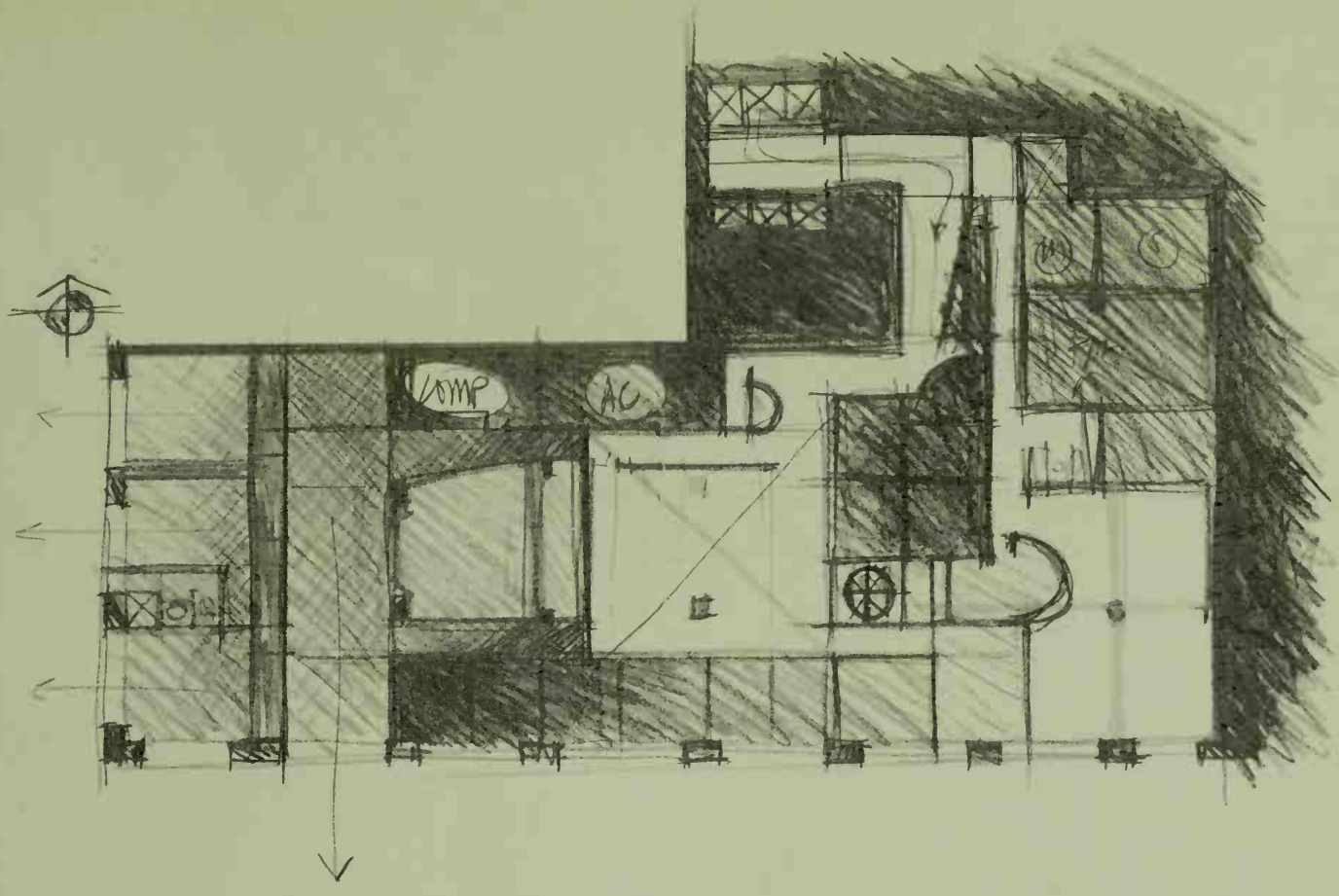


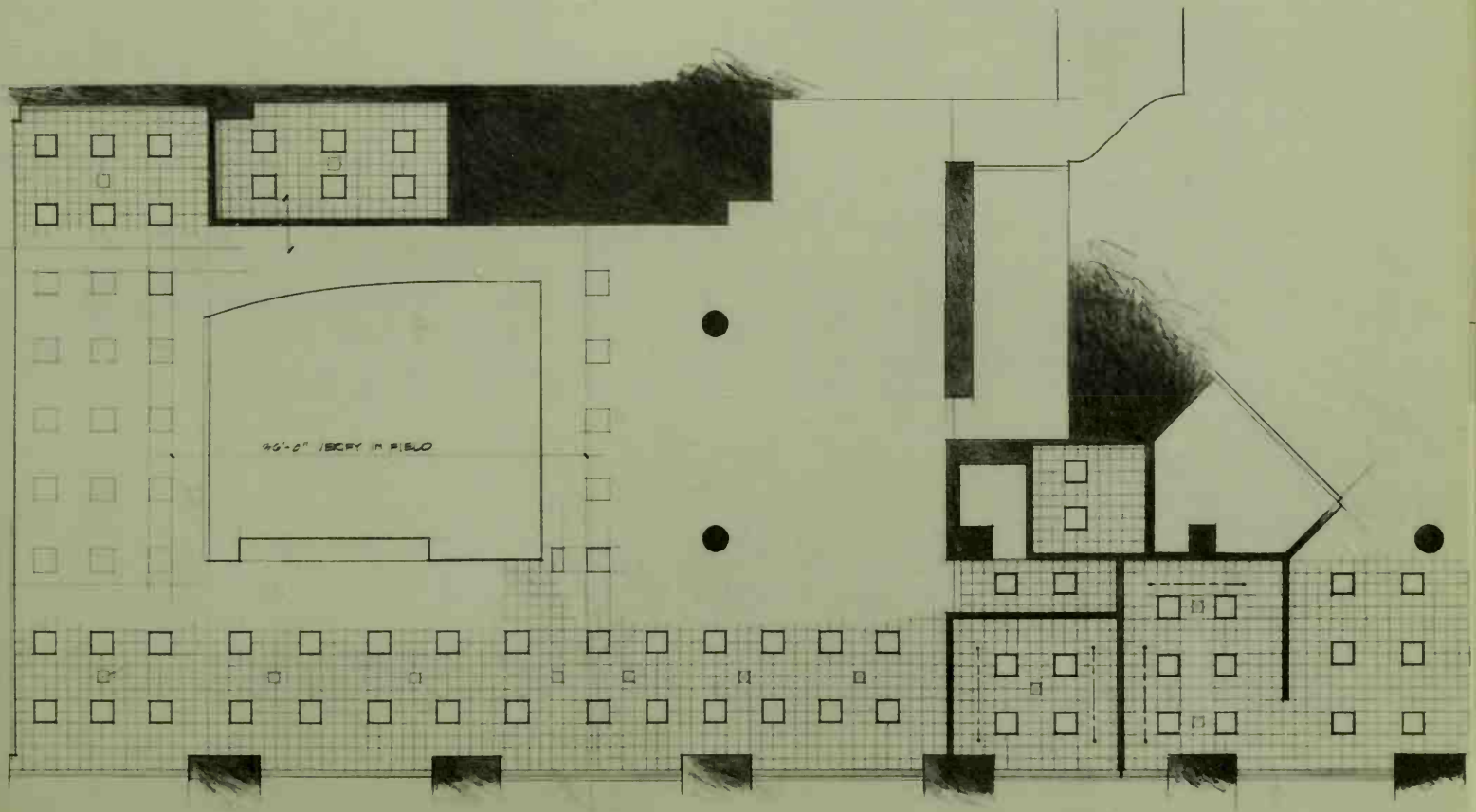
Conceptual pen sketches (above) relate to plan development studies exploring spatial concepts (opposite page top). Design development drawings (bottom) are used to coordinate ceiling pattern with other plan elements.

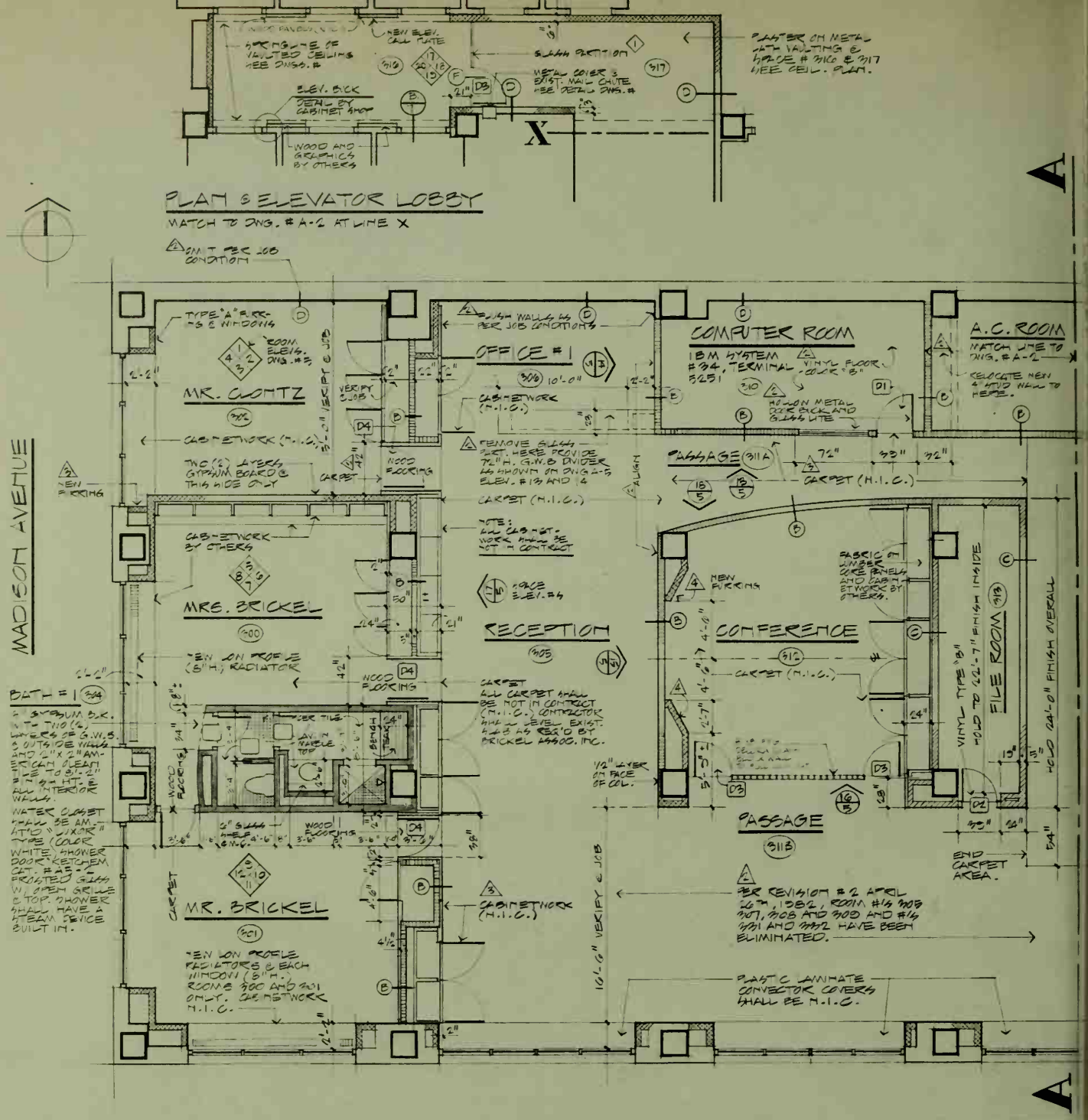
Drawings for this project were made on Mylar (not "Clearprint"), with special Mylar leads in order to make revisions and drawing changes as easy as possible. Mylar erases well and stands up to rough handling while drawing, erasing, and printing. Also note that the style of lettering and dimensioning is clear but somewhat informal, another indication of the fast-track approach to both design and drafting. So many of the elements of such drawings are standardized and repeated (wall indications, doors, light fixtures, etc.) that they become particularly suited to production with computer-aided techniques. In the near future, the task of drafting can be expected to give way to a computer-aided operation in which a drawing is assembled more than drawn, as we now understand this term. The following chapter discusses this possibility in more detail.

Even when design must be developed under such extreme time pressure, there must, of course, be preliminary sketches and studies. These cannot be developed into formal presentation drawings of the sort normally executed for projects where there is time to consider alternatives. Preliminary design for this project was limited to sketches that were either conceptual (in the development of the basic plan) or developed, often, on the job site in discussions with client and contractor.

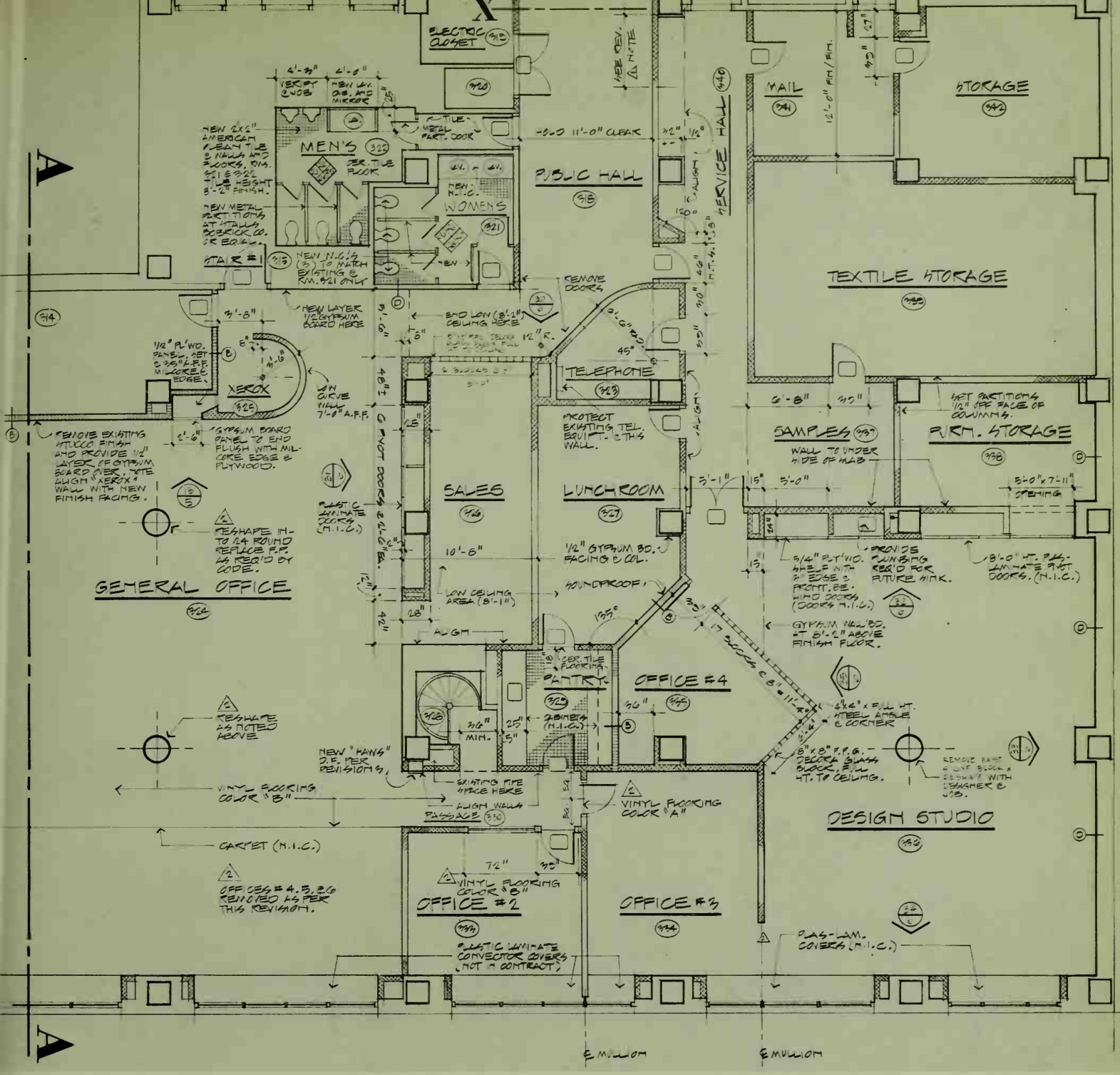
In-process design studies for spaces 335 and 336 are illustrated in the earlier chapters on plans (page 44) and elevations and sections (bottom page 77). The ability to produce a successful project in spite of pressures that reduce design study time to a minimum is one of the special demands that modern realities make of design professionals.

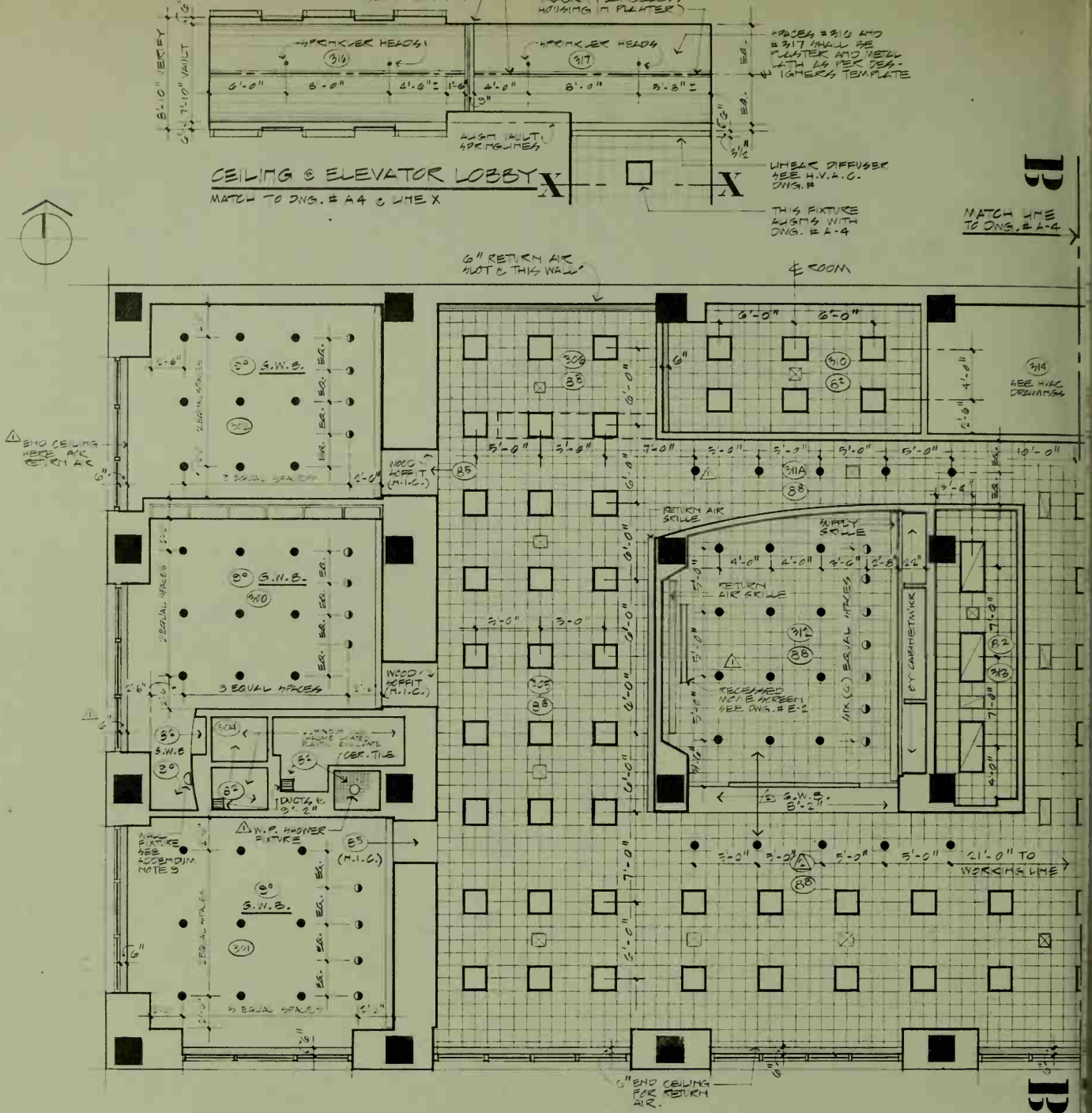

COMP
AC


96'-0" HOCKEY PLAYING FIELD

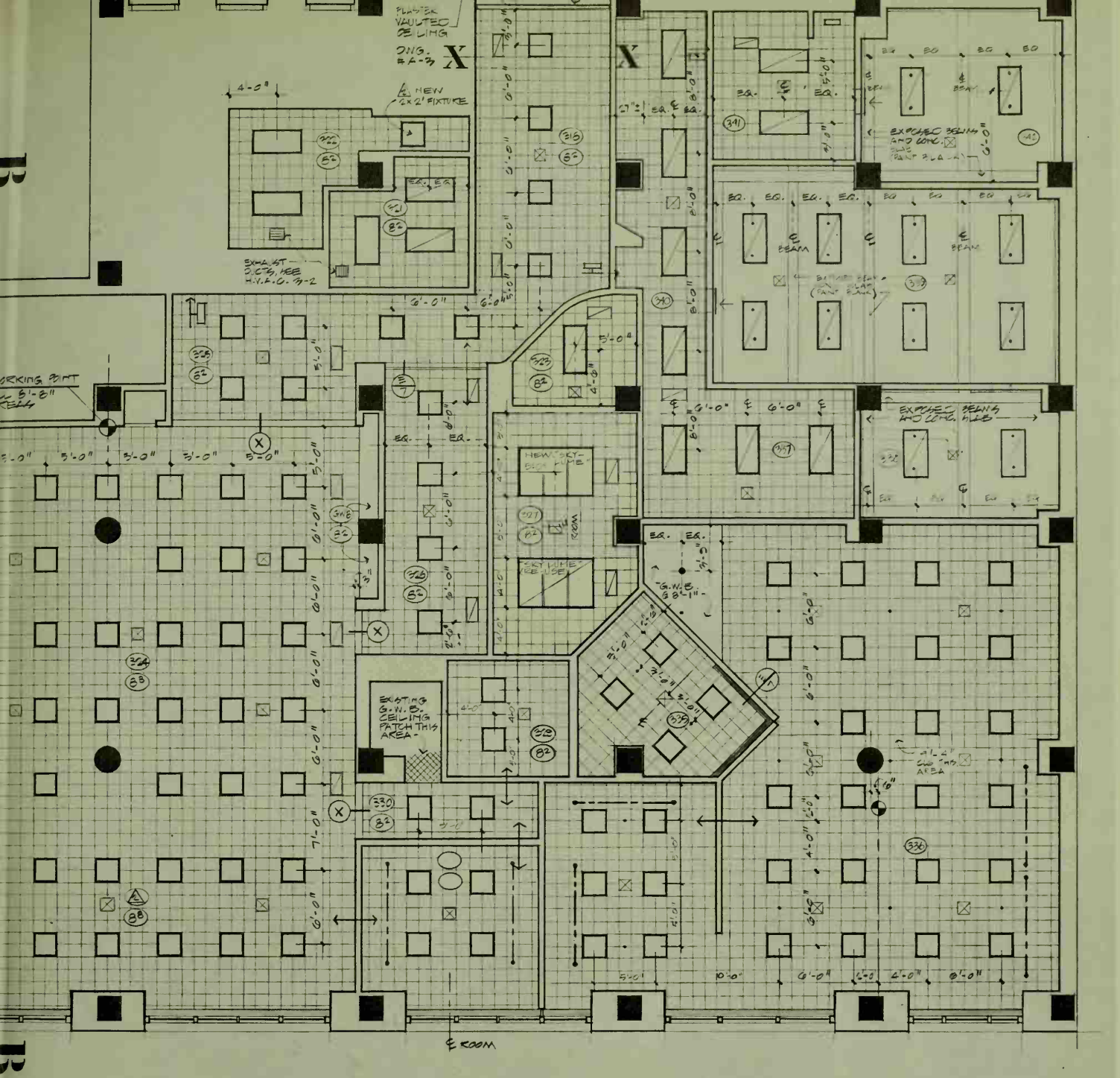


Working drawings of fullly developed plan are black-line Ozalid prints taken from Mylar film originals. The film medium makes revisions easy and permits many prints without damage to the original. Note lettering lined up in columns to increase a sense of organization. See page 44 for design development of office no. 4.

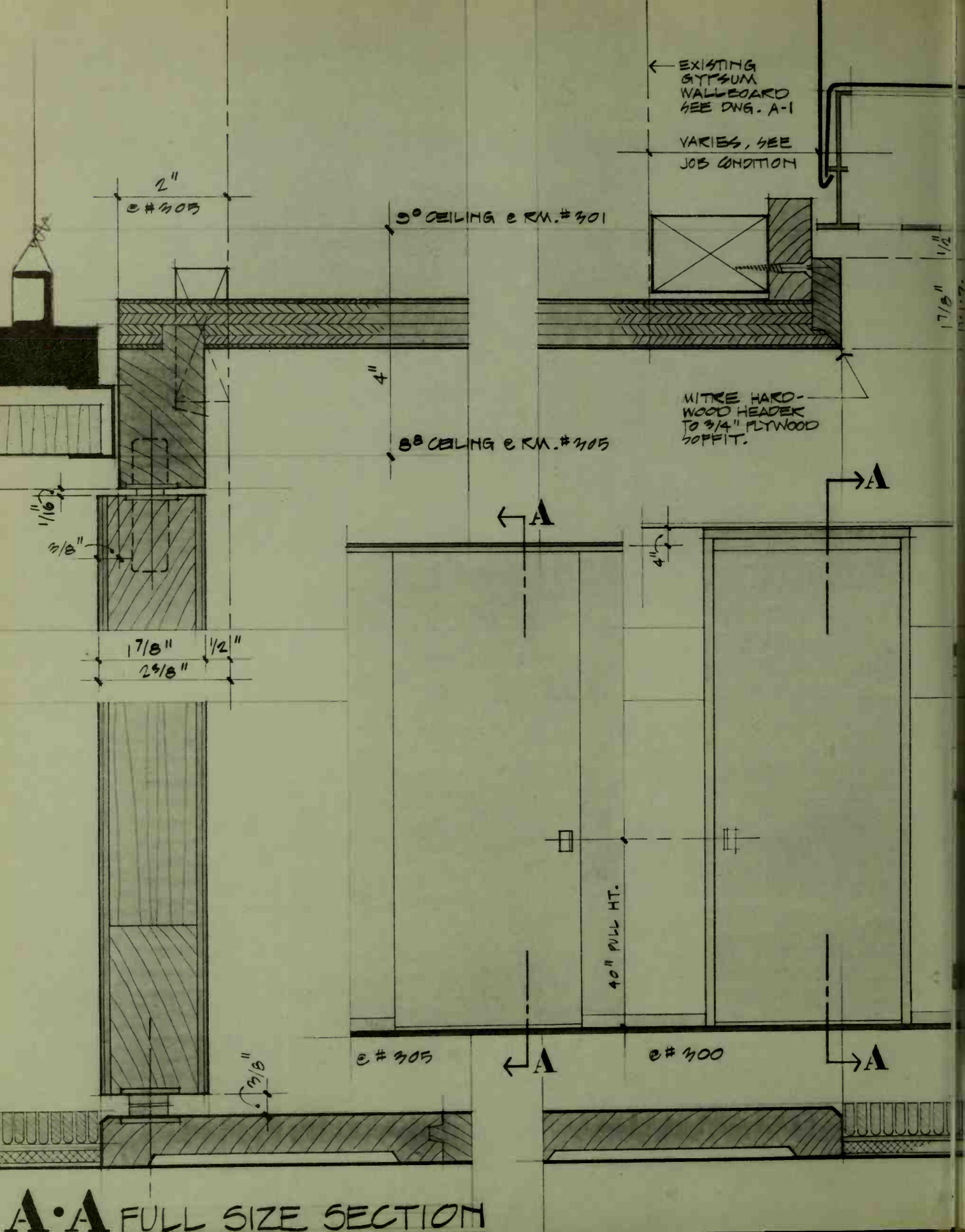

ELECTRIC CLOSET
MEN'S
WOMEN'S
PUBLIC HALL
SERVICE HALL
MAIL
STORAGE
TEXTILE STORAGE
TELEPHONE
XEROX
SALES
LUNCHROOM
SAMPLES
FURN. STORAGE
GENERAL OFFICE
PANTRY
OFFICE #4
DESIGN STUDIO
OFFICE #2
OFFICE #3
VINYL FLOORING COLOR "B"
VINYL FLOORING COLOR "A"
CARPET (N.I.C.)
EMULSION
EMULSION



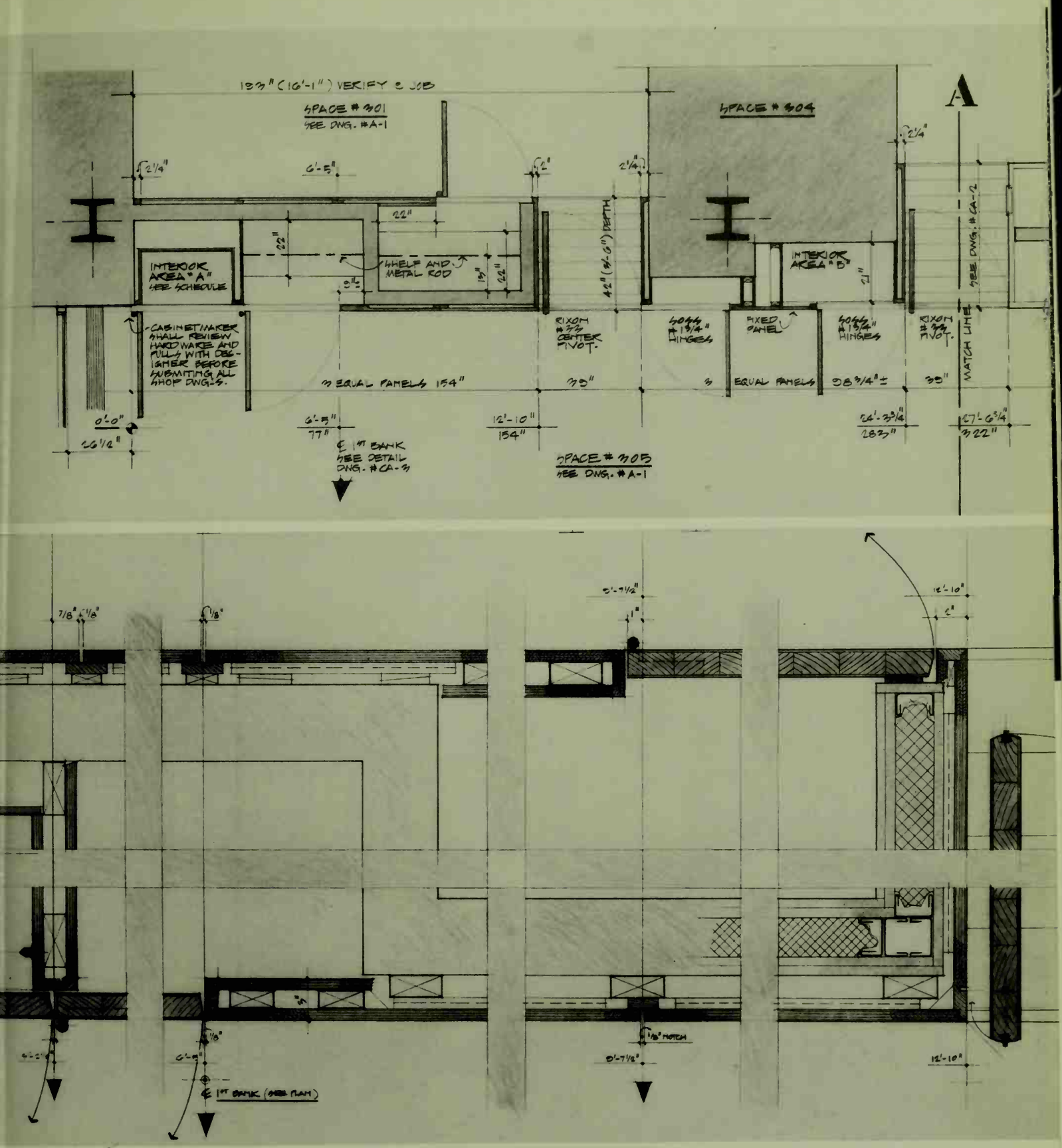
A working drawing reflected ceiling plan is illustrated here. Columns are shown as solid black and air supply grilles as a rectongle with X diagonals. On the original Mylor film sheet, return oir ducts are drawn in red. Although this will print here in black, the color on the original aids a quick overview, which facilitotes coordinoting it with other detail as it is developed.



Pages 154–155: Cabinetwark design details are drawn in variaus stages and at variaus scales sa that they can be incorparated inta the finished warking drawing set.



A·A FULL SIZE SECTION


193" (16'-1") VERIFY @ JOB
SPACE # 301
SEE DWG. #A-1
SPACE # 304
A
INTERIOR AREA "A" SEE SCHEDULE
SHELF AND METAL ROD
42" (3'-6") DEPTH
INTERIOR AREA "B"
MATCH LINE
SEE DWG. #CA-2
CABINETMAKER SHALL REVIEW HARDWARE AND PULLS WITH DESIGNER BEFORE SUBMITTING ALL SHOP DWGS.
RIXON # 33 CENTER PIVOT.
4044 # 19/4" HINGES
FIXED PANEL
4044 # 19/4" HINGES
RIXON # 33 PIVOT.
11 EQUAL PANELS 154"
35"
EQUAL PANELS
0'-0"
26 1/2"
6'-5"
77"
12'-10"
154"
24'-33/4"
283"
27'-63/4"
22"
℄ 1ST BANK SEE DETAIL DWG. #CA-3
SPACE # 305
SEE DWG. #A-1
7/8"
1/8"
0'-7 1/2"
1"
12'-10"
2"
1/8" MITCH
℄ 1ST BANK (SEE PLAN)

A new exterior perspective (top) is developed "after Le Corbusier." An effort was made here to place the house in its regional context so that interior design thinking can begin with a strong sense of the environmental surround.

Plans (bottom) are developed in relationship to the perspective above. Color and furniture layout show a first phase in thinking about furniture selection.

PROJECT 3: THE ERRAZURIS HOUSE BY LE CORBUSIER

This project is a totally theoretical study in the realm of what might have been. It is of a sort than can be taken on by any designer or student as a study project without concern for problems of client, budget, or other limitations on imaginative scope. The house, a design of Le Corbusier that appears in his *Oeuvre Complete* for 1929–1934, was never built. It was a proposal for a M. Errazuris to be built on the coast of Chile. It explores the relationship of simple, almost primitive building techniques—stone walls, plaster, wood beam and posts—to the sophisticated aesthetic of International School architecture. The drawings of the unbuilt scheme had sufficient force to lead Antonin Raymond, an architect of major influence in his own right, to use the design as the basis for a paraphrase that was actually built in Japan.

Le Corbusier always encouraged study and development of his design by others. He had no resistance to such exploration of his own designs and even provided in his will for the continued availability of his own works (in drawings, etc.) to those who might want to use his works as a basis for continuing design study. The original design presents a simple house, suggestive in some ways of the *Mas* farmhouse typical of southern France, but transformed through the subtlety of Le Corbusier's mastery of architectural proportion and space. Local materials of the most basic sort are to be used, but used in a sophisticated way and in combination with such modern, industrial materials as extensive plate glass. The site is intended to be a spectacular seacoast location in which the simplicity and subtlety of the house take on classic grandeur. Since Le Corbusier's sketches of the interior are simple indications of architectural space, an effort to develop these into interiors that might actually be realized presents a stimulating challenge.

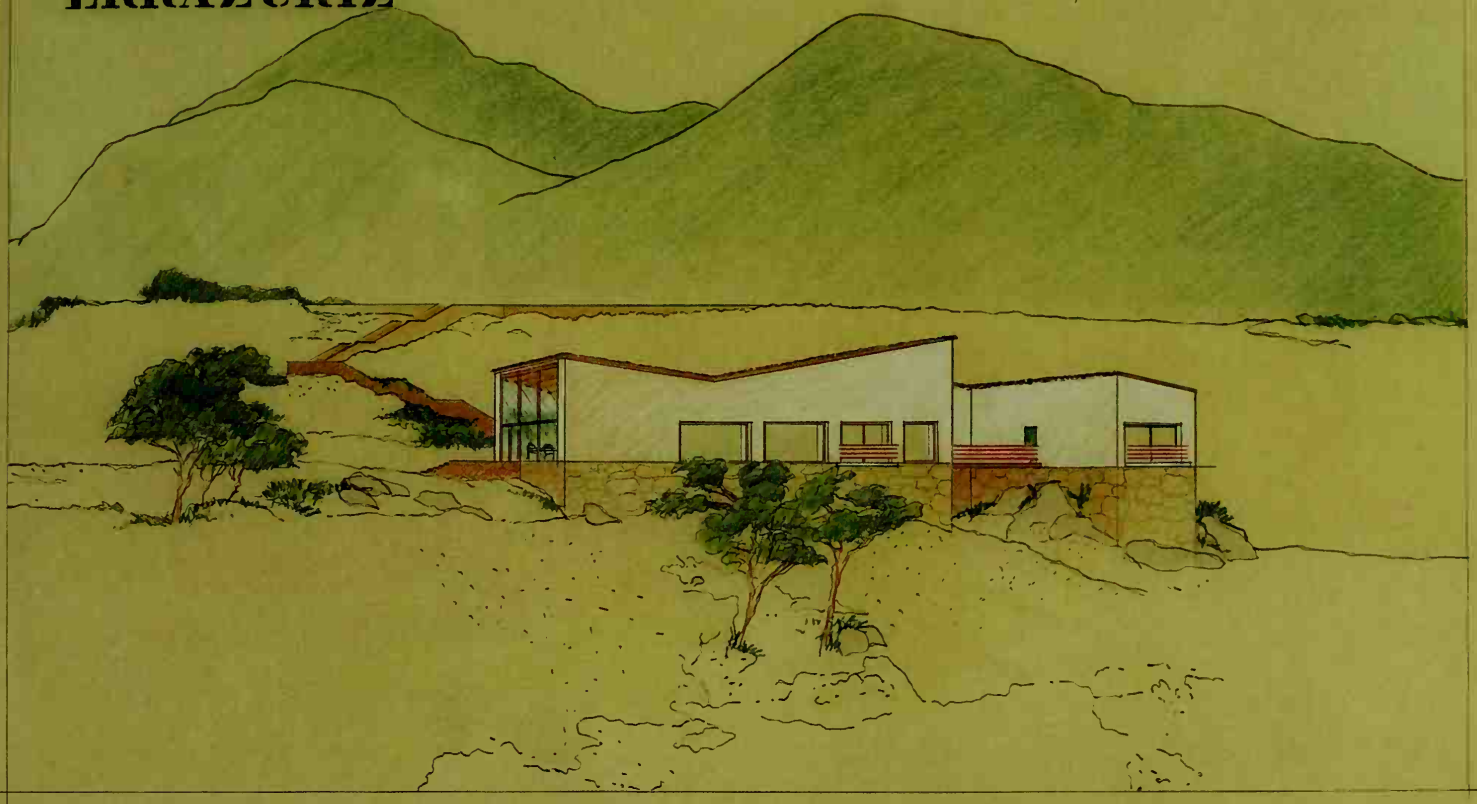
Such a project is an ideal exercise for design students or an exercise in free fantasy design for a mature professional. To reinterpret and complete the skeleton outline provided by a great master for a project never realized can be a way of developing independent, personal design directions linked with the work of an acknowledged leader in design thought.

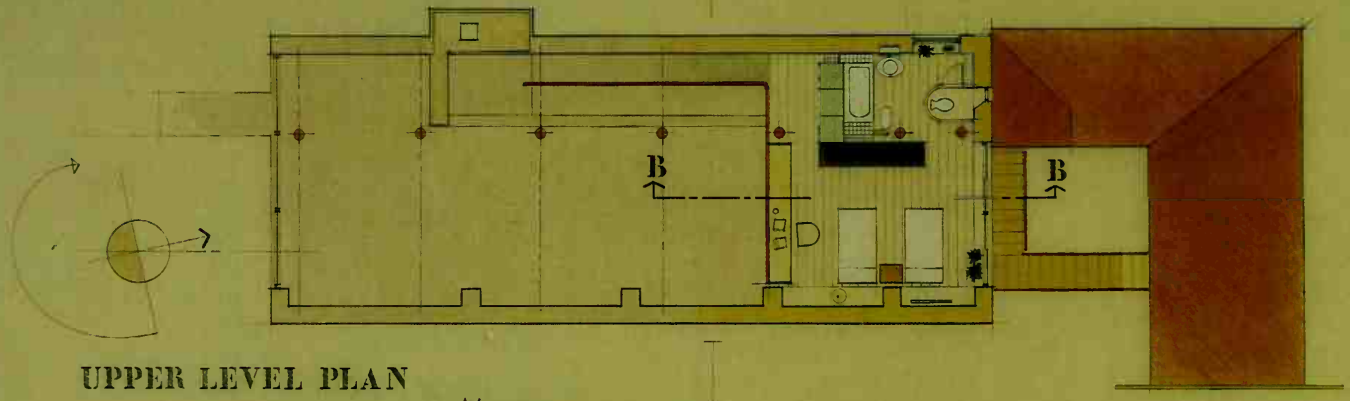
First studies in which furniture is selected and placed in logical ways are soon seen as attempts to overdecorate the simple structure that Le Corbusier had conceived; they come too close to a typical urban or suburban middle-class image of consumer-oriented comfort. The architectural concept behind this design calls for something different—an approach that may not mean any less comfort, but that will reflect the dignity and austerity of the building itself. This design asks for directness and simplicity in interior design.

A simpler approach is developed, first in fantasy and than as rough sketches on the inevitable backs of envelopes. The challenge of relating the house to its spectacular site while still focusing on interior space becomes the basis for the second round of developed proposals. Le Corbusier's plan of the upper bedroom level shows the bath area surrounded by blocklike units. Surely these are the *casiers standard,* standardized modular cabinets developed for the 1925 Pavilion Esprit Nouveau to parallel the standard office files and storage cabinets that Le Corbusier admired.

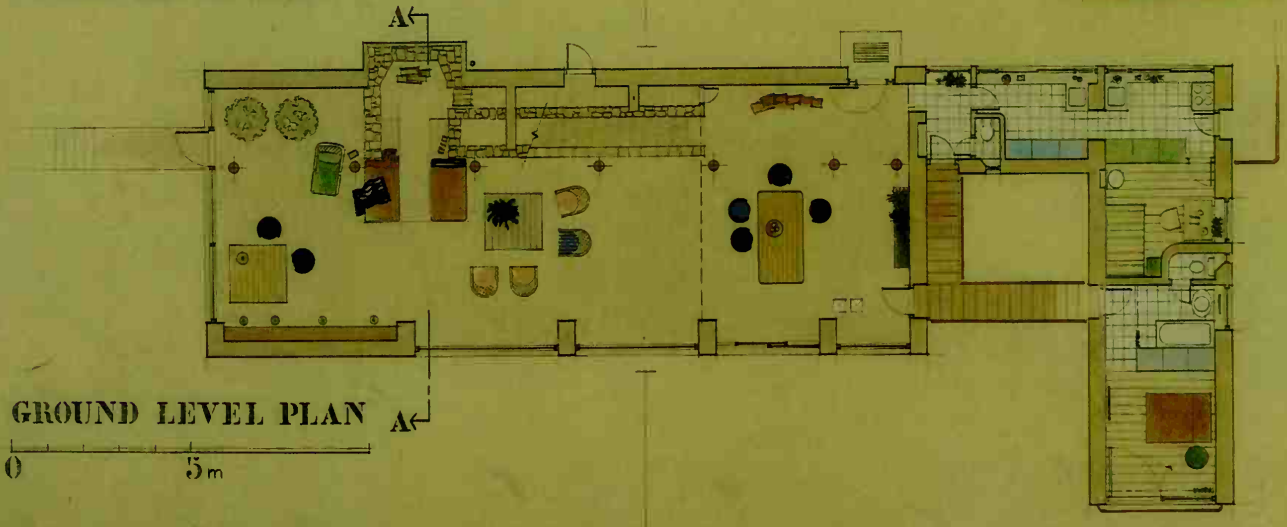
In interior studies of this space, then, these handsome lacquered storage units become elements standing in contrast with the rough wood roof beams and almost crude stucco wall surfaces. It is a remarkable tribute to the vitality of this project that it can, more than fifty years after it was planned, stimulate constructive design thinking in a way that outstrips much of the architecture of the intervening years.

ERRAZURIZ



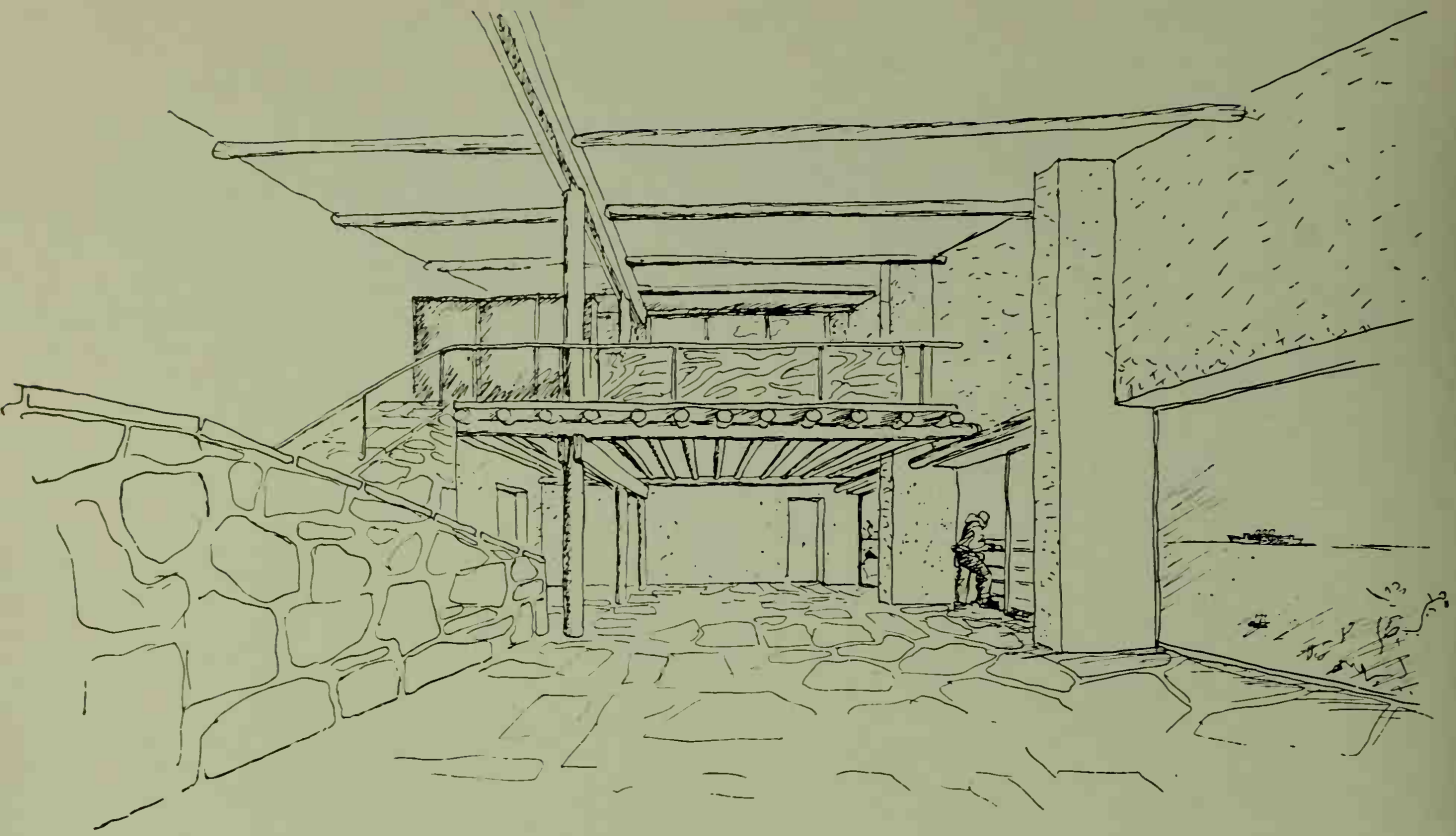


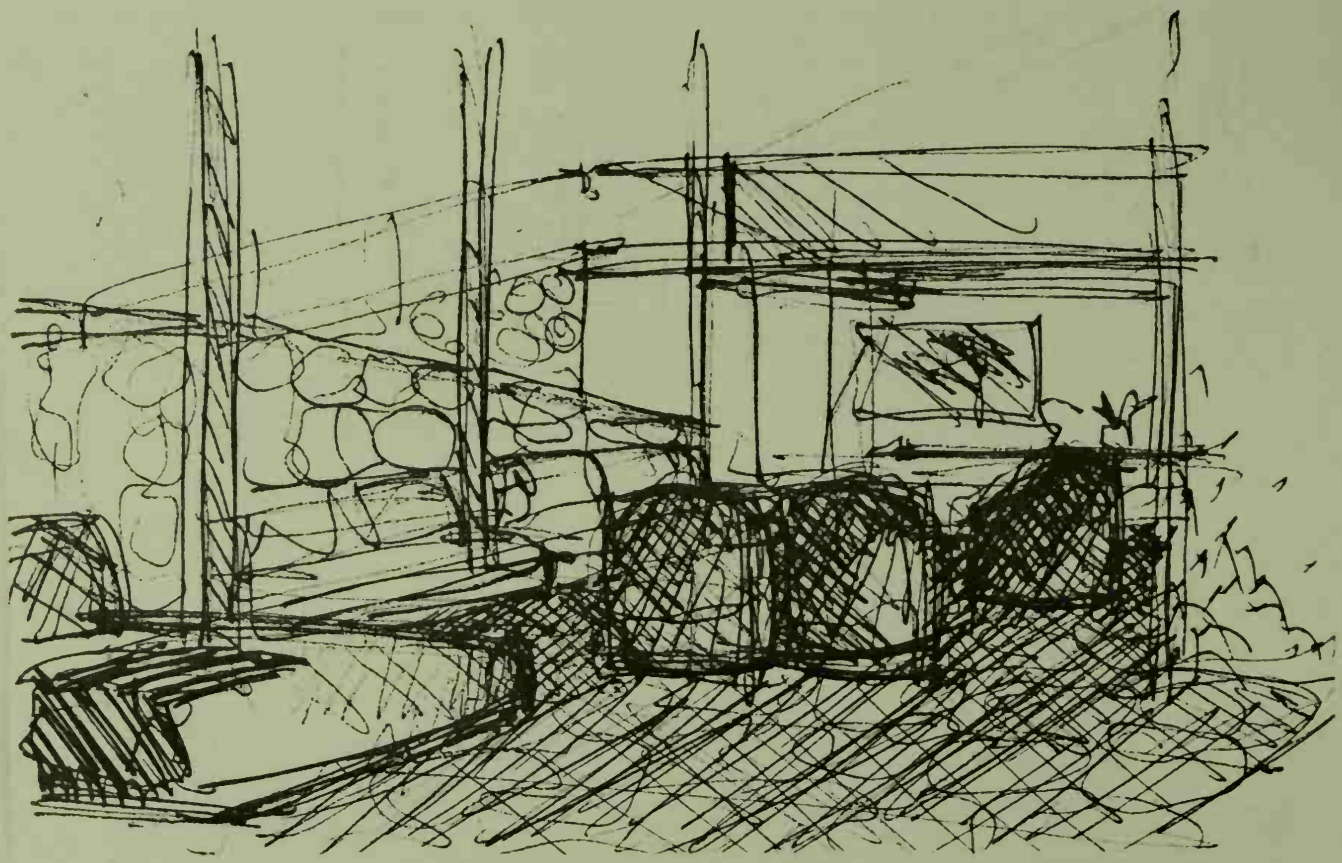
UPPER LEVEL PLAN

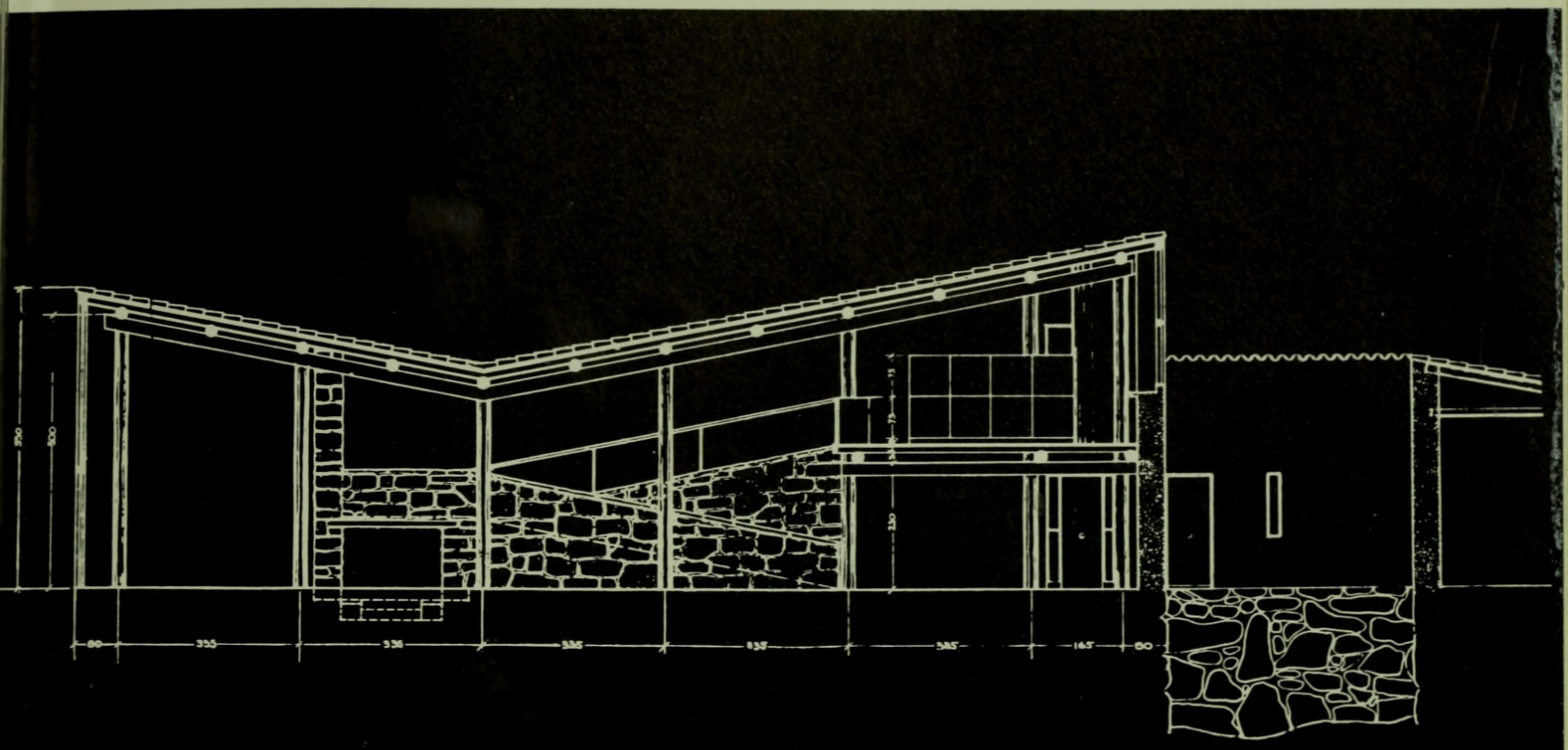


GROUND LEVEL PLAN

0 5m





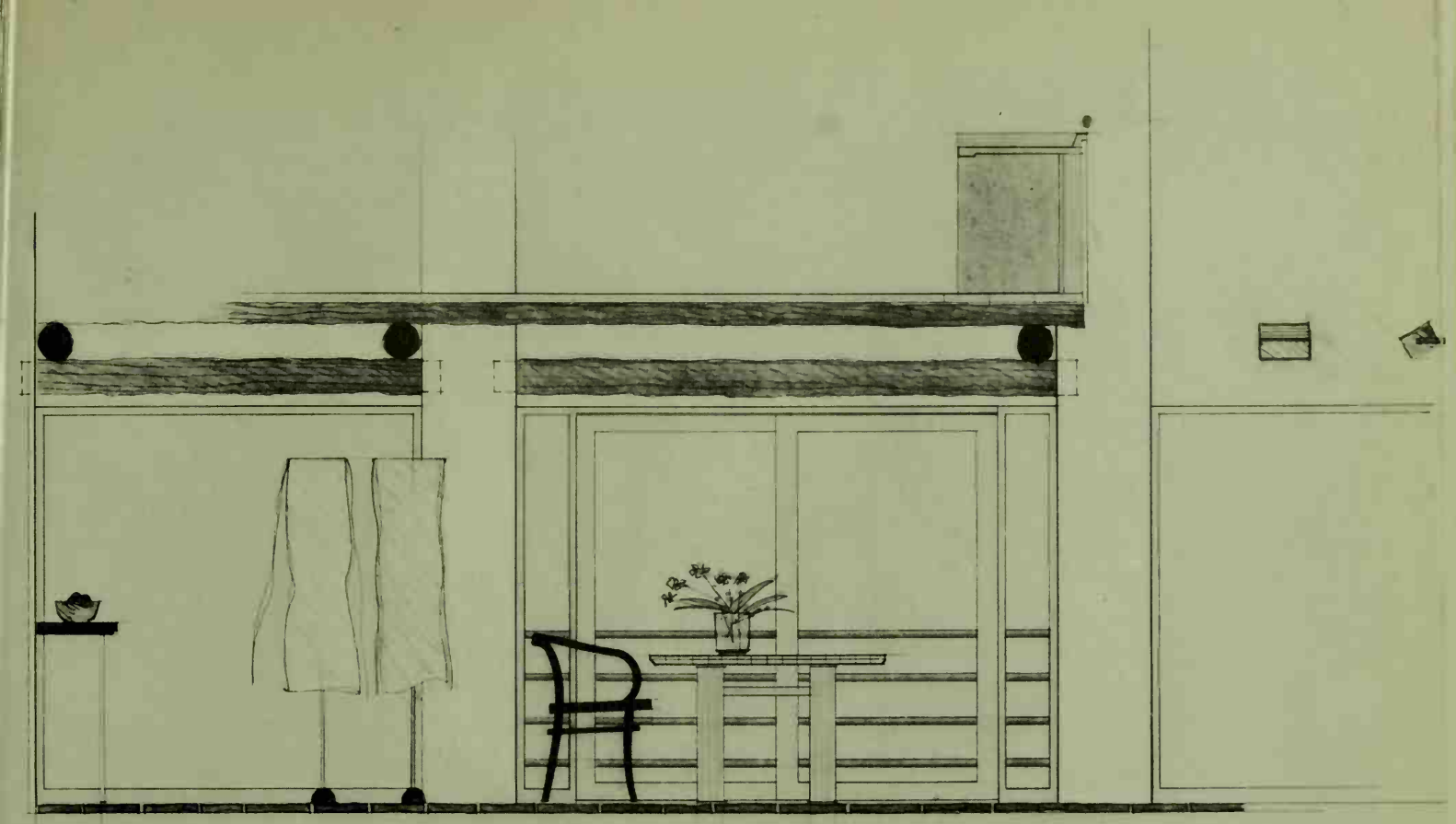


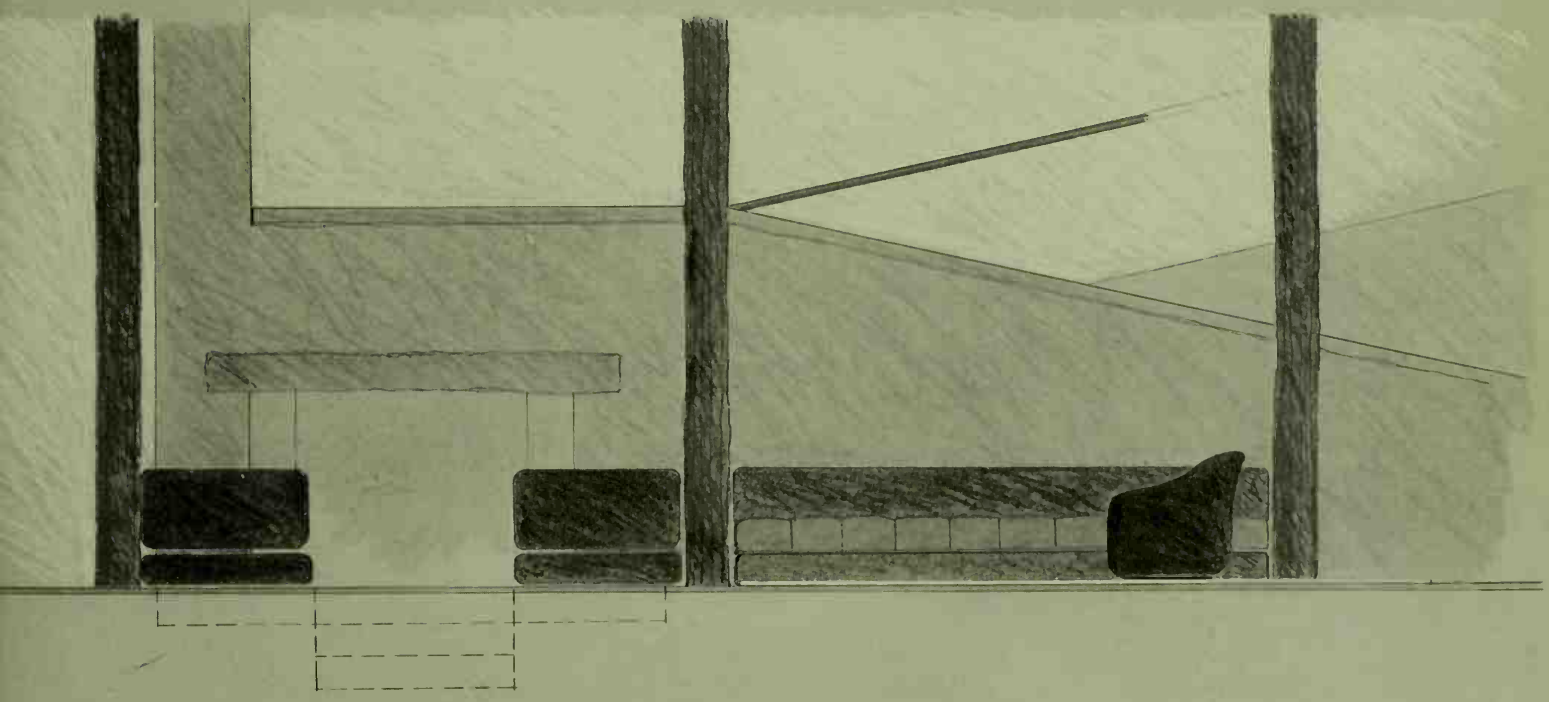
Coupes en long et en travers

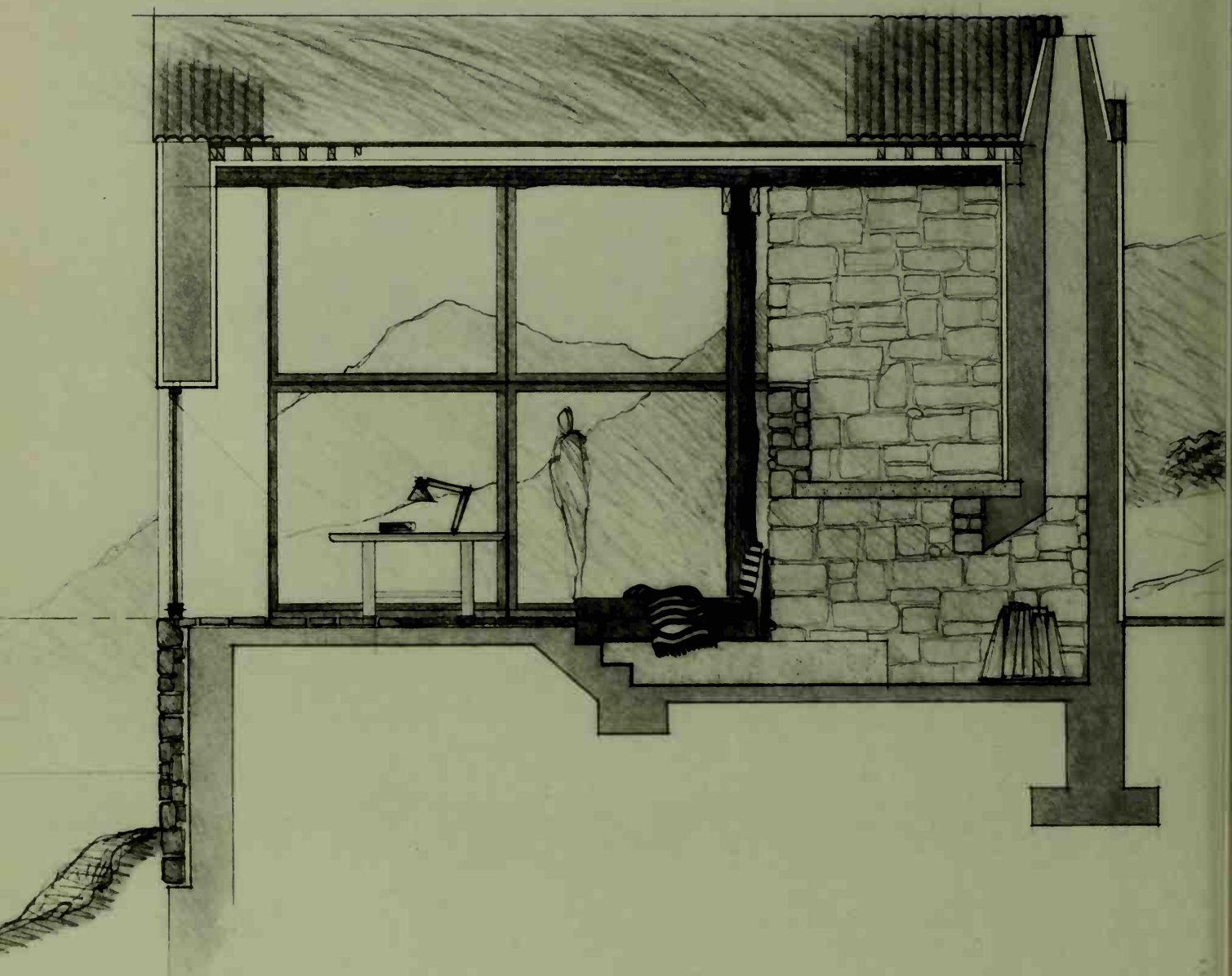
An interior perspective (top) and a section (bottom) are drawings by Le Corbusier reproduced in Oeuvre Complète 1929–1934. To initiate this project a first sketch, actually drawn on a place mat, inspired the above drawing.

A fully developed color rendering (above) has a second furniture scheme. This more outward-looking approach relates furniture to architectural concept and setting.

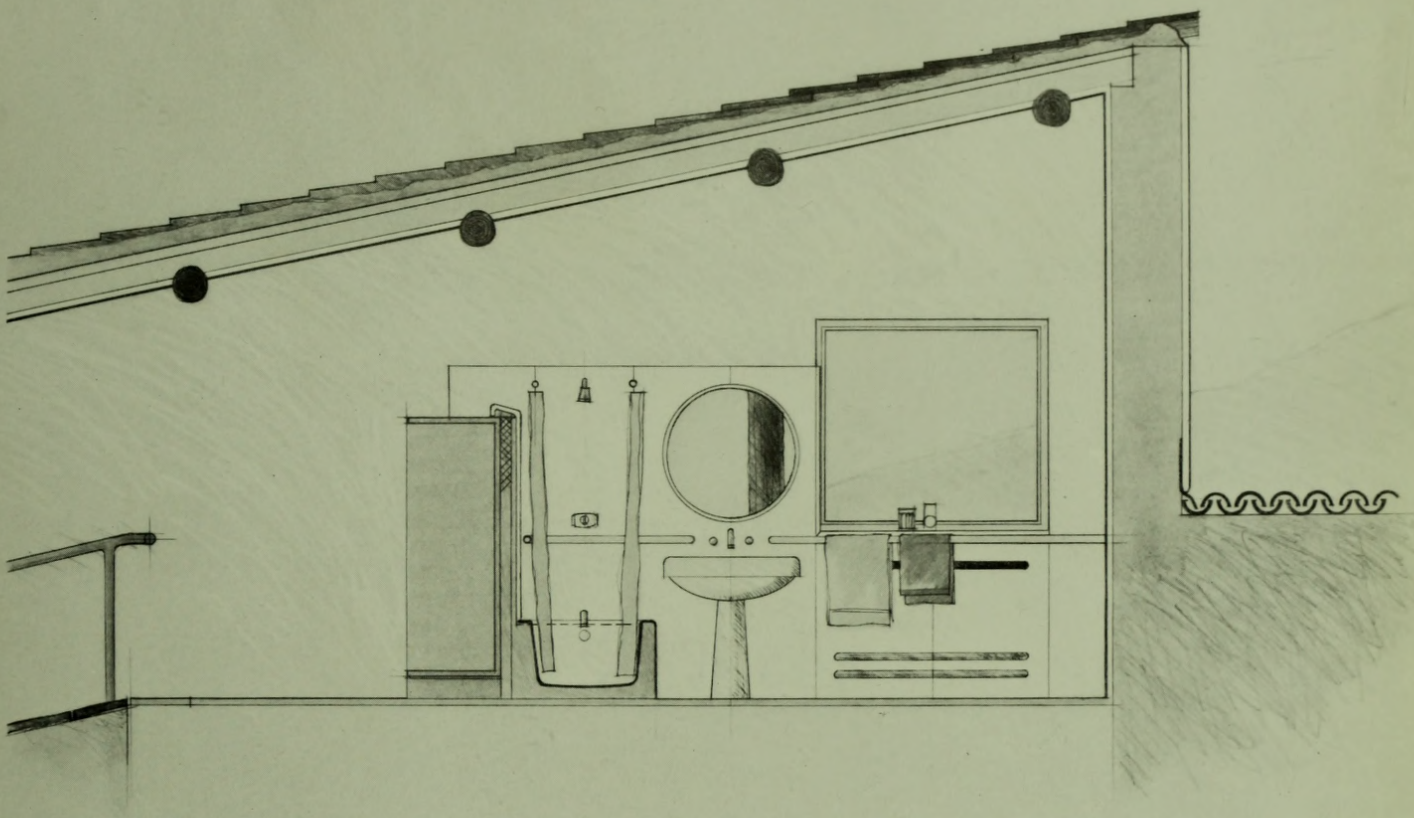
Opposite page: A sectional elevation (top) defines the dining space in the area under the balcony. This study shows the proportional relationship of furniture to architectural space. A design sketch (bottom) illustrates a seating proposal for either side of the fireplace-pit area.







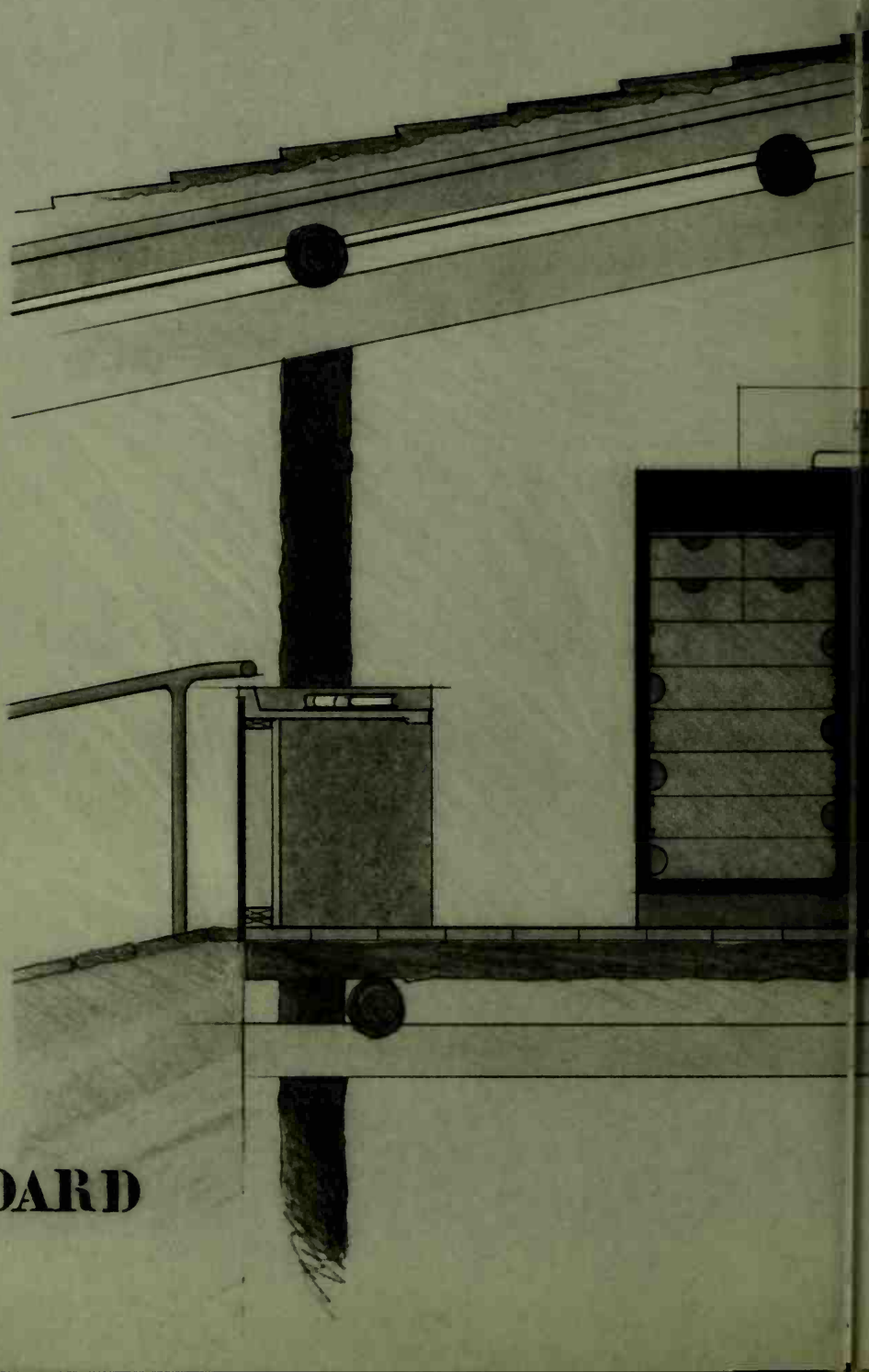
SECTION A·A
FIREPLACE SEATING AREA



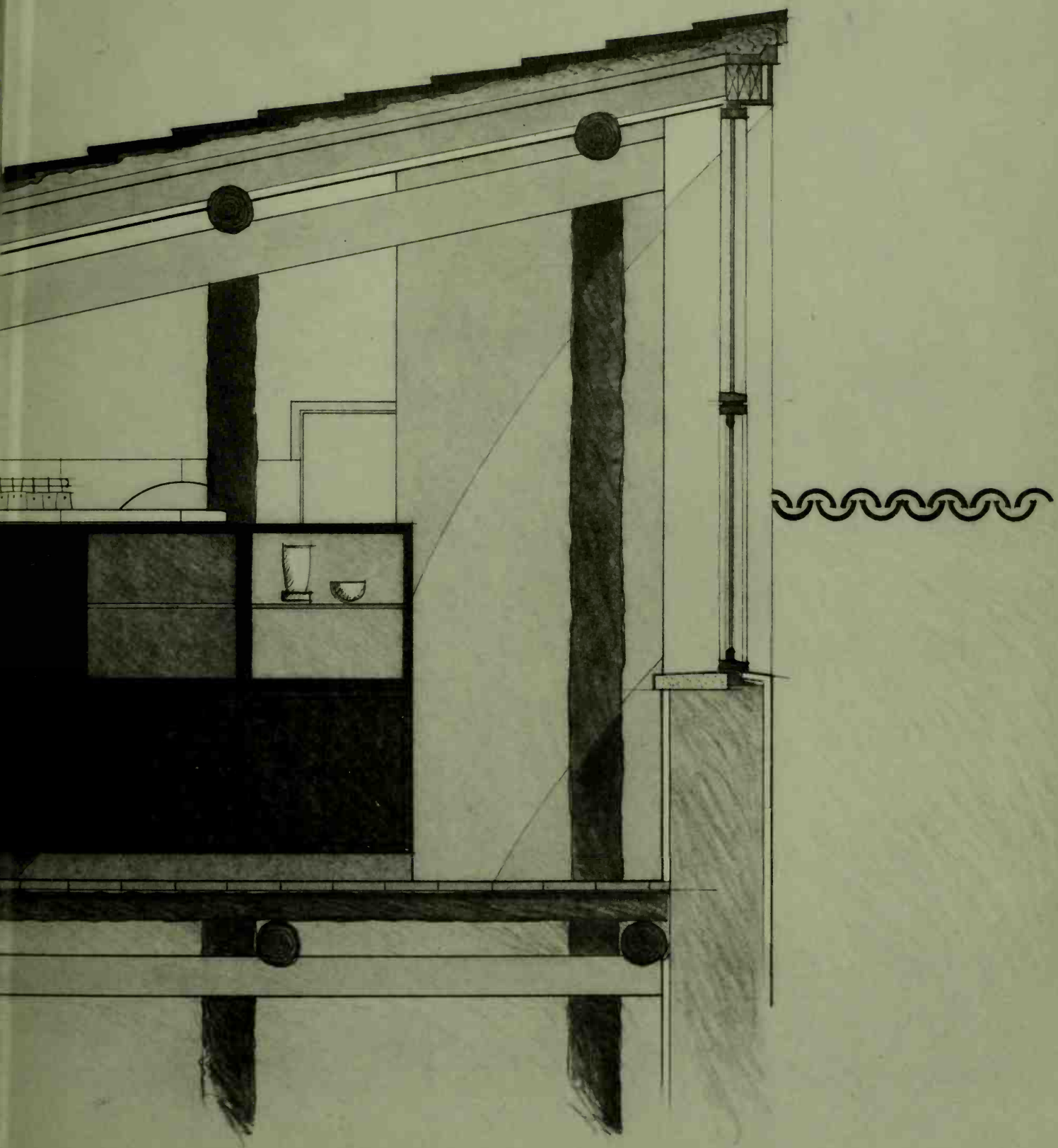
An architectural section (left) with interior development continues the study of seating around the fireplace in relation to the total space.

Design study (above) for the bathroom proposes use of a material not yet available when the original house design was conceived—panels of Corian plastic in place of tile.

Pages 164–165: Section BB, fully developed studies, show potential use of the Casiers Standard storage units on the balcony level.



SECTION B·B
CASIERS STANDARD



FUTURE POSSIBILITIES

In a rapidly changing world, it may seem surprising that the nature of design drawing to date has seemed so little influenced by change. Drawing has not changed greatly since the Renaissance architects added a knowledge of perspective to their use of plan, section, and elevation. And yet, many small items have changed and are continuing to change. Heavy rag paper has given way to tracing paper to make blueprinting and more modern reproduction techniques convenient. Tracing paper is giving way to Mylar and other film media. Ink ground by hand has given way to bottled ink, the ruling pen has been replaced by the technical fountain pen, and both seem to be giving way to improved felt-tip pens.

Pencils have been replaced, in part, by mechanical lead holders, and new leads are now available, better suited to film. Sharpeners and erasers may be motorized; the drafting table may be adjustable with hydraulic or motorized assists.

Taken together, these changes leave little from the past but the image drawing techniques themselves, orthographic and perspective projections drafted more or less laboriously by the designer trained in the various styles and geometric techniques involved.

Developments are now surfacing that may bring far more basic changes in the ways in which drawings are made and in the nature of drawings themselves. These might be described as moves toward increasing automation of the drawing process or perhaps as a conversion to high-tech methods.

Some steps in this direction seem quite modest. There is recognition that a large part of drafting is repetitious. Doors, partitions, fixtures, furniture are drawn over and over in plan with the same forms, requiring the same details and the same lettered notes. Completed drawings require the same borders, the same or similar title blocks. More and more effort is being devoted to make these things available in some standard form. Devices as simple as rubber stamps for title blocks have been around for a long time; we now have tree stamps and stamps providing many often-used images in plan and elevation at various scales. Transfer film can be printed with frequently used details and notes so that these things need not be hand-drawn over and over, but simply applied as needed. Lettering can be added by use of a template or, better yet, typed on by special typewriter or typed by standard typewriter onto transfer film.

COMPUTER-AIDED DRAFTING

Such modern techniques fade to insignificance, however, in comparison with the prospects for computer use in architectural and interior drawing. Computers have been around for quite a few years managing numbers and words for scientists and business people. Display of computer output on the familiar TV-like screen (usually called "CRT" for cathode ray tube) has become commonplace and a CRT can display images (as on TV), as well as words and numbers.

The step to the management of visual material, including drawings, has

A computer-generated perspective for the Enerplex office complex designed by Skidmore, Owings, & Merrill, New York, is shown above. The excitement of a computer-simulated walk-thraugh of an unbuilt space is captured here in a stap-motian freeze-frame still.

been slow because of the complex programming required, but it is a step now proceeding rapidly. An existing drawing can be traced into computer memory using a device called a "cursor" that follows existing lines. It can be entered as a total image, in effect copied by the TV camera, but, more remarkable, it can be created or "drafted" into the computer without any previous existence on paper.

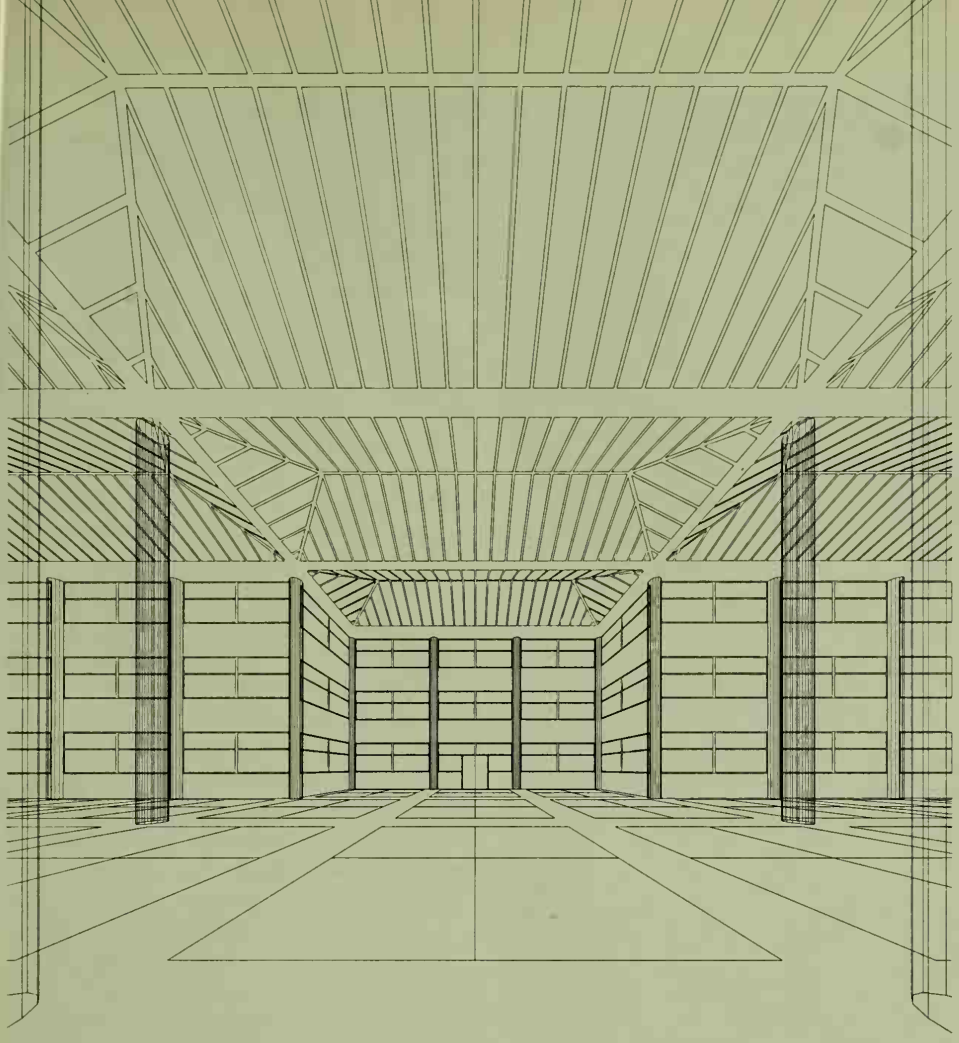
The person doing the drafting becomes an equipment operator who orders lines to appear on the screen by sketching with a light pen on the face of the CRT screen or by sketching on an adjacent metal slate while lines are simultaneously being entered into the computer memory. Push button commands at a keyboard move, modify, add to, and subtract from the developing image. Lettering is simply typed on the keyboard and placed and sized by push button command. The computer memory can contain hundreds of thousands of standard images, details, and drawings of previously developed elements that can be called up in an instant, sized, and moved into place.

Once a drawing is built up, it can be held in memory, displayed at a moment's notice, enlarged or reduced, modified and added to as needed. If a paper print is wanted, the memory-held drawing can be reproduced by a printer similar to the familiar copying machine or blueprint device or can be actually drawn by a "plotter," a machine in which a pen (or pens) draws out the image on film at lightning speed, which is then ready to be printed conventionally.

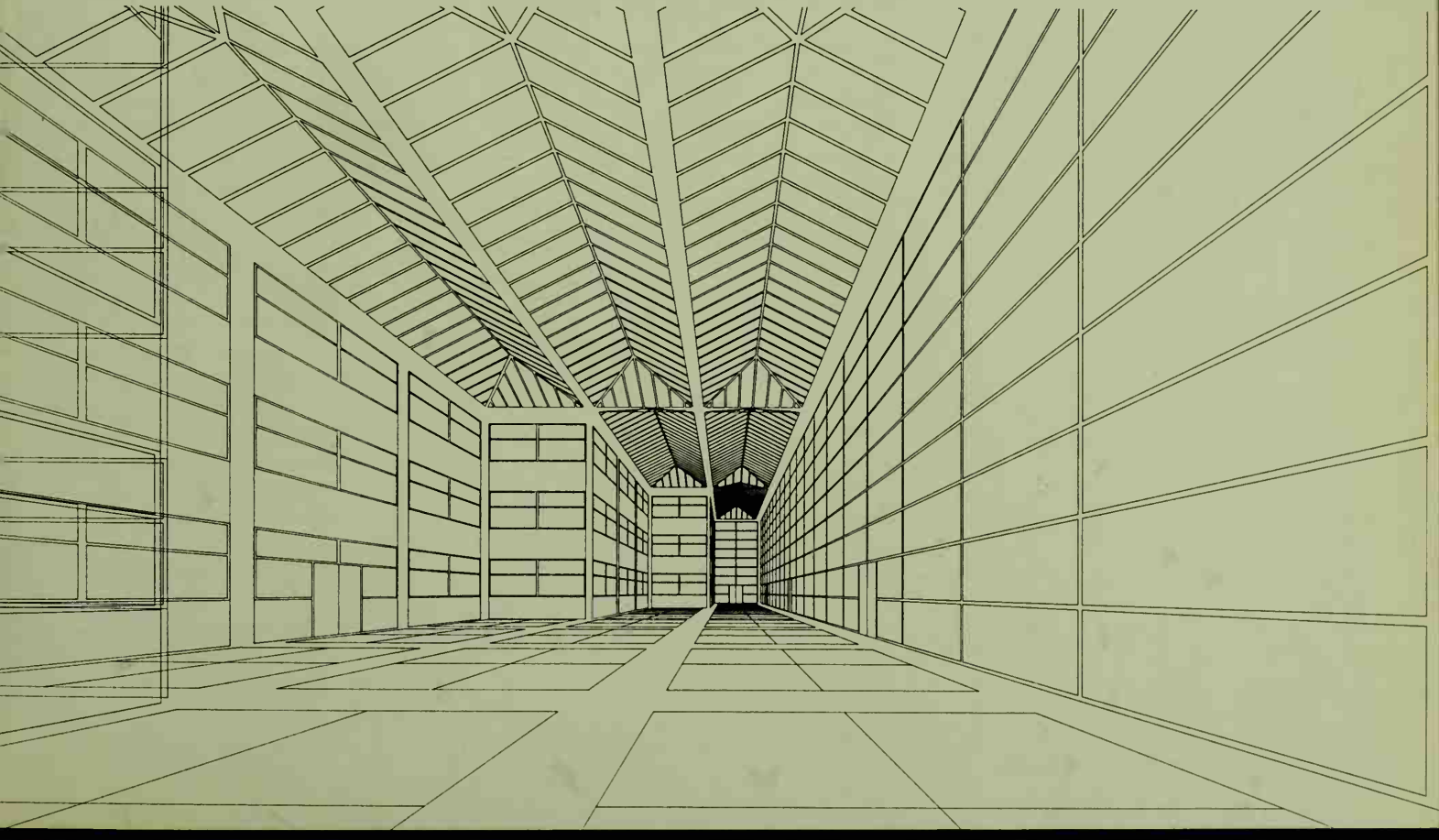
Drawings in computer memory can be transmitted by telephone and/or by satellite for instant delivery anywhere. They can be stored in computer memory format (tape or disk) for moderate periods or transferred to microfilm or other micro format for long-term storage in minimal space. With suitable programming, the computer can "take off" quantities of materials, make lists of items to be ordered, produce actual specifications or purchase orders, and keep track of costs being generated as the very process of design is taking place.

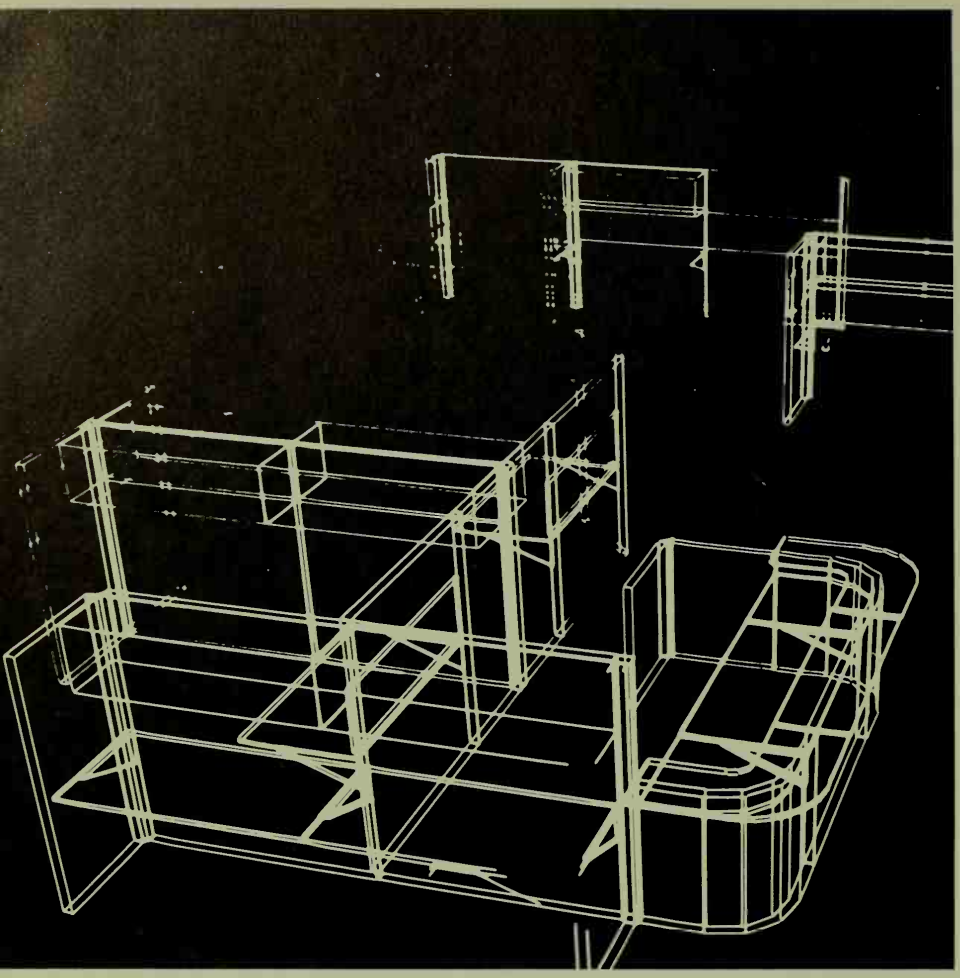
Automated Perspective. In interior design work, the most remarkable of new computer techniques are those that make it possible to generate perspective views automatically. Plan and elevation are entered into computer memory, a point of view is chosen, and a perspective image appears at once on the CRT screen. An object can be rotated and viewed from various angles as if it actually existed in three dimensions. In the case of interiors, the station point and angle of view can be changed on command, making it possible to "walk through" and "look about" in a space that only exists in the "mind" of the computer. After many possible viewpoints are considered, one or two of the best alternatives may be selected and printed out in moments. The computer-generated sheet can then become a base sheet over which a hand-drawn perspective can be developed. Furniture can be placed and moved about and partitions added or removed as a perspective image is built up, which then can be converted back to plan, specifications, and ordering and costing data. Here also, any image desired can be held, stored, or printed out as required.

Many designers remain somewhat skeptical and resistant to these developing techniques, fearing, perhaps, that their creative role will be in some way eliminated or possibly simply wondering if there will be fewer jobs. Neither worry seems to have much foundation, and the experience of those who have worked with "CAD" (computer-aided drafting) and similar techniques seems to suggest that with familiarity the processes become easy and even enjoyable. As with all computer uses, it should be remembered that computers only deal with the material human beings provide and do with that material only what their operators request. There is nothing to stop drawing by hand wherever it is useful, but who would not appreciate having a complex perspective layout produced at the touch of a few buttons or a complex working drawing be the product of a few minutes of easy work at a control terminal?



Two additianal studies fram different pasitians shaw the same space illustrated an page 166. Natice that in the lawer drawing columns are amitted. These examples shaw the ease with which the computer-aided designer can explare various alternatives af structural systems in visual image. (Skidmare, Owings, & Merrill, New Yark)





In another use of computer drafting a diogrommotic perspective shows o group of portition ponels ond office furniture elements selected from a standard office system combined at the designer's command. (Courtesy Herman Miller, Inc.)

Another question has to do with how widely these techniques are really destined to be used. Complex manipulation of visual images requires large computer memory and manipulative power and has therefore, until recently, been expensive. As computers become smaller and cheaper, this problem is rapidly diminishing. Equipment that would have occupied a large room now fits in a desk-size box, and what would have occupied a large box is now shrinking toward near invisibility. Home computers are becoming commonplace, and the more elaborate offer "graphic capability" also.

As yet, the most exciting graphic techniques still require a good deal of computer hardware that remains expensive. For the present, regular use will probably be limited to the large architectural and engineering office where the flow of work justifies the costs involved.

PRESENTATIONS

While computer techniques aid and influence modern design processes, other changes are influencing the ways in which designs are presented. The traditional display of drawings spread out on a table or mounted and pinned up on a wall remain in constant use, but more elaborate techniques can help in some circumstances. More and more often, designs must be presented to groups, executive committees, or boards that are the decision-makers in businesses and institutions. Projection on a screen is an ideal format in such situations, and using photography to convert drawings into slides or motion picture film has been common practice for some time. When well done, a slide show or film can be highly effective in making a project seem real. With a sound track added, narration can be synchronized to the images so that the same presentation can be given over and over in various places as needed.

Models. Scale models are a convincing adjunct to drawings, but they are clumsy to transport and often difficult to view, particularly if a group audience is involved. Slides or films of models can be overwhelmingly effective, suggesting an actual visit to a real space. Plans and other drawings may also be included and explained as desired, and a recorded narration, if well done, can make up a presentation that seems impressively professional.

Photography of an interior model presents some special problems because even the smallest of cameras is too large to position at desired angles of view. There are, however, several solutions to the problem. A model can be planned with photography in mind so that walls can be removed or whole sections swung out of the way. Special lens attachments, actually developed for medical needs, can be used; a slim probe is extended into the model to permit views from eye level at any location. Unfortunately, this device is expensive, but some large offices and some photographers specializing in this work have it available. An economical alternative, more limited but some-

times helpful, is the use of a small pocket mirror supported within the model at a 45° angle, with the camera aimed downward into it. An accessory made for candid photography at a 90° angle may also be used in this way with some success. A special lens, lens attachment, or a set of extension tubes are also needed to make it possible to move close enough for model photography in most cases.

Combinations of some of these techniques are already developing. Taped-TV can replace motion picture and slide film presentations. The TV image can be computer generated, stored, and manipulated. Its transmission by phone and satellite is convenient and practical. Saturation exposure to film and TV is making the general public very receptive to such communication techniques and raising clients' levels of expectation of such methods. While not every designer can expect to become a computer technician, a photographer, film maker, and TV producer, some awareness of what these areas offer is becoming more and more essential.

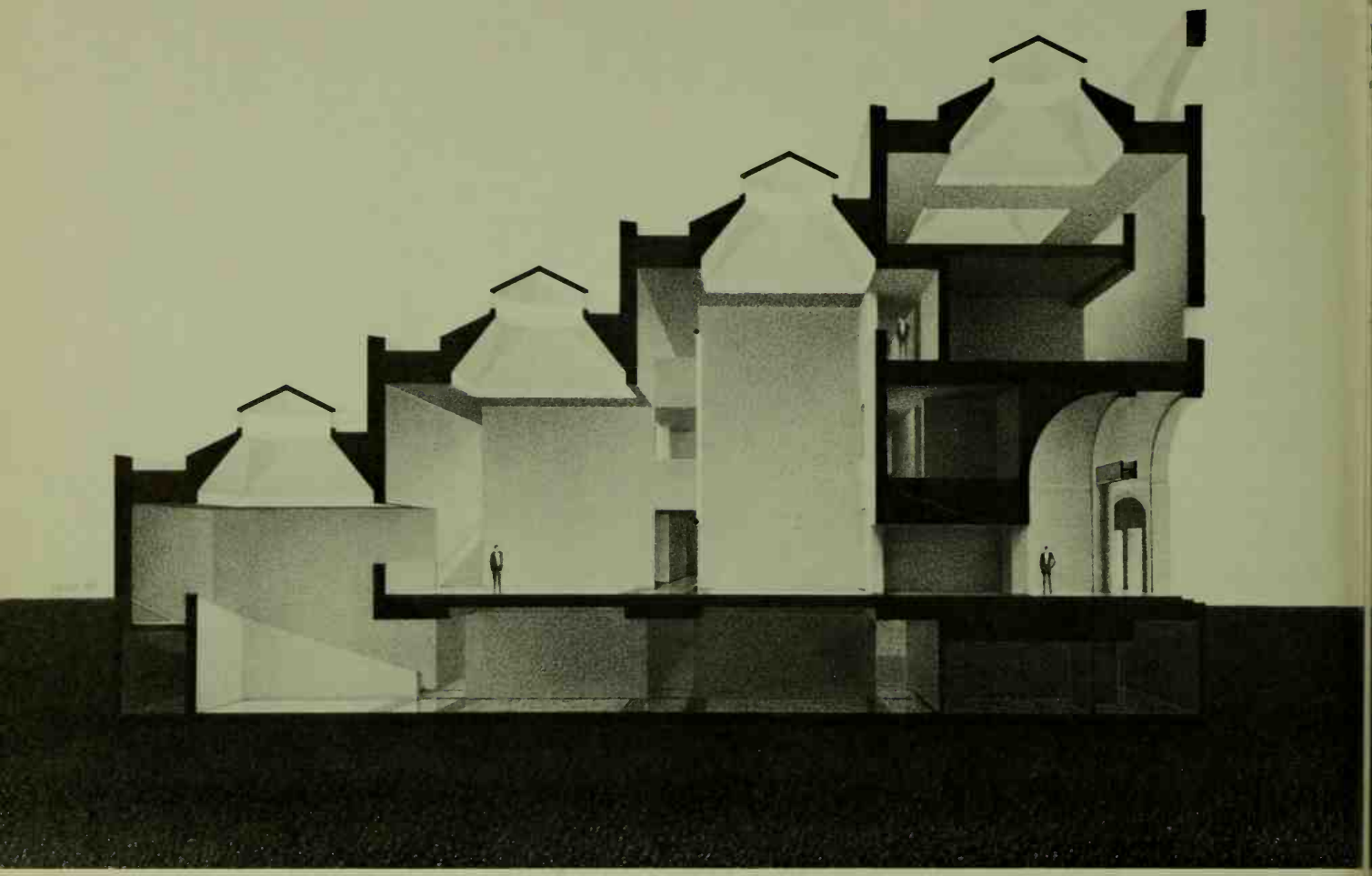
DRAWING ARCHITECTURAL INTERIORS AS ART

Whenever events move in a particular direction, it seems inevitable that opposite trends will also appear. As computer techniques move into the formerly handcraft work of architecutral and interior drawing, we find a new interest developing in these drawings as art. There has always been some interest in the artistic value of anything that came from the hand of great historic figures—from a Michelangelo or a Bernini, for example—but their architectural drawings seem to have been more valued because of their association with a great name than for their intrinsic interest as architectural documents.

With the new-found interest in architectural drawing as an art form in its own right, worthy of exhibition, publication, and collection, there is also a certain interaction between the design world and the world of galleries and collectors. An awareness is developing that public interest in such drawings encourages production of drawings which have intrinsic value for their quality as art, as well as for their practical role in communicating the designer's intent.

It is not easy to indulge an interest in the art of architecture through commission and collection of actual built works. Economic realities block an urge to own a building or even an interior. If a drawing is also seen as an artwork, collecting becomes a realistic possibility. Drawings of projects unbuilt are also in themselves works and remind us that many historic figures are known for designs that never were converted into reality. One thinks of Boullée and Ledoux and, in more recent history, of Le Corbusier, whose drawings of unbuilt projects are among his greatest achievements.

Gallery display of drawings from the world of architecture and interior design is now a fact of life. Publication of drawings is, at least when compared with actual building construction, quick, cheap, and easy. In the end, most of us realize that the majority of architectural work is familiar to us more from published illustration than from direct experience. A new appreciation of the meaning of design and architectural drawing is, perhaps, appropriate in a world in which so much built reality seems to be surprisingly ephemeral and transitory. Is it not true than buildings come and go while drawings remain with us?



Large-scale architectural space presented in a formal sectional perspective—the Great Hall of the Portland (Maine) Museum—can stand alone as a work of art. (Drawing by Steve Oles for I.M. Pei and Partners, architects)

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INDEX

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