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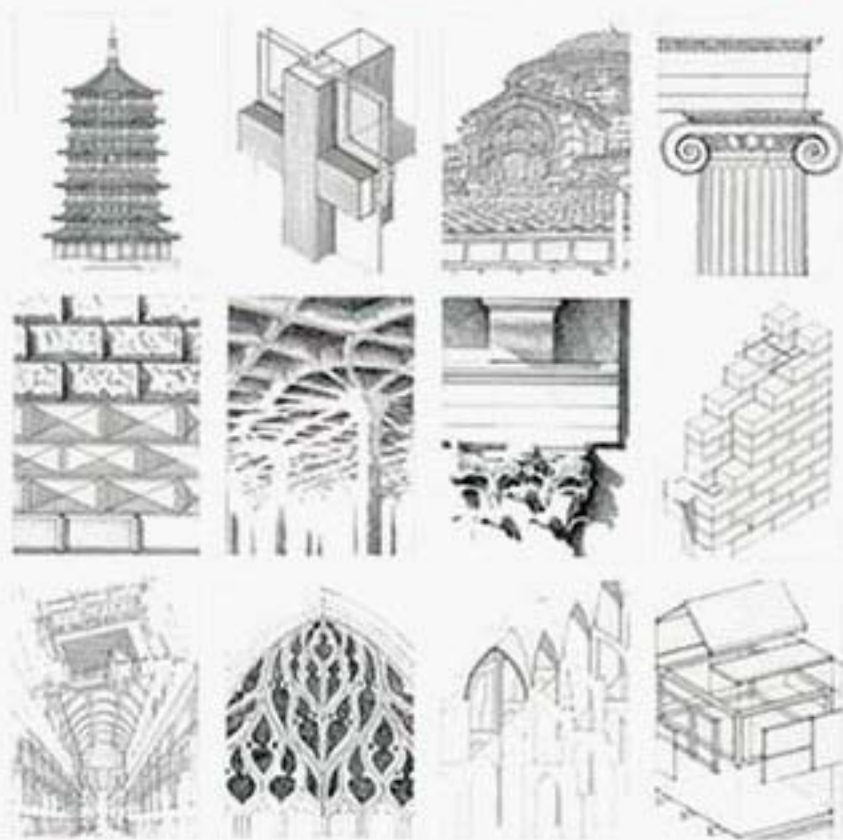
A VISUAL DICTIONARY OF

# Architecture



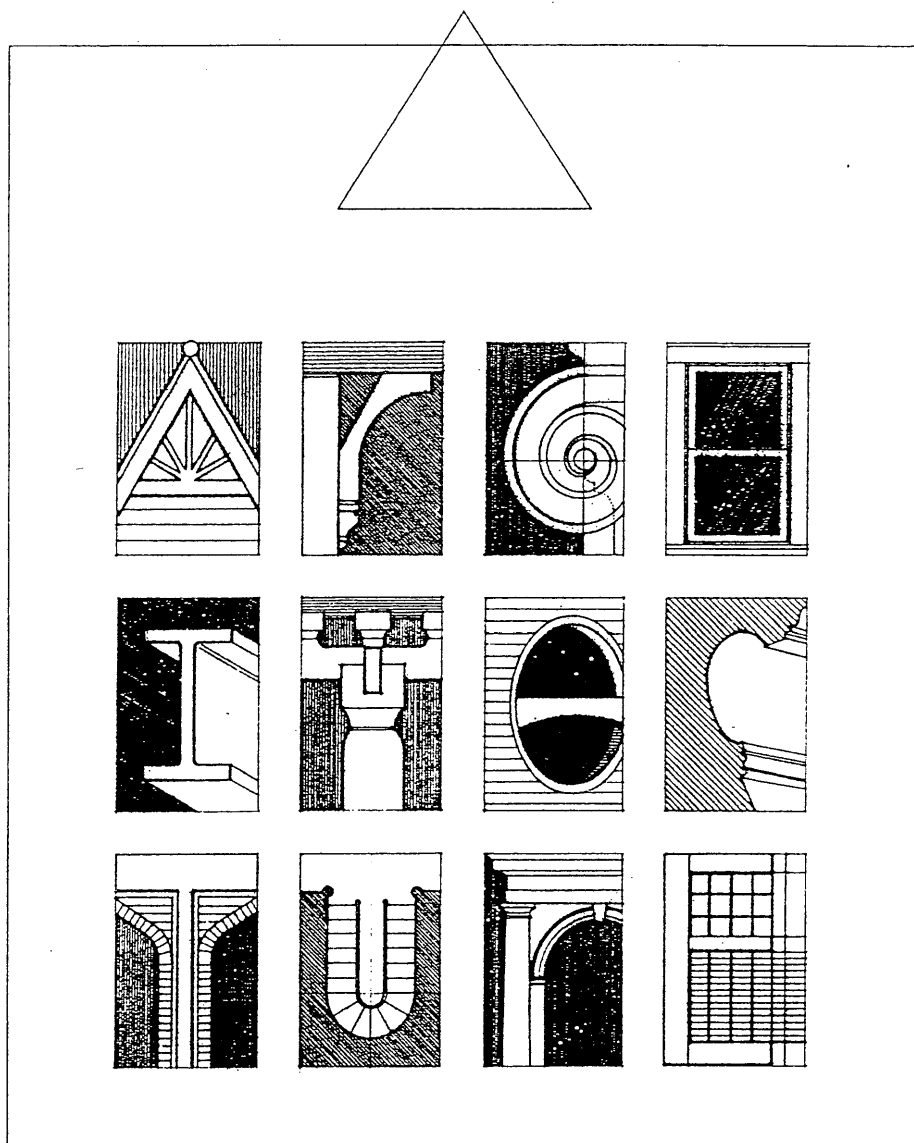
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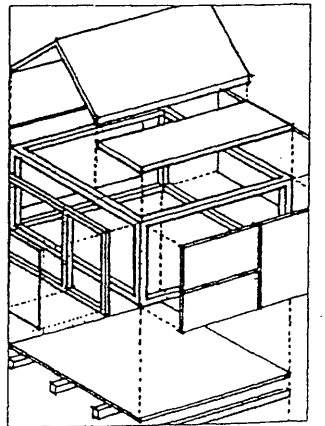
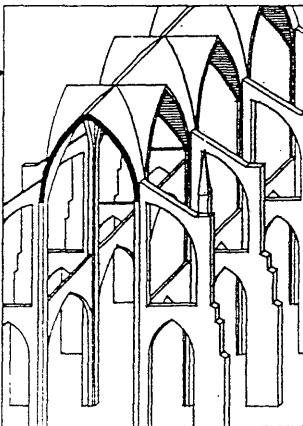
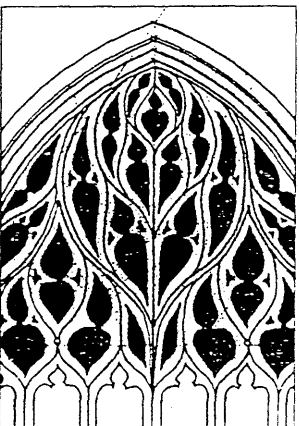
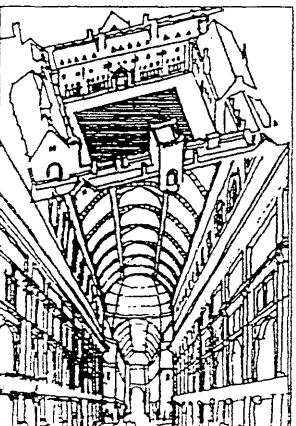
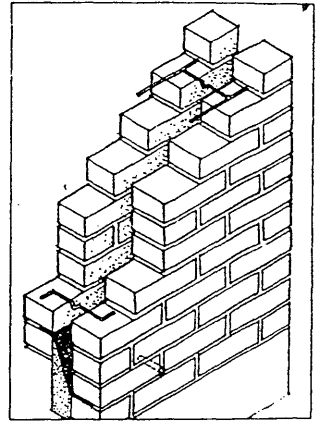
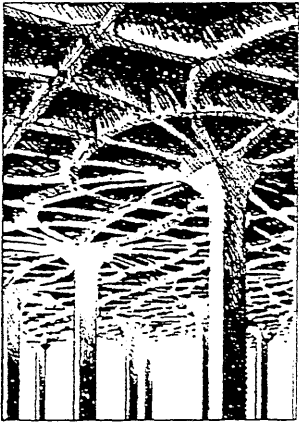
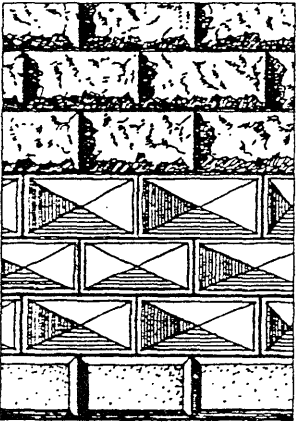
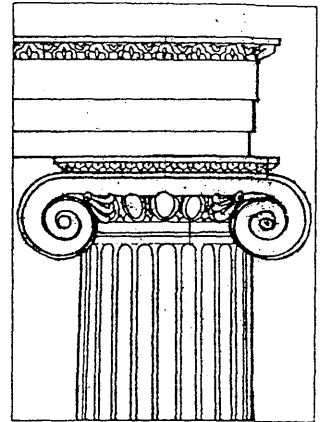
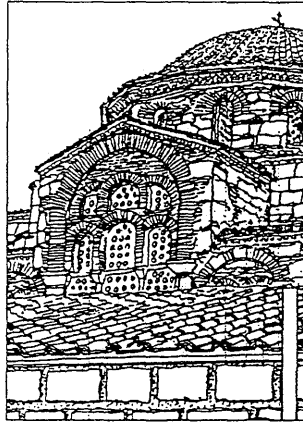
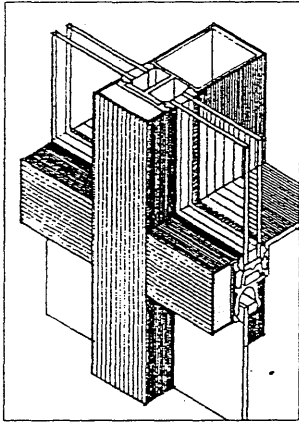
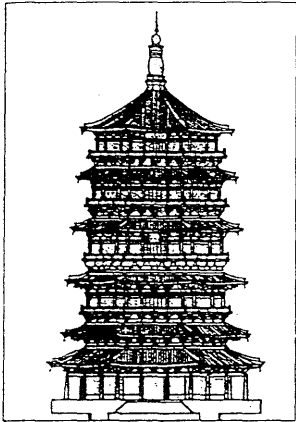
A VNR BOOK



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# A VISUAL DICTIONARY OF ARCHITECTURE



ARCH.  
FRANCIS D.K. CHING  
FERNANDEZ



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# CONTENTS

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PREFACE 7

## ARCHITECTURE 9

ARCH 12

BEAM 15

BRICK 18

BUILDING 21

CABLE STRUCTURE 28

CEILING 30

CERAMIC 32

CHURCH 35

COLOR 38

COLUMN 40

CONCRETE 42

CONSTRUCTION 48

DESIGN 52

DOME 60

DOOR 62

DRAWING 66

ELECTRICITY 74

ELEVATOR 80

FASTENING 82

FIREPLACE 87

FIRE SAFETY 88

FLOOR 92

FORCE 96

FORTIFICATION 98

FOUNDATION 100

FRAME 104

GEOMETRY 108

GLASS 112

HARDWARE 114

HEAT 117

HISTORY 128

HOUSE 136

JOINERY 140

LIGHT 142

LOAD 151

MASONRY 155

MATERIAL 161

MEASURE 166

MEMBRANE 168

METAL 169

MOISTURE CONTROL 176

ORDER 179

ORNAMENT 182

PAINT 187

PLASTER 188

PLASTIC 192

PLATE 194

PLUMBING 196

REINFORCED CONCRETE 202

ROOF 208

ROOM 216

SHELL 219

SITEWORK 221

SOIL 224

SOLAR ENERGY 226

SOUND 228

STAIR 233

STONE 236

STRUCTURE 238

SURVEY 246

TEMPLE 248

THEATER 256

TRUSS 259

VAULT 262

VISION 264

WALL 266

WINDOW 271

WOOD 276

INDEX 285

This is a book for the curious to browse as well as a desktop reference for the student of architecture. The compilation of words and definitions is not intended to be exhaustive. Rather, the selection is designed to be comprehensive enough to reflect the rich, complex, and multidimensional nature of architecture.

Architecture is an art for all to learn because all are concerned with it. –John Ruskin • Architecture depends on Order, Arrangement, Eurythmy, Symmetry, Propriety, and Economy. All of these must be built with due reference to durability, convenience, and beauty. Durability will be assured when foundations are carried down to the solid ground and materials wisely and liberally selected; convenience, when the arrangement of the apartments is faultless and presents no hindrance to use, and when each class of building is assigned to its suitable and appropriate exposure; and beauty, when the appearance of the work is pleasing and in good taste, and when its members are in due proportion according to correct principles of symmetry. –Vitruvius • Architecture is the masterly, correct and magnificent play of masses brought together in light. –Le Corbusier • Anyone entering on the study of architecture must understand that even though a plan may have abstract beauty on paper, the four facades may seem well-balanced and the total volume well-proportioned, the building itself may turn out to be poor architecture. Internal space, that space which cannot be completely represented in any form, which can be grasped and felt only through direct experience, is the protagonist of architecture. To grasp space, to know how to see it, is the key to the understanding of building. –Bruno Zevi • Architecture, painting, and sculpture are called the fine arts. They appeal to the eye as music does to the ear. But architecture is not judged by visual appeal alone. Buildings affect all of the human senses – sound, smell, touch, taste, and vision. –Forrest Wilson • It became apparent to us that architecture is generally assumed to be a highly specialized system with a set of prescribed technical goals rather than a sensual social art responsive to real human desires and feelings. This limitation is most frighteningly manifested in the reliance on two-dimensional diagrams that lay more stress on the quantifiable features of building organization than on the polychromatic and three-dimensional qualities of the whole architectural experience. –Kent Bloomer & Charles Moore • The only way you can build, the only way you can get the building into being, is through the measurable. You must follow the laws of nature and use quantities of brick, methods of construction, and engineering. But in the end, when the building becomes part of living, it evokes unmeasurable qualities, and the spirit of its existence takes over. –Louis Kahn • Built environments have various purposes: to shelter people and their activities and possessions from the elements, from human and animal enemies, and from supernatural powers; to establish place; to create a humanized, safe area in a profane and potentially dangerous world; to stress social identity and indicate status; and so on. Thus the origins of architecture are best understood if one takes a wider view and considers sociocultural factors, in the broadest sense, to be more important than climate, technology, materials, and economy. In any situation, it is the interplay of all these factors that best explains the form of buildings. No single explanation will suffice, because buildings – even apparently humble dwellings – are more than material objects or structures. They are institutions, basic cultural phenomena. People think environments before they build them. Thought orders space, time, activity, status, roles, and behavior. But giving physical expression to ideas is valuable. Encoding ideas makes them useful mnemonics; ideas help behavior by reminding people of how to act, how to behave, and what is expected of them. It is important to stress that all built environments – buildings, settlements, and landscapes – are one way of ordering the world by making ordering systems visible. The essential step, therefore, is the ordering or organizing of the environment. –Amos Rapaport • Ruskin said: 'Great nations write their autobiographies in three manuscripts, the book of their deeds, the book of their words and the book of their art. Not one of these books can be understood unless we read the two others, but of the three the only trustworthy one is the last.' On the whole I think this is true. If I had to say which was telling the truth about society, a speech by a minister of housing or the actual buildings put up in his time, I should believe the buildings. –Kenneth Clark • We require of any building, that it act well, and do the things it was intended to do in the best way; that it speak well, and say the things it was intended to say in the best words; that it look well, and please us by its presence, whatever it has to do or say. –John Ruskin • Architecture also exists without necessary assistance from an architect; and architects sometimes create buildings which are not architecture. –Norval White • Architecture is produced by ordinary people, for ordinary people; therefore it should be easily comprehensible to all. –Steen Eiler Rasmussen



# ARCHITECTURE

The **ART**

*architecture* The product or result of architectural work: buildings, collectively.

and **SCIENCE**

*architecture* A style or method of building characteristic of a people, place, or time.

of **DESIGNING**

*architecture* The profession of designing buildings and other habitable environments.

and **CONSTRUCTING**

*architecture* The conscious act of forming things resulting in a unifying or coherent structure.

**BUILDINGS**

# ARCHITECTURE

## art

The conscious use of skill, craft, and creative imagination in the production of what is beautiful, appealing, or of more than ordinary significance.



## aesthetics

The branch of philosophy that deals with the nature of art, beauty, and taste, with a view to establishing the meaning and validity of critical judgments concerning works of art. Also, esthetics.

## beauty

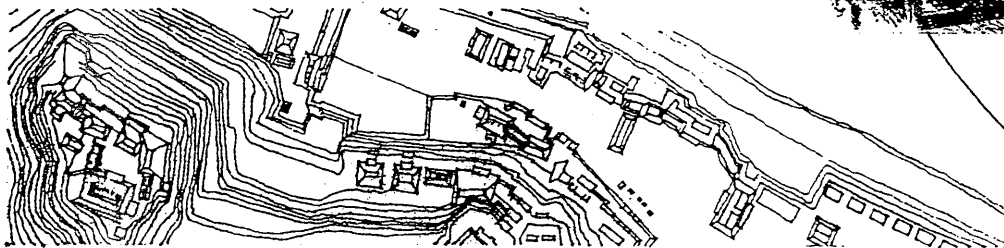
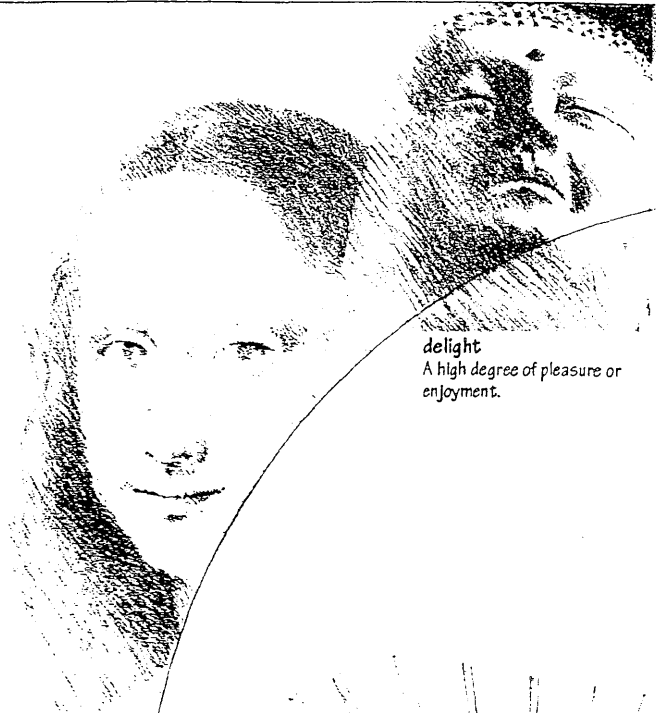
The aggregate of qualities in a person or thing that gives intense pleasure to the senses or deep satisfaction to the mind or spirit, whether arising from harmony of form or color, excellence of craft, truthfulness, originality, or other, often unspecifiable property.

## taste

Critical judgment, discernment, or appreciation of what is fitting, harmonious, or beautiful prevailing in a culture or personal to an individual.

## delight

A high degree of pleasure or enjoyment.



**commodity**  
Something of value, use, or convenience.

## environmental design

The ordering of the physical environment by means of architecture, engineering, construction, landscape architecture, urban design, and city planning.

## urban design

The aspect of architecture and city planning that deals with the design of urban structures and spaces.

## interior design

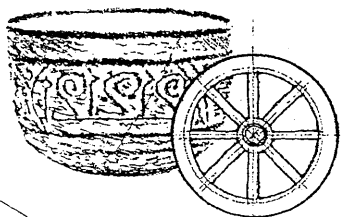
The art, business, or profession of planning the design and supervising the execution of architectural interiors, including their color schemes, furnishings, fittings, finishes, and sometimes architectural features.

## city planning

The activity or profession of determining the future physical arrangement and condition of a community, involving an appraisal of the current conditions, a forecast of future requirements, a plan for the fulfillment of these requirements, and proposals for legal, financial, and constructional programs to implement the plan. Also called town planning, urban planning.

## space planning

The aspect of architecture and interior design that deals with the planning, layout, design, and furnishing of spaces within a proposed or existing building.



## technology

Applied science: the branch of knowledge that deals with the creation and use of technical methods and materials, and their interrelation with life, society, and the environment.

## technics

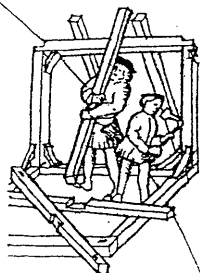
The science of an art or of the arts in general.

## tectonics

The science or art of shaping, ornamenting, or assembling materials in construction.

## architectonics

The unifying structure or concept of an artistic work.

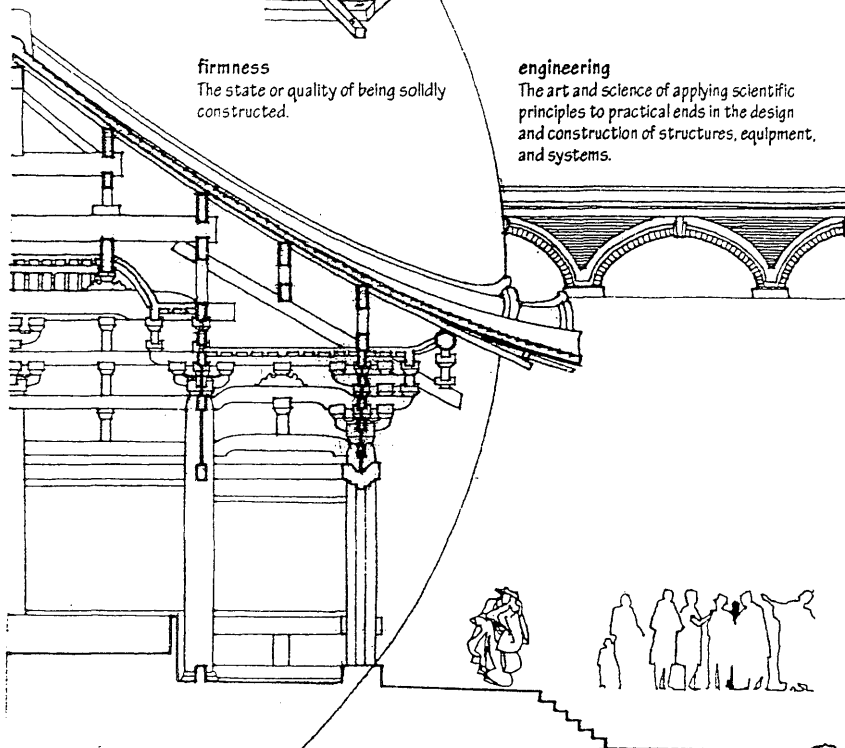


## firmness

The state or quality of being solidly constructed.

## engineering

The art and science of applying scientific principles to practical ends in the design and construction of structures, equipment, and systems.



## science

A branch of knowledge dealing with a body of facts or truths obtained by direct observation, experimental investigation, and methodical study, systematically arranged and showing the operation of general laws.

## behavioral science

Any of the sciences, as sociology and anthropology, that seek to discover general truths from the observation of human behavior in society.

## sociology

The science of human social institutions and relationships; specif. the study of the origin, development, structure, functioning, and collective behavior of organized groups of human beings.

## anthropology

The science of human beings; specif. the study of the origins, physical and cultural development, and environmental and social relations of humankind.



## landscape architecture

The art, business, or profession of designing, arranging, or modifying the features of a landscape for aesthetic or practical reasons.





# ARCH

A curved structure for spanning an opening, designed to support a vertical load primarily by axial compression.

## masonry arch

An arch constructed of individual stone or brick voussoirs.

## voussoir

Any of the wedge-shaped units in a masonry arch or vault, having side cuts converging at one of the arch centers.

## springer

The first voussoir resting on the impost of an arch.

## keystone

The wedge-shaped, often embellished voussoir at the crown of an arch, serving to lock the other voussoirs in place.

## extrados

The exterior curve, surface, or boundary of the visible face of an arch. Also called back.

## archivolt

A decorative molding or band on the face of an arch following the curve of the intrados.

## intrados

The inner curve or surface of an arch forming the concave underside.

## rise

The height of an arch from the springing line to the highest point of the intrados.

## spring

The point at which an arch, vault, or dome rises from its support. Also called springing.

## crown

The highest part or point of a convex construction, as an arch, vault, or roadway.

## haunch

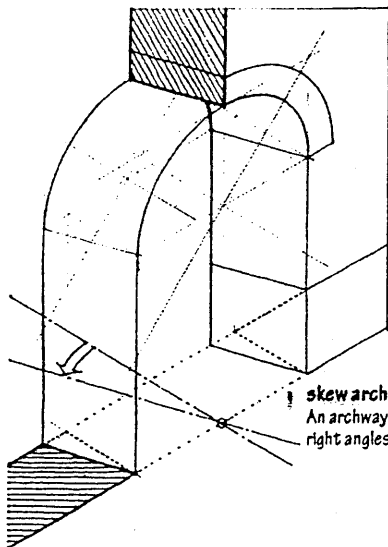
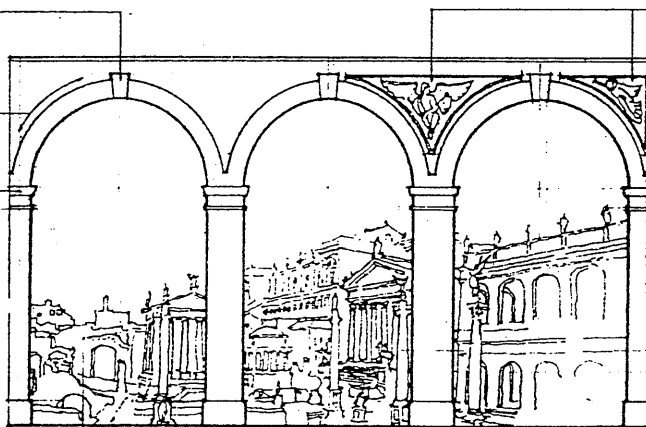
Either side of an arch curving down from the crown to the impost.

## impost

The uppermost part of an abutment, often in the form of a block, capital, or molding, from which an arch springs.

## spandrel

The triangular-shaped, sometimes ornamented area between the extrados of two adjoining arches, or between the left or right extrados of an arch and the rectangular framework surrounding it. Also called spandril.



## skew arch

An archway having sides or jambs not at right angles with the face of its abutments.

## order

Any of several concentric rings of masonry forming an arch, esp. when each projects beyond the one below.

## lag

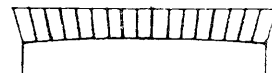
A crosspiece connecting the ribs in a centering. Also called bolster.

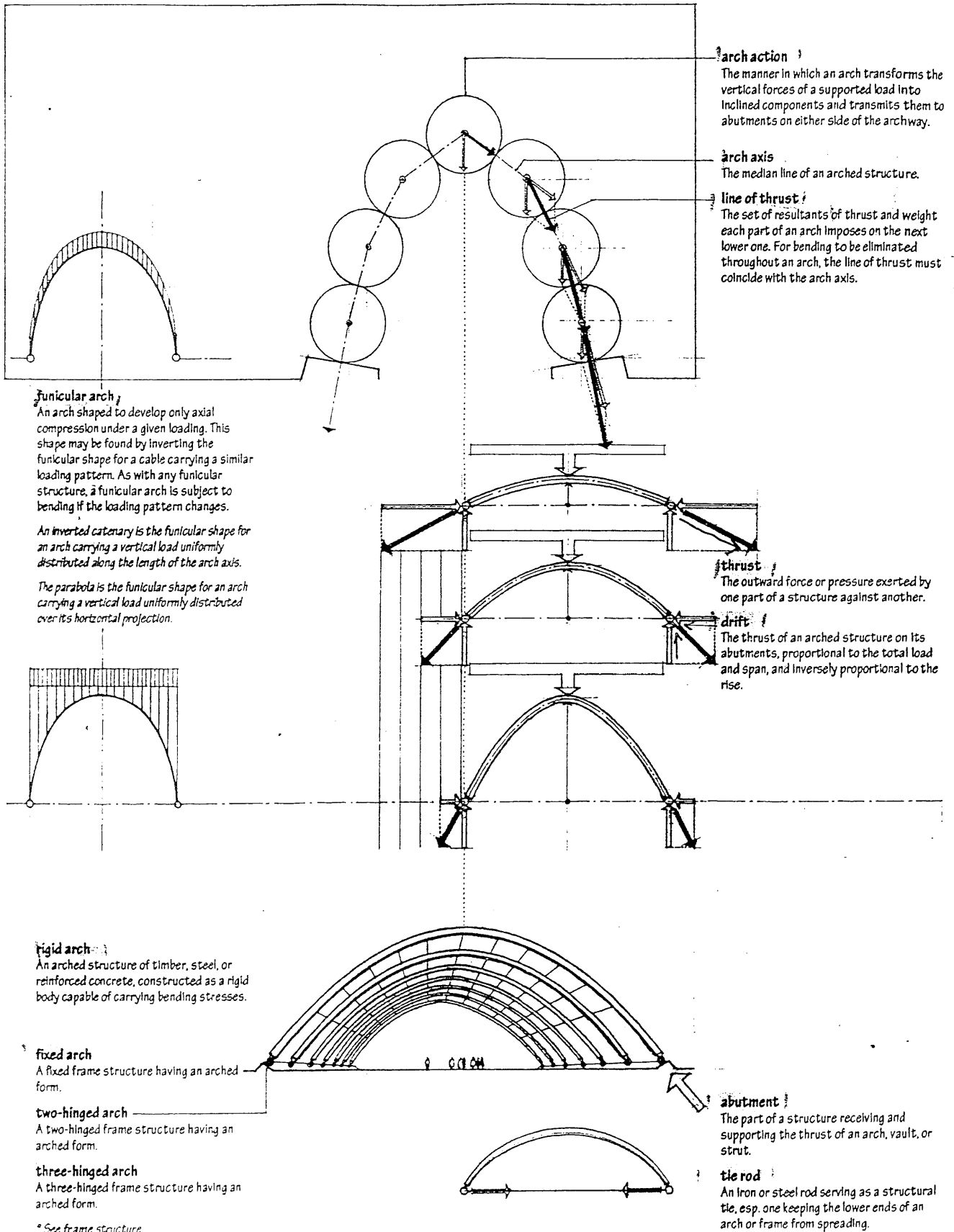
## centering

A temporary framework for supporting a masonry arch or vault during construction until the work can support itself.

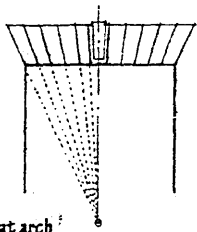
## camber piece

A board used as centering for a flat arch, slightly crowned to allow for settling of the arch. Also called camber slip.



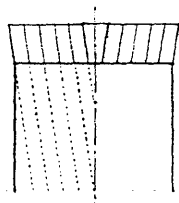


# ARCH



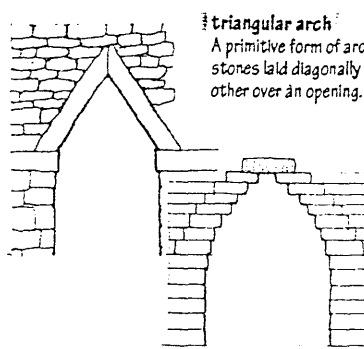
**flat arch**

An arch having a horizontal intrados with voussoirs radiating from a center below, often built with a slight camber to allow for settling. Also called **jack arch**.



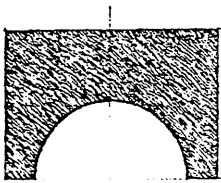
**French arch**

A flat arch having voussoirs inclined to the same angle on each side of the center.



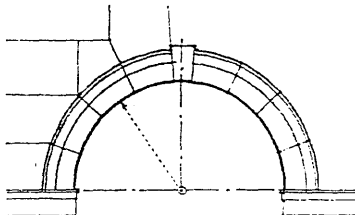
**triangular arch**

A primitive form of arch consisting of two stones laid diagonally to support each other over an opening.



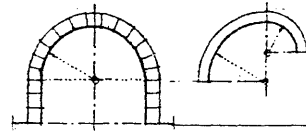
**round arch**

An arch having a continuously curved intrados, esp. a semicircular one.



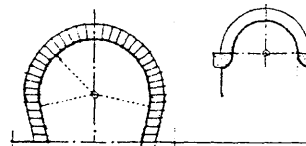
**Roman arch**

An arch having a semicircular intrados.



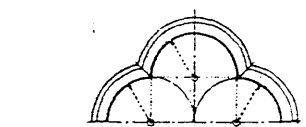
**rampant arch**

An arch having one impost higher than the other.



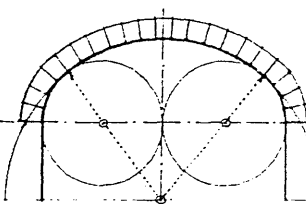
**stilted arch**

An arch resting on imposts treated as downward continuations of the archvolute.



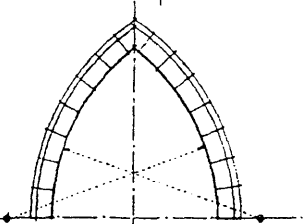
**bell arch**

A round arch resting on two large corbels with curved faces.



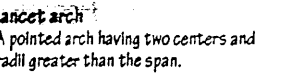
**horseshoe arch**

An arch having an intrados that widens above the springing before narrowing to a rounded crown. Also called **Moorish arch**.



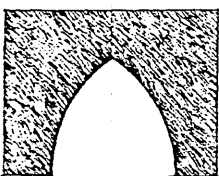
**trefoil arch**

An arch having a cusped intrados with three round or pointed foils.



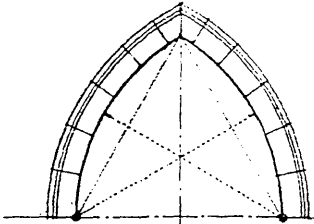
**basket-handle arch**

A three-centered arch having a crown with a radius much greater than that of the outer pair of curves. Also called **anse de panier**.



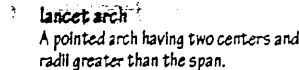
**pointed arch**

An arch having a pointed crown.



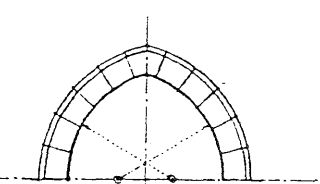
**equilateral arch**  $2r = s$

A pointed arch having two centers and radii equal to the span.



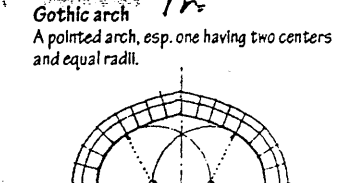
**lancet arch**

A pointed arch having two centers and radii greater than the span.



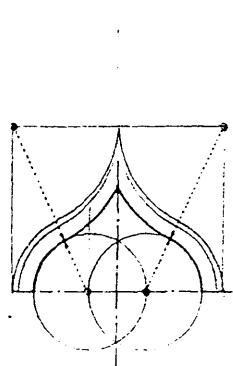
**drop arch**

A pointed arch having two centers and radii less than the span.



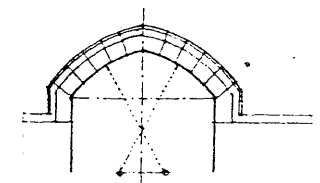
**Gothic arch**  $1r = s$

A pointed arch, esp. one having two centers and equal radii.



**Tudor arch**  $4r = s$

A four-centered arch having an inner pair of curves with a radius much greater than that of the outer pair.



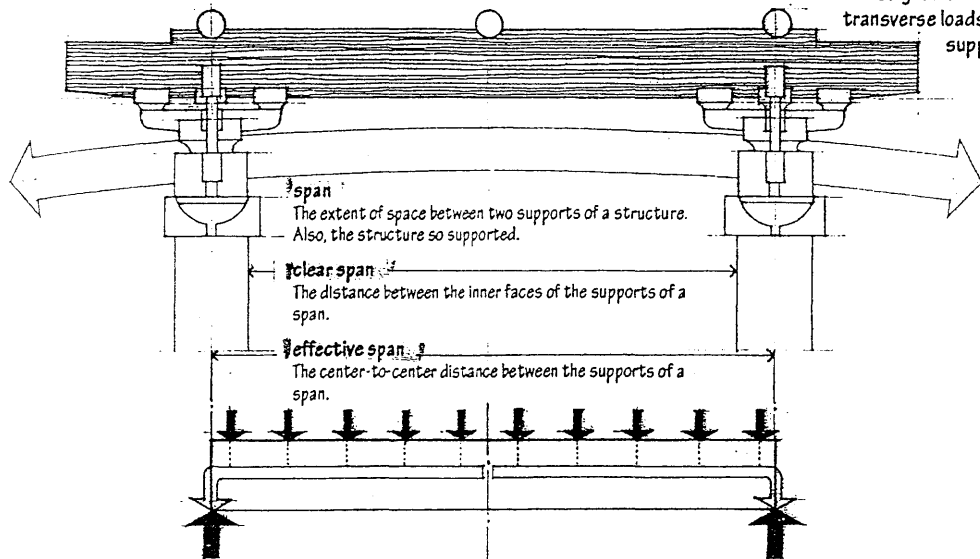
**surbased arch**

An arch having a rise of less than half the span.

**ogee arch**

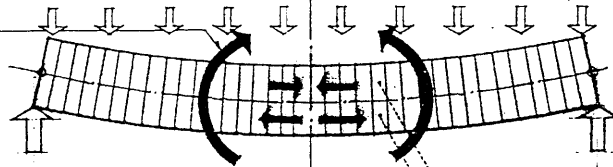
A pointed arch, each haunch of which is a double curve with the concave side uppermost.

A rigid structural member designed to carry and transfer transverse loads across space to supporting elements.



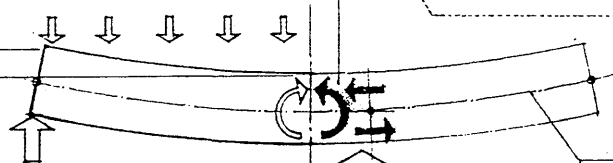
## bending moment

An external moment tending to cause part of a structure to rotate or bend, equal to the algebraic sum of the moments about the neutral axis of the section under consideration.



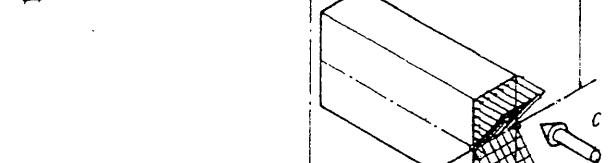
## resisting moment

An internal moment equal and opposite to a bending moment, generated by a force couple to maintain equilibrium of the section being considered.



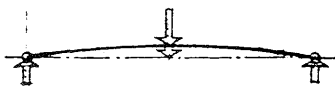
## deflection

The perpendicular distance a spanning member deviates from a true course under transverse loading, increasing with load and span, and decreasing with an increase in the moment of inertia of the section or the modulus of elasticity of the material.



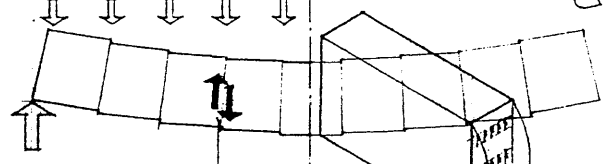
## camber

A slight convex curvature intentionally built into a beam, girder, or truss to compensate for an anticipated deflection.



## transverse shear

An external shear force at a cross section of a beam or other member subject to bending, equal to the algebraic sum of transverse forces on one side of the section.

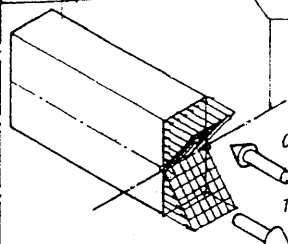


## neutral axis

An imaginary line passing through the centroid of the cross section of a beam or other member subject to bending, along which no bending stresses occur.

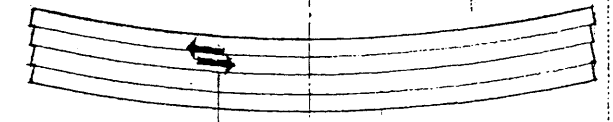
## bending stress

A combination of compressive and tension stresses developed at a cross section of a structural member to resist a transverse force, having a maximum value at the surface furthest from the neutral axis.



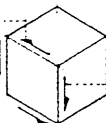
## vertical shearing stress

The shearing stress developed along a cross section of a beam to resist transverse shear, having a maximum value at the neutral axis and decreasing nonlinearly toward the outer faces.



## horizontal shearing stress

The shearing stress developed to prevent slippage along longitudinal planes of a beam under transverse loading, equal at any point to the vertical shearing stress at that point. Also called longitudinal shearing stress.



# BEAM

## flexure formula

A formula defining the relationship between bending moment, bending stress, and the cross-sectional properties of a beam. Bending stress is directly proportional to bending moment and inversely proportional to the moment of inertia of a beam section.

$$f_b = M/c \quad (1)$$

where

$f_b$  = extreme fiber stress in bending

$M$  = bending moment

$c$  = distance from neutral axis to the outermost surface in bending

if

$$I/c = S \quad (2)$$

then

$$f_b = M/S$$

## moment of inertia

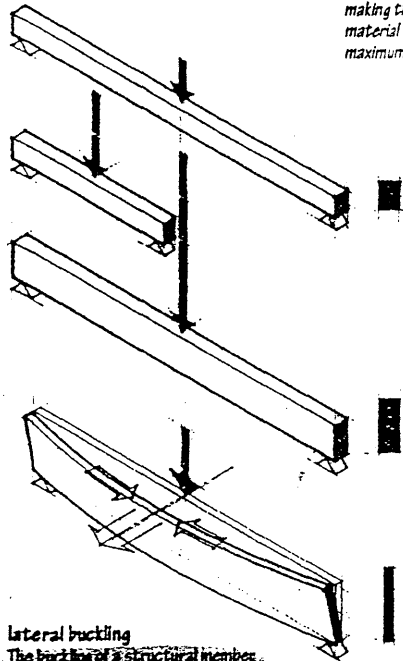
The sum of the products of each element of an area and the square of its distance from a coplanar axis of rotation. Moment of inertia is a geometric property that indicates how the cross-sectional area of a structural member is distributed and does not reflect the intrinsic physical properties of a material.

## section modulus

A geometric property of a cross section, defined as the moment of inertia of the section divided by the distance from the neutral axis to the most remote surface.

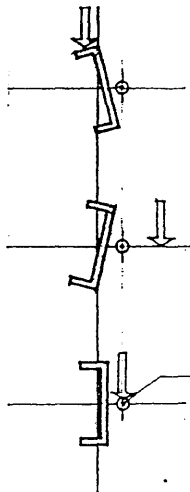
While halving a beam span reduces the bending stresses by a factor of 2, doubling the depth reduces the bending stresses by a factor of 4.

The efficiency of a beam is increased by configuring the cross section to provide the required moment of inertia or section modulus with the smallest possible area, usually by making the section deep with most of the material at the extremities where the maximum bending stresses occur.



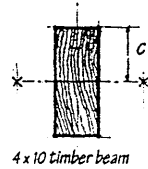
## lateral buckling

The buckling of a structural member reduced by compressive stresses acting on a slender portion insufficiently rigid in the lateral direction.



## shear center

The point in the cross-sectional plane of a structural member through which a transverse load must pass in order to prevent torsion or twisting of the member about a longitudinal axis.

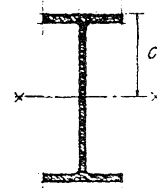


4 x 10 timber beam

$$33.25 \text{ in}^2 = \text{Area of section}$$

$$250 \text{ in}^4 = I \text{ about } x-x \text{ axis}$$

$$52.6 \text{ in}^3 = S$$

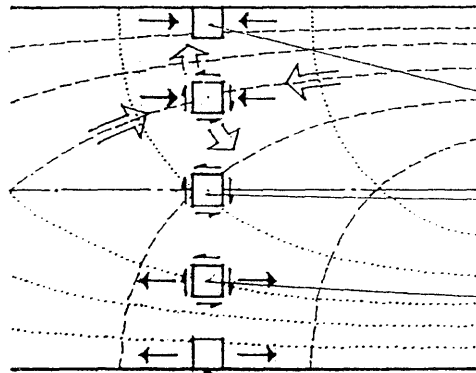


W 14 x 38 steel beam

$$11.20 \text{ in}^2 = \text{Area of section}$$

$$386 \text{ in}^4 = I \text{ about } x-x \text{ axis}$$

$$54.7 \text{ in}^3 = S$$



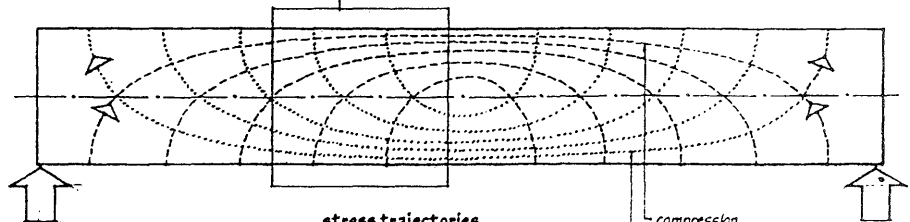
## principal stresses

The tensile and compressive stresses resulting from the interaction of bending and shear stresses at a cross section of a beam.

At the extreme surfaces of a beam, only bending stresses exist and the principal stresses are equivalent to the tensile and compressive stresses resulting from bending.

At the neutral axis of the section, only shear stresses exist and these can be resolved into tensile and compressive stresses acting at 45° angles to the neutral axis.

For an intermediate element subject to both bending and shear stresses, the principal stresses have an inclination determined by the relative magnitudes of these stresses.



## stress trajectories

Lines depicting the direction but not the magnitude of the principal stresses in a beam.

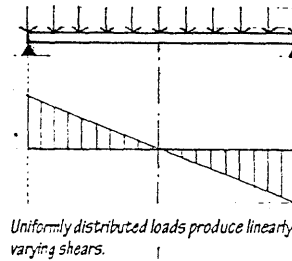
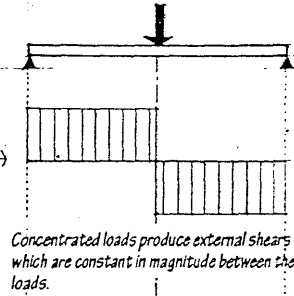
compression  
tension

**shear diagram**

A graphic representation of the variation in magnitude of the external shears present in a structure for a given set of transverse loads and support conditions.

**moment diagram**

A graphic representation of the variation in magnitude of the bending moments present in a structure for a given set of transverse loads and support conditions. The overall deflected shape of a structure subject to bending can often be inferred from the shape of its moment diagram.

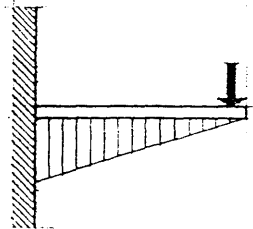


**simple beam**

A beam resting on simple supports at both ends, which are free to rotate and have no moment resistance. As with any statically determinate structure, the values of all reactions, shears, and moments for a simple beam are independent of its cross-sectional shape and material.

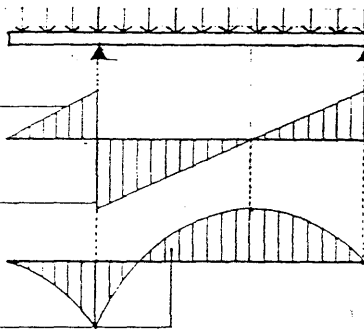
**cantilever beam**

A projecting beam supported at only one fixed end.



**cantilever**

A beam or other rigid structural member extending beyond a fulcrum and supported by a balancing member or a downward force behind the fulcrum.



**overhanging beam**

A simple beam extending beyond one of its supports. The overhang reduces the positive moment at midspan while developing a negative moment at the base of the cantilever over the support.

Assuming a uniformly distributed load, the projection for which the moment over the support is equal and opposite to the moment at midspan is approximately  $1/3$  of the span.

**double overhanging beam**

A simple beam extending beyond both of its supports.

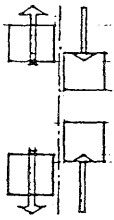
Assuming a uniformly distributed load, the projections for which the moments over the supports are equal and opposite to the moment at midspan are approximately  $1/3$  of the span.

**fixed-end beam**

A beam having both ends restrained against translation and rotation. The fixed ends transfer bending stresses, increase the rigidity of the beam, and reduce its maximum deflection.

**continuous beam**

A beam extending over more than two supports in order to develop greater rigidity and smaller moments than a series of simple beams having similar spans and loading. Both fixed-end and continuous beams are indeterminate structures for which the values of all reactions, shears, and moments are dependent not only on span and loading but also on cross-sectional shape and material.

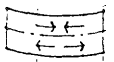


**positive shear**

A net resultant of shear forces that acts vertically upward on the left part of the structure being considered.

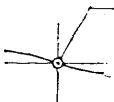
**negative shear**

A net resultant of shear forces that acts vertically downward on the left part of the structure being considered.



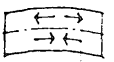
**positive moment**

A bending moment that produces a concave curvature at a section of a structure.



**inflection point**

A point at which a structure changes curvature from convex to concave or vice versa as it deflects under a transverse load; theoretically an internal hinge and therefore a point of zero moment.

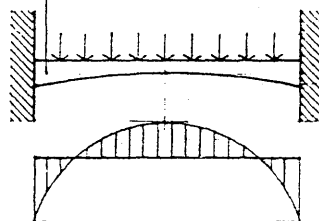


**negative moment**

A bending moment that produces a convex curvature at a section of a structure.

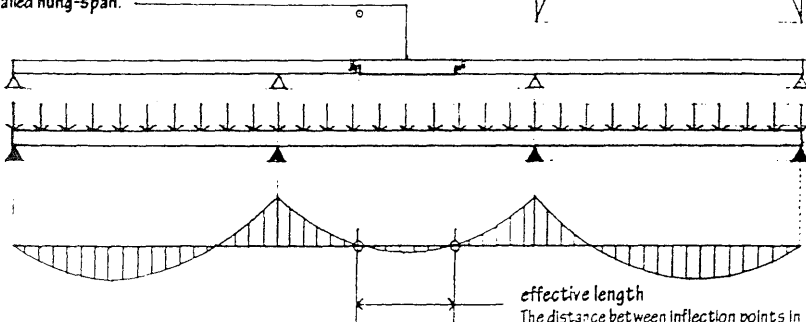
**haunch**

The part of a beam that is thickened or deepened to develop greater moment resistance. The efficiency of a beam can be increased by shaping its length in response to the moment and shear values which typically vary along its longitudinal axis.



**suspended-span**

A simple beam supported by the cantilevers of two adjoining spans with pinned construction joints at points of zero moment. Also called hung-span.



**effective length**

The distance between inflection points in the span of a fixed-end or continuous beam, equivalent in nature to the actual length of a simply supported beam.

## BRICK

A masonry unit of clay, formed into a rectangular prism while plastic and hardened by drying in the sun or firing in a kiln.

### common brick

Brick made for general building purposes and not specially treated for color and texture. Also called building brick.

### facing brick

Brick made of special clays for facing a wall, often treated to produce the desired color and surface texture. Also called face brick.

### brick type

A designation indicating the permissible variation in size, color, chipping, and distortion allowed in a facing brick unit.

#### FBX

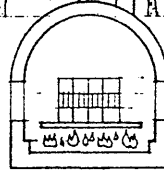
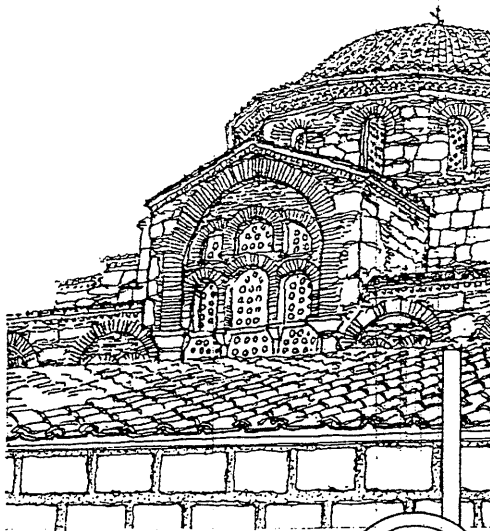
Facing brick suitable for use where a minimum variation in size, narrow color range, and high degree of mechanical perfection are required.

#### FBS

Facing brick suitable for use where a wider color range and greater variation in size are permitted than for type FBX.

#### FBA

Facing brick suitable for use where particular effects are desired resulting from nonuniformity in size, color, and texture of the individual units.



### soft-mud process

The process of forming brick by molding relatively wet clay having a moisture content of 20% to 30%.

### sandstruck brick

Brick formed in the soft-mud process with a mold lined with sand to prevent sticking, producing a matte-textured surface.

### waterstruck brick

Brick formed in the soft-mud process with a mold lubricated with water to prevent sticking, producing a smooth, dense surface.

### stiff-mud process

The process of forming brick and structural tile by extruding stiff but plastic clay having a moisture content of 12% to 15% through a die and cutting the extrusion to length with wires before firing.

### dry-press process

The process of forming brick by molding relatively dry clay having a moisture content of 5% to 7% under high pressure, resulting in sharp-edged, smooth-surfaced bricks.

### kiln

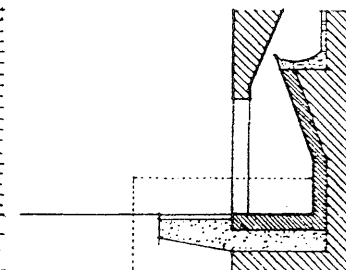
A furnace or oven for burning, baking, or drying something, esp. one for firing pottery, baking bricks, or drying timber.

### flashing

Firing brick units alternately with too much or too little air to vary their face color.

### cull

A brick or timber rejected as being of inferior quality.



### brick grade

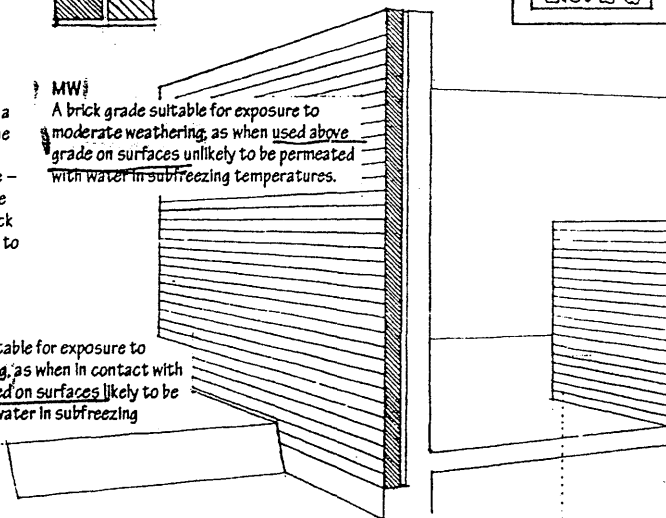
A designation indicating the durability of a brick unit when exposed to weathering. The U.S. is divided into three weathering regions - severe, moderate, and negligible - according to annual winter rainfall and the annual number of freezing-cycle days. Brick is graded for use in each region according to compressive strength, maximum water absorption, and maximum saturation coefficient.

### MW

A brick grade suitable for exposure to moderate weathering, as when used above grade on surfaces unlikely to be permeated with water in subfreezing temperatures.

### SW

A brick grade suitable for exposure to severe weathering, as when in contact with the ground or used on surfaces likely to be permeated with water in subfreezing temperatures.



### NW

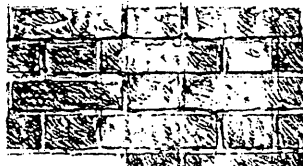
A brick grade suitable for exposure to negligible weathering as when used as a backup or in interior masonry.

### absorption

The weight of water absorbed by a clay masonry unit when immersed in either cold or boiling water for a stated length of time, expressed as a percentage of the weight of the dry unit.

### saturation coefficient

The ratio of the weight of water absorbed by a clay masonry unit immersed in cold water to the weight absorbed when immersed in boiling water, indicating the probable resistance of the brick to the action of freezing and thawing.

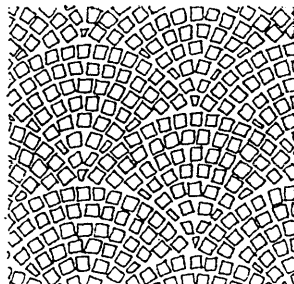


### suction

The weight of water absorbed by a clay masonry unit when partially immersed for one minute, expressed in grams or ounces per minute. Also called initial rate of absorption.

### efflorescence

A white, powdery deposit that forms on an exposed masonry or concrete surface, caused by the leaching and crystallization of soluble salts from within the material.



### firebrick

A brick made of fire clay and used for lining furnaces and fireplaces.

### fire clay

A refractory clay used in the making of firebricks, crucibles, and other objects exposed to high temperatures.

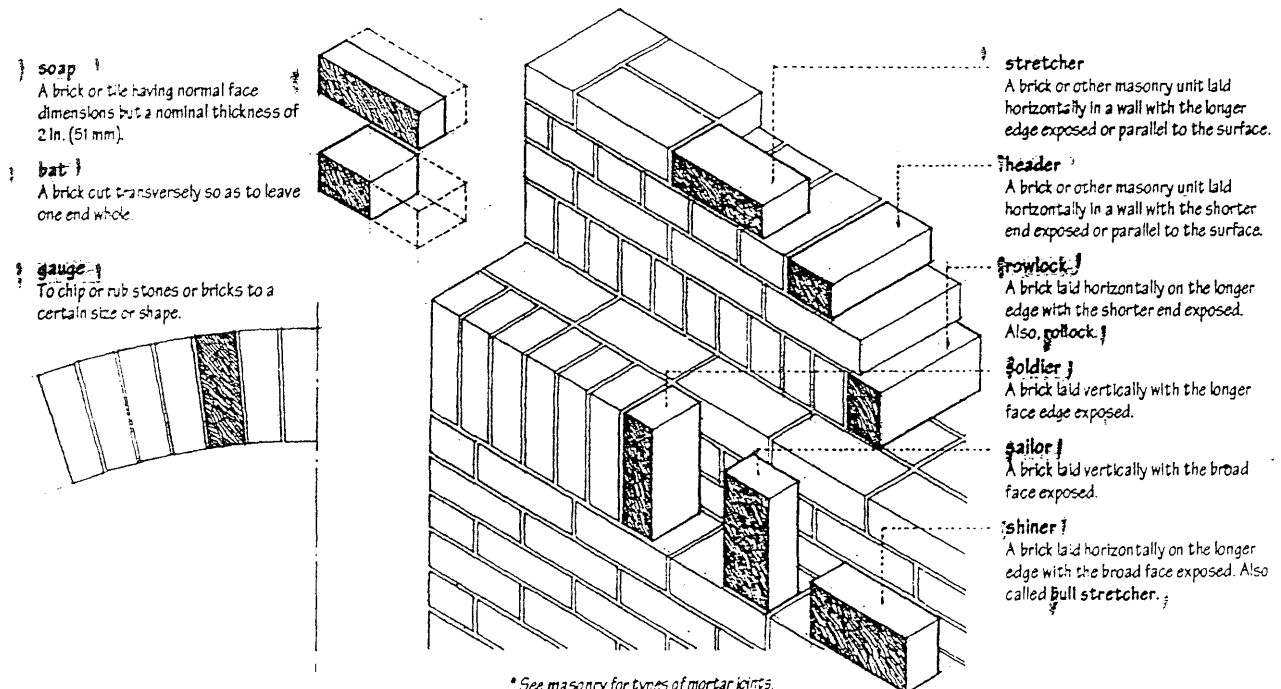
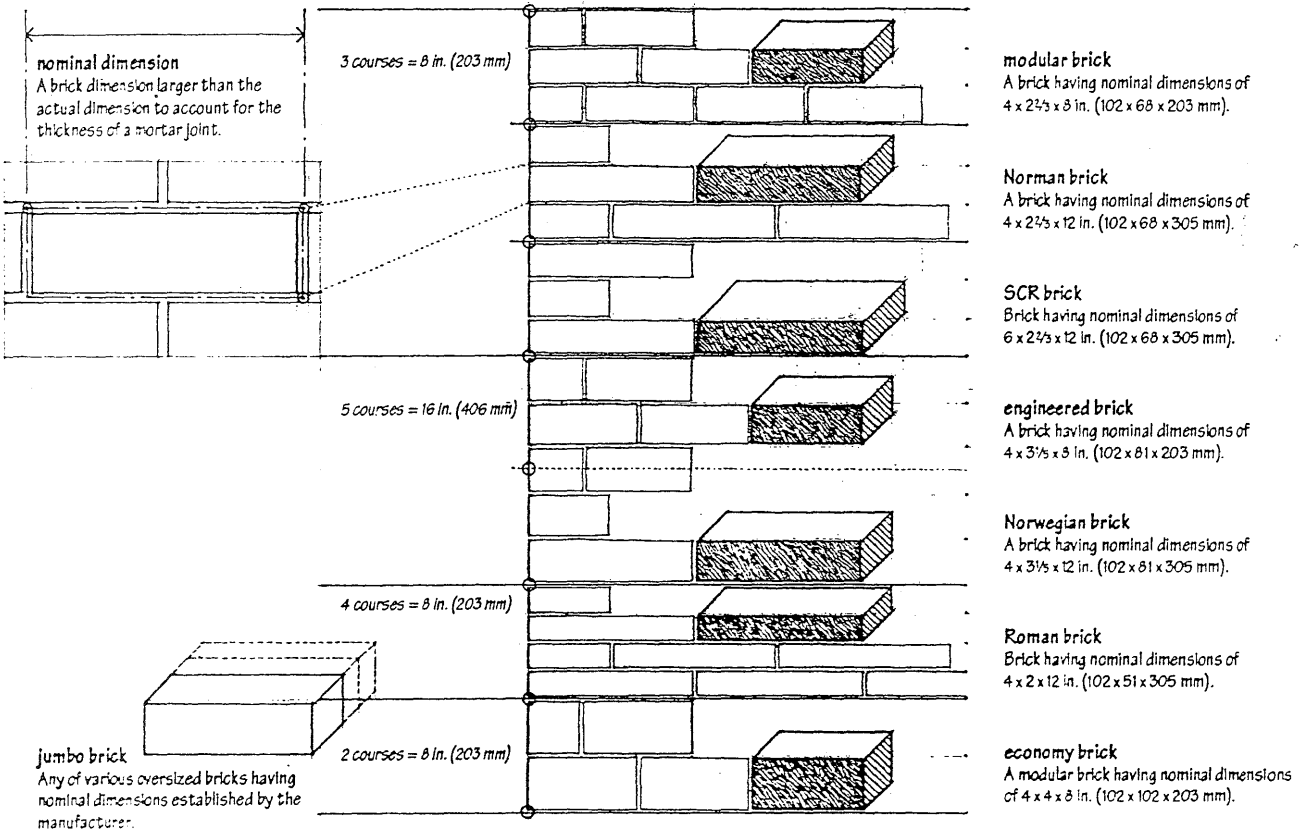
### refractory

A material having the ability to retain its physical shape and chemical identity when subjected to high temperatures.

### clinker

A dense, hard-burned brick used esp. for paving.





# BRICK

## brickwork

Brick construction, esp. the art of bonding bricks effectively.

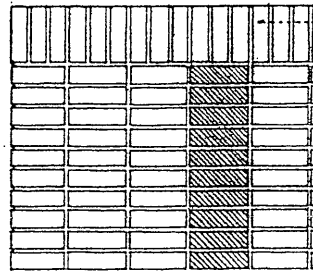
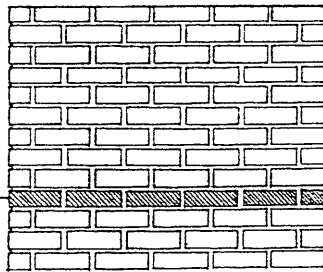
## bond

Any of various arrangements of masonry units having a regular, recognizable, usually overlapping pattern to increase the strength and enhance the appearance of the construction.

## running bond

A brickwork or masonry bond composed of overlapping stretchers. Also called

## stretcher bond.



## soldier course

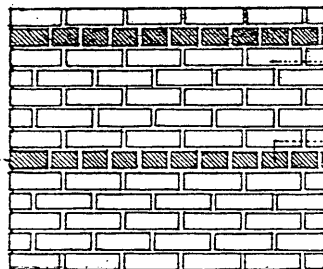
A continuous course of soldiers in brickwork.

## stack bond

A brickwork or masonry bond having successive courses of stretchers with all head joints aligned vertically. Also, stacked bond.

## common bond

A brickwork bond having a course of headers between every five or six courses of stretchers. Also called American bond.



## stretching course

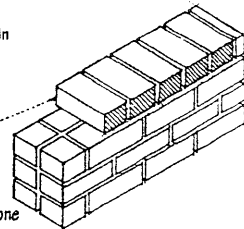
A continuous course of stretchers in brickwork.

## heading course

A continuous course of headers in brickwork.

## bond course

A continuous course of headers or bondstones overlapping more than one wythe of masonry.

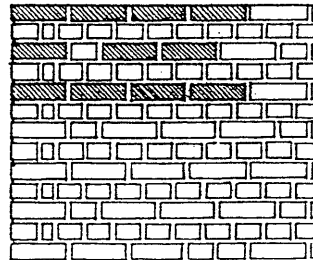
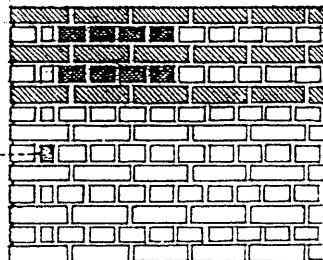


## closer

A masonry unit specially formed or cut to finish a course or complete the bond at the corner of a wall. Also, closure.

## English bond

A brickwork bond having alternate courses of headers and stretchers in which the headers are centered on stretchers and the joints between stretchers line up vertically in all courses.



## English cross bond

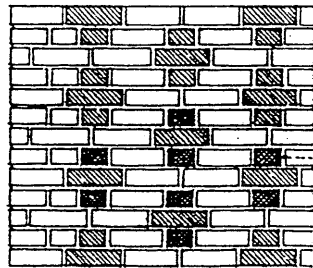
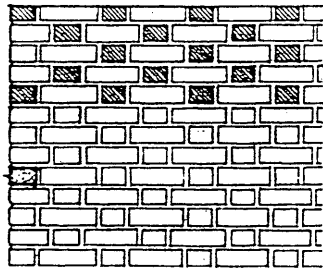
A modified English bond in which the head joints in the stretching courses are offset by half the length of a stretcher. Also called Dutch bond.

## queen closer

A brick of half the normal width, used for completing a course or for spacing regular bricks. Also, queen closure.

## Flemish bond

A brickwork bond having alternating headers and stretchers in each course, each header being centered above and below a stretcher.



## Flemish cross bond

A modified Flemish bond having courses of alternate headers and stretchers alternating with stretching courses.

## king closer

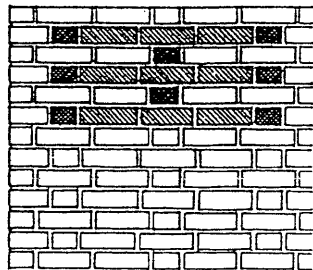
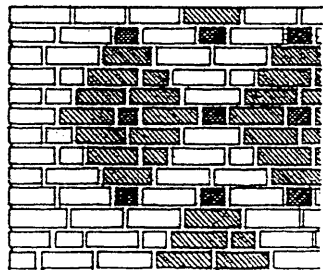
A three-quarter brick for finishing a course or for spacing regular bricks. Also, king closure.

## flare header

A brick having a darker end exposed as a header in patterned brickwork.

## Flemish diagonal bond

A form of Flemish cross bond in which the courses are offset to form a diamond pattern.



## garden-wall bond

A brickwork bond for tightly loaded boundary walls, having a sequence of a header and three stretchers in each course, with each header being centered over a header in alternate courses.

A relatively permanent enclosed structure constructed over a plot of land for habitable use.

A building is a shelter from rain, sun, and wind. This implies a Roof, and Walls to support it. If the walls entirely enclose the space within, there are Doorways for access, and Windows for light. Roofs and walls, doors and windows are the essential features of buildings.

Roofs may be flat, sloping, or curved. A roof with one slope is called a Lean-to. When two sloping roofs rest upon parallel walls and lean against one another, they meet in a horizontal ridge at the top, and form a Gable at each end. If two walls make a projecting angle, their roofs intersect in an inclined line called a Hip. If the walls meet in a reentering angle, the inclined line of intersection is called a Valley. Circular walls carry conical or domical roofs.

If there is more than one story, the flat roof of the lower story becomes the Floor of the story above. If the roof extends beyond the wall that supports it, the projection is called the Eaves. If the wall also projects to support the extension of the roof, the projection is called a Cornice. The principal member of a cornice, which projects like a shelf and crowns the wall, is called a Corona.

Walls are generally made wider just at the bottom so as to get a better bearing on the ground. This projection is the Base. A similar projection at the top is called a Cap or, if it projects much, a Cornice, as has been said. A low wall is called a Parapet. A short piece of wall about as long as it is thick is called a Post, and if it supports something, a Pedestal; the part between its cap and base is then the Die. A tall post is called a Pier. If it is square, and a Column if it is round. Caps of piers and columns are called Capitals, and the part between the cap and the base, the shaft. The flat upper member of a capital is called the Abacus.

A beam that spans the space between two piers or columns or between a pier or column and a wall is called an Architrave, or Epistyle. Above it, between the architrave and the cornice, there is generally a little strip of wall called the Frieze. Architrave, frieze, and cornice constitute the Entablature. A series of columns is called a Colonnade. The spaces between piers or columns are sometimes spanned by Arches, a series of which is called an Arcade.

The space between two parallel walls is sometimes covered by a sort of continuous arch called a Vault, instead of by a floor or roof.

The Wall, the Pier, and the Column, with or without the pedestal, constitute the chief supporting members; the Frieze and Cornice, with the roof that rests upon them, constitute the chief part of the load they carry. The Architrave, the Arches, and the Spandrels form part of the load relative to what is below them, but are supporting members relative to what is above them.

Besides being valuable as a shelter, a building may be in itself a noble and delightful object, and architects are builders who, by giving a building good proportions and fine details, and by employing beautiful materials, make it valuable on its own account, independently of its uses.

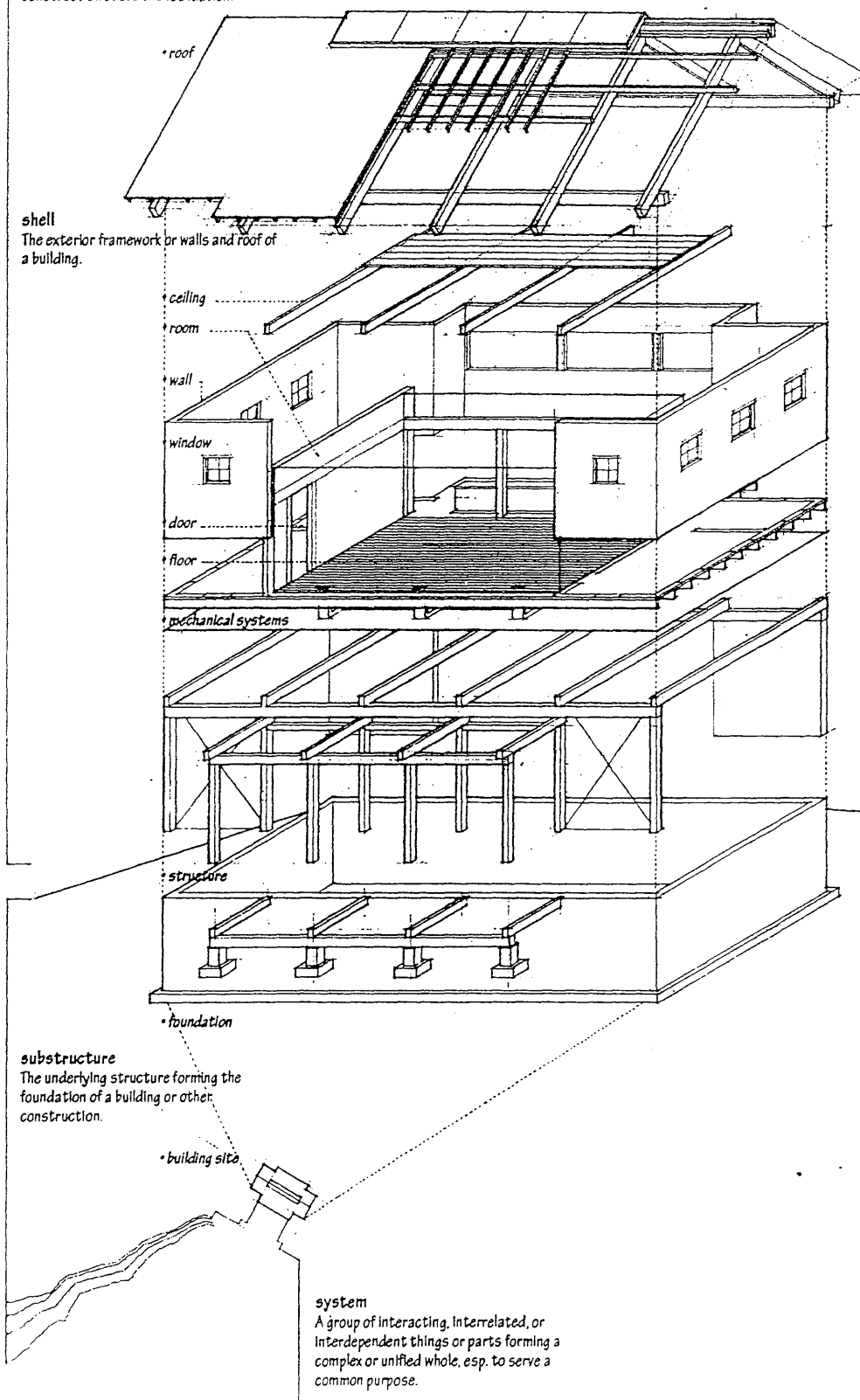
—William Robert Ware  
The American Vignola

## superstructure

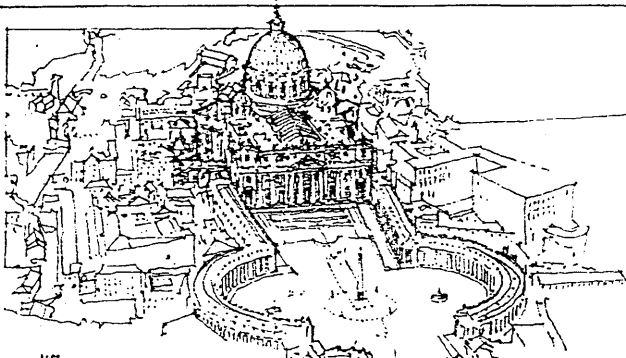
The vertical extension of a building or other construction above the foundation.

## shell

The exterior framework or walls and roof of a building.



## BUILDING

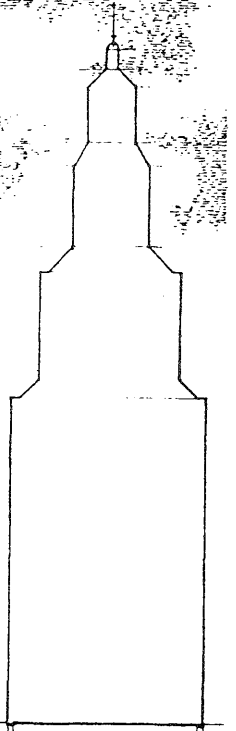


### edifice

A building, esp. one of large size, massive structure, or imposing appearance.

### skyscraper

A building of exceptional height and many stories, supported by a steel or concrete framework from which the walls are suspended.

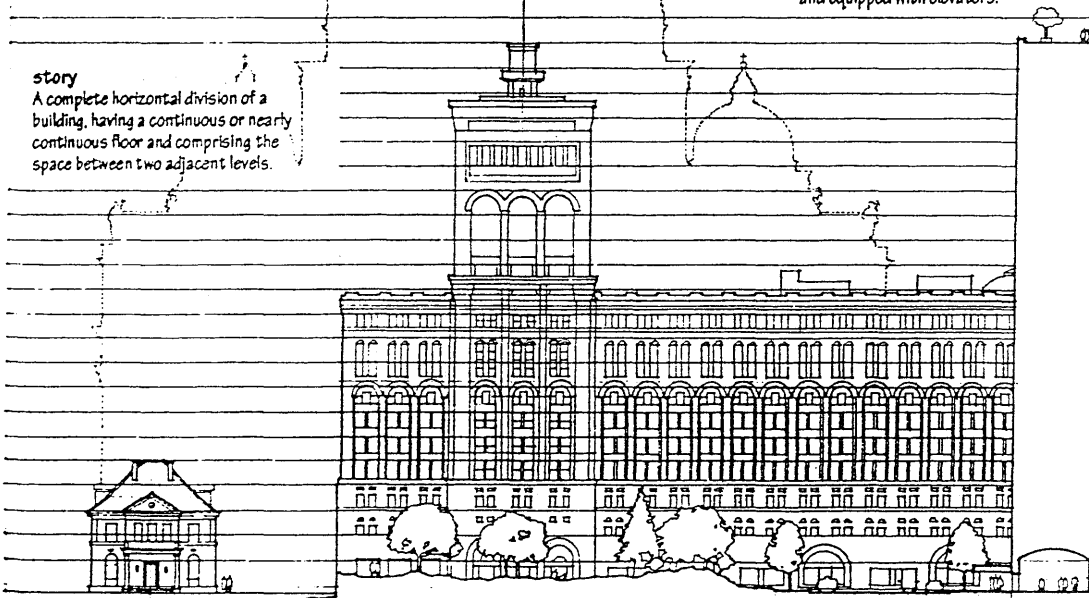


### high-rise

Describing a building having a comparatively large number of stories and equipped with elevators.

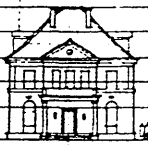
### story

A complete horizontal division of a building, having a continuous or nearly continuous floor and comprising the space between two adjacent levels.



### low-rise

Describing a building having one, two, or three stories and usually no elevator.



### mid-rise

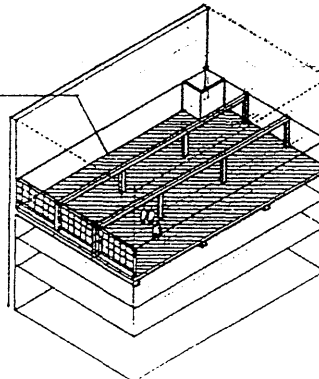
Describing a building having a moderately large number of stories, usually 5 to 10, and equipped with elevators.

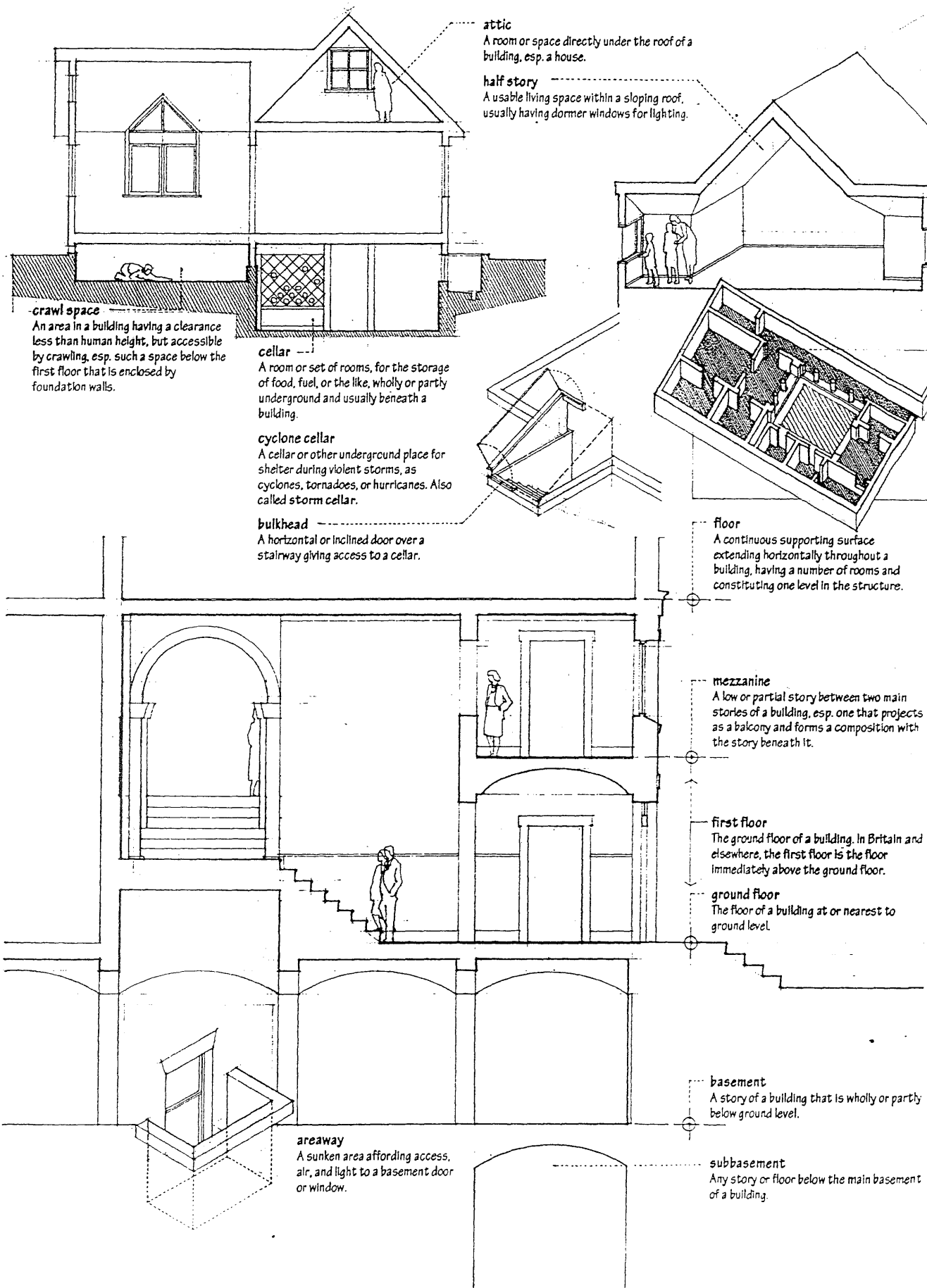
### loft

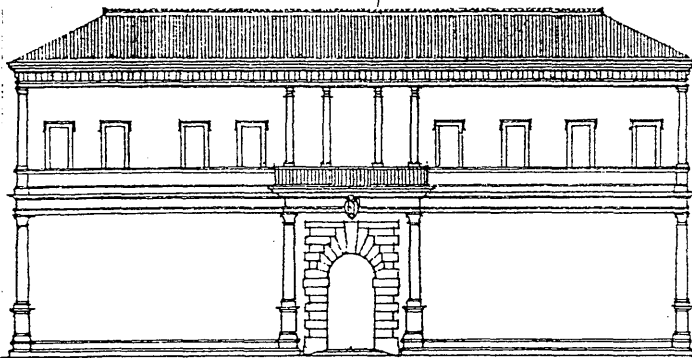
One of the upper floors of a warehouse or factory, typically unpartitioned and sometimes converted or adapted to other uses, as living quarters, artists' studios, or exhibition galleries.

### loft building

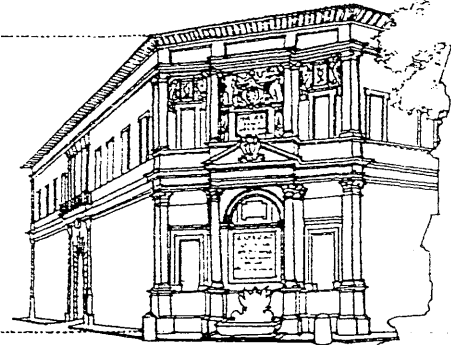
A building having several floors with large areas of unobstructed space, originally rented out for light industrial purposes and now frequently converted to residential occupancy.



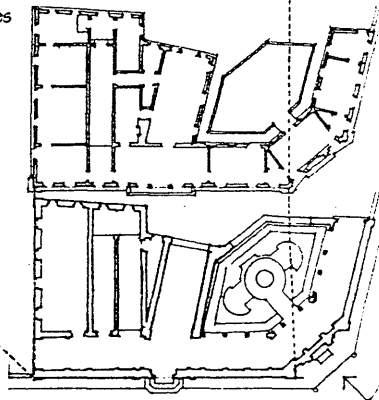




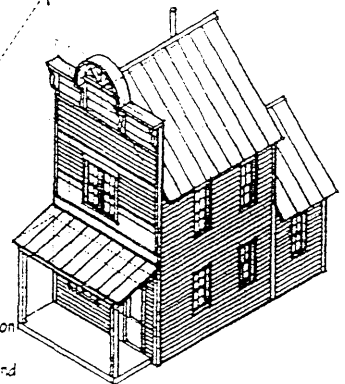
**facade**  
The front of a building or any of its sides facing a public way or space, esp. one distinguished by its architectural treatment.



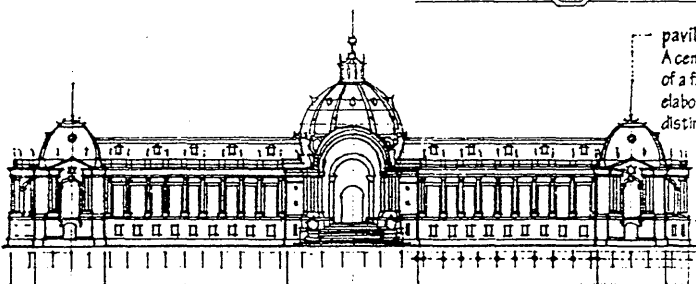
**frontispiece**  
A principal facade, or a part or feature of a facade, often treated as a separate element of the design and highlighted by ornamentation.



**pavilion**  
A central or flanking projecting subdivision of a facade, usually accented by more elaborate decoration or greater height and distinction of skyline.



**false front**  
A facade falsifying the size or importance of a building.

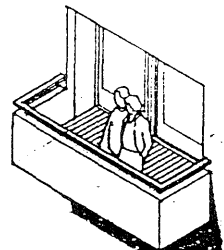


**story**  
A major horizontal architectural division, as of a facade or the wall of a nave.

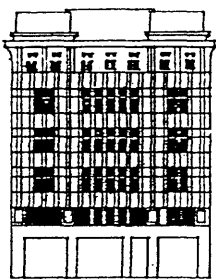
**bay**  
Any of a number of principal divisions of a wall, roof, or other part of a building marked off by vertical or transverse supports.

**blindstory**  
A major horizontal division of a wall having no exterior windows.

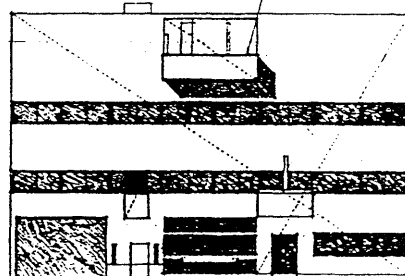
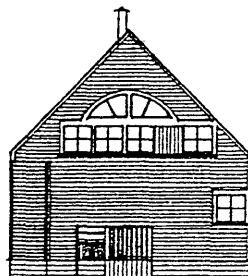
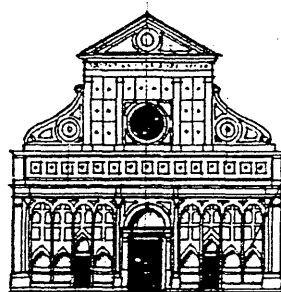
**blind**  
Describing a recess in a wall having the appearance of a window (blind window) or door (blind door). Inserted to complete a series of windows or to provide symmetry of design.

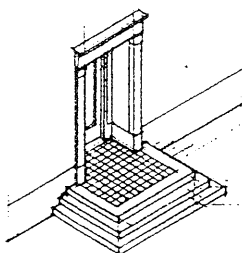


**balcony**  
An elevated platform projecting from the wall of a building and enclosed by a railing or parapet.



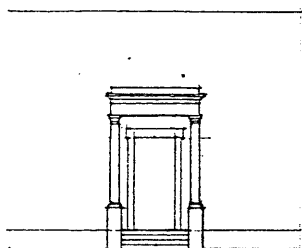
**fenestration**  
The design, proportioning, and disposition of windows and other exterior openings of a building.





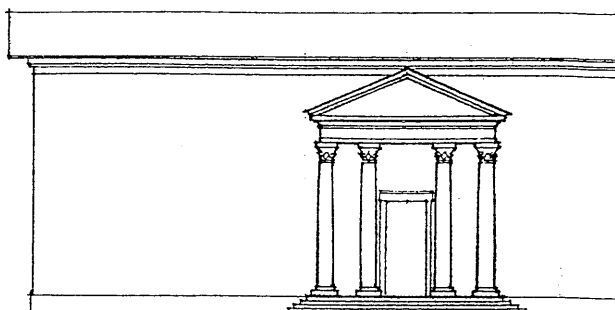
**stoop**

A raised platform, approached by steps and sometimes having a roof, at the entrance of a house.



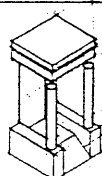
**porch**

An exterior appendage to a building, forming a covered approach or vestibule to a doorway.



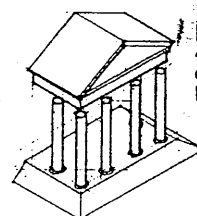
**portico**

A porch having a roof supported by columns, often leading to the entrance of a building.



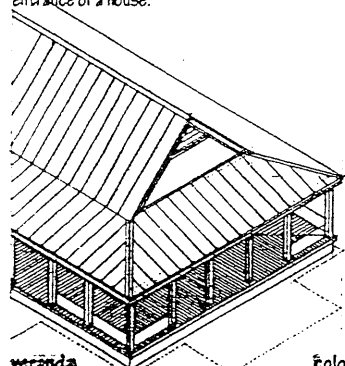
**colonnade**

A series of regularly spaced columns supporting an entablature and usually one side of a roof structure.



**forecourt**

A courtyard before the entrance to a building or a group of buildings.

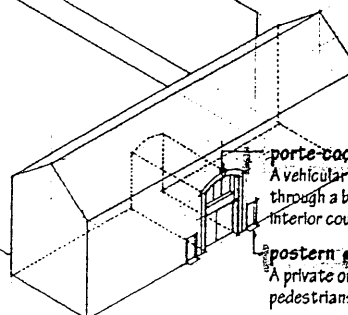


**veranda**

A large, open porch, usually roofed and partly enclosed, as by a railing, often extending across the front and sides of a house. Also *verandah*.

**lanai**

A veranda, esp. a fully furnished one used as a living room.



**porte-cochère**

A vehicular passageway leading through a building or screen wall into an interior courtyard.

**postern**

A private or side entrance, as one for pedestrians next to a porte-cochère.

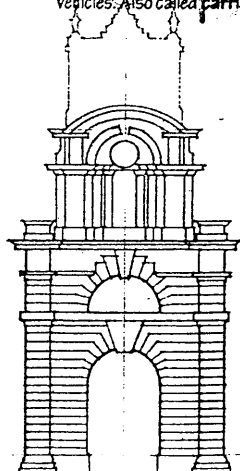
**porte-cochère**

A porch roof projecting over a driveway at the entrance to a building and sheltering those getting in or out of vehicles. Also called *carriage porch*.



**terrace**

An open, often paved area connected to a house or building and serving as an outdoor living area.

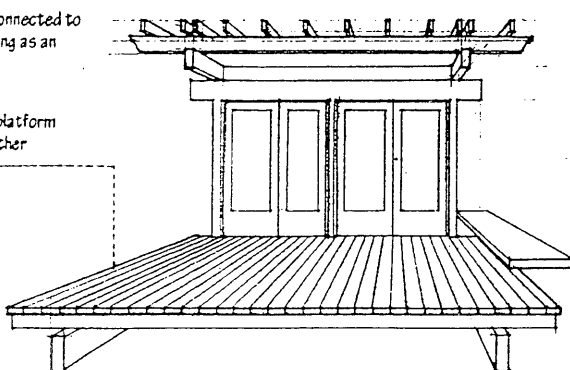


**portal**

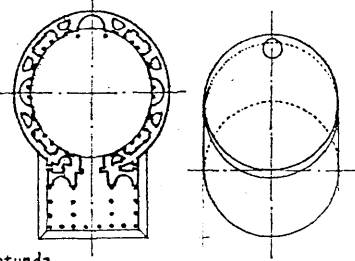
A doorway, gate, or entrance, esp. an imposing one emphasized by size and stately architectural treatment.

**deck**

An open, unroofed porch or platform extending from a house or other building.

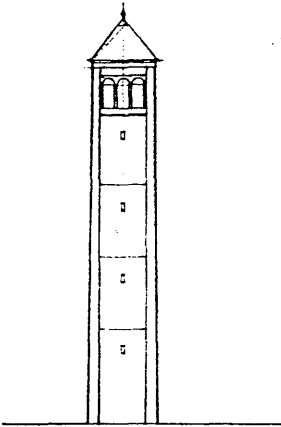






**rotunda**

A round, domed building, or a large and high circular space in such a building, esp. one surmounted by a dome.



**tower**

A building or structure high in proportion to its lateral dimensions, either standing alone or forming part of a larger building.

**block**

A large building divided into a number of separate apartments, offices, or shops.

**loggia**

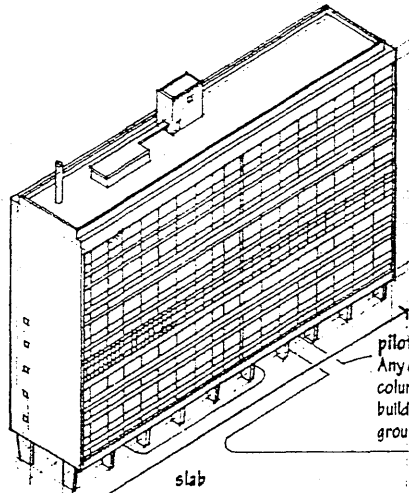
A colonnaded or arcaded space within the body of a building but open to the air on one side, often at an upper story overlooking an open court.

**piano nobile**

The principal story of a large building, as a palace or villa, with formal reception and dining rooms, usually one flight above the ground floor.

**cortile**

A large or principal courtyard of an Italian palazzo.

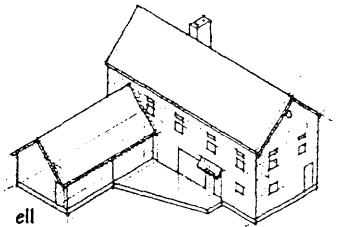


**slab**

A rectangular building having little width with respect to its length and height.

**piloti**

Any of a series of columns supporting a building above an open ground level.

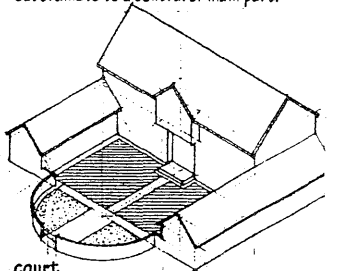


**ell**

A wing at right angles to the length of a building. Also, *el*.

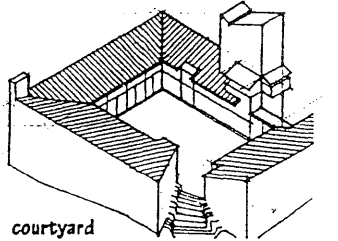
**wing**

A part of a building projecting from and subordinate to a central or main part.



**court**

An area open to the sky and mostly or entirely surrounded by walls or buildings.

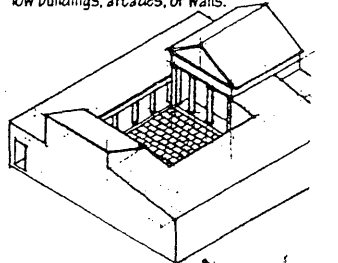


**courtyard**

A court adjacent to or within a building, esp. one enclosed on all four sides.

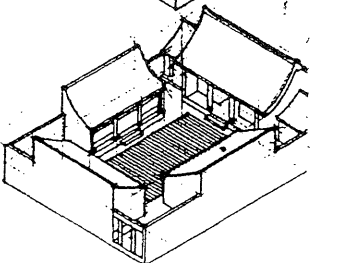
**patio**

A courtyard, esp. of a house, enclosed by low buildings, arcades, or walls.



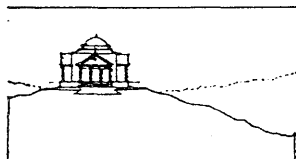
**atrium**

An open, skylit court around which a house or building is built.



**palazzo**

A large, imposing public building or private residence, esp. in Italy.



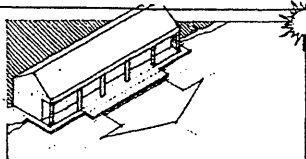
**claim**  
To assert or demand recognition or possession.



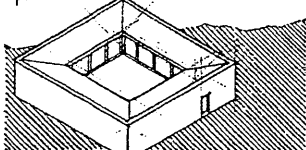
**merge**  
To combine, blend, or unite gradually by stages so as to blur identity or distinctions.

**plaza**  
A public square or open space in a city or town.

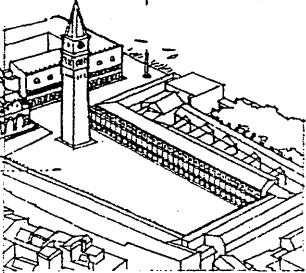
**piazza**  
An open square or public place in a city or town, esp. in Italy.



**front**  
To face in a specific direction or look out upon.



**surround**  
To enclose or encompass on all sides.



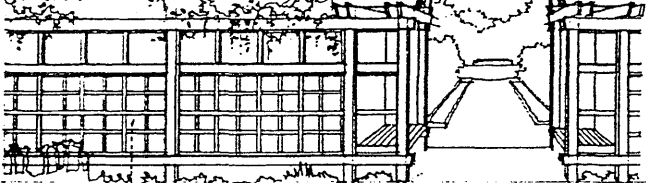
**quadrangle**  
A square or quadrangular space or court surrounded by a building or buildings, as on a college campus. Also called quad.

**galleria**  
A spacious promenade, court, or indoor mall, usually having a vaulted roof and lined with commercial establishments.

**promenade**  
An area used for a stroll or walk, esp. in a public place, as for pleasure or display.

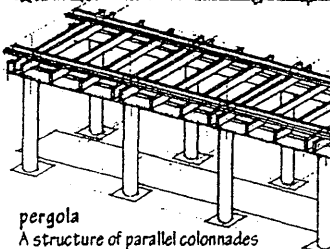
**allée**  
French term for a broad walk planted with trees.

**arbor**  
A shelter of shrubs and branches or of latticework intertwined with climbing vines and flowers.



**trellis**  
A frame supporting open latticework, used as a screen or a support for growing vines or plants.

**lattice**  
A structure of crossed strips arranged to form a regular pattern of open spaces.



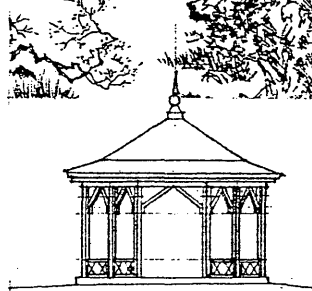
**pergola**  
A structure of parallel colonnades supporting an open roof of beams and crossing rafters or trelliswork, over which climbing plants are trained to grow.

**orientation**  
The position of a building on a site in relation to true north, to points on the compass, to a specific place or feature, or to local conditions of sunlight, wind, and drainage.

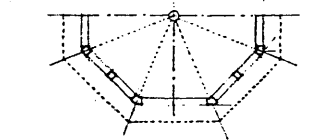


**folly**  
A whimsical or extravagant structure built to serve as a conversation piece, lend interest to a view, or commemorate a person or event.

**pavilion**  
A small, often ornamental building in a garden.



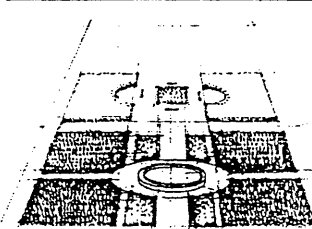
**gazebo**  
A freestanding roofed structure, usually open on the sides, affording shade and rest in a garden or park.



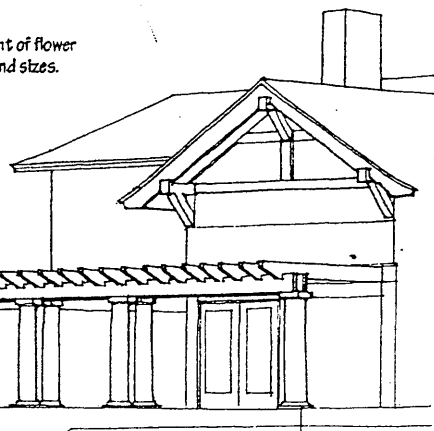
**belvedere**  
A building, or architectural feature of a building, designed and situated to look out upon a pleasing scene.



**topiary**  
Clipped or trimmed into ornamental and fantastic shapes, or the work or art of such clipping.



**parterre**  
An ornamental arrangement of flower beds of different shapes and sizes.



## suspension structure

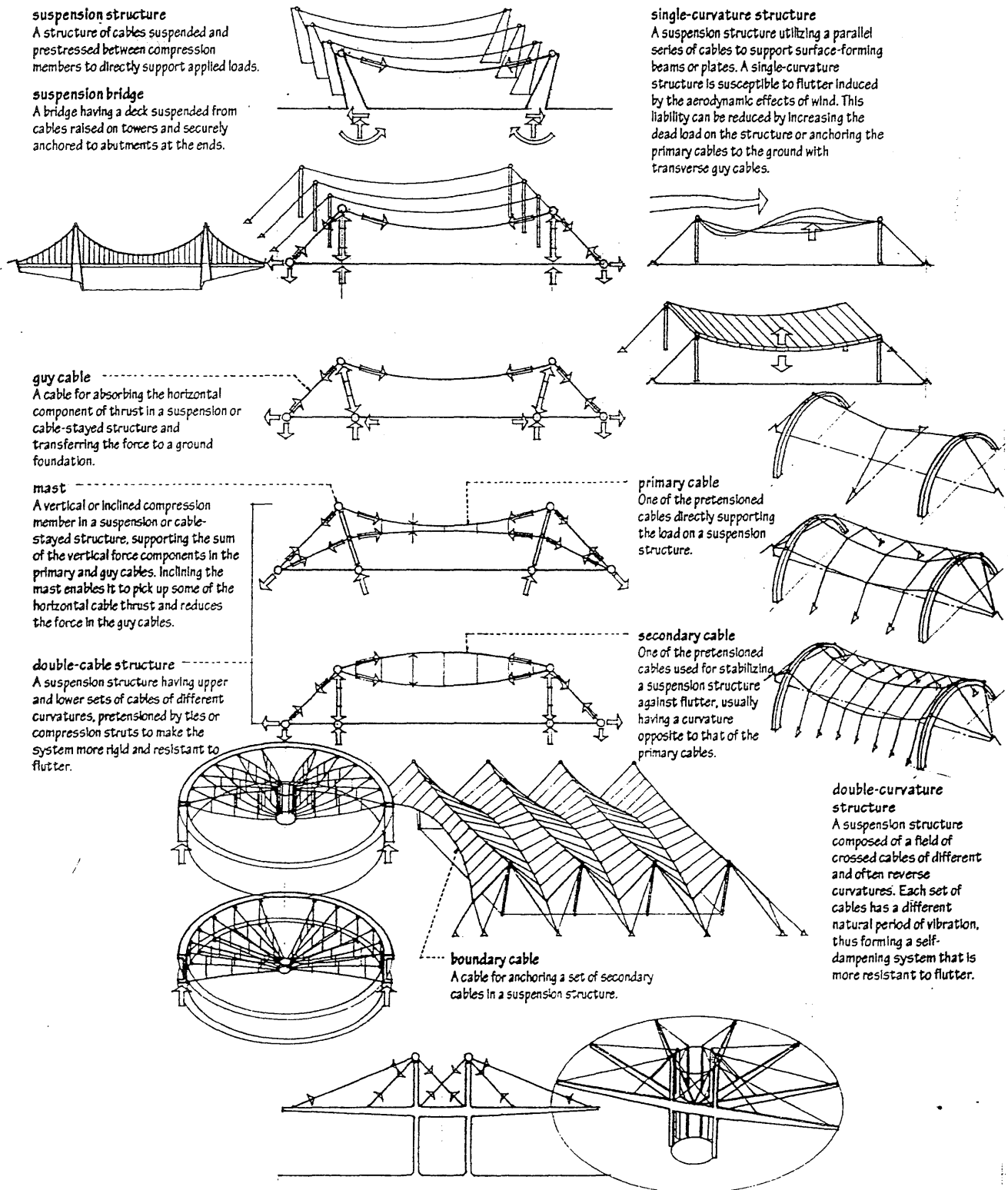
A structure of cables suspended and prestressed between compression members to directly support applied loads.

## suspension bridge

A bridge having a deck suspended from cables raised on towers and securely anchored to abutments at the ends.

## single-curvature structure

A suspension structure utilizing a parallel series of cables to support surface-forming beams or plates. A single-curvature structure is susceptible to flutter induced by the aerodynamic effects of wind. This liability can be reduced by increasing the dead load on the structure or anchoring the primary cables to the ground with transverse guy cables.



## guy cable

A cable for absorbing the horizontal component of thrust in a suspension or cable-stayed structure and transferring the force to a ground foundation.

## mast

A vertical or inclined compression member in a suspension or cable-stayed structure, supporting the sum of the vertical force components in the primary and guy cables. Inclining the mast enables it to pick up some of the horizontal cable thrust and reduces the force in the guy cables.

## double-cable structure

A suspension structure having upper and lower sets of cables of different curvatures, pretensioned by ties or compression struts to make the system more rigid and resistant to flutter.

## primary cable

One of the pretensioned cables directly supporting the load on a suspension structure.

## secondary cable

One of the pretensioned cables used for stabilizing a suspension structure against flutter, usually having a curvature opposite to that of the primary cables.

## double-curvature structure

A suspension structure composed of a field of crossed cables of different and often reverse curvatures. Each set of cables has a different natural period of vibration, thus forming a self-dampening system that is more resistant to flutter.

## boundary cable

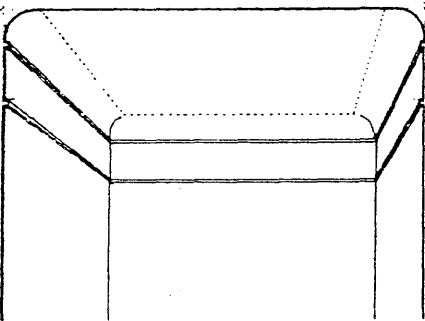
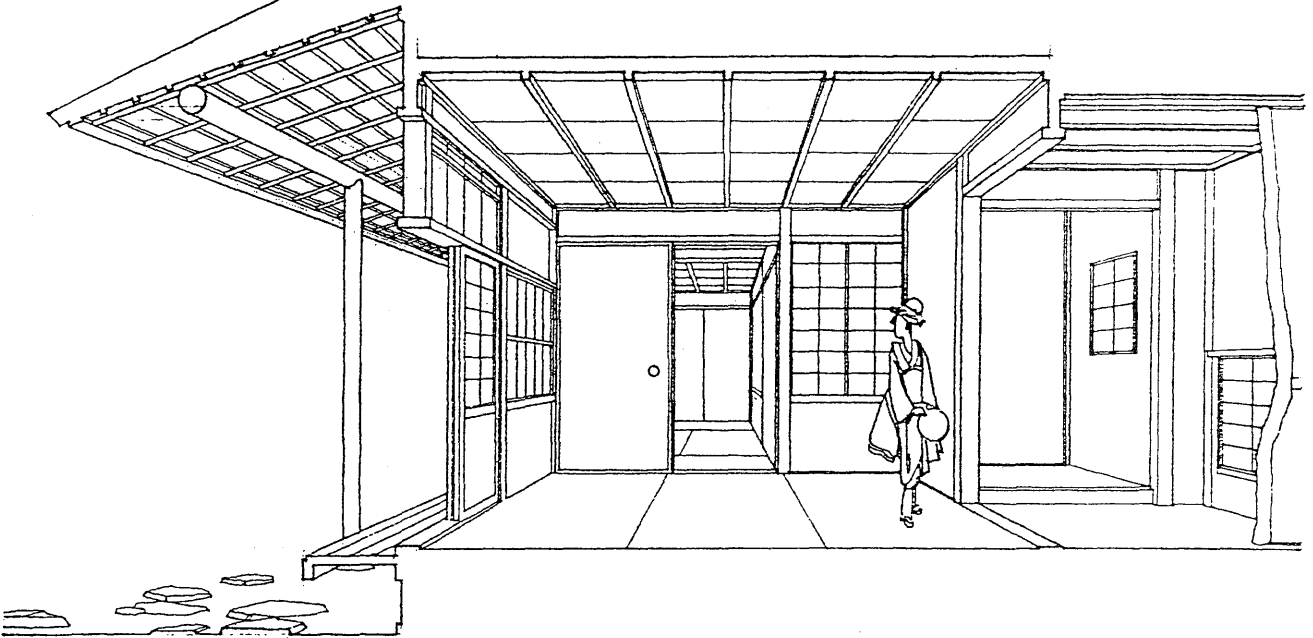
A cable for anchoring a set of secondary cables in a suspension structure.

## cable-stayed structure

A structure having vertical or inclined masts from which cables extend to support horizontally spanning members arranged in a parallel or radial pattern.

## CEILING 1

The overhead interior surface or lining of a room, often concealing the underside of the floor or roof above.



### cove ceiling

A ceiling having a cove. Also, coved ceiling.

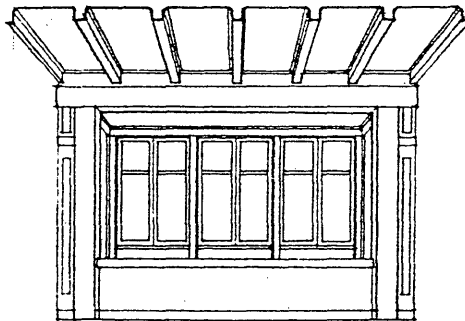
### cove

A concave surface forming part of a ceiling at its edge so as to eliminate the usual interior angle between the wall and the ceiling.



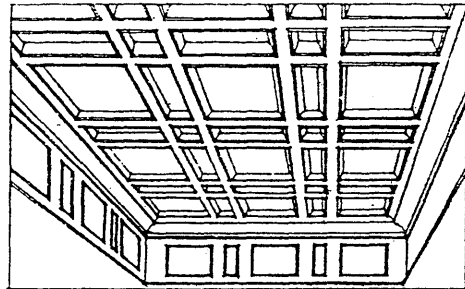
### camp ceiling

A ceiling having the form of a truncated pyramid.



### beam ceiling

The underside of a floor showing the supporting beams and finished to form a ceiling.

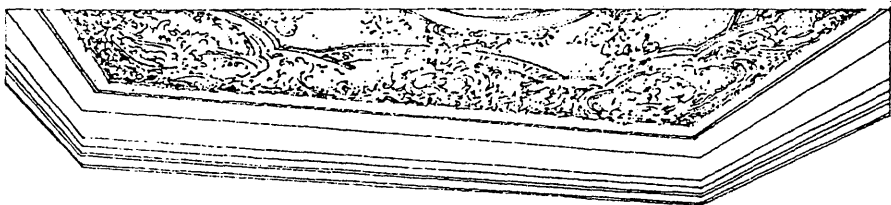
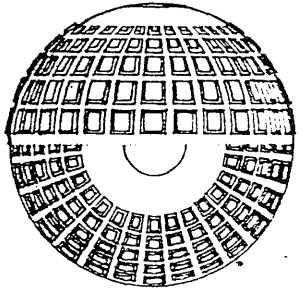


### coffer

One of a number of recessed, usually square or octagonal panels in a ceiling, soffit, or vault. Also called caisson, lacunar.

### lacunar

A ceiling, soffit, or vault adorned with a pattern of recessed panels.

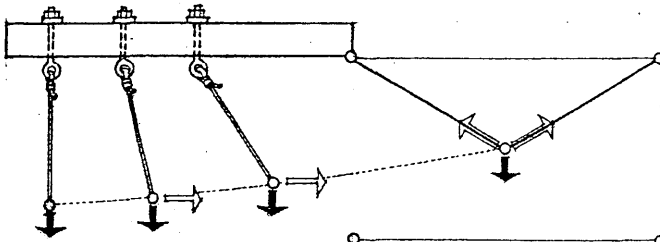


### plafond

A flat or vaulted ceiling of decorative character.

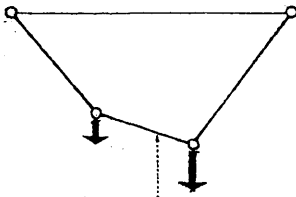
## CABLE STRUCTURE

A structural system utilizing the cable as the principal means of support.



### cable

A flexible structural member, as wire rope or metal chain, having high tensile strength but offering no resistance to compression or bending.



### funicular shape

The shape assumed by a freely deforming cable in direct response to the magnitude and location of external forces. A cable always adapts its shape so that it is in pure tension under the action of an applied load.

### funicular polygon

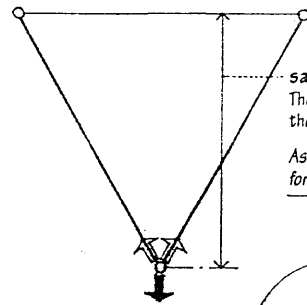
The shape assumed by a freely deforming cable in direct response to a set of concentrated loads.

### funicular curve

The shape assumed by a freely deforming cable in direct response to a uniformly distributed load.

### catenary

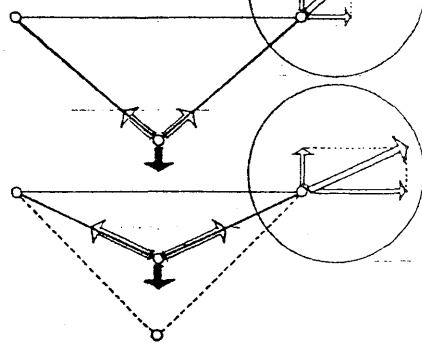
The curve assumed by a perfectly flexible, uniform cable suspended freely from two points not in the same vertical line. For a load that is uniformly distributed in a horizontal projection, the curve approaches that of a parabola.



### sag

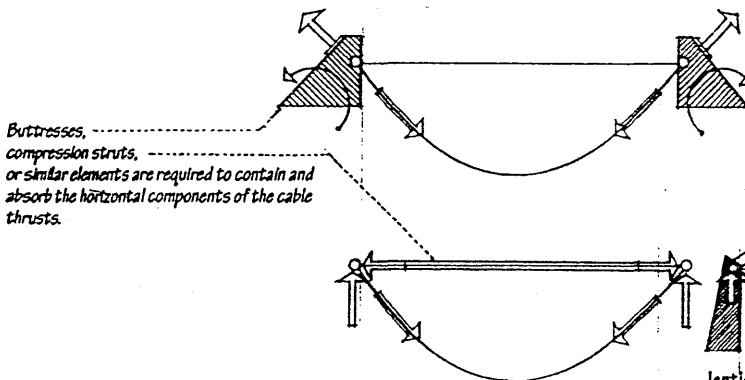
The vertical distance from the supports to the lowest point of a cable structure.

As the sag of a cable increases, the internal forces developed in the cable decrease.

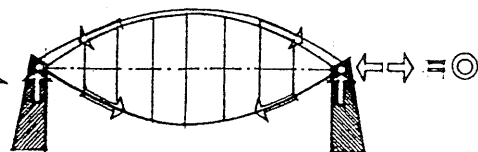


### funicular structure

A structure shaped to carry or support a given loading by either axial tension or compression. For any given loading condition, there is only one general funicular shape. If the loading pattern changes, bending is induced in the structure.



Buttresses, compression struts, or similar elements are required to contain and absorb the horizontal components of the cable thrusts.

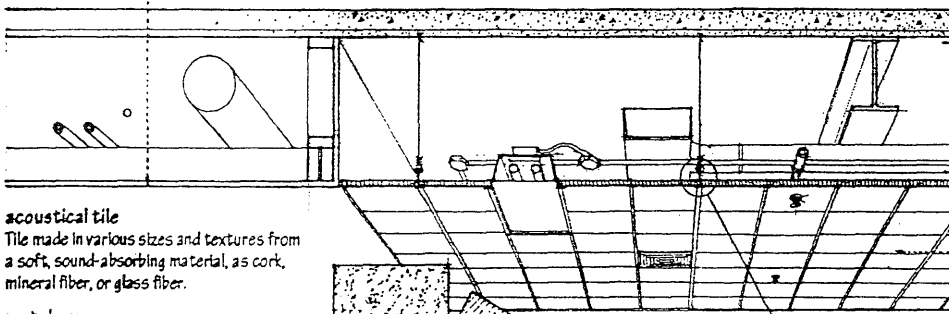


### lenticular structure

A lens-shaped structure having the outward thrusts of an arch balanced by the inward pulls of a cable, resulting in no net lateral forces at the supports.

### drop ceiling

A secondary ceiling formed to provide space for piping or ductwork, or to alter the proportions of a room. Also, dropped ceiling.

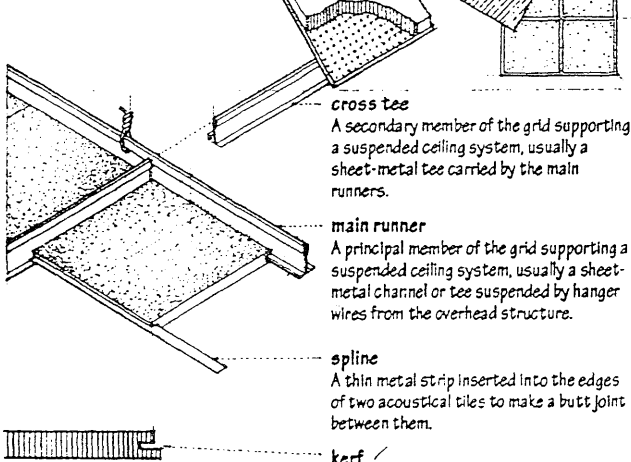


### acoustical tile

Tile made in various sizes and textures from a soft, sound-absorbing material, as cork, mineral fiber, or glass fiber.

### metal pan

An acoustical tile consisting of a steel or aluminum pan having a perforated face and containing a separate layer of sound-absorbing material.



### cross tee

A secondary member of the grid supporting a suspended ceiling system, usually a sheet-metal tee carried by the main runners.

### main runner

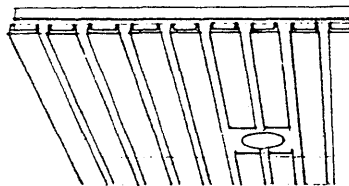
A principal member of the grid supporting a suspended ceiling system, usually a sheet-metal channel or tee suspended by hanger wires from the overhead structure.

### spline

A thin metal strip inserted into the edges of two acoustical tiles to make a butt joint between them.

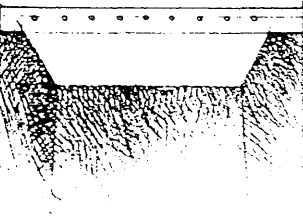
### kerf

A groove cut into the edges of an acoustical tile to receive a spline or T-shaped member of a supporting grid.



### linear metal ceiling

A suspended ceiling system of narrow metal strips, usually incorporating modular lighting and air-handling components.

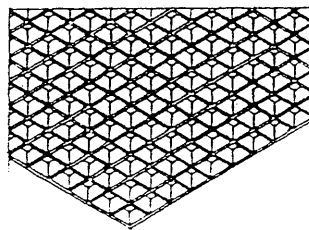


### luminous ceiling

A suspended ceiling of translucent panels for diffusing the light from luminaires mounted above it.

### louvered ceiling

A suspended ceiling of multicellular louvers for shielding the light sources mounted above it.



### suspended ceiling

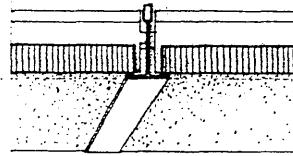
A ceiling suspended from an overhead floor or roof structure to provide space for pipes, ductwork, lighting fixtures, or other service equipment.

### plenum

The space between a suspended ceiling and the floor structure above, esp. one that serves as a receiving chamber for conditioned air to be distributed to inhabited spaces or for return air to be conveyed back to a central plant for processing.

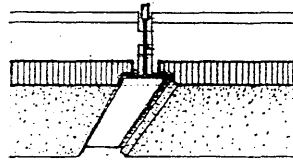
### acoustical ceiling

A ceiling of acoustical tile or other sound-absorbing material.



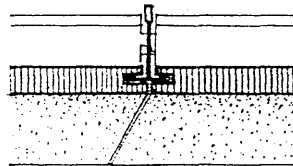
### exposed grid

A metal grid of inverted tees supporting the acoustical tiles of a suspended ceiling.



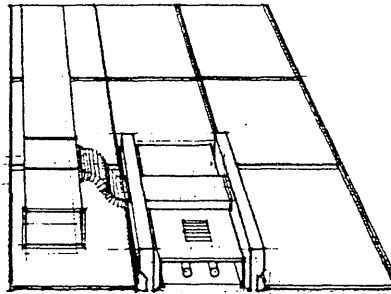
### recessed grid

A metal grid for supporting a suspended ceiling of acoustical tiles having rabbeted joints.



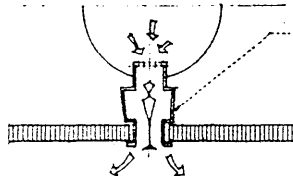
### concealed grid

A metal grid supporting the acoustical tiles of a suspended ceiling, hidden within kerfs cut into the edges of the tiles.



### integrated ceiling

A suspended ceiling system incorporating acoustical, lighting, and air-handling components into a unified whole.

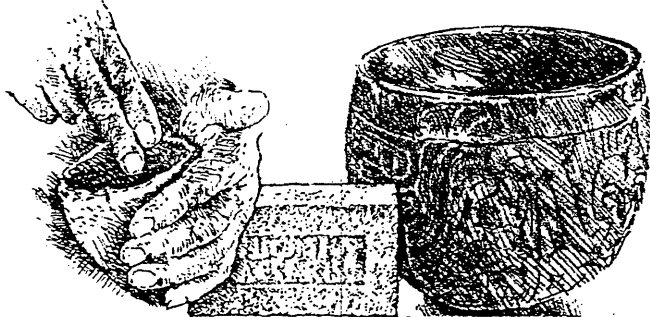


### linear diffuser

A long, narrow diffuser designed to disperse air through slots between the panels of an integrated ceiling system. Also called slot diffuser.

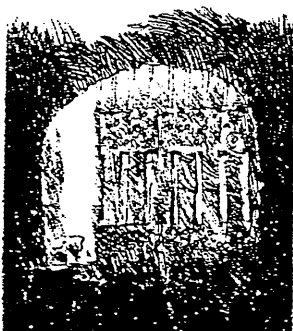
# CERAMIC

Any of various hard, brittle, noncorrosive, and nonconductive materials formed by the ionic bonding of a metal and a nonmetal, as brick, concrete, and natural stone.



## ceramic ware

Any of various products made by firing clay or similar materials in a kiln, as brick, tile, and pottery.



## firing

The process of hardening or glazing ceramic ware by heating in a kiln to a specified temperature.

## hard-burned

Fired at a high temperature to near vitrification and having relatively low absorption and high compressive strength.

## soft-burned

Fired at a low temperature and having relatively high absorption and low compressive strength.

## earthenware

Low-fired, opaque, nonvitreous ceramic ware.

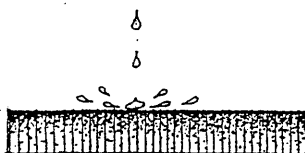
## stoneware

High-fired, opaque, vitrified ceramic ware.



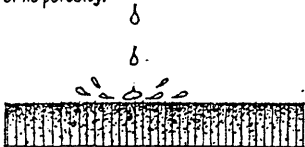
## vitrify

To make a clay body vitreous by firing at a specified temperature.



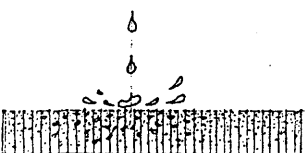
## vitreous

Resembling glass, as in transparency, hardness, brittleness, luster, or having low or no porosity.



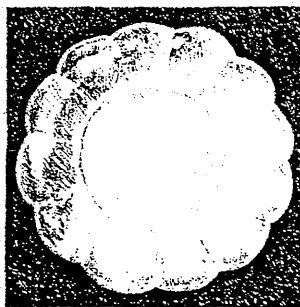
## semivitreous

Having a moderate water absorption of slightly under 6%.



## nonvitreous

Having a water absorption greater than 7%.



## porcelain

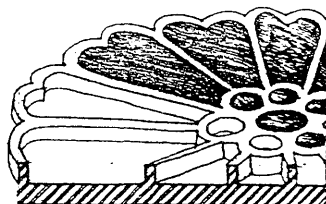
A hard, vitreous, translucent ceramic material consisting essentially of kaolin, feldspar, and quartz, fired at a very high temperature.

## china

A translucent ceramic material, bisque-fired at a high temperature and glaze-fired at a lower temperature.

## kaolin

A fine white clay used in the manufacture of porcelain and white portland cement. Also called china clay.

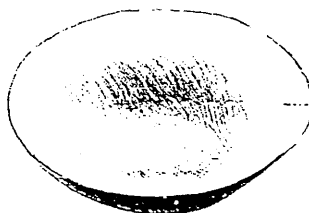


## enamel

A vitreous, usually opaque, decorative or protective coating applied by fusion to the surface of metal, glass, or pottery.

## porcelain enamel

An opaque, glassy coating bonded to metal by fusing at a high temperature. Also called vitreous enamel.



## ceramic bond

A thermochemical bond between materials resulting from exposure to temperatures approaching the fusion point of the mixture.

## body

The structural portion of a ceramic article or the clay material or mixture from which it is made.



## bisque-fired

Fired to harden a clay body.

## bisque

Earthenware or porcelain that has been fired once but not glazed. Also called biscuit.

## glaze-fired

Fired to fuse a glaze to a clay body.

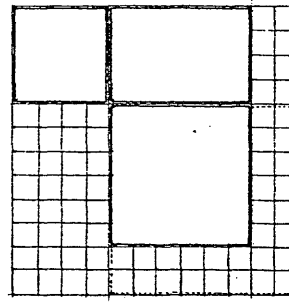
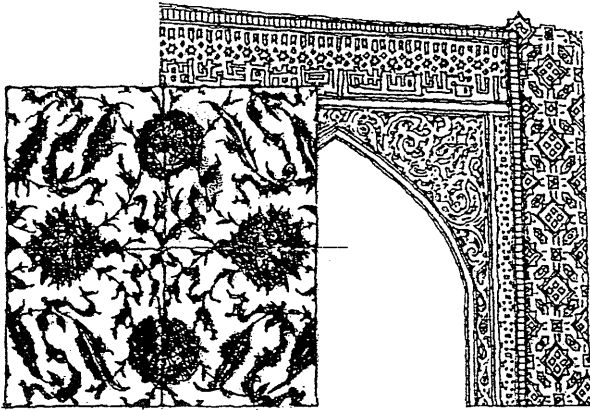
## glaze

A vitreous layer or coating fused to a clay body to color, decorate, waterproof, or strengthen its surface.

## frit

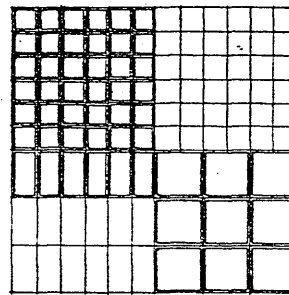
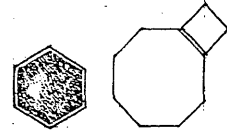
A fused or partially fused material that is ground to introduce a soluble or unstable ingredients into glazes or enamels.





**ceramic tile**  
Any of various fired clay tiles used for surfacing walls, floors, and countertops.

**glazed wall tile**  
Ceramic tile having a nonvitreous body and a bright, matte, or crystalline glaze, used for surfacing interior walls and light-duty floors.

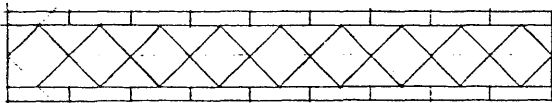
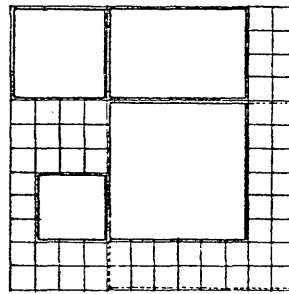
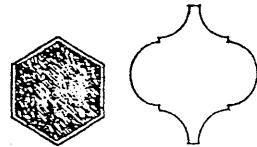


**ceramic mosaic tile**  
Small ceramic tile having a porcelain or natural clay body, glazed for surfacing walls or unglazed for use on both floors and walls, and usually face- or back-mounted on sheets to facilitate handling and speed installation.

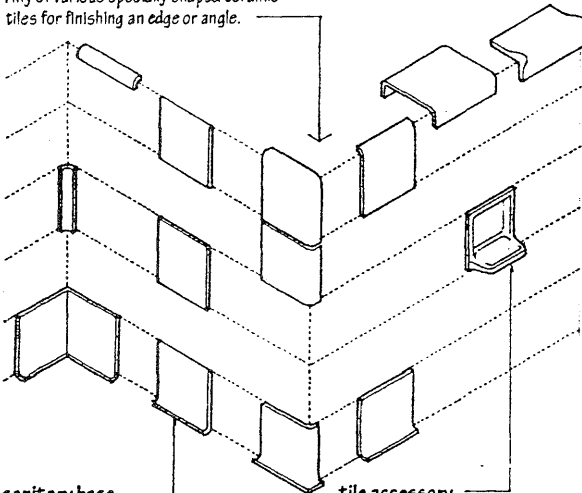


**quarry tile**  
Unglazed ceramic floor tile having a natural clay body. Also called promenade tile.

**paver tile**  
Unglazed ceramic floor tile similar in composition to ceramic mosaic tile but thicker and larger in surface area.

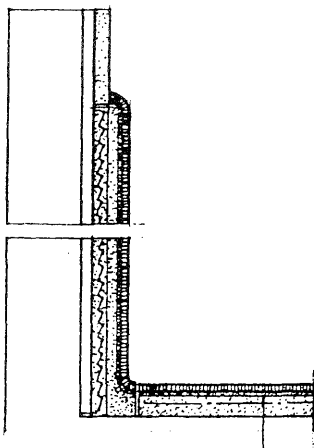


**trimmer**  
Any of various specially shaped ceramic tiles for finishing an edge or angle.



**sanitary base**  
A covered tile set at the meeting of a floor and wall to prevent accumulation of dirt and to facilitate cleaning.

**tile accessory**  
Any of the ceramic or nonceramic articles designed to be affixed to or inserted in tilework, as towel bars, soap holders, and the like.



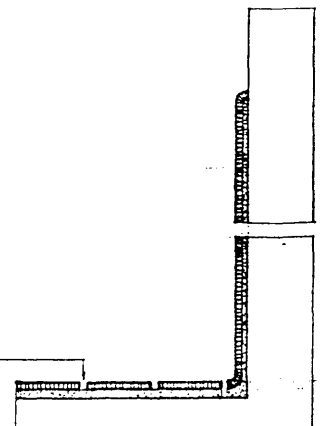
**thick-set process**  
A tiling process in which ceramic tile is applied over a portland cement mortar bed  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. (19 to 38 mm) thick, which allows for accurate slopes and planes in the finished work.

**portland cement mortar**  
A field mix of portland cement, sand, water, and sometimes hydrated lime, used for leveling or setting ceramic tile in the thick-set process.

**bond coat**  
A thin coat of mortar for bonding ceramic tile to a backing.

**thin-bed process**  
A tiling process in which ceramic tile is bonded to a continuous, stable backing with a thin coat of dry-set mortar, latex-portland cement mortar, epoxy mortar, or an organic adhesive,  $\frac{1}{32}$  to  $\frac{1}{8}$  in. (0.8 to 3.2 mm) thick.

**tile grout**  
A cementitious or resinous mix for filling joints in ceramic tilework.



## CERAMIC

### structural clay tile

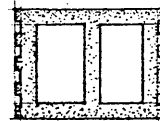
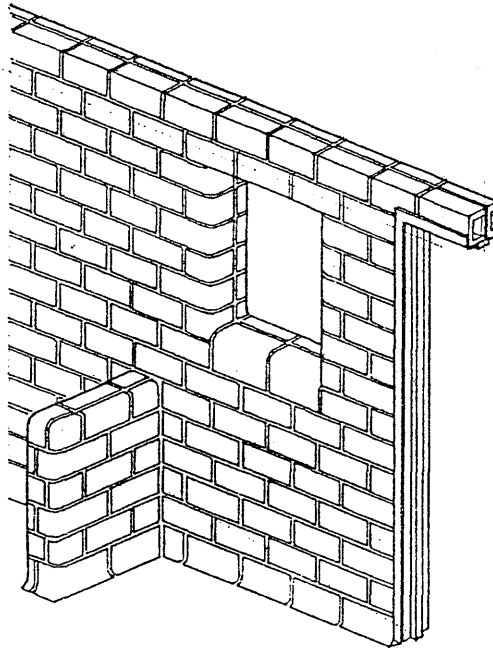
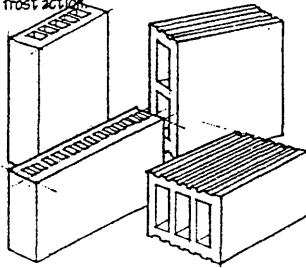
A hollow tile of fired clay having parallel cells or cores, used in building walls and partitions.

#### LB

Load-bearing structural clay tile suitable for masonry walls not exposed to frost action, or in exposed masonry where protected by a facing of 3 in. (76.2 mm) or more of stone, brick, terra cotta, or other masonry.

#### LBX

Load-bearing structural clay tile suitable for masonry walls exposed to weathering or frost action.



### hollow tile

Any of various cellular building units of fired clay, concrete, or gypsum, used for building walls, floors, and roofs, or for fireproofing steelwork.

### structural facing tile

Structural clay tile having a glazed surface, used for facing walls and partitions, esp. in areas subject to heavy wear, moisture problems, and strict sanitation requirements.

#### FTS

Structural facing tile suitable for exposed exterior and interior masonry walls and partitions where moderate absorption, slight variation in face dimensions, minor defects in surface finish, and medium color range are acceptable.

#### FTX

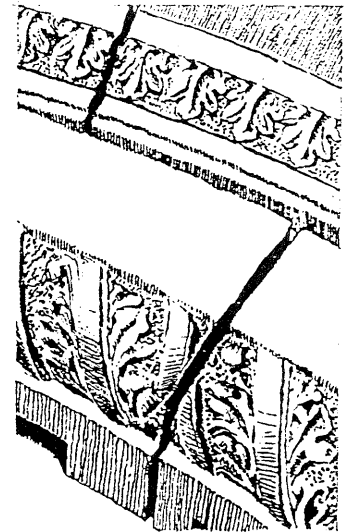
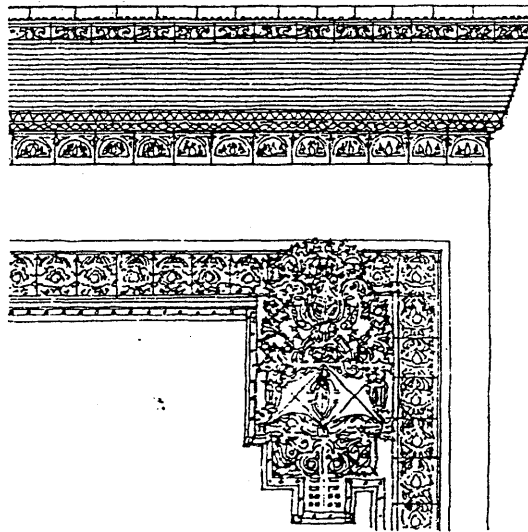
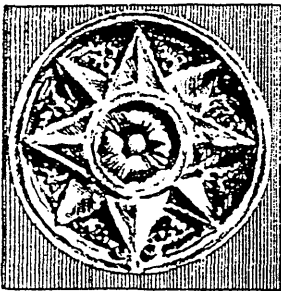
Smooth structural facing tile suitable for exposed exterior and interior masonry walls and partitions where low absorption and stain resistance are required, and where a high degree of mechanical perfection, minimum variation in face dimensions, and narrow color range are desired.

### terra cotta

A hard, fired clay, reddish-brown in color when unglazed, used for architectural facings and ornaments, tile units, and pottery.

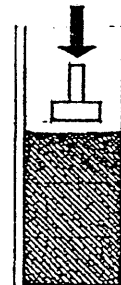
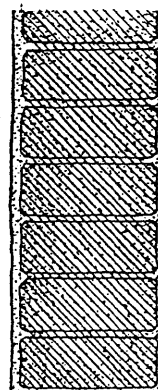
### architectural terra cotta

Hard-burned, glazed or unglazed terra cotta, hand-molded or machine-extruded to order as a ceramic veneer for walls or for ornamentation.



### adobe

Sun-dried brick made of clay and straw, commonly used in countries with little rainfall.



### rammed earth

A stiff mixture of clay, sand or other aggregate, and water compressed and dried within forms as a wall construction. Also called pisé, pisay, pisé de terre.

A building for public Christian worship.

## Christianity

The religion, founded on the teachings of Jesus Christ, including the Catholic, Protestant, and Eastern Orthodox churches.

### basilica

An early Christian church, characterized by a long, rectangular plan, a high colonnaded nave lit by a clerestory and covered by a timbered gable roof, two or four lower side aisles, a semicircular apse at the end, a narthex, and often other features, as an atrium, a bema, and small semicircular apses terminating the aisles.

### atrium

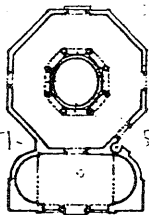
The forecourt of an early Christian church, flanked or surrounded by porticoes.

### ambulatory

The covered walk of an atrium or cloister.

### antiarthrus

A basin for a ritual cleansing with water in the atrium of an early Christian basilica.



### baptistry

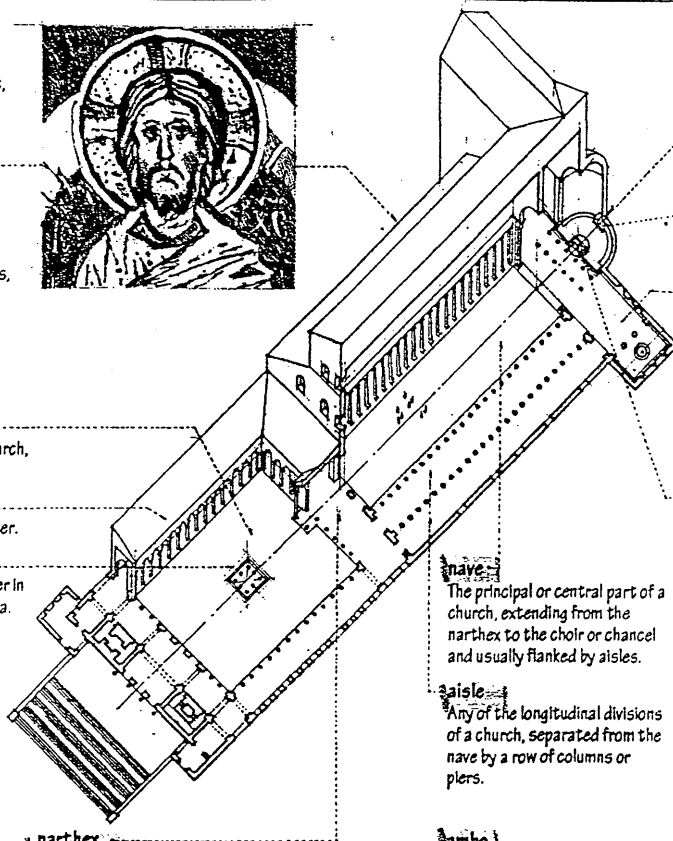
A part of a church or a separate building in which baptism is administered. Also, baptistry.

### baptism

A sacrament of initiation into Christianity, symbolic of spiritual regeneration, marked by a ceremonial immersion or application of water.

### font

A basin, usually of stone, holding the water used in baptism.



### apse

A semicircular or polygonal projection of a building, usually vaulted and used esp. at the sanctuary or east end of a church. Also, apsis.

### tribune

The bishop's throne, occupying a recess or apse in an early Christian church.

### bema

A transverse open space separating the nave and the apse of an early Christian church, developing into the transept of later cruciform churches.

### sanctuary

A sacred or holy place, as that part of a church in which the principal altar is placed.

### altar

The table in a Christian church upon which the Eucharist, the sacrament celebrating Christ's Last Supper, is celebrated. Also called communion table.

### baldachin

An ornamental canopy of stone or marble permanently placed over the altar in a church. Also, baldachino, baldaquin. Also called ciborium.

### nave

The principal or central part of a church, extending from the narthex to the choir or chancel and usually flanked by aisles.

### aisle

Any of the longitudinal divisions of a church, separated from the nave by a row of columns or piers.

### ambo

Either of two raised stands from which the Gospels or Epistles were read or chanted in an early Christian church. Also, ambon.

### narthex

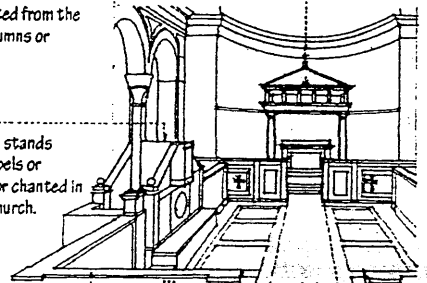
The portico before the nave of an early Christian or Byzantine church, appropriated to penitents.

### esonarthex

An inner narthex when two are present.

### exonarthex

A covered walk or outer narthex situated before an inner narthex.



### cancell

A low screen in an early Christian basilica, separating the clergy and sometimes the choir from the congregation.

### sarcophagus

A stone coffin, esp. one bearing sculpture or inscriptions and displayed as a monument.

### bema

The sanctuary space surrounding the altar of an Eastern church.

### diaconicon

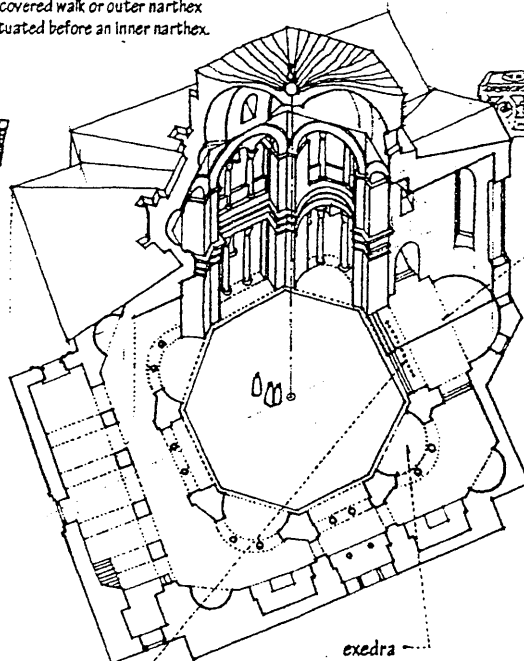
A sacristy in an early Christian or Eastern church, usually on the south side of the bema.

### sacristy

A room in a church where the sacred vessels and vestments are kept. Also called vestry.

### prothesis

A chapel in an Eastern Church where the Eucharistic elements are prepared, usually on the north side of the bema.



### exedra

A large apsidal extension of the interior volume of a church. Also, exhedra.

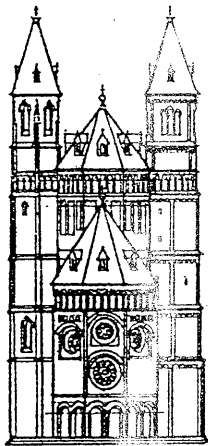
### iconostasis

A screen or partition on which icons are placed, separating the bema from the nave of an Eastern church. Also, iconostas.



### icon

A representation of a sacred Christian personage, as Christ or a saint or angel, typically painted on a wood surface and itself venerated as being sacred, esp. in the tradition of the Eastern Church.



## westwork

The monumental western front of a Romanesque church, treated as a tower or towers containing a low entrance hall below and a chapel open to the nave above.

## wheel window

A rose window having distantly radiating mullions or bars. Also called Catherine wheel, marigold window.

## tympanum

The space between an arch and the horizontal head of a door or window below, often decorated with sculpture.

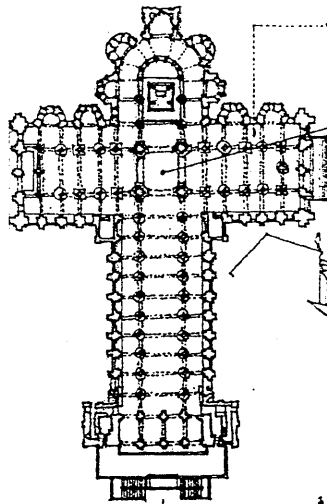
## trumeau

A column supporting the tympanum of a doorway at its center.



## tabernacle

A canopied recess for a religious image or icon.

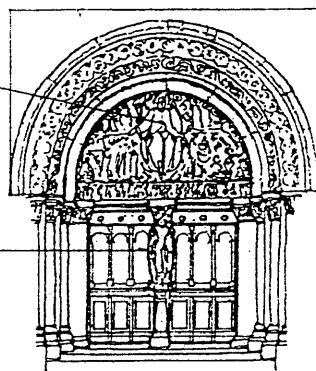
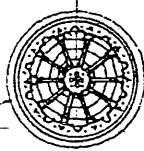


## transept

The major transverse part of a cruciform church, crossing the main axis at a right angle between the nave and choir.

## crossing

The intersection of the nave and transept in a cruciform church.

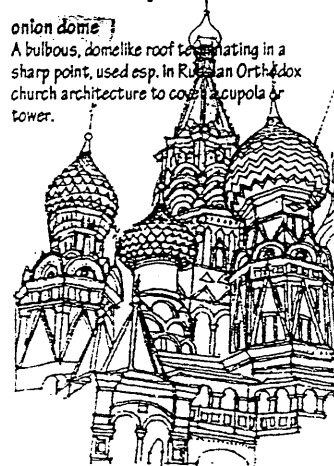


## campanile

A bell tower, usually one near but not attached to the body of a church.

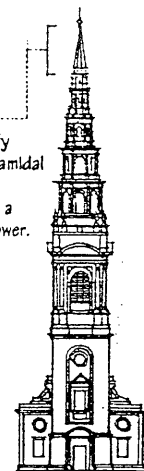
## onion dome

A bulbous, domelike roof terminating in a sharp point, used esp. in Russian Orthodox church architecture to cover a cupola or tower.



## spire

A tall, acutely tapering pyramidal structure surmounting a steeple or tower.



## steeple

A tall ornamental structure, usually ending in a spire and surmounting the tower of a church or other public building.

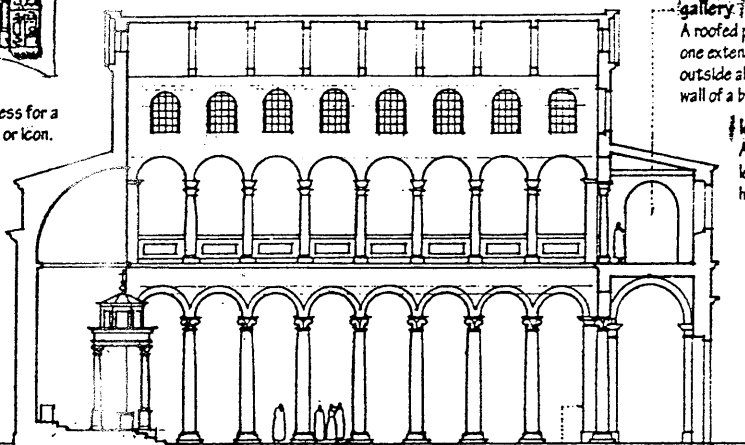


## gallery

A roofed promenade, esp. one extending inside or outside along the exterior wall of a building.

## loft

A gallery or upper level in a church or hall.



## arcade

A series of arches supported on piers or columns.

## arcuate

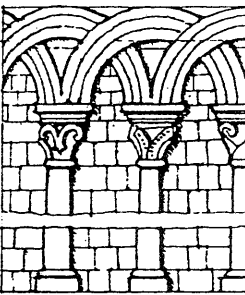
Curved or arched like a bow: a term used in describing the arched or vaulted structure of a Romanesque church or Gothic cathedral, as distinguished from the trabeated architecture of an Egyptian hypostyle hall or Greek Doric temple. Also, arcuated.

## respond

A pier or pilaster projecting from a wall as a support for an arch or lintel, esp. at the termination of an arcade or colonnade.

## dossieret

A thickened abacus or supplementary capital set above a column capital to receive the thrust of an arch. Also called impost block.



## interlacing arcade

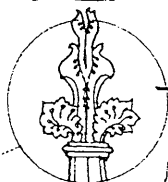
An arcade, esp. a blind one, composed of arches resting on alternate supports and overlapping in series where they cross. Also called intersecting arcade.

## blind arcade

A series of arches superimposed on a wall for decoration. Also called arcature.

## **fleche**

A slender spire rising from the ridge of a roof, esp. one above the crossing of a Gothic church.



## **finial**

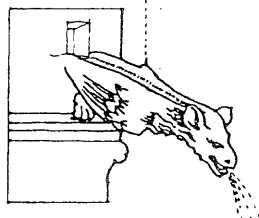
A relatively small, usually foliated ornament terminating the peak of a spire or pinnacle.

## **crocket**

A projecting ornament, usually in the form of curved foliage, used esp. in Gothic architecture to decorate the outer angles of pinnacles, spires, and gables.

## **gargoyle**

A grotesquely carved figure of a human or animal, esp. one with an open mouth that serves as a spout and projects from a gutter to throw rainwater clear of a building.



## **rose window**

A circular window, usually of stained glass and decorated with tracery symmetrical about the center.

## **stained glass**

Glass colored or stained by having pigments baked onto its surface or by having various metallic oxides fused into it while in a molten state.

## **triforium**

An arcaded story in a church, between the nave arches and clerestory and corresponding to the space between the vaulting and the roof of an aisle.

## **crypt**

An underground chamber or vault used as a burial place, esp. one beneath the main floor of a church.

## **rood**

A crucifix symbolizing the cross on which Christ was crucified, esp. a large one set above the entrance to the choir or chancel of a medieval church.

## **rood screen**

A screen, often elaborately adorned and properly surmounted by a rood, separating the chancel or choir from the nave of a medieval church.



## **chancel**

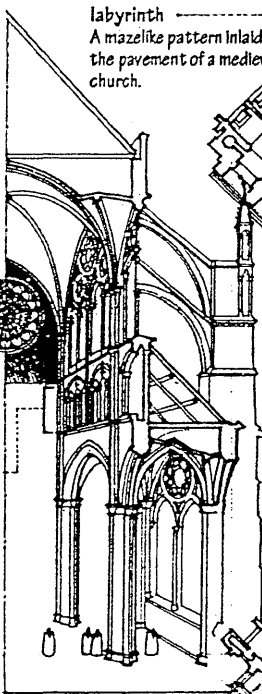
The space about the altar of a church for the clergy and choir, often elevated above the nave and separated from it by a railing or screen.

## **chantry**

A chapel endowed for the saying of Masses and prayers for the souls of the founders or of persons named by them.

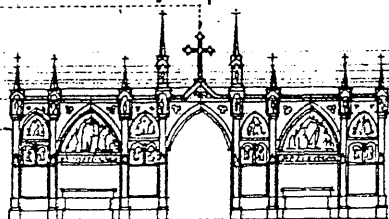
## **labyrinth**

A mazelike pattern inlaid in the pavement of a medieval church.



## **galilee**

A small porch used as a chapel for penitents at the west end of some medieval English churches. Also, galilee porch.



## **cathedral**

The principal church of a diocese, containing the bishop's throne called the cathedra.

## **chapel**

A separately dedicated part of a church for private prayer, meditation, or small religious services.

## **chevet**

The rounded east end of a Gothic cathedral, including the apse and ambulatory.

## **ambulatory**

An aisle encircling the end of the choir or chancel of a church. Also called deambulatory.

## **choir**

The part of a church occupied by the singers of a choir, usually part of the chancel.

## **retrochoir**

A separate division behind the choir or high altar of a large church.

## **Lady chapel**

A chapel dedicated to the Virgin Mary, usually located behind the high altar of a cathedral at the extremity of the apse.

## **high altar**

The main altar of a church.

## **presbytery**

The part of a church reserved for the officiating clergy.

## **close**

An enclosed place, esp. the land surrounding or beside a cathedral.

## **slupe**

A covered passage, esp. one between the transept and chapter house of a cathedral. Also, slip.

## **chapter house**

The place where the chapter of a cathedral or monastery meets, usually a building attached to or a hall forming part of the cathedral or monastery.

## **chapter**

An assembly of the monks in a monastery, or the members of a religious house or order.

## **paradise**

An atrium or cloister beside a church.

## **cloister**

A covered walk having an arcade or colonnade on one side opening onto a courtyard.

## **garth**

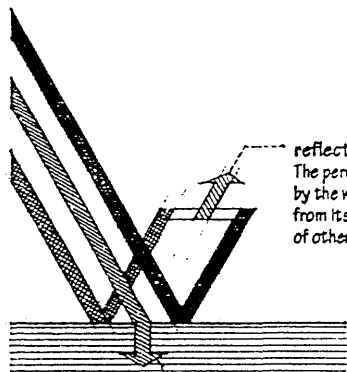
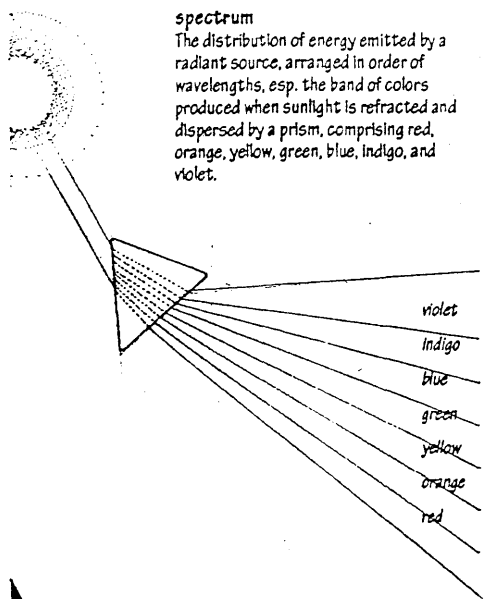
A courtyard or quadrangle enclosed by a cloister. Also called cloister garth.

## **alure**

A walk or passage, as along a cloister or behind the parapets of a castle. Also, allure.

## COLOR

A phenomenon of light and visual perception that may be described in terms of an individual's perception of hue, saturation, and lightness for objects, and hue, saturation, and brightness for light sources.



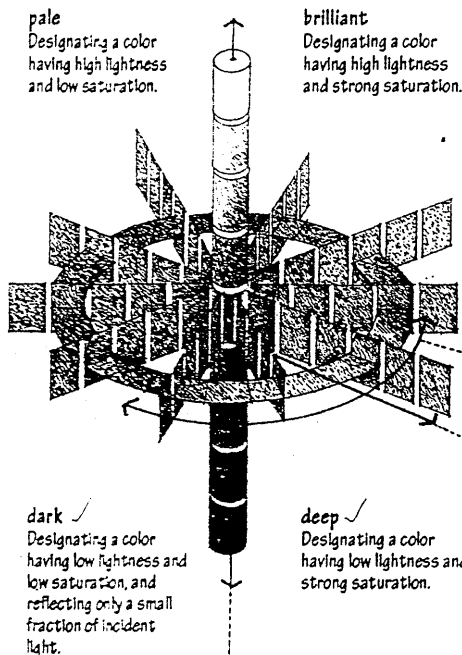
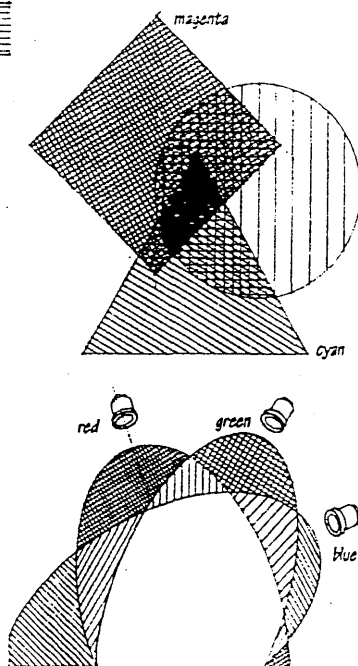
**selective absorption**  
The absorption of certain wavelengths of the light incident on a colored surface, the remaining portion being reflected or transmitted.

### subtractive color

A color produced by mixing cyan, yellow, and magenta pigments, each of which absorbs certain wavelengths. A balanced mixture of these colorant or subtractive primaries theoretically yields black since it absorbs all wavelengths of visible light.

### additive color

A color produced by combining lights of red, green, and blue wavelengths. These light or additive primaries contain all the wavelengths necessary to produce a colorless or white light.



### Munsell System

A system for specifying colors arranged in three orderly scales of uniform visual steps according to hue, chroma, and value, developed in 1898 by Albert H. Munsell. Hue extends in a rotary direction about a central axis through a spectrum of five major and five secondary hues. Value extends vertically direction from black at the bottom through a series of grays to white at the top. Chroma extends radially from the central axis at which saturation is zero, out to the strongest saturation attainable for each color's hue and value.

### hue

One of the three dimensions of color: the property of light by which the color of an object is classified as being red, yellow, green, or blue, or an intermediate between any contiguous pair of these colors.

### saturation

One of the three dimensions of color: the purity or vividness of a hue. Also called intensity.

### chroma

The degree by which a color differs from a gray of the same lightness or brightness, corresponding to saturation of the perceived color.

### lightness

The dimension of color by which an object appears to reflect more or less of the incident light, varying from black to white for surface colors and from black to colorless for transparent volume colors.

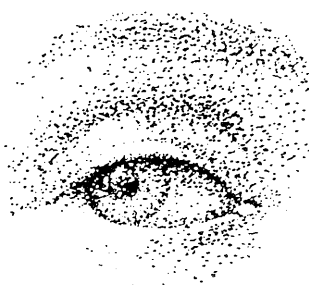
### value

The degree by which a color appears to reflect more or less of the incident light, corresponding to lightness of the perceived color.

### brightness

The dimension of a color which is correlated with luminance and by which visual stimuli are ordered continuously from very dim to very bright. Pure white has the maximum brightness, and pure black the minimum brightness.

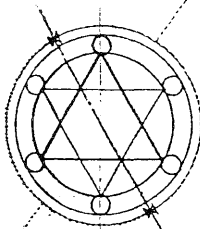
**gray scale**  
A scale of achromatic colors having several, usually ten, equal gradations ranging from white to black.



### optical mixing

The merging of juxtaposed dots or strokes of pure colors when seen from a distance to produce a hue often more luminous than that available from a premixed pigment.

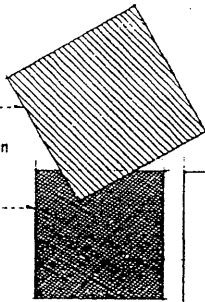
**warm**  
Designating a color inclined toward or dominated by red, orange, or yellow.



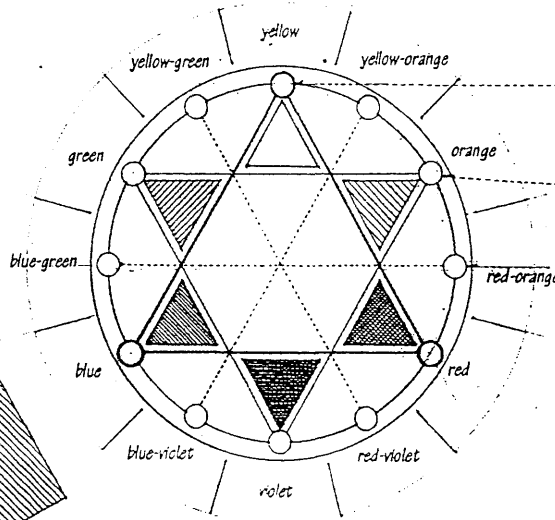
**cool**  
Designating a color inclined toward or dominated by green, blue, or violet.

**advancing color**  
A warm color that appears to move toward an observer, giving an illusion of space.

**receding color**  
A cool color that appears to move away from an observer, giving an illusion of space.



**color scheme**  
An arrangement or pattern of colors conceived of as forming an integrated whole.

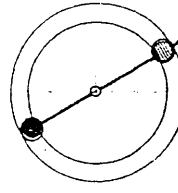
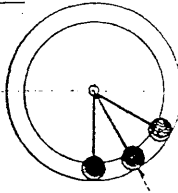


**color wheel**  
A circular scale of the colors of the spectrum, showing complementary colors opposite each other. Also called **color circle**.

**primary color**  
Any of a set of colors, as red, yellow, and blue, regarded as generating all other colors.

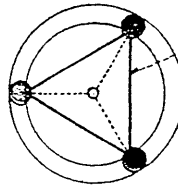
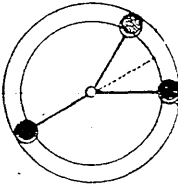
**secondary color**  
A color, as orange, green, or violet, produced by mixing two primary colors.

**tertiary color**  
A color, as brown, produced by mixing two secondary colors, or a secondary color with one of its constituent primaries.



**complementary color**  
One of a pair of opposing colors on a color wheel, perceived as completing or enhancing each other.

**analogous color**  
One of two or three closely related colors on a color wheel.



**triad**  
A combination of three colors forming an equilateral triangle on a color wheel.

**split complementary**  
A combination of one color and the pair of colors adjoining its complementary color on a color wheel.

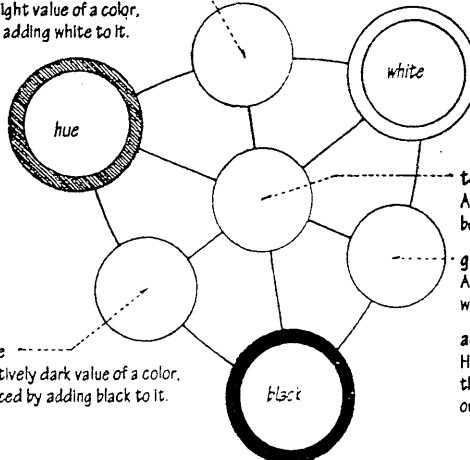
**double complementary**  
A combination of two analogous colors and their complementary colors on a color wheel.

**monochromatic**  
Having only one color or exhibiting varying intensities and values of a single hue.

**polychromatic**  
Having or exhibiting a variety of colors.

**tint**  
A relatively light value of a color, produced by adding white to it.

**color triangle**  
A triangular diagram developed by Faber Birren to describe the relationship between a pure hue, white, and black, which combine to yield secondary tints, tones, shades, and grays. All colors may be subjectively conceived as a mixture of the psychological primaries - red, yellow, green, and blue - plus the achromatic pair of white and black.

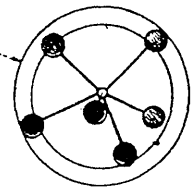


**shade**  
A relatively dark value of a color, produced by adding black to it.

**tone**  
An intermediate value of a color between a tint and a shade.

**gray**  
An achromatic color between white and black.

**achromatic**  
Having no saturation and therefore no hue, as white, black, or gray.



## COLUMN

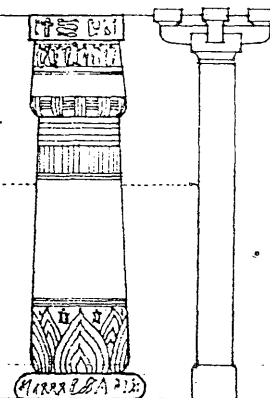
A rigid, relatively slender structural member designed primarily to support axial, compressive loads applied at the member ends.

### pillar

An upright, relatively slender shaft or structure, usually of brick or stone, used as a building support or standing alone as a monument.

### post

A stiff vertical support, esp. a wooden column in timber framing.



### buckling

The sudden lateral or torsional instability of a slender structural member induced by the action of a compressive load. Buckling can occur well before the yield stress of the material is reached.

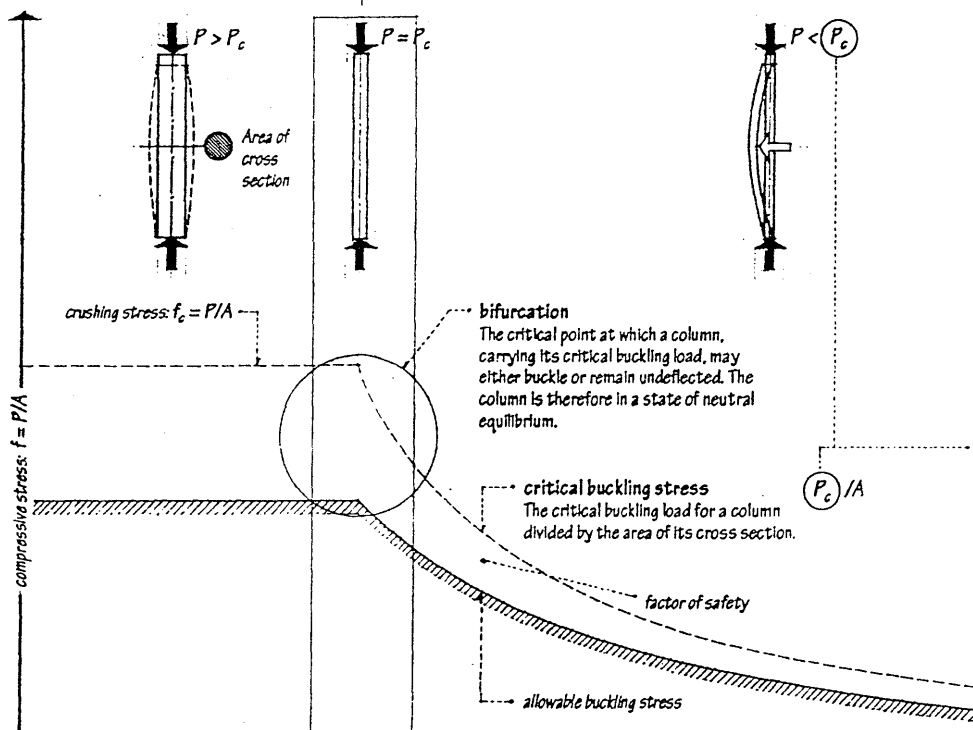
### buckling load

The axial load at which a column begins to deflect laterally and becomes unstable.

Under a buckling load, a column cannot generate the internal forces necessary to restore its original linear condition. Any additional loading would cause the column to deflect further until collapse occurs in bending. Most columns in practice are subject to both compression and bending due to variation in material properties, initial crookedness in fabrication, or some eccentricity in load application. This bending often causes the actual buckling load to be slightly lower than the critical buckling load.

### critical buckling load

The maximum axial load that can theoretically be applied to a column without causing it to buckle. The critical buckling load for a column is inversely proportional to the square of its effective length, and directly proportional to the modulus of elasticity of the material and to the moment of inertia of the cross section. Also called Euler buckling load.



### short column

A thick column subject to failure by crushing rather than by buckling. Failure occurs when the direct stress from an axial load exceeds the compressive strength of the material available in the cross section. An eccentric load, however, can produce bending and result in an uneven stress distribution in the section.

### intermediate column

A column having a mode of failure between that of a short column and a long column, often partly inelastic by crushing and partly elastic by buckling.

### slenderness ratio

The ratio of the effective length of a column to its least radius of gyration.

The higher the slenderness ratio, the lower is the critical stress that will cause buckling. A primary objective in the design of a column is to reduce its slenderness ratio by minimizing its effective length or maximizing the radius of gyration of its cross section.

### long column

A slender column subject to failure by buckling rather than by crushing.

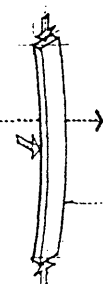
$$L_e / r$$

$$r = \sqrt{I/A}$$

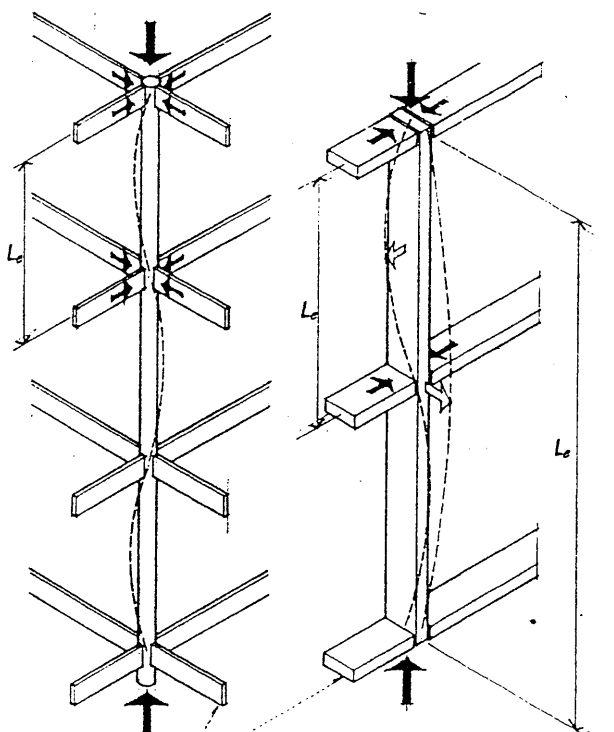
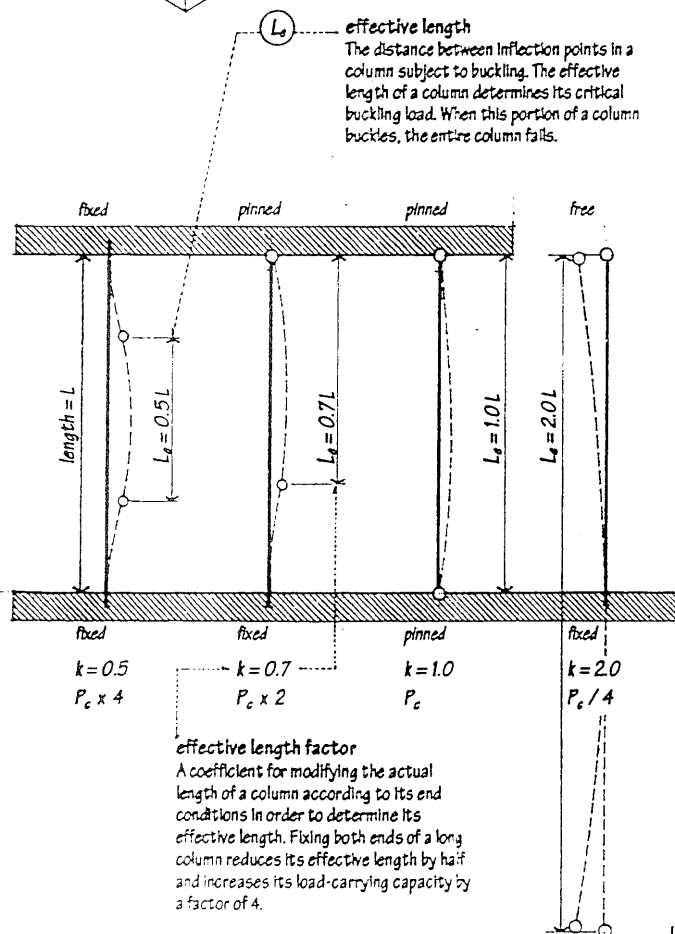
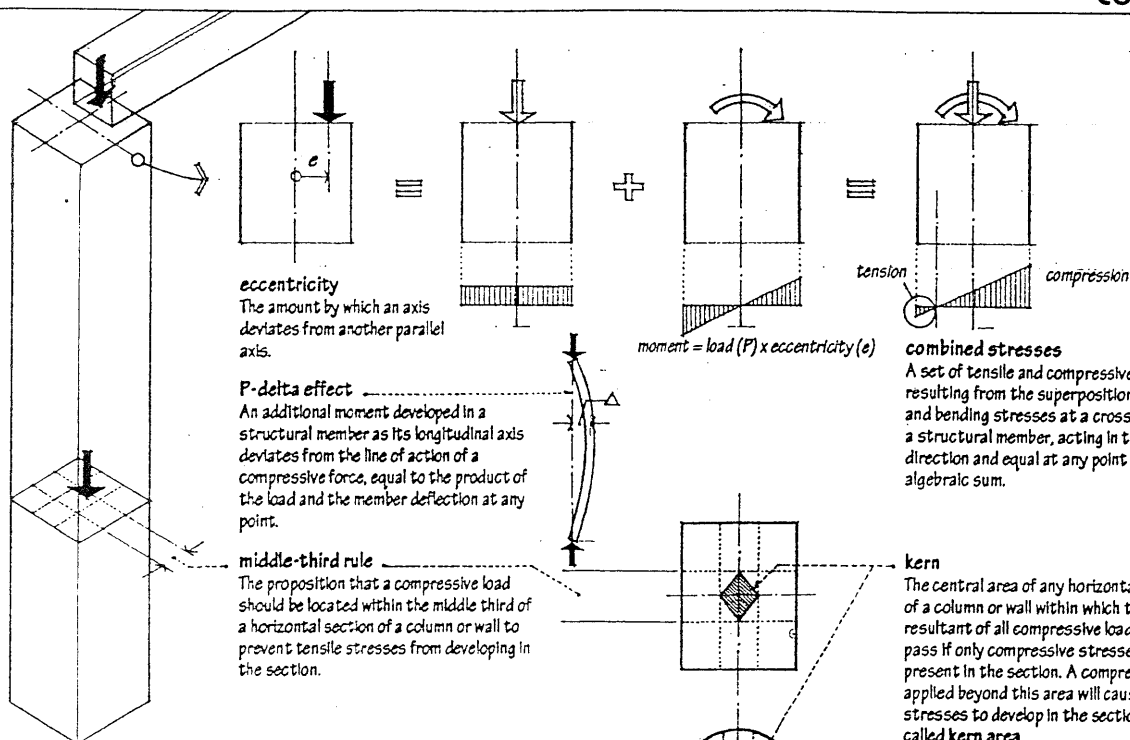
### radius of gyration

The radial distance from any axis to a point at which the mass of a body could be concentrated without altering the moment of inertia of the body about that axis. For a structural section, the radius of gyration is equal to the square root of the quotient of the moment of inertia and the area.

The higher the radius of gyration of a structural section, the more resistant the section is to buckling. In determining the cross-sectional shape of a column, the objective is to provide the necessary radius of gyration about the different axes. For an asymmetrical cross section, buckling will tend to occur about the weaker axis or in the direction of the least dimension.







## CONCRETE

An artificial, stonelike building material made by mixing cement and various mineral aggregates with sufficient water to cause the cement to set and bind the entire mass.



### natural cement

A naturally occurring clayey limestone which, when calcined and finely pulverized, produces a hydraulic cement.

### pozzolan

A siliceous material, as fly ash, that reacts chemically with slaked lime in the presence of moisture to form a slow-hardening cement, named after a natural cement from Pozzuoli, an ancient Roman town near Vesuvius. Also, pozzolona, pozzolana.

### siliceous

Containing silica or a silicate.

### fly ash

Fine particles of ash recovered from the waste gases of a solid-fuel furnace.

### cement

A calcined mixture of clay and limestone, finely pulverized and used as an ingredient in concrete and mortar. The term is frequently used incorrectly for concrete.

### tricalcium silicate

A compound constituting about half the volume of portland cement and responsible for the hardening or early gain in strength of the cement.

### dicalcium silicate

A compound constituting about one-quarter of the volume of portland cement and responsible for the aging or long-term gain in strength of the cement.

### tricalcium aluminate

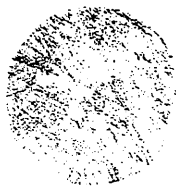
A compound constituting about one-tenth of the volume of portland cement and responsible for the initial setting of the cement.

### portland cement

A hydraulic cement made by burning a mixture of clay and limestone in a rotary kiln and pulverizing the resulting clinker into a very fine powder, named for its resemblance to a limestone quarried on the Isle of Portland, England.

### hydraulic cement

Cement capable of setting and hardening by a reaction with water.



### Type I: normal

A portland cement used for general construction, having none of the distinguishing qualities of the other types.

### Type II: moderate

A portland cement having a reduced content of tricalcium aluminate, making it more resistant to sulfates and causing it to generate less heat of hydration; used in general construction where resistance to moderate sulfate action is required or where heat buildup can be damaging, as in the construction of large piers and heavy retaining walls.

### Type III: high early strength

A very finely ground portland cement having an increased content of tricalcium silicate, causing it to cure faster and gain strength earlier than normal portland cement; used when the early removal of formwork is desired, or in cold-weather construction to reduce the time required for protection from low temperatures.

### Type IV: low heat

A portland cement having a reduced content of tricalcium silicate and an increased content of dicalcium silicate, causing it to generate less heat of hydration than normal portland cement; used in the construction of massive concrete structures, as gravity dams, where a large buildup in heat can be damaging.

### Type V: sulfate resisting

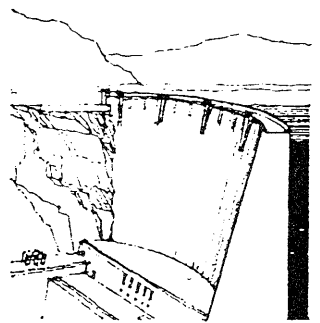
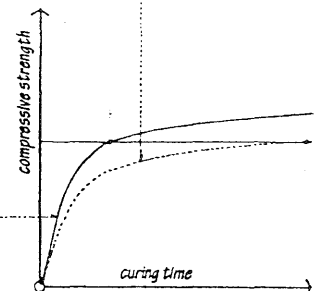
A portland cement having a reduced content of tricalcium aluminate, lessening the need for gypsum, a sulfate normally added to cement to retard its setting time; used where resistance to severe sulfate action is required.

### air-entraining portland cement

A Type I, Type II, or Type III portland cement to which a small quantity of an air-entraining agent has been interground during manufacture; designated by the suffix A, as Type IA, Type IIA, or Type IIIA.

### white portland cement

A portland cement produced from raw materials low in iron oxide and manganese oxide, the substances that give concrete its gray color; used in precast concrete work and in the making of terrazzo, stucco, and tile grout.

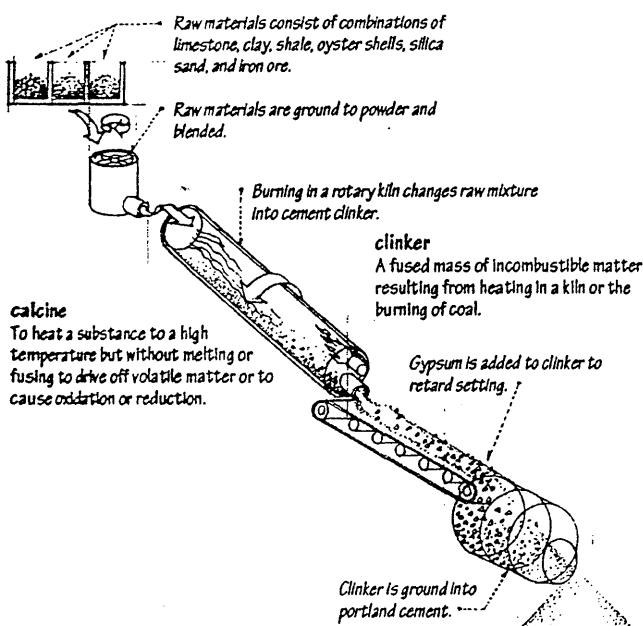


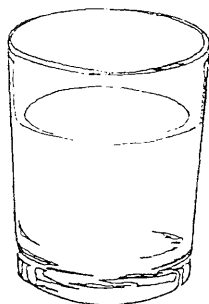
### sulfate action

An expansive reaction occurring when the cement matrix of concrete or mortar comes in contact with sulfates dissolved in ground water or in soil.

### entrained air

Microscopic, spherical air bubbles, typically 0.004 to 0.04 in. (0.1 to 1.0 mm) in diameter, intentionally dispersed in a concrete or mortar mix by an air-entraining agent.



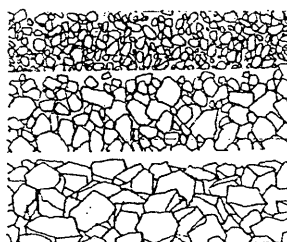


### mixing water

The water used in a concrete or mortar mix, exclusive of any absorbed by the aggregate and free of such harmful substances as organic material, clay, and salts. Water fit for drinking is generally acceptable.

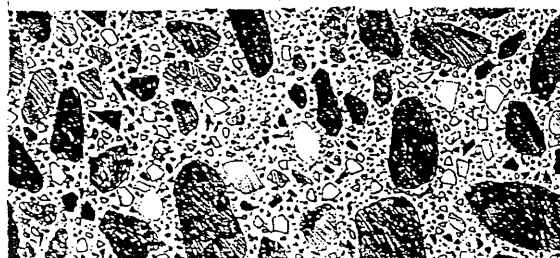
### cement paste

A mixture of cement and water for coating, setting, and binding the aggregate particles together in a concrete or mortar mix.



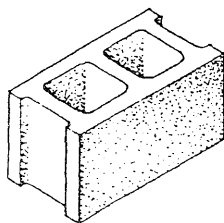
### aggregate

Any of various hard, inert, mineral materials, as sand and gravel, added to a cement paste to make concrete or mortar. Since aggregate represents from 60% to 80% of the concrete volume, its properties are important to the strength, weight, and fire-resistance of the hardened concrete. Aggregate should be hard, dimensionally stable, and free of clay, silt, and organic matter which can prevent the cementing matrix from binding the particles together.



### lightweight concrete

Concrete made with aggregate of low specific gravity and weighing less than normal concrete which has a unit weight of about 150 pcf (2,400 kg/m<sup>3</sup>).



### structural lightweight concrete

Concrete made with strong lightweight aggregate, as expanded shale or slate, having a unit weight from 85 to 115 pcf (1,362 to 1,840 kg/m<sup>3</sup>) and compressive strength comparable to that of normal concrete.

### insulating concrete

Lightweight concrete having a unit weight of less than 60 pcf (960 kg/m<sup>3</sup>) and low thermal conductivity, made with lightweight aggregate, as perlite, or with a foaming agent or gas-forming chemical that infuses the mix with a homogeneous cellular structure.

### fine aggregate

Aggregate consisting of sand having a particle size smaller than 1/4 in. (6.4 mm): specif. the portion of aggregate that will pass through a 3/8 in. (9.5 mm) sieve, almost entirely through a No. 4 (4.8 mm) sieve, and be predominantly retained on a No. 200 (74µ) sieve.

### coarse aggregate

Aggregate consisting of crushed stone, gravel, or blast-furnace slag having a particle size larger than 1/4 in. (6.4 mm): specif. the portion of aggregate that is retained on a No. 4 (4.8 mm) sieve. The maximum size of coarse aggregate in reinforced concrete is limited by the size of the section and the spacing of the reinforcing bars.

### graded aggregate

Aggregate having a particle-size distribution characterized by uniform grading. Graded aggregate requires the least amount of cement paste to fill the voids and surround the particles.

### particle-size distribution

The range of particle sizes in a granular material, expressed either as the cumulative percentage by weight of particles smaller or larger than a specified sieve opening, or as the percentage by weight of the particles that range between specified sieve openings.

### uniform grading

A particle-size distribution in which aggregate particles vary uniformly from fine to coarse without a preponderance of any one size or group of sizes.

### expanded shale

A strong lightweight aggregate obtained by the exfoliation of clay or shale. Also called **expanded clay**.

### expanded slate

A strong lightweight aggregate obtained by the exfoliation of slate.

### exfoliation

The splitting or swelling of certain minerals into a scaly aggregate when heated.

### perlite

A volcanic glass expanded by heat to form lightweight, spherical particles, used as nonstructural lightweight aggregate and as loose-fill thermal insulation. Also, **pearlite**.

### vermiculite

Mica expanded by heat into very light, wormlike threads, used as nonstructural lightweight aggregate and as loose-fill thermal insulation.



### admixture

Any substance other than cement, water, or aggregate, added to a concrete or mortar mix to alter its properties or those of the hardened product. Also called **additive**.

#### ○ air-entraining agent

An admixture that disperses entrained air in a concrete or mortar mix to increase workability, improve resistance of the cured product to the cracking induced by freeze-thaw cycles or the scaling caused by deicing chemicals, and in larger amounts, to produce lightweight insulating concrete.

#### ○ accelerator

An admixture that hastens the setting and strength development of a concrete, mortar, or plaster mix.

#### ○ retarder

An admixture that slows the setting of a concrete, mortar, or plaster mix in order to allow more time for placing and working the mix.

#### ○ surface-active agent

An admixture for reducing the surface tension of the mixing water in a concrete mix, thereby facilitating the wetting and penetrating action of the water or aiding in the emulsifying and dispersion of other additives in the mix. Also called **surfactant**.

#### ○ water-reducing agent

An admixture for reducing the amount of mixing water required for the desired workability of a concrete or mortar mix. Lowering the water-cement ratio in this manner generally results in increased strength. Also called **superplasticizer**.

#### ○ coloring agent

A pigment or dye added to a concrete mix to alter or control its color.

# CONCRETE

## mix design

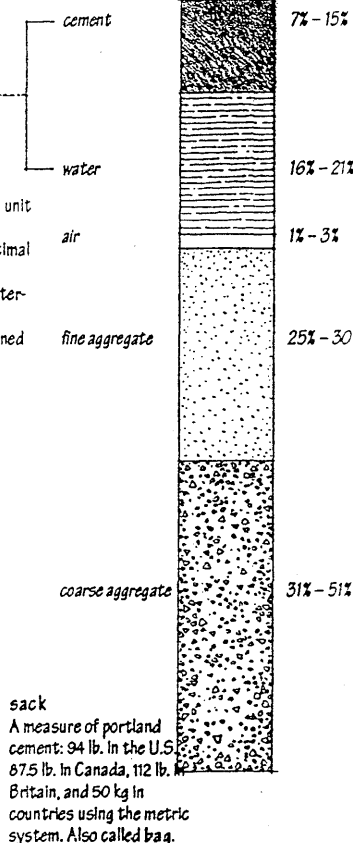
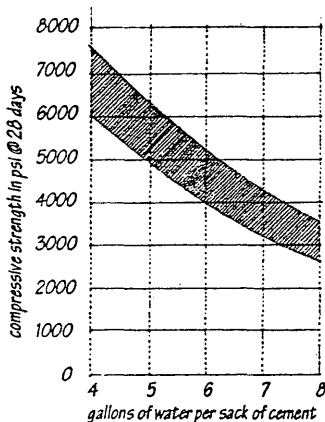
The most economical selection and proportioning of cement, water, and aggregate to produce concrete or mortar having the required properties of workability, strength, durability, and watertightness.

## Abram's law

A law postulating that, with given concrete materials, curing, and testing conditions, the compressive strength of concrete is inversely proportional to the ratio of water to cement; developed by D.A. Abrams in 1919 from experiments at Lewis Institute in Chicago.

## water-cement ratio

The ratio of mixing water to cement in a unit volume of concrete or mortar mix, preferably expressed by weight as a decimal fraction but often stated in gallons of water per 94-lb. sack of cement. The water-cement ratio controls the strength, durability, and watertightness of hardened concrete.



## cement content

The quantity of cement per unit volume of concrete or mortar mix, preferably expressed in pounds per cubic yard but often stated in sacks of cement per cubic yard of mix.

## water content

The quantity of water per unit volume of concrete or mortar mix, preferably expressed in pounds per cubic yard but often stated in gallons per cubic yard of mix.

## consistency

The relative ability of freshly mixed concrete or mortar to flow, usually measured by the slump test for concrete and by the flow test for grout or mortar. Consistency depends largely on the proportion of cement paste to aggregate in a mix.

## workability

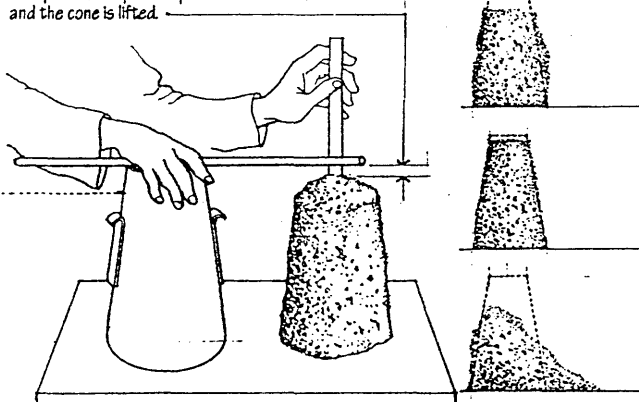
The relative ease with which freshly mixed concrete or mortar can be handled, placed in formwork, compacted, and finished. Workability depends partly on the water-cement ratio and partly on the grading of the aggregate in a mix.

## slump test

A method for determining the consistency and workability of freshly mixed concrete by measuring the slump of a test specimen.

## slump

A measure of the consistency and workability of freshly mixed concrete, expressed as the vertical settling, in inches, of a specimen after it has been placed in a slump cone, tamped in a prescribed manner, and the cone is lifted.



## slump cone

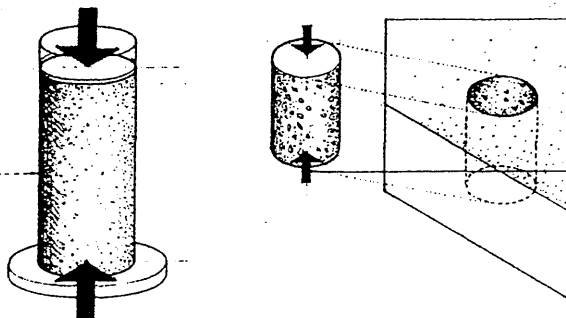
An open-ended, truncated cone of sheet metal 12 in. (305 mm) high, with a base diameter of 8 in. (203 mm) and a top diameter of 4 in. (102 mm), used to mold a specimen of freshly mixed concrete for the slump test.

## compression test

A test for determining the compressive strength of a concrete batch, using a hydraulic press to measure the maximum load a test cylinder can support in axial compression before fracturing.

## test cylinder

A cylinder of concrete 6 in. (152 mm) in diameter and 12 in. (305 mm) high, cast from a representative batch and cured in a laboratory or in the field under controlled conditions.



## core test

A compression test of a cylinder cut from a hardened concrete structure, usually by means of a core drill.

## form liner

Material for lining the inside face of a form, specially selected to impart a smooth or patterned finish to the concrete surface.

## release agent

Any of various materials, as oil or silicone, for preventing the bonding of concrete to a surface. Also called parting compound.

## bulkhead

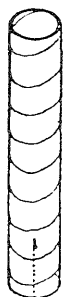
A partition closing the end of a form or preventing the passage of newly placed concrete at a construction joint.

## keyway

A longitudinal groove or channel formed in a concrete footing or other member that has set, providing a shear-resisting key for newly placed concrete.

## yoke

A clamping device for keeping column forms or the tops of wall forms from spreading under the fluid pressure of newly placed concrete.



## Sonotube

Trademark for a brand of cylindrical column form made of compressed, resin-impregnated paper.

## chair

A device for supporting and holding steel reinforcement in proper position before and during the placing of concrete.

## high chair

A tall chair for supporting top bars in a concrete beam or slab.

## bolster

A wide chair for supporting and spacing bottom bars in a concrete beam or slab.

## climbing form

A form that can be raised vertically for succeeding lifts of concrete during the construction of a multistory building.

## lift

The height of a quantity of concrete placed in a form at one time.

## slip form

A form that can be moved slowly and continuously as concrete is being placed during the construction of a concrete pavement or building.

## spreader

A brace, usually of wood, for spacing and keeping wall or footing forms apart. Also called spacer.

## wale

A horizontal timber or steel beam for reinforcing various vertical members, as in formwork or sheet piling, or for retaining earth at the edge of an embankment. Also called breast timber, ranger, walser.

## strongback

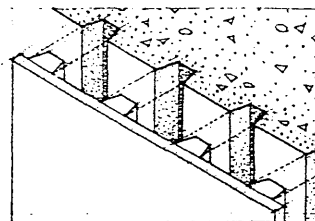
A vertical support for aligning and reinforcing wales. Also called stiffback.

## formwork

The temporary structure required to support newly placed concrete, including the forms and all necessary supporting members, bracing, and hardware.

## form

Boarding or sheeting of wood, metal, plastic, or fiberglass for containing and giving a desired shape to newly placed concrete until it sets and gains sufficient strength to be self-supporting.



## form tie

A metal tie for keeping wall forms from spreading under the fluid pressure of newly placed concrete.

## snap tie

A form tie having notches or crimps which allow its ends to be snapped off below the concrete surface after stripping of the forms.

## cone bolt

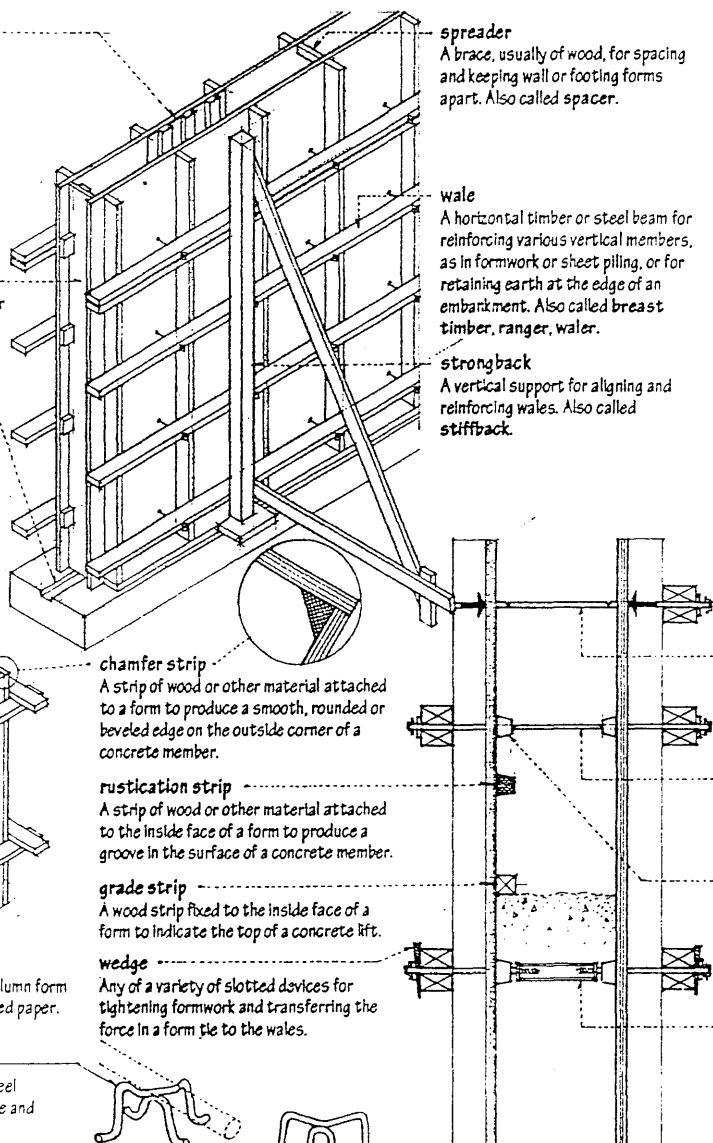
A form tie having cones at each end inside the forms which allow it to also serve as a spreader.

## cone

A small, truncated cone of wood, steel, or plastic attached to a form tie to space and spread wall forms, leaving a neatly finished depression in the concrete surface to be filled or left exposed.

## she bolt

A form tie consisting of waler rods which are inserted through the form and threaded onto the ends of an inner rod. After stripping, the waler rods are removed while the inner rod remains in the concrete.



## chamfer strip

A strip of wood or other material attached to a form to produce a smooth, rounded or beveled edge on the outside corner of a concrete member.

## rustication strip

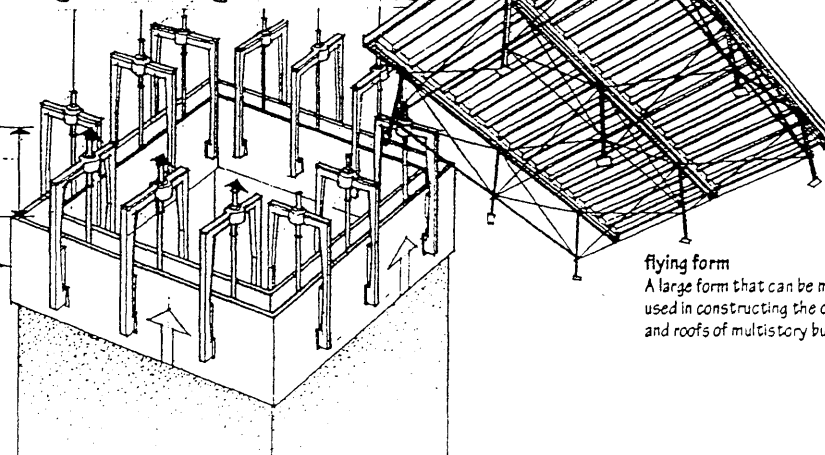
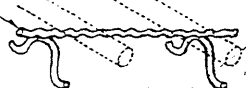
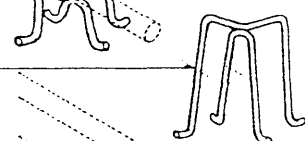
A strip of wood or other material attached to the inside face of a form to produce a groove in the surface of a concrete member.

## grade strip

A wood strip fixed to the inside face of a form to indicate the top of a concrete lift.

## wedge

Any of a variety of slotted devices for tightening formwork and transferring the force in a form tie to the wales.



## flying form

A large form that can be moved by a crane, used in constructing the concrete floors and roofs of multistory buildings.

# CONCRETE

## cast-in-place concrete

Concrete deposited, formed, cured, and finished in its final position as part of a structure. Also called cast-in-situ concrete.

## time of haul

The period from first contact between mixing water and cement to completion of discharge of the freshly mixed concrete from a truck mixer.

## ready-mixed concrete

Concrete mixed at a batch plant for delivery by an agitator truck to a construction site.

## shrink-mixed concrete

Concrete partially mixed at a batch plant and then mixed more completely in a truck mixer en route to a construction site.

## transit-mixed concrete

Concrete dry batched at a batch plant and mixed in a truck mixer en route to a construction site.

## placement

The process of depositing and consolidating freshly mixed concrete in a form or in the final position where it is to harden.

## direct placement

The discharging of freshly mixed concrete directly into a form from a concrete mixer, buggy, or crane bucket.

## free fall

The descent of freshly mixed concrete into a form without the aid of a drop chute.

## drop chute

A chute for containing and directing a falling stream of freshly mixed concrete so as not to cause segregation.

## chute

An inclined trough or tube for conveying free-flowing materials to a lower level by gravity.

## agitator truck

A truck equipped with a rotating drum to prevent segregation or loss of plasticity of the ready-mixed concrete being delivered to a construction site.

## truck mixer

A truck equipped with a rotating drum and a separate water tank for mixing concrete en route to a construction site.

## concrete mixer

A machine having a revolving drum, often motor-driven, for mixing cement, aggregate, and water to produce concrete.

## buggy

A cart, often motor-driven, for transporting heavy materials, as freshly mixed concrete, for short distances at a construction site.

## pneumatic placement

The delivery of concrete, slurry, or plaster by a pipeline or hose to the point of placement on a construction site, either in a plastic state for depositing in place or for spraying, or in a dry state with water added at the nozzle from which it is sprayed.

## Gunite

A lightweight concrete construction consisting of a mixture of cement, sand or crushed slag, and water, pumped through a hose and sprayed at high velocity over reinforcement until the desired thickness is reached. Also called shotcrete.

## consolidation

The process of eliminating voids other than entrained air within newly placed concrete and ensuring close contact of the concrete with form surfaces and embedded reinforcement.

## spading

Consolidation of newly placed concrete by the repeated insertions and withdrawals of a flat, spadelike tool.

## rodding

Consolidation of newly placed concrete by the repeated insertions and withdrawals of a rod.

## vibration

Consolidation of newly placed concrete by the moderately high-frequency oscillations of a vibrator.

## vibrator

An electric or pneumatic oscillating tool for agitating and consolidating newly placed concrete.

## segregation

The separation of coarse aggregate from the mortar or of water from the other ingredients of freshly mixed concrete, resulting from excessive horizontal movement or free fall of the mix, or from overvibration after placement.

## stratification

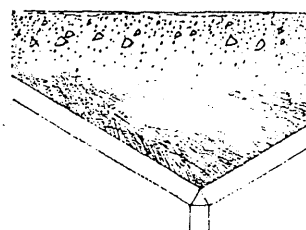
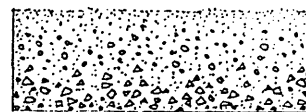
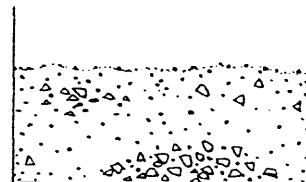
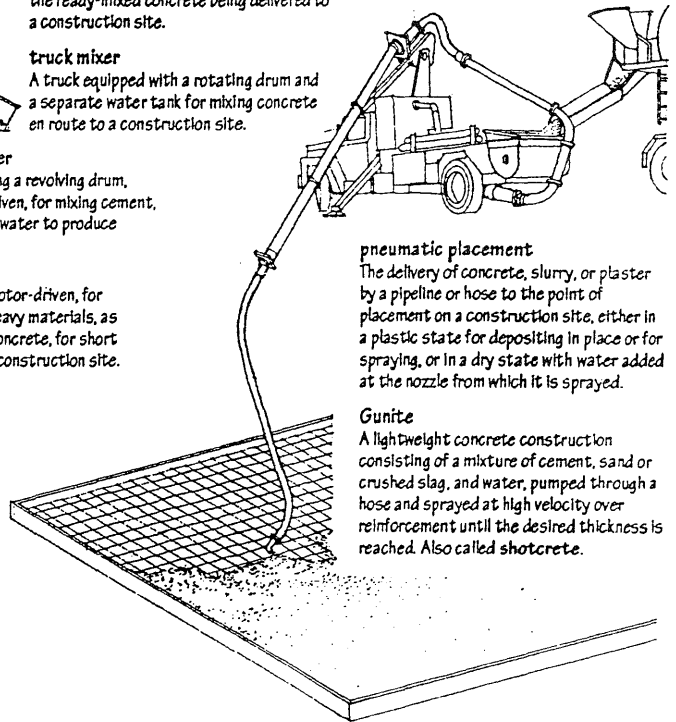
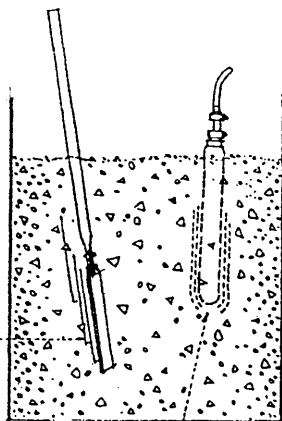
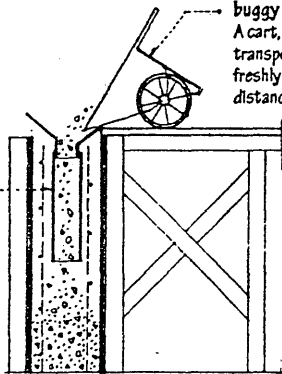
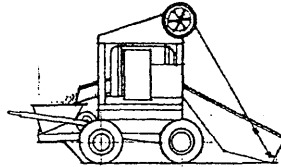
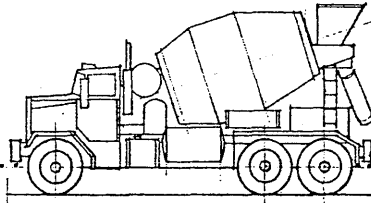
The separation of an excessively wet or overvibrated concrete mix into horizontal layers with increasingly lighter material migrating toward the top.

## bleeding

The emergence of excess mixing water on the surface of newly placed concrete, caused by settlement of solids within the mass. Also called water gain.

## laitance

A milky deposit containing cement and aggregate fines on the surface of new concrete, caused by the bleeding of excess mixing water, overworking of the mix, or improper finishing.



## finishing

The process of leveling, smoothing, compacting, and treating a newly placed concrete surface to produce the desired texture and appearance.

## screed

A wooden or metal straightedge drawn over a newly placed concrete slab to bring it to proper level.

## screed

A firmly established grade strip or edge form serving as a guide for making a true level surface on a newly placed concrete slab.

## float

A flat tool for spreading and smoothing a fresh concrete, stucco, or plaster surface.

## bull float

A float having a large, flat blade attached to a long handle.

## trowel

Any of various flat-bladed hand tools for applying, spreading, working, or smoothing plastic material, as concrete, mortar, and plaster.

## power trowel

A portable machine having steel trowels mounted on radial arms that rotate about a vertical shaft to smooth, compact, and finish a fresh concrete surface.

## edger

A trowel having a long, curved lip for rounding the edges of a fresh concrete slab as it begins to set.

## pavement saw

A wheel-mounted, rotary power saw equipped with a silicon-carbide or diamond blade for cutting a control joint in a hardened concrete slab.

## set

The assumption of a rigid or hard state by concrete, mortar, plaster, or glue due to a physical or chemical change.

## cure

To maintain newly placed concrete or mortar at the required temperature and humidity for the first seven days following placement, casting, or finishing to ensure satisfactory hydration of the cementitious materials and proper hardening.

## heat of hydration

The heat generated by the process of hydration, as during the setting and curing of a concrete mix.

## hydration

The process in which a substance combines chemically with water, as that occurring when cement is mixed with water.

## darby

A long wooden or metal straightedge for smoothing a fresh concrete surface immediately after screeding.

## dry-shake finish

A colored finish produced by sprinkling a dry mixture of cement, sand, and a pigment on a fresh concrete surface following screeding and after any free water has evaporated, and then working the mixture into the surface with a float.

## float finish

A fine-textured finish obtained by smoothing a fresh concrete, plaster, or stucco surface with a wood float.

## broom finish

A striated finish obtained by stroking a broom or stiff brush over a freshly troweled concrete surface.

## trowel finish

A dense, smooth finish obtained by working a fresh concrete or plaster surface with a steel trowel.

## swirl finish

A textured finish given to a fresh plaster or concrete surface by troweling with a circular, overlapping motion.

## architectural concrete

Exposed concrete work requiring special care in the selection of materials, forming, placing, and finishing to acquire the desired appearance.

## béton brut

Concrete left in its natural state after formwork is removed, esp. when the concrete surface reflects the texture, joints, and fasteners of a board form.

## exposed aggregate finish

A decorative finish produced by sandblasting, etching with an acid, or scrubbing a concrete surface after the initial set in order to remove the outer layer of cement paste and expose the aggregate.

## bushhammered finish

A coarse-textured finish obtained by fracturing a concrete or stone surface with a power-driven hammer having a rectangular head with a corrugated, serrated, or toothed face.

## honeycomb

Voids on a formed concrete surface, caused by segregation during placement or by insufficient consolidation.

## spalling

The chipping or scaling of a hardened concrete or masonry surface caused by freeze-thaw cycles or the application of deicing salts. Also called scaling.

## crazing

Numerous hairline cracks occurring in the surface of a newly hardened concrete slab as a result of rapid drying shrinkage.

## drying shrinkage

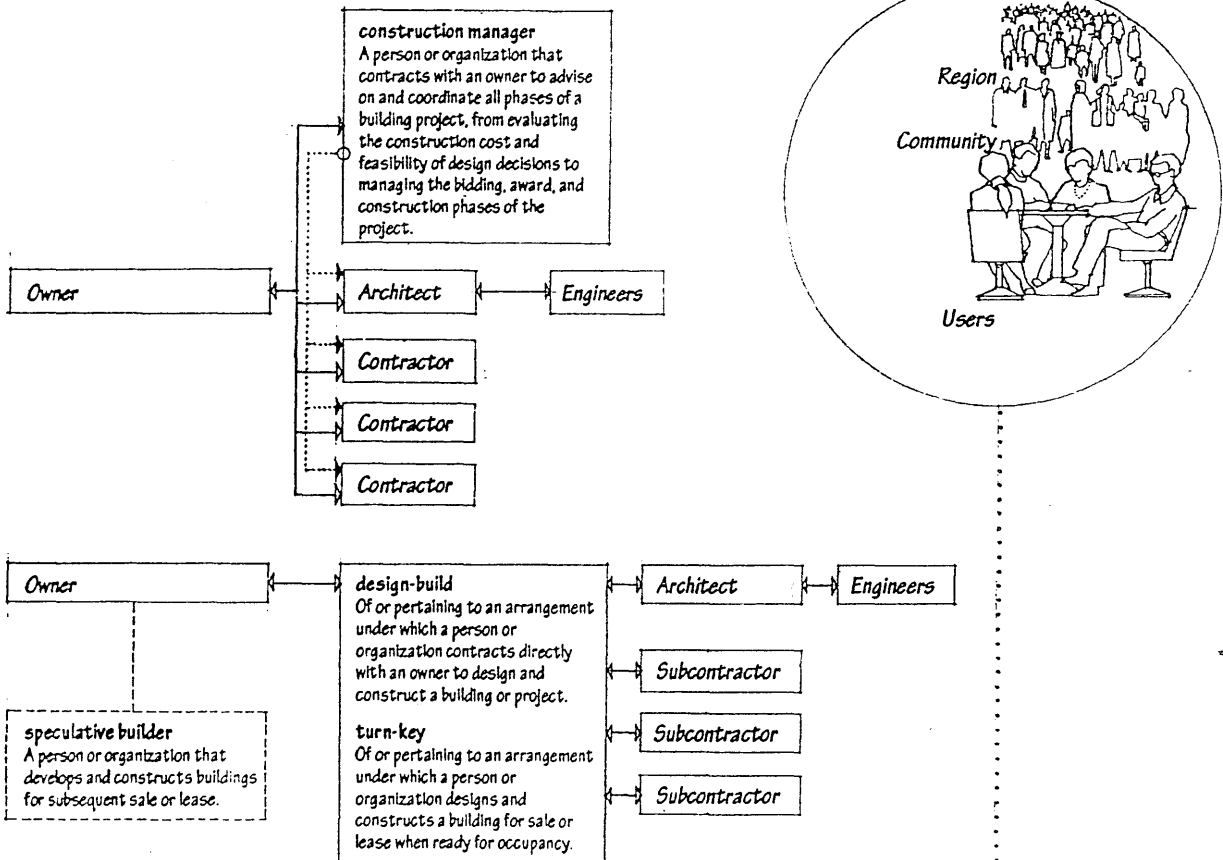
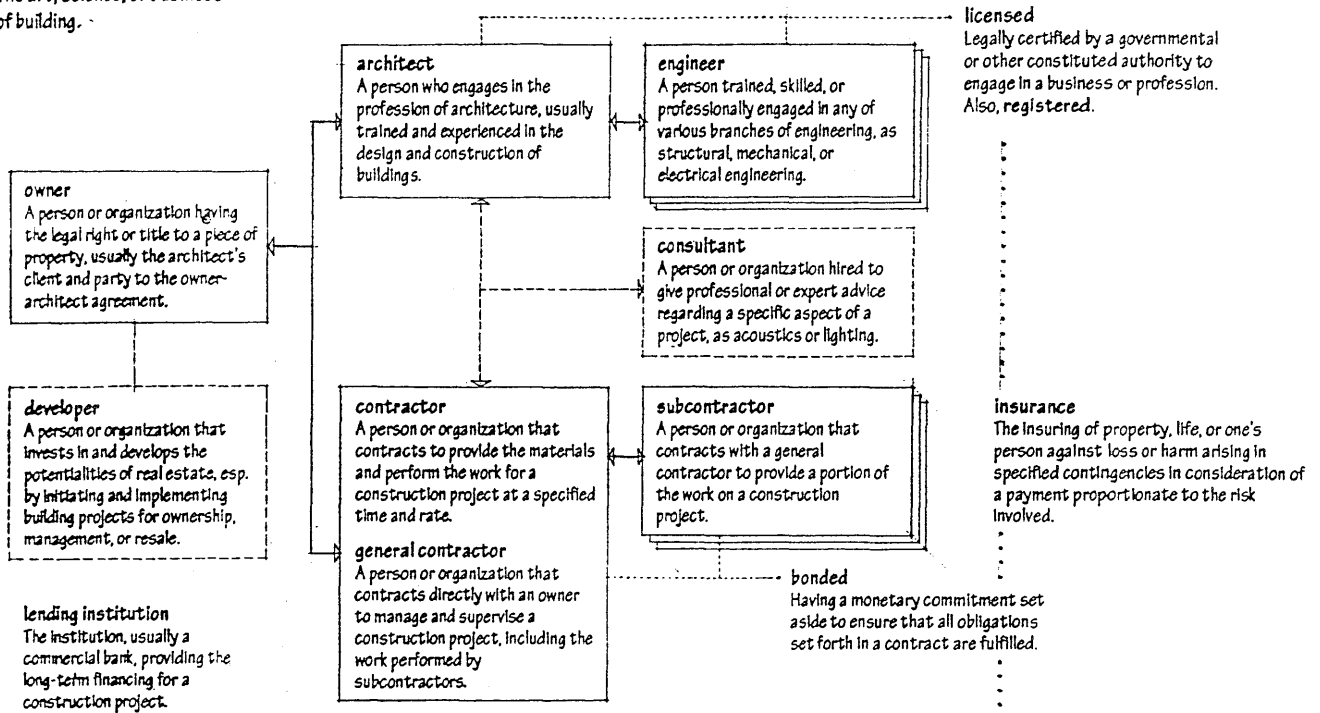
A reduction in volume of concrete, mortar, or plaster caused by a loss of moisture.

## setting shrinkage

A reduction in volume of concrete prior to its final set, caused by hydration of the cement paste.

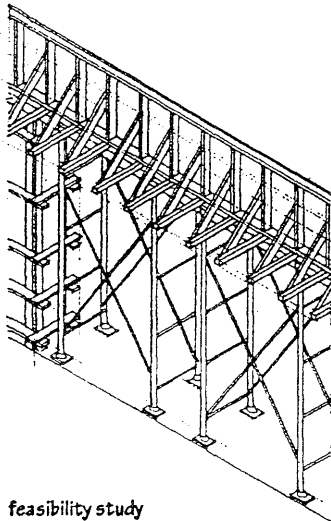
# CONSTRUCTION

The art, science, or business of building.





The process of building, from site preparation through erection, assembly, and finishing operations.



## feasibility study

A detailed investigation and analysis conducted to determine the financial, technical, or other advisability of a proposed construction project.

## top out

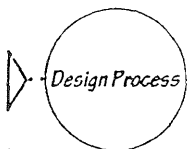
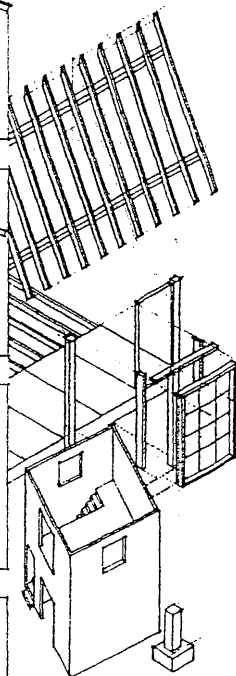
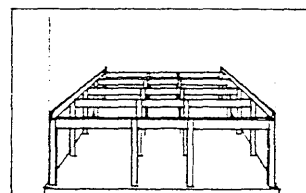
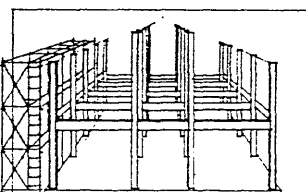
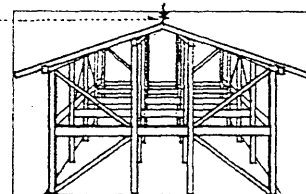
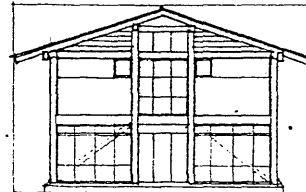
To install the highest structural member in a construction or complete the uppermost course in a masonry wall.

## falsework

The temporary framework for supporting a structure under construction that is not yet capable of supporting itself.

## scaffold

A temporary structure or platform for supporting workers and materials at a height above the floor or ground during the construction or repair of a building. Also called staging.



## bidding

The competitive process of offering to perform the work described in a contract for a specified sum.

## award

A formal acceptance of a bid or a negotiated proposal.

## contract

A legally enforceable agreement, usually in written form, between two or more parties to do or not to do something specified.

## notice to proceed

A written communication issued by an owner authorizing a contractor to proceed with the work and establishing the date of commencement of the work.

## building permit

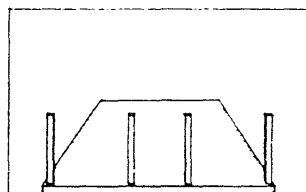
A written authorization to proceed with construction of a building project in accordance with approved drawings and specifications, issued by the local government agency having jurisdiction after plans have been filed and reviewed.

## building official

A person designated by a governmental authority to administer and enforce the provisions of a building code.

## erect

To construct by the raising, positioning, fitting together, and fastening of materials or parts.



## certificate of occupancy

A document issued by a building official certifying that all or a designated portion of a building complies with the provisions of the building code, and permitting occupancy for its designated use.

## postoccupancy evaluation

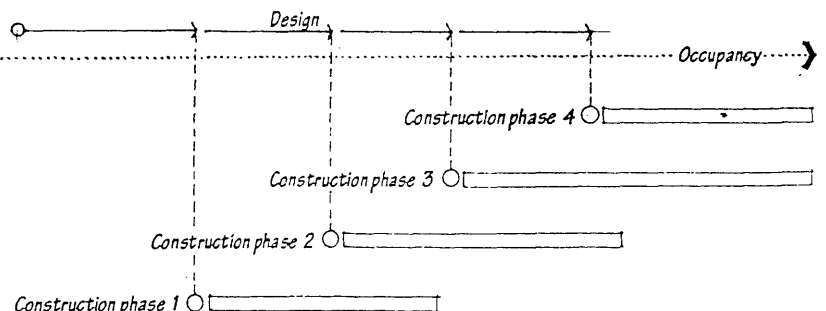
The process of diagnosing the technical, functional and behavioral aspects of a completed building in order to accumulate information for future programming and design activities.

## fast-track

Of or pertaining to project scheduling in which the design and construction phases of a building project overlap to compress the total time required for completion.

## CPM

Critical Path Method: a method for planning, scheduling, and managing a project, combining all relevant information into a flow chart, including the optimum sequence and duration of activities, the relative significance of each event, and the coordination required for timely completion of the project.



# CONSTRUCTION

The manner in which materials are ordered, assembled, and united into a whole, as frame construction.

## systems building

A construction process using a high degree of prefabrication in the manufacture of standardized units or components to speed assembly and erection of a building. Also called industrialized building.

## panel

A prefabricated section of a floor, wall, ceiling, or roof, handled as a single unit in the assembly and erection of a building.

## sandwich panel

A structural panel consisting of a core of relatively light material enclosed between two sheets of a high-strength material, generally resulting in a high stiffness-to-weight ratio.

## stressed-skin panel

A structural panel consisting of plywood facings glued to lumber stringers, used as floor, roof, or wall member subject to bending. The plywood facings and stringers act as a series of I-beams with the plywood resisting nearly all of the bending stresses. Cross bracing may be placed to support the edges of the skin and to help distribute concentrated loads.

## prefabricate

To fabricate or manufacture beforehand, esp. in standardized units or components for quick assembly and erection.

## fabricate

To construct by assembling diverse and usually standardized parts.

## contract documents

The legal documents comprising a construction contract, including the owner-contractor agreement, conditions of the contract, and the construction drawings and specifications for the project, including all addenda, modifications, and any other items stipulated as being specifically included.

## construction documents

The construction drawings and specifications setting forth in detail the requirements for the construction of a project.

## specifications

The part of the contract documents consisting of a detailed description of the technical nature of the materials, standards, and quality of execution of the work to be placed under contract.

## uniform system

A format developed by the Construction Specifications Institute for coordinating specifications, filling of technical data and product literature, and construction cost accounting, organized into 16 divisions based on an interrelationship of material, trade, or function. Also called Masterformat.

Division 1 General Requirements

Division 2 Sitework

Division 3 Concrete

Division 4 Masonry

Division 5 Metals

Division 6 Wood & Plastics

Division 7 Thermal & Moisture Protection

Division 8 Doors & Windows

Division 9 Finishes

Division 10 Specialties

Division 11 Equipment

Division 12 Furnishings

Division 13 Special Construction

Division 14 Conveying Systems

Division 15 Mechanical

Division 16 Electrical

## performance specification

A specification that stipulates how a particular component or system must perform without giving the means to be employed to achieve the results.

## descriptive specification

A specification that stipulates the exact quantities and qualities of materials to be furnished and how they are to be assembled in a construction.

## reference specification

A specification that refers to a standard specification to indicate the properties desired in a material or component and the methods of testing required to substantiate the performance of products.

## proprietary specification

A specification that stipulates the use of specific products, systems, or processes without provision for substitution.

## modular design

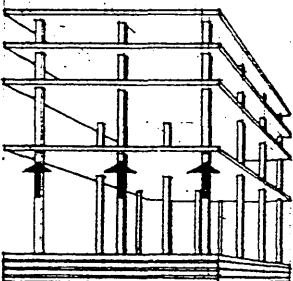
Planning and design utilizing prefabricated modules or modular coordination for ease of erection, flexible arrangement, or variety of use.

## module

Any in a series of standardized, frequently interchangeable components used in assembling units of differing size, complexity, or function.

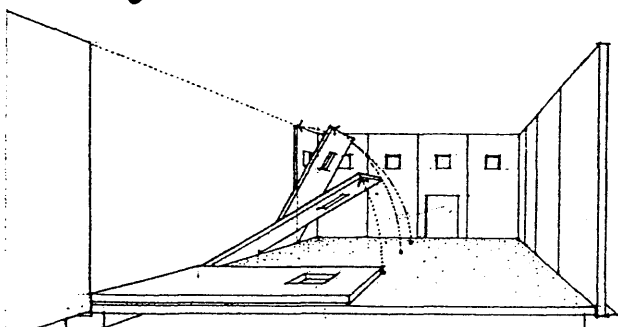
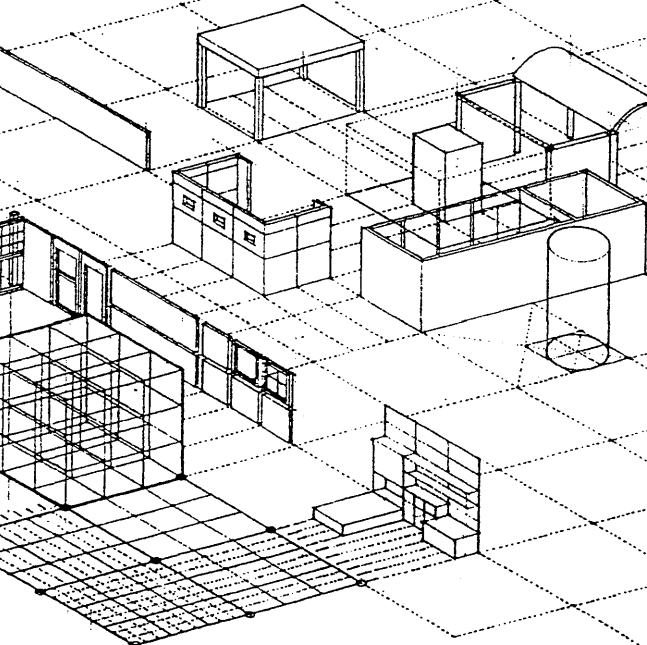
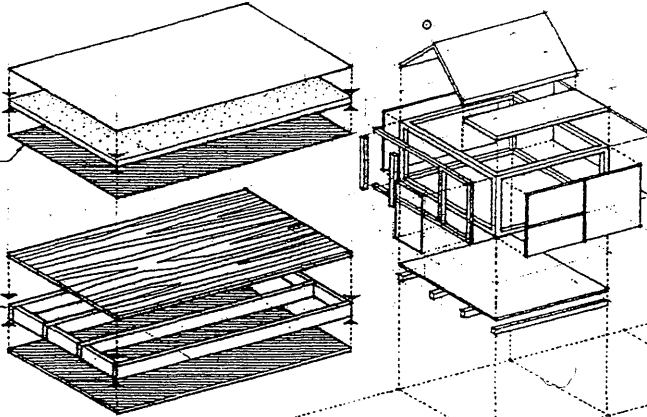
## modular coordination

Correlating the dimensions of a structure and the unit sizes of its components, usually with the aid of a planning grid based on a 4-inch or 100-mm cubical module.



## lift-slab construction

A technique of constructing multistory buildings in which all horizontal slabs are cast at ground level and, when cured, are raised into position by hydraulic jacks.



## tilt-up construction

A method of casting reinforced concrete wall panels on site in a horizontal position, then tilting them up into their final position.

## building code

A code regulating the design, construction, alteration, and repair of buildings, adopted and enforced by a local government agency to protect the public safety, health, and welfare.

A building code generally establishes minimum standards for materials and methods of construction, specifications for structural and fire safety, and other requirements based on the type of construction and the occupancy of a building, often using standards established by the American Society for Testing and Materials (ASTM), the American National Standards Institute (ANSI), and various technical societies and trade associations.

## model code

A building code developed by an organization of states, professional societies, and trade associations for adoption by local communities.

## BOCA National Building Code

A building code developed and published by the Building Officials and Code Administrators International, Inc. (BOCA), and used primarily in the northeastern U.S.

## Uniform Building Code

A building code developed and published by the International Conference of Building Officials (ICBO), and used primarily in the central and western U.S.

## Standard Building Code

A building code developed and published by the Southern Building Code Conference (SBCC), and used primarily in the southeastern U.S.

## energy code

A building code that sets minimum standards for energy conservation and the energy-efficient design of buildings.

## Americans with Disabilities Act

An act of Congress that became law in 1992, establishing design standards and requirements for all buildings except single-family residences to ensure their accessibility by the physically disabled.

## zoning ordinance

An ordinance regulating the division of land into zones, as to restrict the height, bulk, density, and use of buildings, and the provision of any ancillary facilities, as parking; a principal instrument in the implementation of a master plan. Also called zoning code.

## restrictive covenant

A covenant with a clause that restricts the action of any party to it, as an agreement among property owners specifying the use to which a property can be put; racial and religious restrictions are legally unenforceable.

## nonconforming

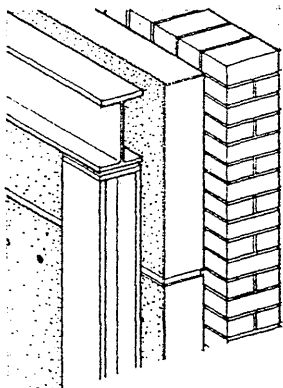
Of or pertaining to a material, type of construction, or occupancy or use not complying with the requirements set forth in a building code.

## variance

An official permit to do something normally forbidden by regulations, esp. by building in a way or for a purpose normally forbidden by a building code or zoning ordinance.

## noncombustible construction

Construction having a structure of steel, concrete or masonry, and walls, floors and a roof of noncombustible materials.

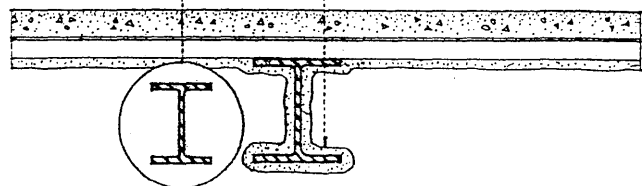


## protected noncombustible construction

Noncombustible construction having a structure and major components with fire-resistance ratings at least equal to those specified by the appropriate authorities.

## unprotected noncombustible construction

Noncombustible construction having no fire-resistance requirements except for fire walls and enclosures of fire exits and vertical shafts.

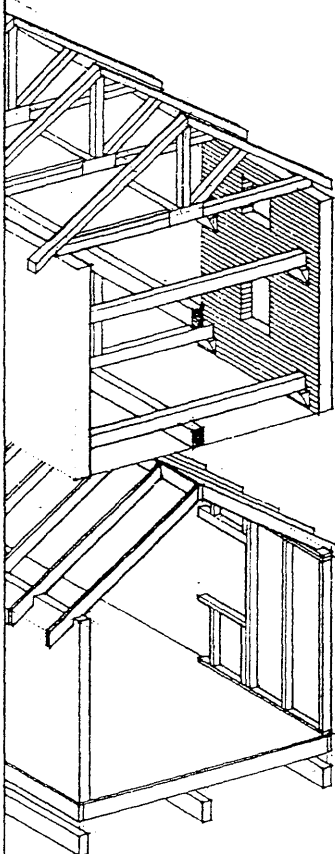


## construction type

A classification of a building's construction according to the fire resistance of its major components: structural frame, exterior bearing and nonbearing walls, interior bearing walls, floors and ceilings, roofs, and enclosures of fire exits and vertical shafts. While each of the model codes differs in the detailed requirements for each construction type, they all limit the area and height of a building according to construction type and intended occupancy. Also called construction class.

## combustible construction

Any construction that does not fulfill the requirements for noncombustible construction.



## ordinary construction

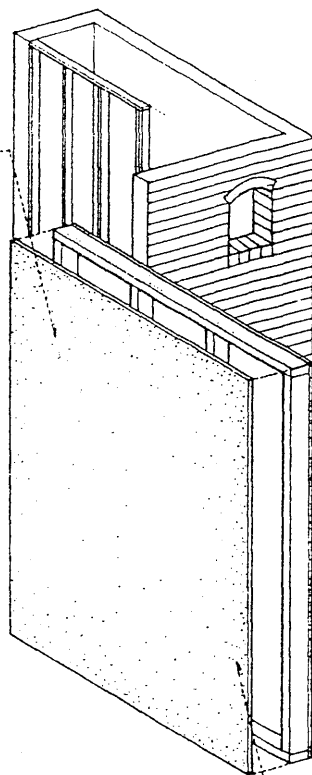
A construction type having noncombustible exterior walls and an interior structure wholly or partly of light wood framing.

## protected ordinary construction

Ordinary construction having a structure and major components with fire-resistance ratings at least equal to those specified by the appropriate authorities.

## unprotected ordinary construction

Ordinary construction having no fire-resistance requirements for the interior structure except for fire walls and enclosures of fire exits and vertical shafts.



## heavy-timber construction

A construction type having noncombustible exterior walls and an interior structure of timbers and decking of specified minimum sizes. Also called mill construction.



## light wood frame construction

A construction type having a framework of wood members not meeting the requirements for heavy-timber construction.



## protected light wood frame construction

Light wood frame construction having a structure and major components with fire-resistance ratings at least equal to those specified by the appropriate authorities.

## unprotected light wood frame construction

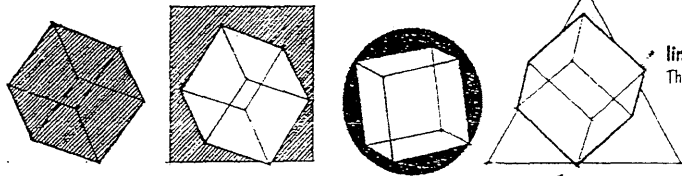
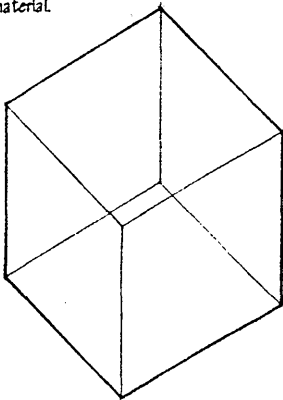
Light wood frame construction having no fire-resistance requirements except for fire walls and enclosures of fire exits and vertical shafts.

## DESIGN

The creation and organization of formal elements in a work of art.

### form

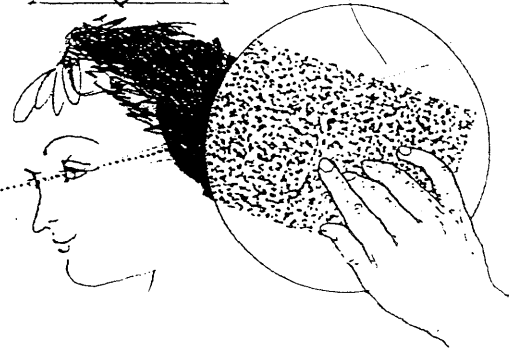
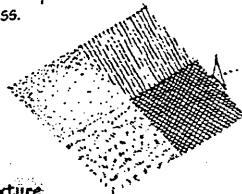
The shape and structure of something as distinguished from its substance or material.



**line**  
The edge or contour of a shape.

### shape

The outline or surface configuration of a particular form or figure. While form usually refers to the principle that gives unity to a whole, and often includes a sense of mass or volume, shape suggests an outline with some emphasis on the enclosed area or mass.



### texture

The visual and esp. tactile quality of a surface, apart from its color or form.

### visual texture

The apparent texture of a surface resulting from the combination and interrelation of colors and tonal values.

### tactile texture

The physical, dimensional structure of a surface, apart from its color or form.

### organic

Of or pertaining to shapes and forms having irregular contours which appear to resemble those of living plants or animals.

### nonobjective

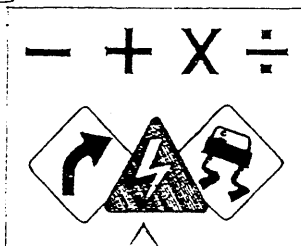
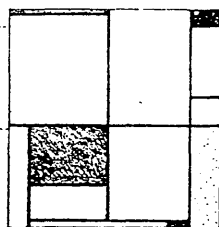
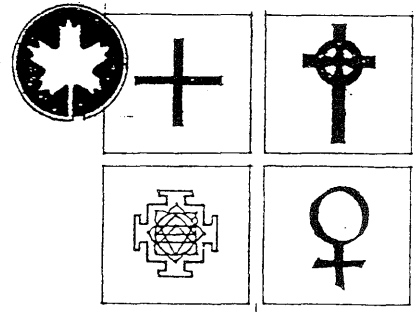
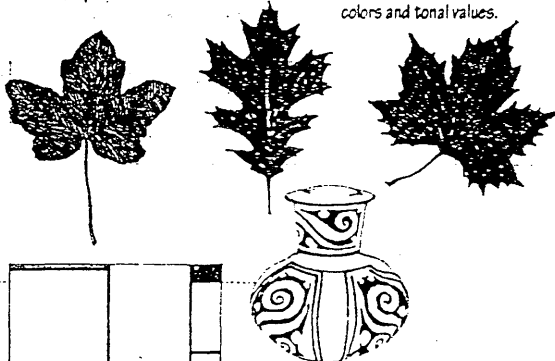
Of or pertaining to shapes and forms not representing natural or actual objects. Also, **nonrepresentational**.

### geometric

Of or pertaining to shapes and forms which resemble or employ the simple rectilinear or curvilinear elements of geometry.

### abstract

Of or pertaining to shapes and forms having an intellectual and affective content dependent solely on their intrinsic lines, colors, and relationship to one another.



### symbol

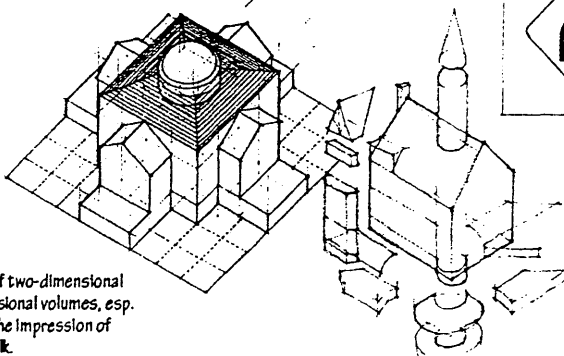
Something that stands for or represents something else by association, resemblance, or convention, deriving its meaning chiefly from the structure in which it appears.

### sign

A mark or figure having a conventional meaning and used in place of a word or phrase to express a complex notion.

### massing

A unified composition of two-dimensional shapes or three-dimensional volumes, esp. one that has or gives the impression of weight, density, and bulk.

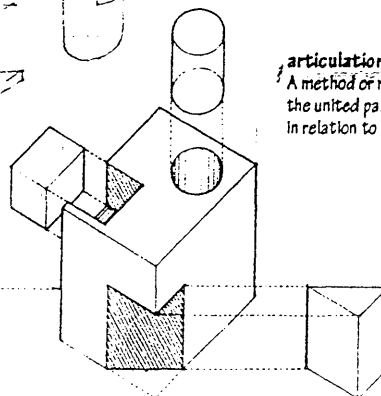


### additive

Characterized or produced by addition, accumulation, or uniting, often resulting in a new identity.

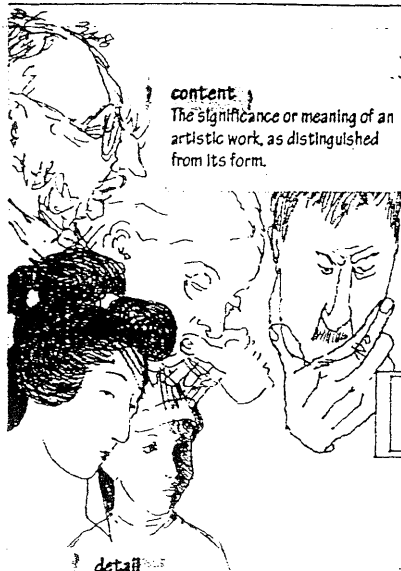
### subtractive

Characterized or produced by removal of a part or portion without destroying a sense of the whole.

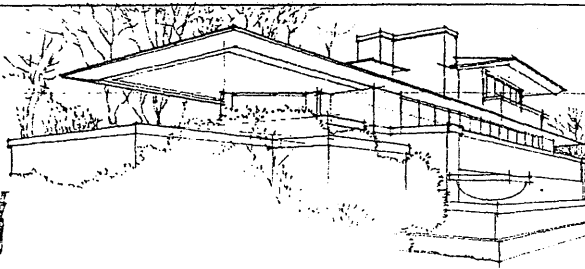


### articulation

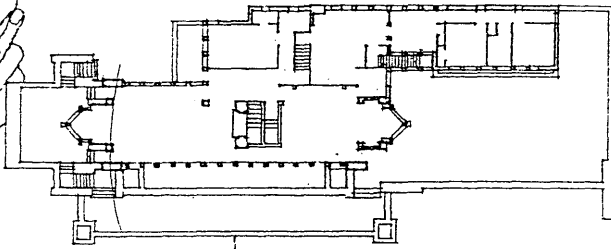
A method or manner of jointing that makes the united parts clear, distinct, and precise in relation to each other.



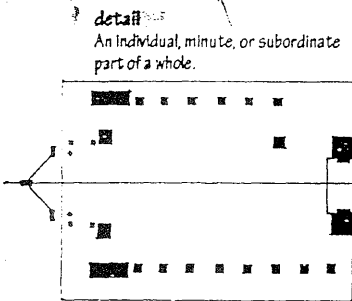
**content**  
The significance or meaning of an artistic work, as distinguished from its form.



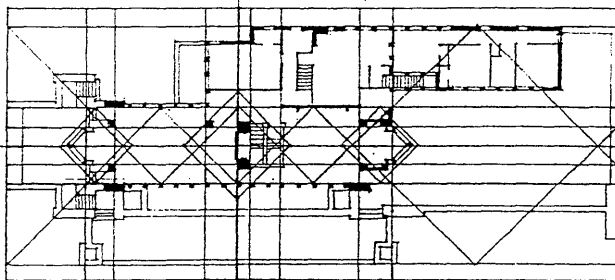
**form**  
The manner of arranging and coordinating the parts of a composition so as to produce a coherent image.



**organization**  
The systematic arranging of interdependent or coordinated parts into a coherent unity or functioning whole.



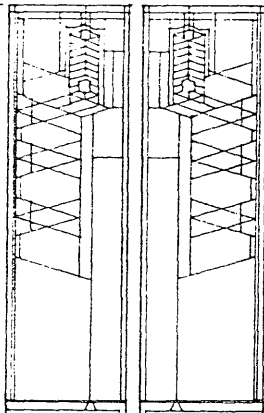
**detail**  
An individual, minute, or subordinate part of a whole.



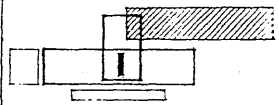
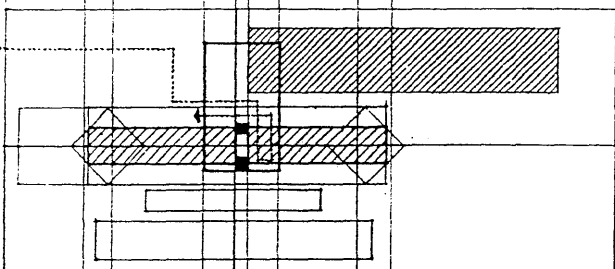
**structure**  
The organization of elements or parts in a complex system as dominated by the general character of the whole.

**texture**  
The characteristic structure given to a surface or substance by the size, shape, arrangement, and proportions of the parts.

**fabric**  
An underlying framework or structure of connected parts.



**pattern**  
An artistic or decorative design, esp. one having a characteristic arrangement and considered as a unit, of which an idea can be given by a fragment.

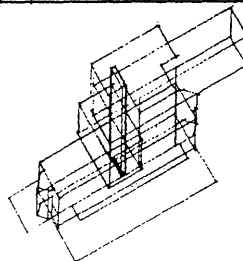


**part**  
The basic scheme or concept for an architectural design, represented by a diagram.

**diagram**  
A drawing, not necessarily representational, that outlines, explains, or clarifies the arrangement and relations of the parts of a whole.



**composition**  
The arranging of parts or elements into proper proportion or relation so as to form a unified whole.



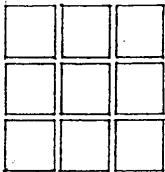
# DESIGN

## design principle:

A fundamental and comprehensive concept of visual perception for structuring an aesthetic composition.

## unity

The state or quality of being combined into one, as the ordering of elements in an artistic work that constitutes a harmonious whole or promotes a singleness of effect.



## uniformity

The state or quality of being identical, homogeneous, or regular.

## homogeneous

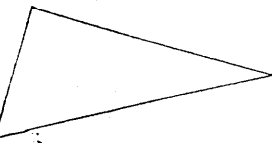
Uniform in structure throughout or composed of parts that are all of the same nature or kind.

## regular

Uniformly or evenly formed or arranged.

## monotony

The state or quality of lacking variety.



## variety

The state or quality of having varied or diverse forms, types, or characteristics.

## emphasis

Stress or prominence given to an element of a composition by means of contrast, anomaly, or counterpoint.

## contrast

Opposition or juxtaposition of dissimilar elements in a work of art to intensify each element's properties and produce a more dynamic expressiveness.

## anomaly

A deviation from the normal or expected form, order, or arrangement.

## point

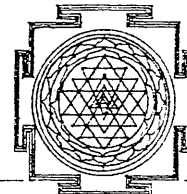
The major idea, essential part, or salient feature of a narrative or concept.

## salient

Prominent or conspicuous.

## order

A condition of logical, harmonious, or comprehensible arrangement in which each element of a group is properly disposed with reference to other elements and to its purpose.



## harmony

The orderly, pleasing, or congruent arrangement of the elements or parts in an artistic whole.

## repose

Harmony in the arrangement of parts or colors that is restful to the eye.

## coherent

Logically or aesthetically ordered or integrated to afford comprehension or recognition.

## agreement

Correspondence in shape, size, or color among the elements in a work of art.

## similarity

The state or quality of being alike in substance, essentials, or characteristics.

## proximity

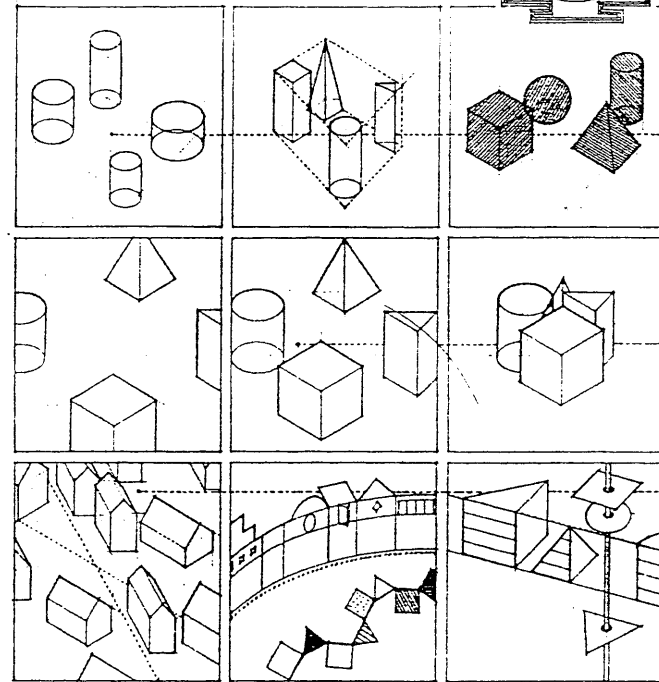
Nearness in place, order, or relation.

## continuity

The state or quality of being continuous, as a line, edge, or direction.

## alignment

Arrangement in or adjustment according to a straight line.

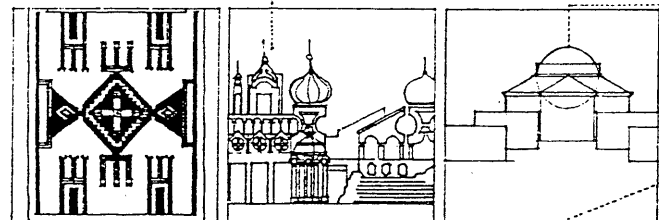


## complexity

The state or quality of being a whole composed of complicated, intricate, or interconnected parts.

## collage

An artistic composition of often diverse elements in unlikely or unexpected juxtaposition.



## hierarchy

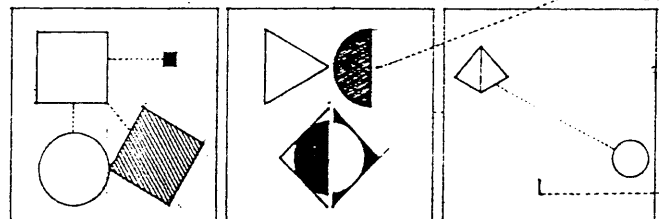
A system of elements ranked, classified, and organized one above another, according to importance or significance.

## opposition

The state or position of being placed opposite another, or of lying in corresponding positions from an intervening space or object.

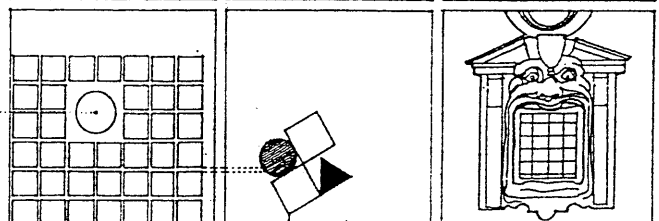
## juxtaposition

The state or position of being placed close together or side by side, so as to permit comparison or contrast.



## tension

A tenuous balance maintained in an artistic work between opposing forces or elements, often causing anxiety or excitement.

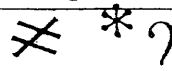


## counterpoint

A parallel but contrasting element or theme in a narrative or concept.

## chaos

A state of utter disorder or confusion.



**equilibrium**  
A state of rest or balance between contrasting elements or opposing forces.

**equipoise**  
An equal distribution of weight, relationship, or forces.

**counterpoise**  
A counterbalancing weight or force.

**balance**  
The pleasing or harmonious arrangement or proportion of parts or elements in a design or composition.

**symmetry**  
The exact correspondence in size, form, and arrangement of parts on opposite sides of a dividing line or plane, or about a center or axis.

**bilateral symmetry**  
Symmetry resulting from the arrangement of similar parts on opposite sides of a median axis.

**radial symmetry**  
Symmetry resulting from the arrangement of similar, radiating parts about a center point or central axis.

**local symmetry**  
A symmetrical condition occurring in one part of a design, often serving to center an irregular pattern.

**axis**  
A straight line to which elements in a composition are referred for measurement or symmetry.

**axis of symmetry**  
An imaginary line about which a figure, body, or composition is symmetrical.

**movement**  
The rhythmic quality or character of a composition suggesting motion by represented gestures or by the relationship of structural elements.

**direction**  
The line along which something is moving, pointing, or facing, with reference to the point toward which it is directed.

**rhythm**  
Movement characterized by a patterned repetition or alternation of formal elements or motifs in the same or a modified form.

**repetition**  
The act or process of repeating formal elements or motifs in a design.

**interval**  
A space between two objects, points, or states.

**gradation**  
A process or change taking place by degrees or through a series of gradual, successive stages.

**concatenation**  
A series of linked or interconnected things or events.

## DESIGN

### proportion

The comparative, proper, or harmonious relation of one part to another or to the whole with respect to magnitude, quantity, or degree.

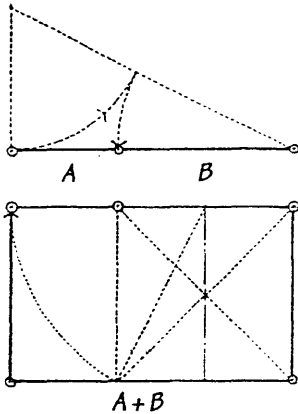
$$A/B = B/A+B$$

### proportions

The equality between two ratios in which the first of the four terms divided by the second equals the third divided by the fourth.

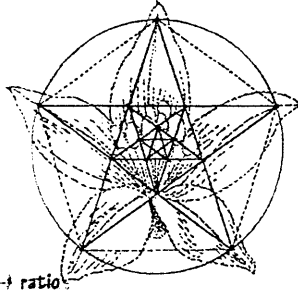
### golden section

A proportion between the two dimensions of a plane figure or the two divisions of a line, in which the ratio of the smaller to the larger is the same as the ratio of the larger to the whole: a ratio of approximately 0.618 to 1.000. Also called **golden mean**.

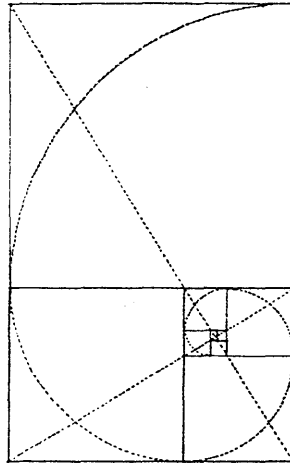


### eurythmy

Harmony of proportion or movement.



**ratio**  
Relation in magnitude, quantity, or degree between two or more similar things.



1, 1, 2, 3, 5, 8, 13, 21...

$1/1, 1/2, 2/3, 3/5, 5/8, 8/13...$

### Fibonacci series

The unending sequence of numbers where the first two terms are 1 and 1, and each succeeding term is the sum of the two immediately preceding. Also called **Fibonacci sequence**.

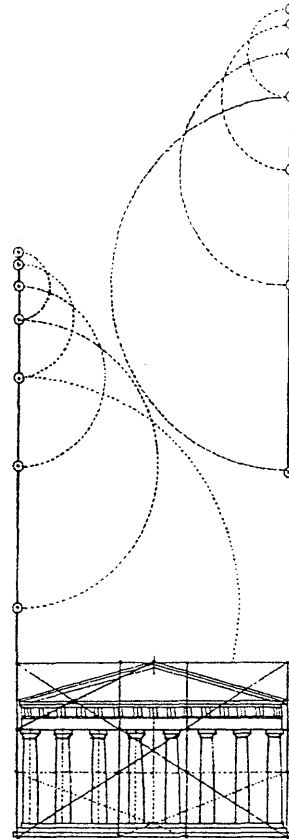
### harmonic series

A series in which the terms are in harmonic progression.

1,  $1/3, 1/5, 1/7, 1/9$

### harmonic progression

A sequence of numbers the reciprocals of which form an arithmetic progression.

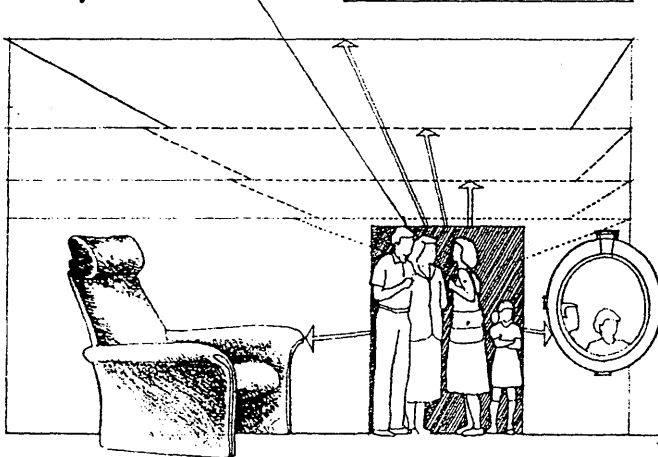


### scale

A certain proportionate size, extent, or degree, usually judged in relation to some standard or point of reference.

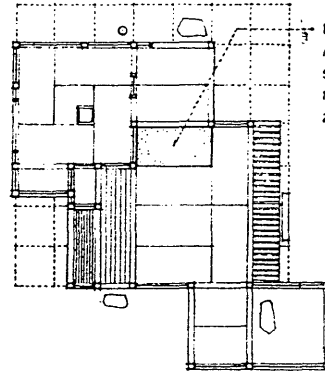
### human scale

The size or proportion of a building element or space, or an article of furniture, relative to the structural or functional dimensions of the human body.



### module

A unit of measurement used for standardizing the dimensions of building materials or regulating the proportions of an architectural composition.

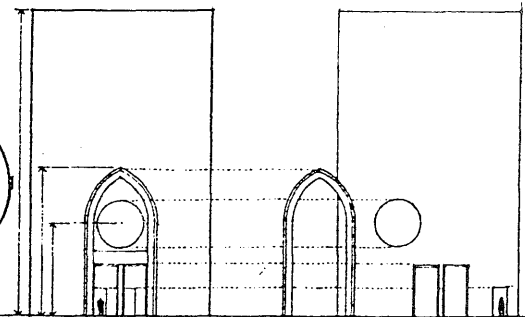


### mechanical scale

The size or proportion of something relative to an accepted standard of measurement.

### visual scale

The size or proportion a building element appears to have relative to other elements or components of known or assumed size.



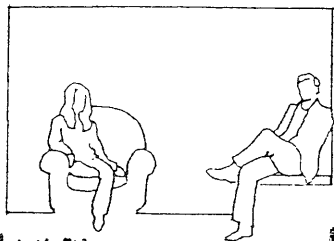


**structural dimension**

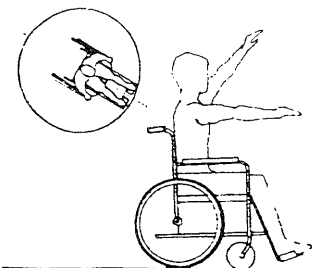
Any of the dimensions of the human body and its parts.

**functional dimension**

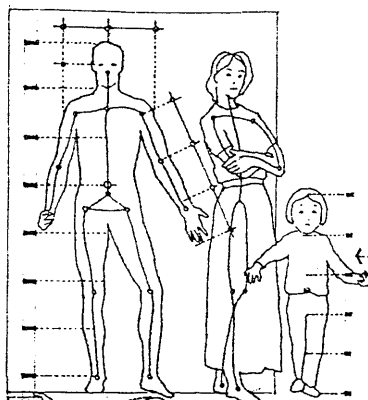
Any of the dimensions determined by bodily position and movement, as reach, stride, or clearance.

**static fit**

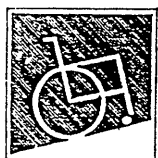
The correspondence between the size and posture of a human body and a building element or article of furniture.

**barrier-free**

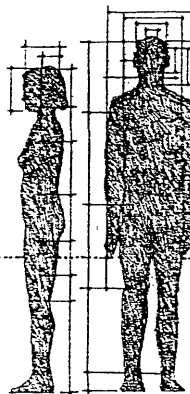
Of or pertaining to spaces, buildings, and facilities fully accessible and usable by all people, including the physically handicapped.

**dynamic fit**

The correspondence between the sensory experience of bodily presence and movement and the size, shape, and proportion of a space.



**access**  
The ability, freedom, or permission to approach, enter, or use.

**ergonomics**

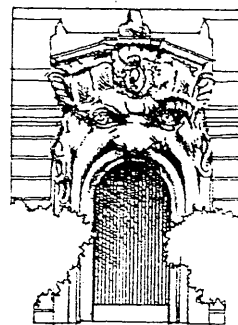
An applied science concerned with the characteristics of people that need to be considered in the design of devices and systems in order that people and things will interact effectively and safely. Also called **human engineering**.

**anthropometry**

The measurement and study of the size and proportions of the human body.

**anthropomorphize**

To ascribe human form or characteristics to nonhuman things or beings.

**kinesthesia**

The sensory experience of bodily position, presence, or movement derived chiefly from stimulation of nerve endings in muscles, tendons, and joints. Also, **kinaesthesia**, **kinesthesia**.

**haptic**

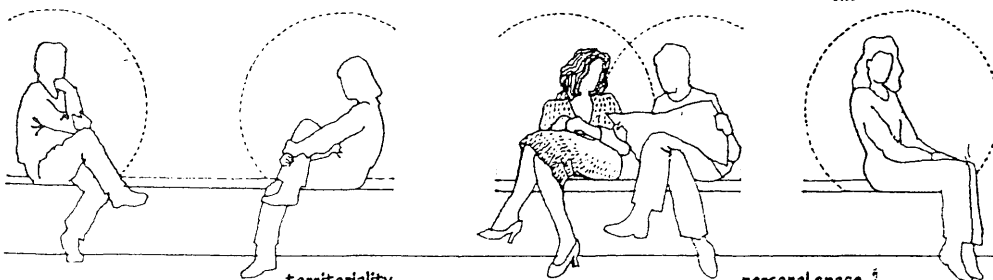
Relating to or based on the sense of touch.

**olfactory**

Relating to or based on the sense of smell.

**proxemics**

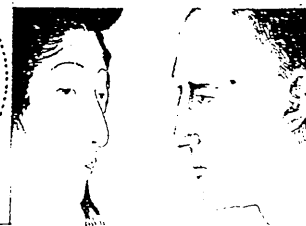
The study of the symbolic and communicative role of the spatial separation individuals maintain in various social and interpersonal situations, and how the nature and degree of this spatial arrangement relates to environmental and cultural factors.

**territoriality**

The pattern of behavior associated with defining and defending a territory or domain.

**personal space**

The variable and subjective distance at which one person feels comfortable talking to another. Also called **personal distance**.



# DESIGN

## design

To conceive, contrive, or devise the form and structure of a building or other construction.

## design process

A purposeful activity aimed at devising a plan for changing an existing situation into a future preferred state, esp. the cyclical, iterative process comprising the following phases.

## process

A systematic series of actions or operations leading or directed to a particular end.

## phase

A particular stage in a process of change or development.

## program

A procedure for solving a problem, as a statement setting forth the context, conditions, requirements, and objectives for a design project.

## initiation

Identifying a problem and its social, economic, and physical context.

## preparation

Collecting and analyzing relevant information and establishing goals and criteria for an acceptable solution.

## synthesis

Discovering constraints and opportunities, and hypothesizing possible alternative solutions.

## hypothesis

Formulating a tentative assumption in order to draw out and test its logical or empirical consequences.

## alternative

One of the propositions or courses of action to be chosen from a set of two or more mutually exclusive possibilities.

## analysis

Separating of a whole into its constituent parts or elements, esp. as a method of studying the nature of the whole and determining its essential features and their relations.

## synthesis

Combining of separate, often diverse parts or elements so as to form a single or coherent whole.

## develop

To work out, expand, or realize the capabilities or possibilities of so as to bring gradually to a fuller or more advanced or effective state.

## modify

To change the form, character, or qualities of in order to give a new orientation to or to serve a new end.

## refine

To improve or elaborate in order to make more fine or precise.

## inflection

A bend, angle, or similar change in the shape of a configuration, by means of which a change of relationship to some context or condition is indicated.

## transformation

The process of changing in form or structure through a series of discrete permutations and manipulations in response to a specific context or set of conditions without a loss of identity or concept.

## draft

A preliminary version of a plan or design.

## feedback

Evaluative information about an action or process prompting a return to a preceding phase for alteration or correction.

## action

Selecting and implementing the most suitable solution.

## evaluation

Simulating, testing, and modifying acceptable alternatives according to specified goals and criteria.

## implement

To ensure the fulfillment of by means of a definite plan or procedure.

## communicate

To express, convey, or interchange ideas, information, or the like by writing, speaking, or through a common system of signs or symbols, esp. in a way that is clearly and readily understood.

## proposal

The offering of a plan for consideration, acceptance, or action.

## select

To choose from a number of alternatives by fitness or preference.

## judgment

The mental ability to perceive distinctions, comprehend relationships, or distinguish alternatives.

## function

The natural or proper action for which something is designed, used, or exists.

## purpose

The reason for which something exists or is done, made, or used.

## amenity

Any feature that provides or increases comfort, convenience, or pleasure.

## economy

Careful, thrifty, and efficient use and management of resources.

## evaluate

To ascertain or assess the significance, worth, or quality of, usually by careful appraisal and study.

## criterion

A standard, rule, or principle on which a judgment or decision may be based.

## datum

An assumed, given, or otherwise determined fact or proposition from which conclusions may be drawn or decisions made.

## simulate

To create a likeness or model of something anticipated for testing and evaluation.

## model

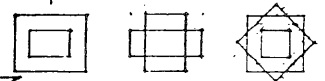
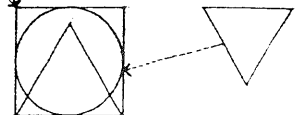
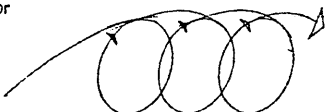
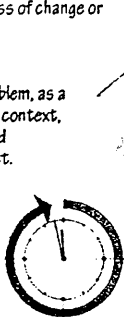
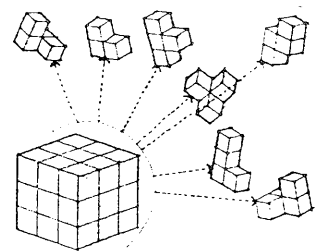
A miniature representation, usually built to scale, to show the appearance or construction of something.

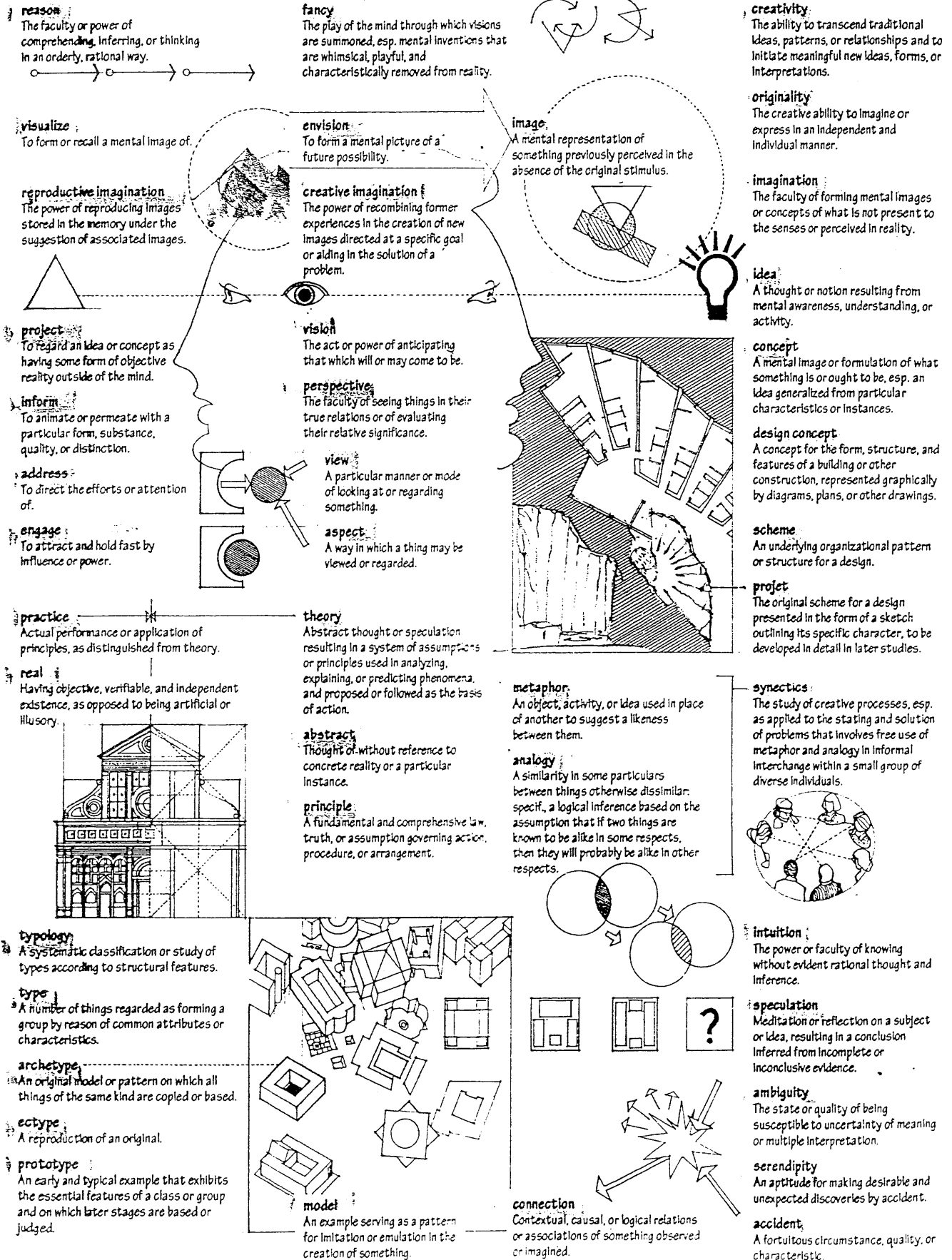
## mock-up

A full-sized model of a building or structure, built accurately to scale for study, testing, or teaching.

## test

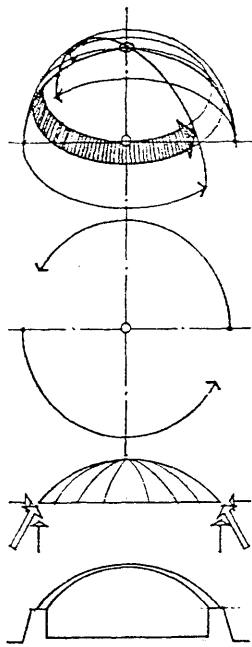
To subject a system or process to such conditions or operations as will lead to a critical evaluation of abilities or performance and subsequent acceptance or rejection.





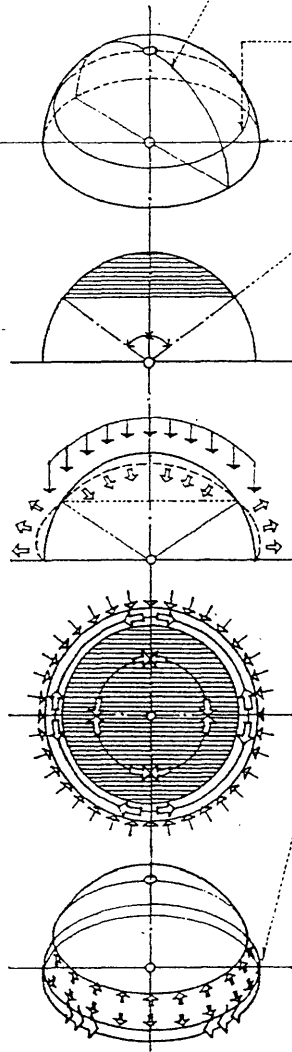
## DOME

A vaulted structure having a circular plan and usually the form of a portion of a sphere, so constructed as to exert an equal thrust in all directions.



### saucer dome

A dome having the form of a segment of a sphere, with its center well below the springing line. A saucer dome is particularly sensitive to buckling under an external load.



### meridional line

A curved line describing a vertical section cut through the axis of a rotational surface.

### hoop line

A circular line describing a horizontal section cut perpendicular to the axis of a rotational surface.

### semicircular dome

A dome having the form of a hemisphere.

Transition from meridional to hoop forces occurs at an angle of from  $45^\circ$  to  $60^\circ$  from the vertical axis for most load conditions.

### hoop force

A force acting along a hoop line of a dome structure, perpendicular to meridional forces. Hoop forces, which restrain the out-of-plane movement of the meridional strips in the shell of a dome, are compressive in the upper zone and tensile in the lower zone.

### meridional force

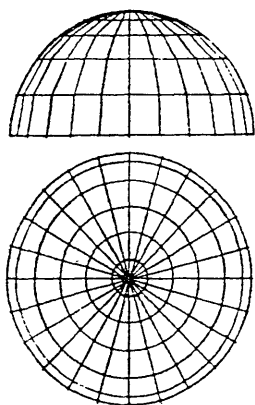
A force acting along a meridional line of a dome structure, always compressive under full vertical loading.

### tension ring

A ring encircling the base of a dome to contain the outward components of the meridional forces. In a concrete dome, this ring is thickened and reinforced to handle the bending stresses caused by the differing elastic deformations of the ring and shell.

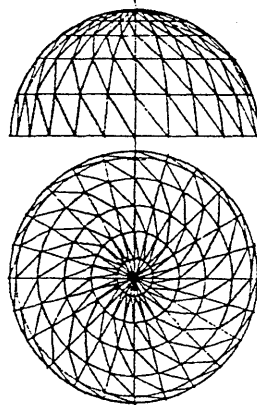
### great circle

The circle of greatest diameter that can be drawn on a sphere.



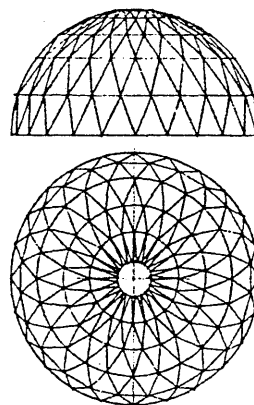
### radial dome

A dome built with steel or timber trusses arranged in a radial manner and connected by polygonal rings at various heights.



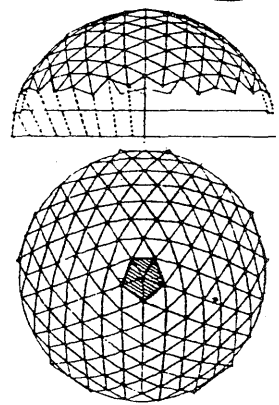
### Schwedler dome

A steel dome having members which follow the lines of latitude and longitude, and a third set of diagonals completing the triangulation.



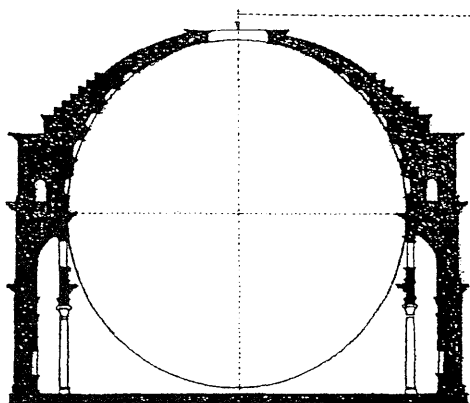
### lattice dome

A steel dome structure having members which follow the circles of latitude, and two sets of diagonals replacing the lines of longitude and forming a series of isosceles triangles.



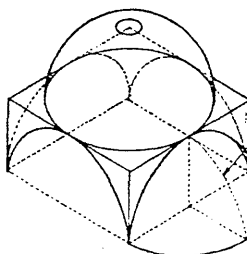
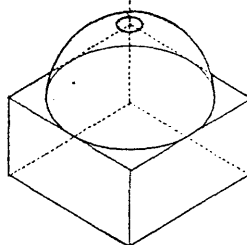
### geodesic dome

A steel dome having members which follow three principal sets of great circles intersecting at  $60^\circ$ , subdividing the dome surface into a series of equilateral spherical triangles.



**oculus**

A circular opening, esp. one at the crown of a dome.

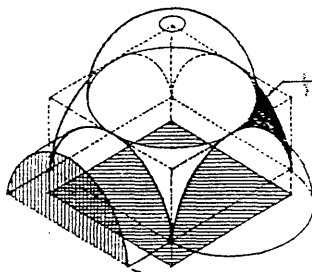


**semidome**

Half a dome formed by a vertical section, as over a semicircular apse.

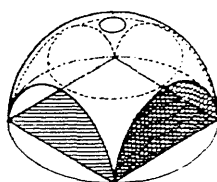
**cul-de-four**

A semidome or quarter-sphere vault, as over an apse or niche.



**pendentive**

A spherical triangle forming the transition from the circular plan of a dome to the polygonal plan of its supporting structure.

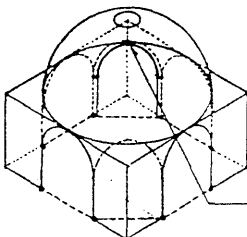


**lunette**

An area in the plane of a wall framed by an arch or vault, containing a window, painting, or sculpture.

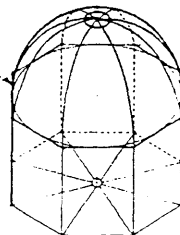
**pendentive dome**

A spherical dome formed by removing four segments so that it merges with its pendentives and sits on a square plan.



**squinch**

An arch or corbeling built across the upper inside corner of a square tower to support the side of a superimposed octagonal structure.



**lantern**

A superstructure crowning a roof or dome having open or windowed walls to let in light and air.

**cupola**

A light structure on a dome or roof, serving as a belfry, lantern, or belvedere.

**tambour**

The vertical part of a cupola.

**interdome**

The space between the inner and outer shells of a dome.

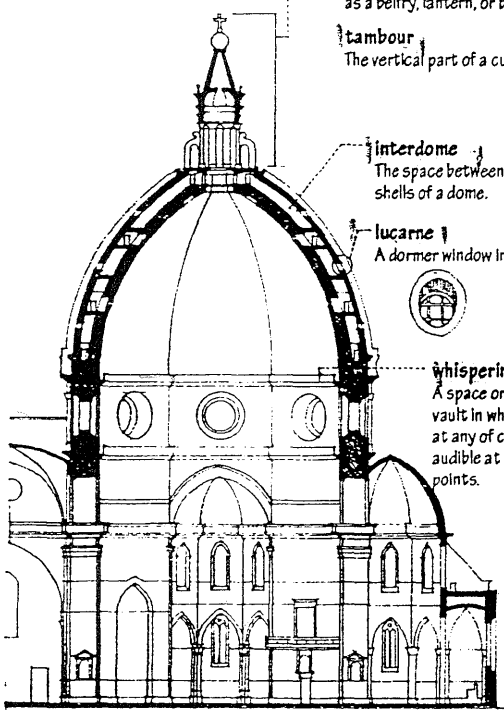
**lucarne**

A dormer window in a roof or spire.



**whispering gallery**

A space or gallery beneath a dome or vault in which low sounds produced at any of certain points are clearly audible at certain other distant points.

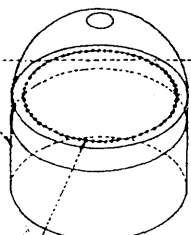


**drum**

A cylindrical or faceted construction, often pierced with windows, supporting a dome.

**tholobate**

The substructure supporting a dome or cupola.



**bandage**

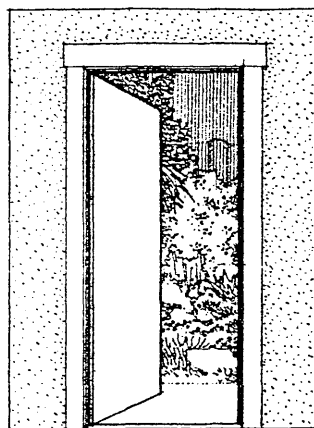
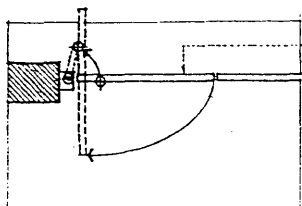
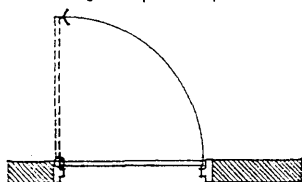
A strap, ring, or chain placed around a structure to secure and hold its parts together, as around the springing of a dome.

## DOOR

A hinged, sliding, or folding barrier of wood, metal, or glass for opening and closing an entrance to a building, room, or cabinet.

### swinging door

A door that turns on hinges or pivots about a vertical edge when pushed or pulled.



### balanced door

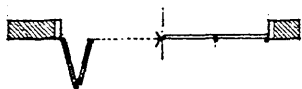
A pivoted door that is partially counterbalanced for easier opening and closing.

### automatic door

A door that opens automatically at the approach of a person or automobile.

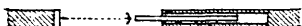
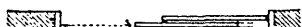
### pivoted door

A door carried on and swinging about on a center or offset pivot, as distinguished from one hung on hinges.



### folding door

A door with hinged sections that can be folded flat against one another when opened.

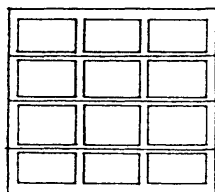


### sliding door

A door that operates or moves by sliding on a track, usually parallel to a wall.

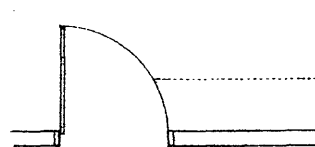
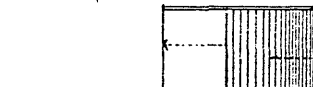
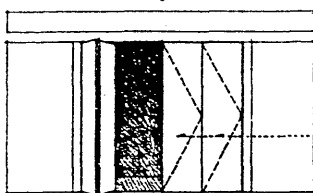
### rolling door

A large door consisting of horizontal, interlocking metal slats guided by a track on either side, opening by coiling about an overhead drum at the head of the door opening.



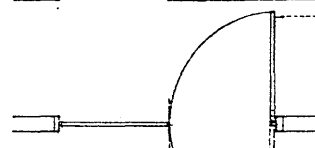
### door opener

A mechanism that automatically opens a door when actuated by a radio transmitter, electric eye, or other device.



### single-acting door

A door hung on hinges that permit it to swing in one direction only.



### double-acting door

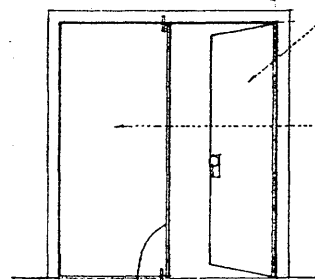
A door hung on hinges that permit it to swing in either direction from a closed position.

### double doors

A pair of doors hung in the same doorframe.

### leaf

A hinged or sliding section of a door or shutter.



### active leaf

The leaf of a pair of double doors to which the latching or locking mechanism is attached. Also called opening leaf.

### inactive leaf

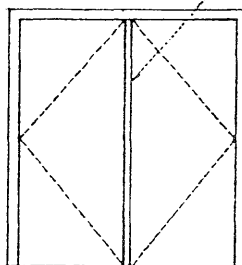
The leaf of a pair of double doors to which the strike plate is fastened to receive the latch or bolt of the active leaf, usually fixed in a closed position by bolts at the top and bottom of the door. Also called standing leaf.

### astragal

A molding attached to one or both meeting stiles of a pair of double doors to prevent drafts or the passage of light, noise, or smoke.

### mullion

A slender vertical member dividing the opening for a pair of double doors, sometimes removable to permit the passage of large objects.



### bifold door

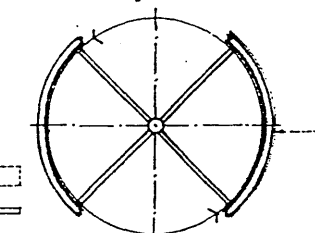
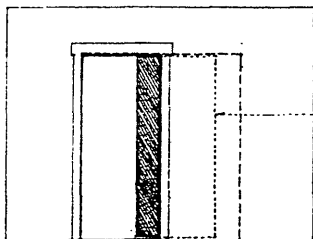
A folding door that divides into two parts, the inner leaf of each part being hung from an overhead track and the outer leaf pivoted at the jamb.

### accordion door

A multileafed door that is hung from an overhead track and opens by folding back in the manner of an accordion.

### pocket door

A door that slides into and out of a recess in a doorway wall.



### revolving door

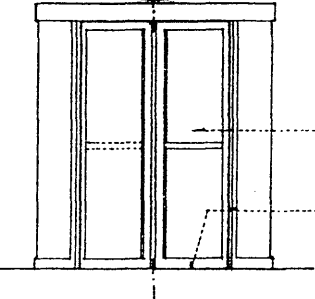
An entrance door for excluding drafts from the interior of a building, consisting of four leaves set in the form of a cross and rotating about a central vertical pivot within a cylindrically shaped vestibule. Some revolving doors automatically fold back in the direction of egress when pressure is applied, providing a legal passageway on both sides of the door pivot.

### wing

One of the leaves of a double or revolving door.

### sweep

The flexible weatherstripping along the edges of a revolving door.

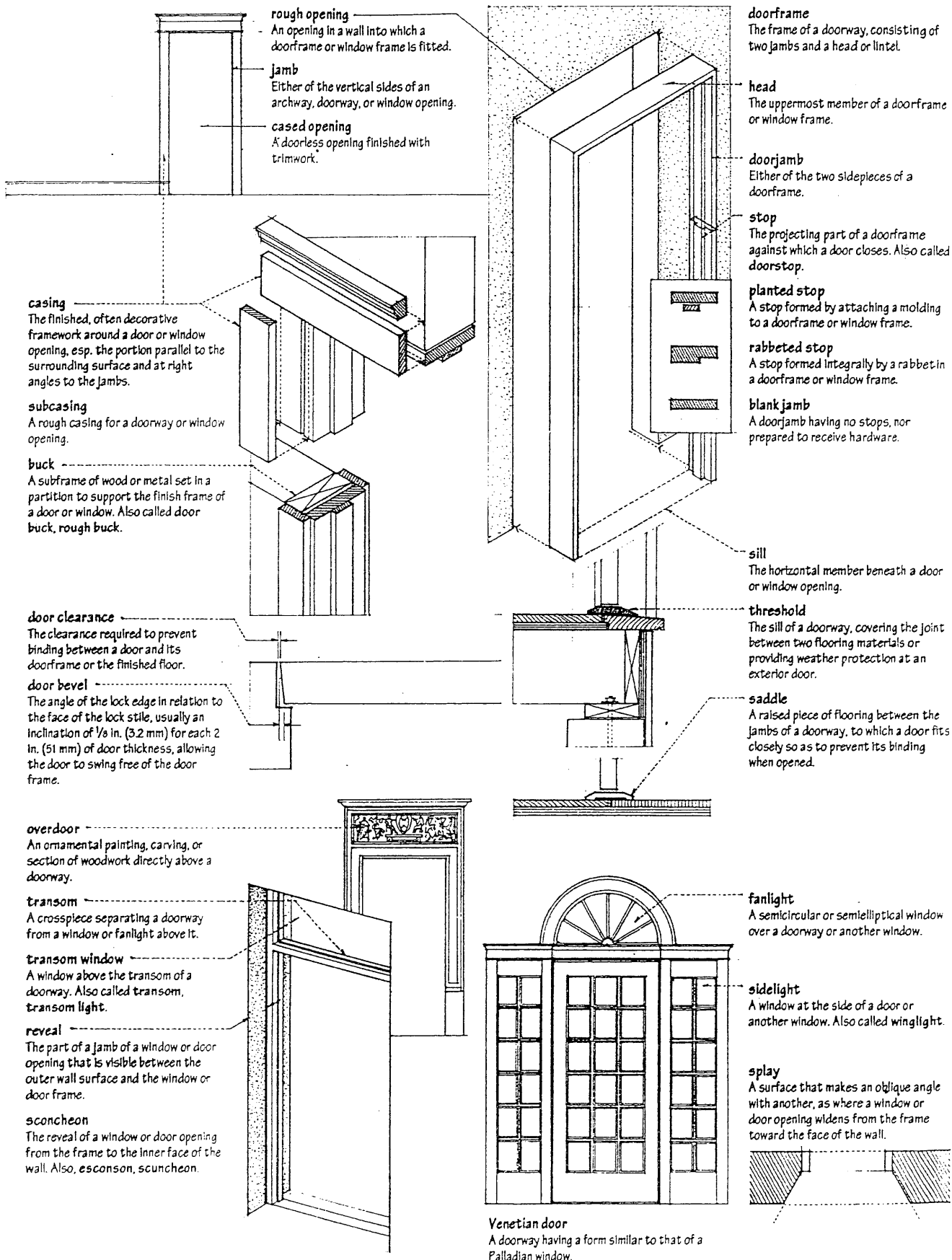


### overhead door

A large door constructed of one or several leaves, opening by swinging or rolling up to a horizontal position above the door opening.

### air curtain

A stream of compressed air directed downward across a doorway so as to form a shield to exclude drafts.



# DOOR

## paneled door

A door having a framework of stiles, rails, and sometimes muntins, filled with panels of a thinner material.

### rail

Any of various horizontal members framing panels, as in a system of paneling, a paneled door, window sash, or chest of drawers.

### top rail

The uppermost rail connecting the stiles of a paneled door or window sash.

### lock rail

The rail of a door that meets the shutting stile at the level of the lockset.

### bottom rail

The lowest rail connecting the stiles of a paneled door or window sash.

## panel

A distinct section or division of a wall, ceiling, or door, recessed below or raised above the general level or enclosed by a frame.

### stile

Any of various upright members framing panels, as in a system of paneling, a paneled door, window sash, or a chest of drawers.

### hinge stile

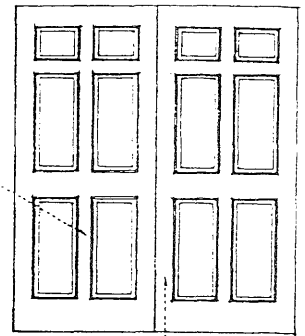
The stile of a door by which it is hung. Also called hanging stile.

### lock stile

The stile of a door that closes against the frame of the opening. Also called shutting stile.

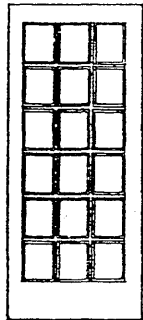
### muntin

A stile within the frame of a door.



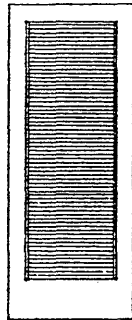
### meeting stile

One of the abutting stiles in a pair of double doors.



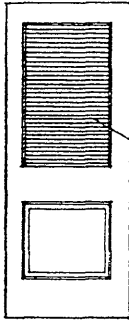
## French door

A door having rectangular glass panes extending throughout its length, and often hung in pairs. Also called casement door.



## louvered door

A door having a louvered opening for the passage or circulation of air. Also called blind door.

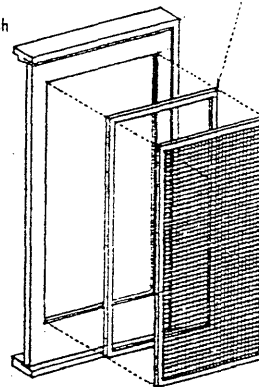


### vision light

A small light in the upper portion of a door glazed with clear glass for viewing.

## louver

An opening fitted with slanting, fixed or movable slats to admit air but exclude rain and snow or to provide privacy. Also, *louvre*.



### storm door

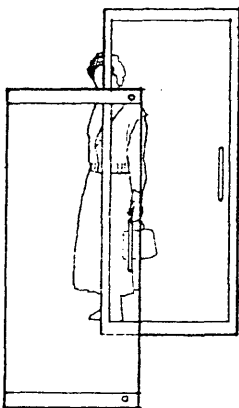
An outer or supplementary door, usually glazed, for protecting an entrance door from drafts, driving rain, or severe weather.

### screen door

An exterior door having wood or aluminum stiles and rails that hold a wire or plastic mesh to admit air but exclude insects.

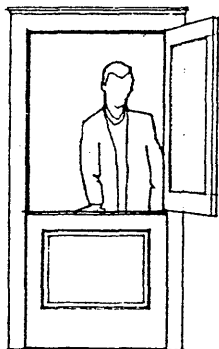
## combination door

An exterior door having a frame into which different types of panels can be inserted, as a screen for summer or storm sash for winter.



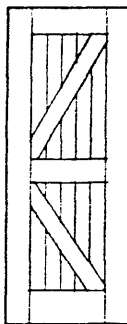
## glass door

A door of heat-strengthened or tempered glass, with or without rails or stiles, used primarily as an entrance door.



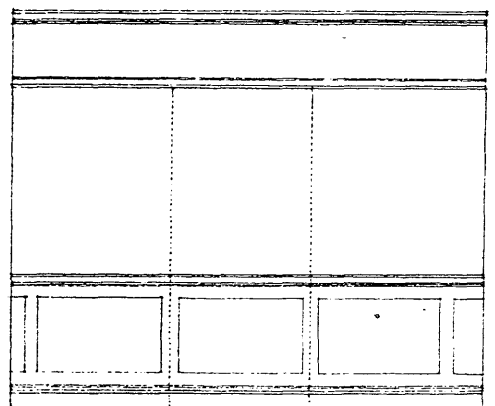
## Dutch door

A door divided horizontally so that the upper or lower part can be opened or closed separately.



## batten door

A door constructed of vertical boards held together by horizontal battens and diagonal bracing.



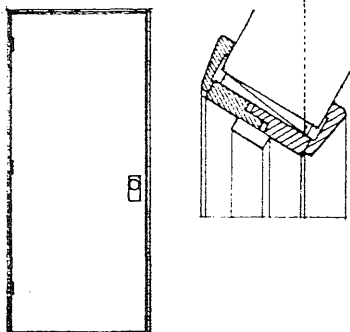
## jib door

A door hinged to be flush with the wall on either side and treated so as to be indiscernible when closed. Also, *gib door*.



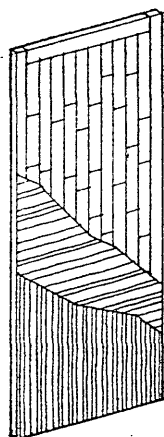
## adjustable doorframe

A doorframe having a split head and jambs for installation in various wall thicknesses.



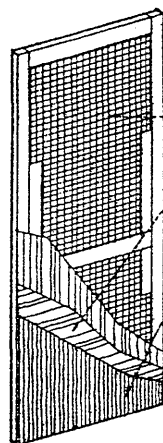
## prehung door

A door hung in a doorframe before installation in a wall, sometimes prefinished and prefitted with all necessary hardware and casing trim.



## solid-core door

A wood flush door having a solid core of staved lumber, particle board, or a mineral composition.

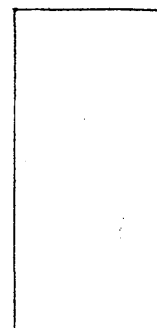


## hollow-core door

A wood flush door having a framework of stiles and rails encasing an expanded honeycomb core of corrugated fiberboard or a grid of interlocking horizontal and vertical wood strips.

## flush door

A door having smooth-surfaced faces.



### core

A wooden construction, as in a door, forming a backing for face veneers.

### crossbanding

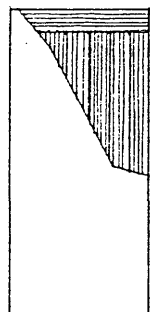
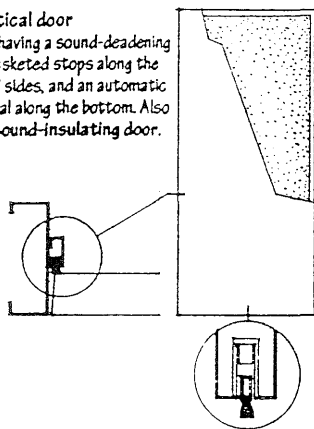
The plywood or hardboard veneer immediately beneath the face veneers of a flush door. Also, crossband.

### doorskin

A surface veneer of plywood, hardboard, plastic laminate, or medium density overlay, bonded to the crossbanding or core of a flush door.

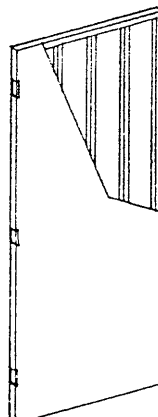
## acoustical door

A door having a sound-deadening core, gasketed stops along the top and sides, and an automatic drop seal along the bottom. Also called sound-insulating door.



## kalamein door

A door having a structural wood core clad with galvanized sheet metal.



## hollow metal door

A door having face sheets of light-gauge steel bonded to a steel channel frame, reinforced with channels, a kraft honeycomb structure, or a rigid plastic-foam core.

## throat

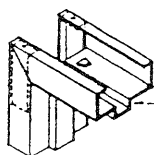
The opening between the backbends of a metal doorframe.

## backbend

The face at the outer edge of a metal doorframe that returns to the wall surface.

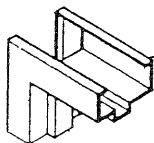
## hollow metal frame

A doorframe having a head and jambs formed from a single piece of metal.



## knockdown frame

A metal doorframe composed of three or more parts for assembly in the field.

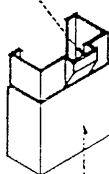


## welded frame

A metal doorframe that is completely set up and welded at the factory.

## cutoff stop

A stop having a closed end that terminates above the floor line at a 45° or 90° angle. Also called hospital stop, sanitary stop.

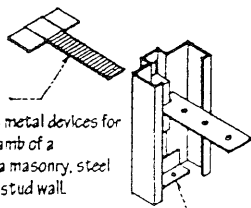


## spat

A protective lining, usually of stainless steel, at the base of a doorframe.

## jamb anchor

Any of various metal devices for securing the jamb of a doorframe to a masonry, steel stud, or wood stud wall.



## anchor

Any of various metal devices for binding one part of a structure to another.

## base anchor

A metal clip or device for securing the base of a doorframe to the floor.

## flush frame

A metal doorframe designed to be installed during the construction of a masonry or stud wall.

## drywall frame

A knockdown frame having a double-return backbend for installation after a drywall partition is finished.

## grouted frame

A metal doorframe completely filled with plaster or mortar for structural rigidity and increased fire resistance.

## double egress frame

A metal doorframe prepared to receive a pair of single-acting doors that swing in opposite directions.

# DRAWING

The art, process, or technique of representing an object, scene, or idea by means of lines on a surface.

## technique

A method or procedure for accomplishing a desired aim or task, as that employed by an artist showing a high degree of skill or command of fundamentals.

## contour drawing

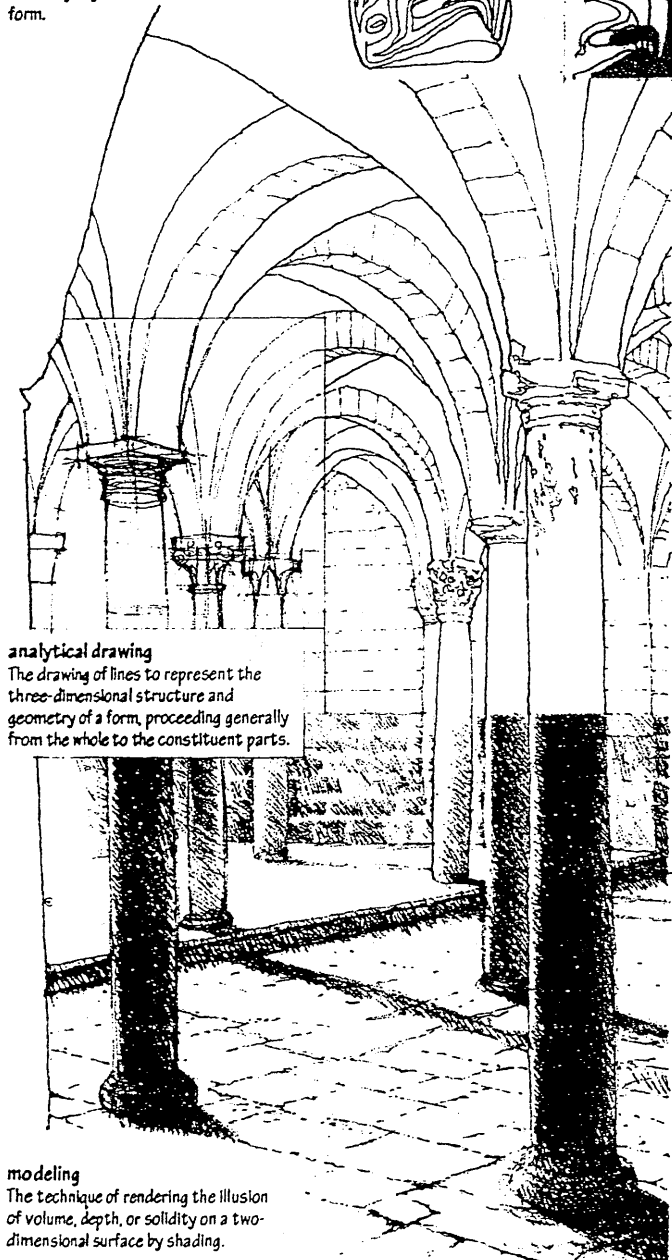
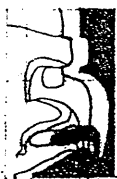
The technique of drawing lines to represent the contours of a subject, without shading or modeling of form.

## contour

The outline of a two-dimensional shape or bounding edges of a three-dimensional form.

## freehand drawing

The art, process, or technique of drawing by hand without the aid of drafting instruments or mechanical devices, esp. for the representation of perceptions or the visualization of ideas.



## analytical drawing

The drawing of lines to represent the three-dimensional structure and geometry of a form, proceeding generally from the whole to the constituent parts.

## modeling

The technique of rendering the illusion of volume, depth, or solidity on a two-dimensional surface by shading.

## grisaille

Monochromatic painting in shades of gray to produce a three-dimensional effect.

## SEEING

## image

A representation of the form or appearance of something, made visible in a sculpture, photograph, or drawing.

## PERCEIVING IMAGINING

## DRAWING

## line

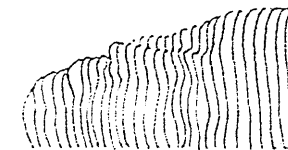
A thin, continuous mark made on a surface with a pencil, pen, or brush, as distinguished from shading or color.

## outline

A line describing the outer boundary of a figure or object.

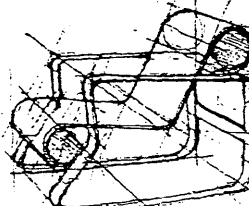
## profile

An outline of a form or structure seen or represented from the side.



## cross-contour drawing

The technique of drawing lines to represent a series of cuts across the surface of a form rather than its edges.



## gesture drawing

The technique of drawing a single or multiple lines freely and quickly as a subject is scanned and perceptions of volume, mass, movement, and significant details are projected onto the drawing surface. In contrast to contour drawing, gesture drawing generally proceeds from the whole to the parts.

## gesture

A movement of the hand, arm, head, face, or body that expresses an idea, opinion, or emotion.

## movement

The effect or illusion of motion conveyed by the relationship of structural elements in a design or composition.

## regulating line

A line drawn to measure or express alignment, scale, or proportion.

## trace

A line lightly drawn to record alignment or measurement.



## shading

The rendering of light and dark values in a drawing to create the illusion of three-dimensionality, represent light and shadow, or give the effect of color.

## hatching

Shading composed of fine lines drawn in close proximity.



## crosshatching

Shading composed of two or more series of intersecting parallel lines.

## scribbling

Shading by means of a network of random, multidirectional lines.



## stippling

Shading by means of dots, small spots, or short strokes.

## key

The dominant tonal value of a drawing or painting.

## high-key

Having chiefly light tones with little contrast.

## low-key

Having chiefly dark tones with little contrast.

## sketch

A simply or hastily executed drawing or painting representing the essential features of an object or scene without the details, often made as a preliminary study.

## study

A drawing executed as an educational exercise, produced as a preliminary to a final work, or made to record observations. Sometimes referred to as a referential drawing.

## conception

A drawing of something that does not yet exist.

## draft

A preliminary sketch of a design or plan, esp. one subject to revision.

## esquisse

A sketch showing the general features of a design or plan.

## épure

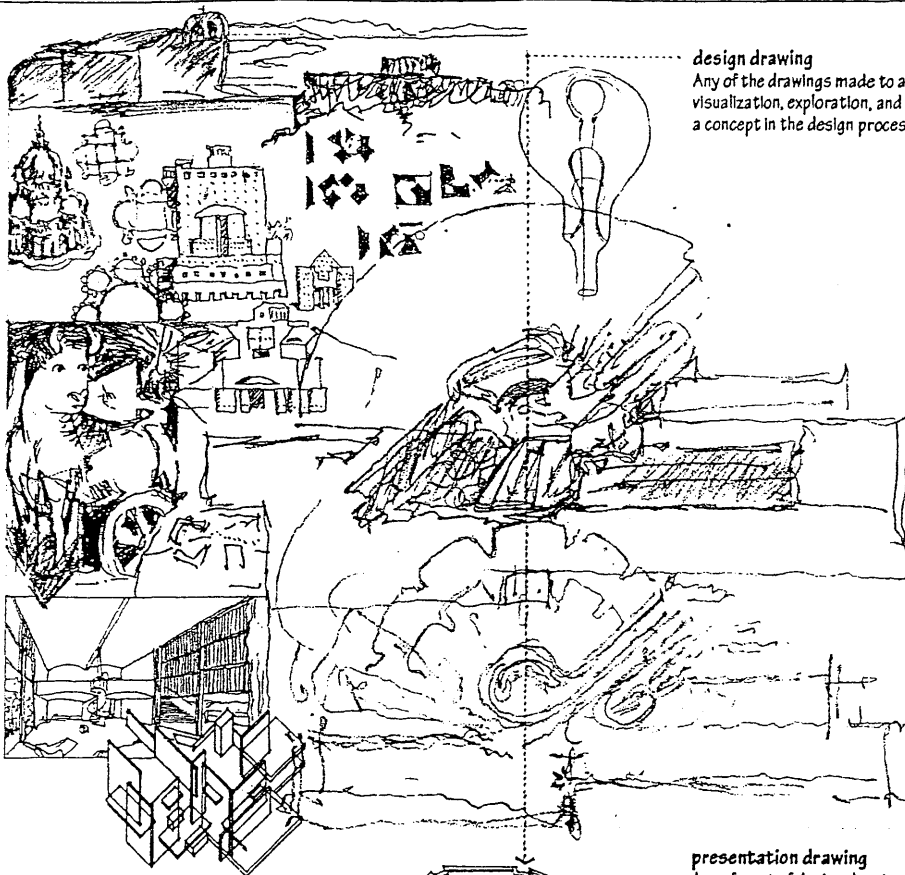
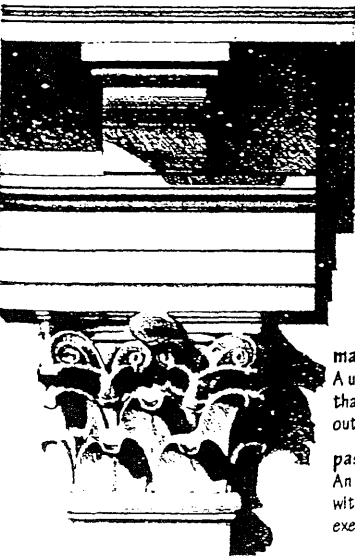
A full-scale, detailed drawing done on a wall, floor, or other large surface, from which are traced the patterns for various building elements.

## cartoon

A full-scale drawing of a motif or design, to be transferred in preparation for a fresco, mosaic, or tapestry.

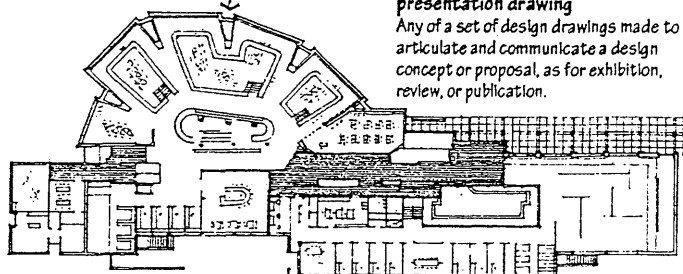
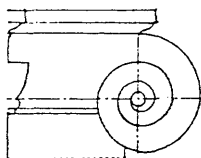
## rendering

A drawing, esp. a perspective, of a building or interior space, artistically delineating materials, shades and shadows; usually done for the purposes of presentation and persuasion.



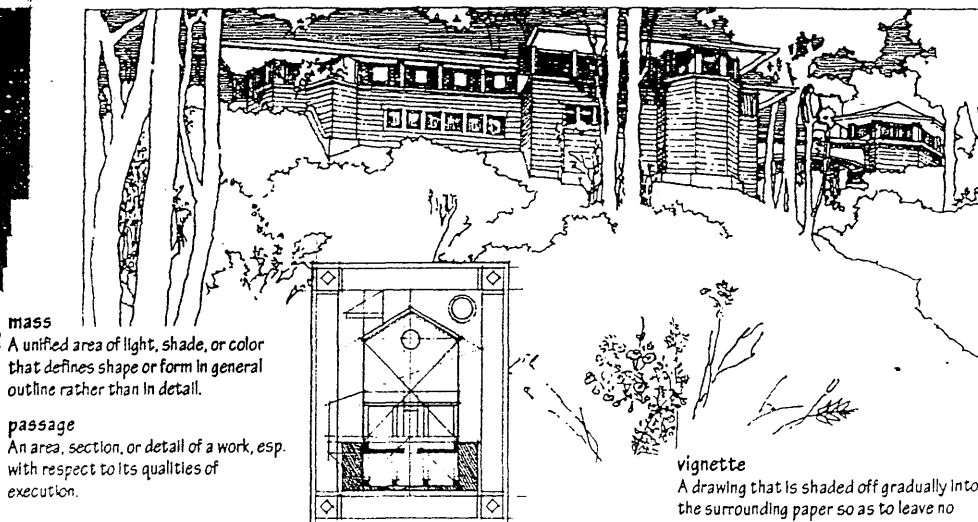
## design drawing

Any of the drawings made to aid in the visualization, exploration, and evaluation of a concept in the design process.



## presentation drawing

Any of a set of design drawings made to articulate and communicate a design concept or proposal, as for exhibition, review, or publication.



## mass

A unified area of light, shade, or color that defines shape or form in general outline rather than in detail.

## passage

An area, section, or detail of a work, esp. with respect to its qualities of execution.

## analytique

An elevation drawing of a facade, surrounded by a decorative arrangement of drawings of important details and sometimes a plan or section of the facade.

## vignette

A drawing that is shaded off gradually into the surrounding paper so as to leave no definite line at the border.

## trompe l'œil

A drawing or painting in which objects are rendered in extremely fine detail to emphasize the illusion of tactile and spatial qualities.

# DRAWING

## drafting

Drawing done with the aid of such instruments as T-squares, triangles, compasses, and scales, esp. for the systematic representation and dimensional specification of architectural and engineering structures. Also called mechanical drawing.

### object line

A solid line representing a contour of an object.

### dashed line

A broken line consisting of short, closely spaced strokes, used esp. to represent object lines that are hidden or removed from view.

### dotted line

A broken line consisting of a series of closely spaced dots, sometimes used in place of a dashed line.

### centerline

A broken line consisting of relatively long segments separated by single dashes or dots, used to represent the axis of a symmetrical element or composition.

### grid

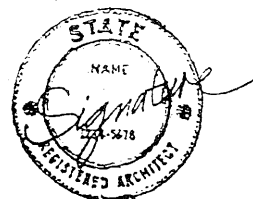
A rectangular system of lines and coordinates serving as a reference for locating and regulating the elements of a plan.

### construction drawings

The portion of the contract documents showing in accurate graphic or pictorial form the design, location, dimensions, and relationships of the elements of a project. Also called contract drawings, working drawings.

### seal

An embossing stamp used by a licensed architect, engineer, or other design professional on contract drawings and specifications to show evidence of registration in the state where the work is to be performed.



### extension line

A line extending from an edge or feature of an object, to which a dimension line is drawn.

### dimension line

A line terminated by arrows, short slashes, or dots, indicating the extent or magnitude of a part or the whole, and along which measurements are scaled and indicated.

### break line

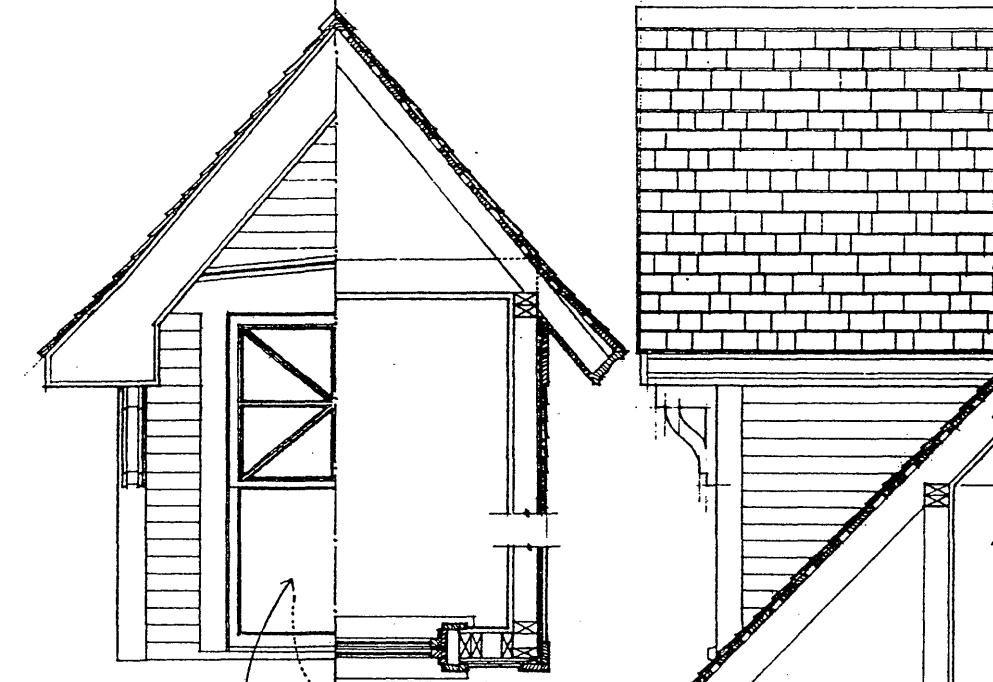
A broken line consisting of relatively long segments joined by short zigzag strokes, used to cut off a portion of a drawing.

### crowfoot

A V-shaped mark the apex of which is a reference point.

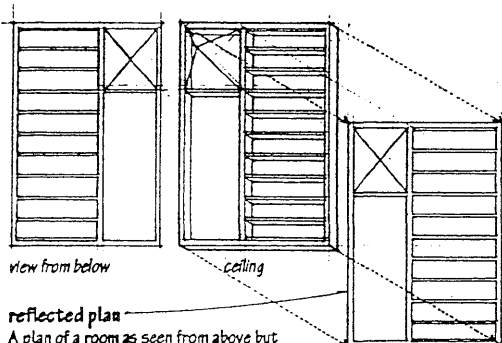
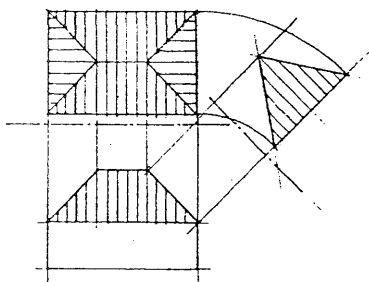
### leader

A short line leading the eye from a note or dimension to a reference point, line, or area.



**descriptive geometry**

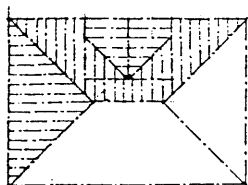
The theory of making projections of three-dimensional objects on a plane surface in order to deduce their geometric properties and relationships.

**reflected plan**

A plan of a room as seen from above but having its ceiling surfaces and elements projected downward upon it so that what would appear to the right when seen from below appears on the plan to the left. Also called reflected ceiling plan.

**framing plan**

A plan showing the pattern, elements, and connections of the structural frame for a floor or roof of a building, using a system of symbols and drafting linework.

**contour line**

An imaginary line joining points of equal elevation on a surface, or its representation on a topographic plan or map.

**contour interval**

The difference in elevation represented by each contour line on a topographic plan or map.

**grading plan**

A plan showing the proposed finish contours and elevations of the ground surface of a construction site.

**north arrow**

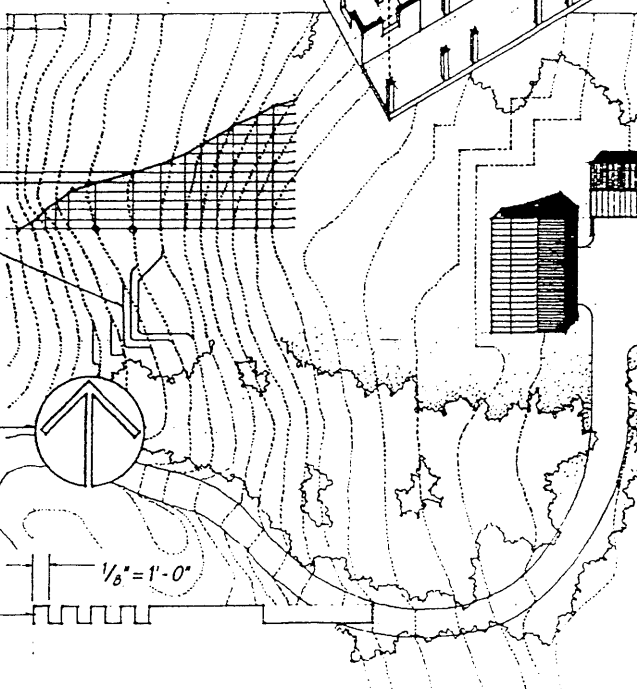
A graphic symbol used on plans and maps to indicate the direction of north.

**scale**

A proportion determining the relationship of a representation to that which it represents.

**graphic scale**

A graduated line or bar indicating the proportion between a representation and that which it represents.

**projection**

The process or technique of representing a three-dimensional object by projecting all its points by straight lines, either parallel or converging, to a picture plane.

**orthographic projection**

A method of projection in which a three-dimensional object is represented by projecting lines perpendicular to a picture plane. Also called orthogonal projection.

**plan**

An orthographic projection of the top or section of an object or structure on a horizontal plane, usually drawn to scale. Also called plan view.

**floor plan**

A plan of a room, suite, or entire floor of a building as seen from above after a horizontal section is cut and the upper portion removed, typically showing the form and arrangement of interior spaces and their enclosing walls, windows, and doors.

**poché**

The walls, columns, and other solids of a building that are cut in a floor plan or section drawing. Indicated usually in black or by hatching.

**roof plan**

A plan showing the top view of a building, esp. the form of its roof.

**site plan**

A plan showing the form, location, and orientation of a building or group of buildings on a site, usually including the dimensions, contours, landscaping and other significant features of the plot. Also called plot plan.

**area plan**

A plan showing the principal elements of a design project in the wider context of its surrounding environment.

## section

An orthographic projection of an object or structure as it would appear if cut through by an intersecting plane to show its internal configuration, usually drawn to scale.

## cross section

An orthographic projection of a section made by cutting transversely, esp. at right angles to the long axis of an object. Also called transverse section.

## longitudinal section

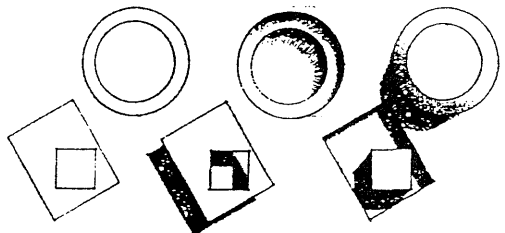
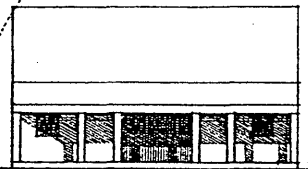
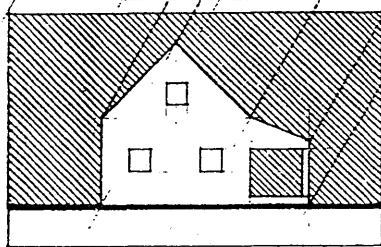
An orthographic projection of a section made by cutting through the longest axis of an object.

## section line

A centerline terminating in a perpendicular segment with an arrow, used to indicate where a section is cut in a plan or elevation view and the direction in which the section is to be viewed.

## oblique section

An orthographic projection of a section made by cutting with a plane that is neither parallel nor perpendicular to the long axis of an object.



## elevation

An orthographic projection of an object or structure on a vertical picture plane parallel to one of its sides, usually drawn to scale.

## shades and shadows

The casting and rendering of shades and shadows, esp. in orthographic views, to convey light, surface, form, and depth.

## relief

An apparent projection from a flat background due to contrast, creating the illusion of three dimensions.

## shade

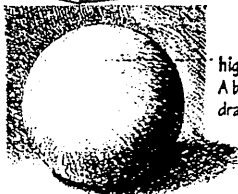
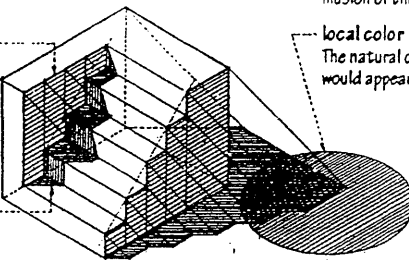
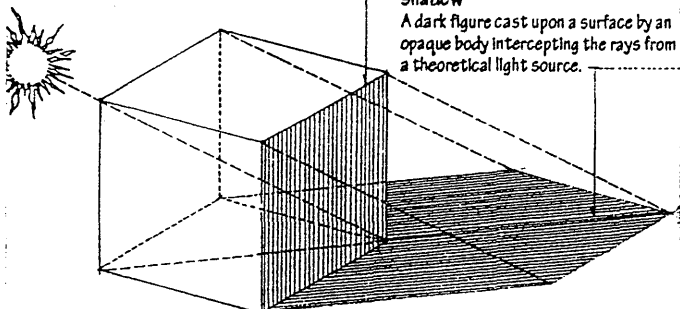
The parts of a solid that receive no light because they are tangent to or turned away from a theoretical light source.

## shadow

A dark figure cast upon a surface by an opaque body intercepting the rays from a theoretical light source.

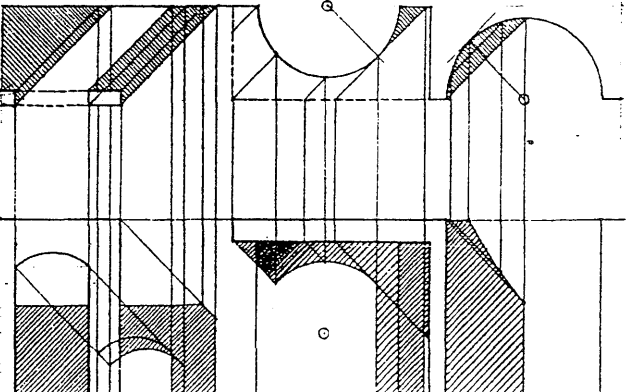
## local color

The natural color of a particular object as it would appear in white light.



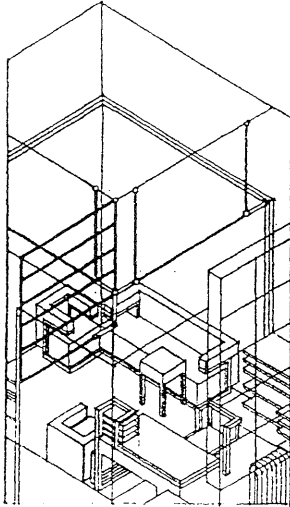
## highlight

A brilliantly lighted area of a modeled drawing appearing as a luminous spot.

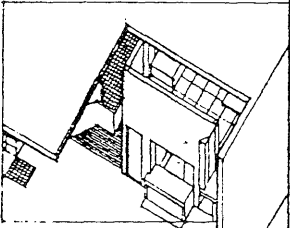


**parallel drawing**

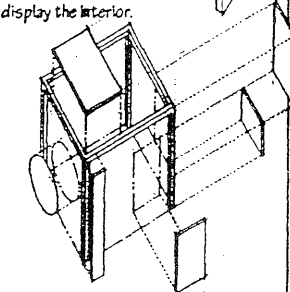
Any of various single-view drawings characterized by parallel lines remaining parallel to each other rather than converging as in linear perspective.

**phantom**

A part of a drawing that is made transparent to permit representation of details otherwise hidden from view.

**cutaway**

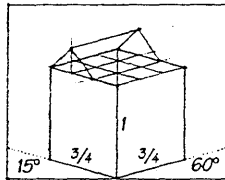
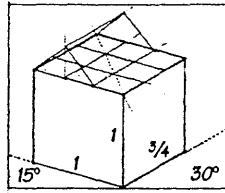
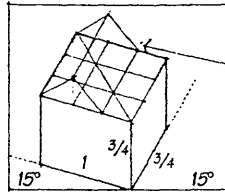
A drawing or model having an outer section removed to display the interior.

**exploded view**

A drawing that shows the individual parts of a structure or construction separately but indicates their proper relationships to each other and to the whole. Also called expanded view.

**phantom line**

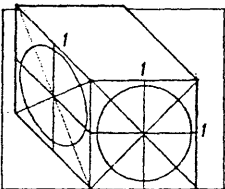
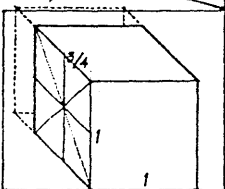
A broken line consisting of relatively long segments separated by two short dashes or dots, used to represent a property line, an alternative position of a part of an object, or the relative position of an absent part.

**dimetric projection**

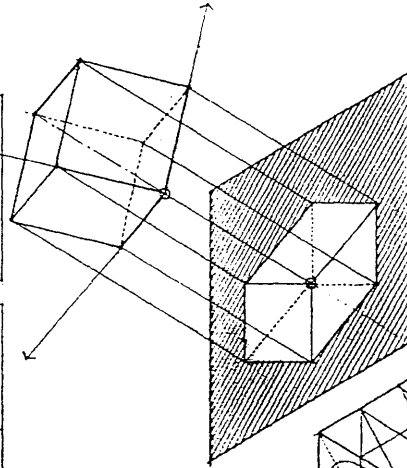
An axonometric projection of a three-dimensional object inclined to the picture plane in such a way that two of its principal axes are equally foreshortened and the third appears longer or shorter than the other two.

**trimetric projection**

An axonometric projection of a three-dimensional object inclined to the picture plane in such a way that all three principal axes are foreshortened at a different rate.

**cavalier drawing**

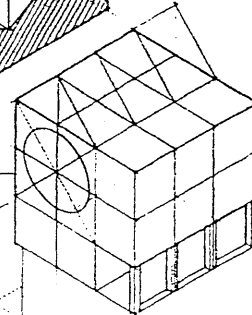
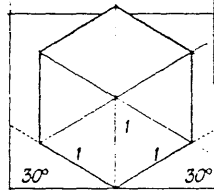
A parallel drawing of an oblique projection, having the receding lines perpendicular to the picture plane drawn to the same scale as the lines parallel to the picture plane.

**axonometric projection**

The orthographic projection of a three-dimensional object inclined to the picture plane in such a way that its three principal axes are foreshortened.

**axonometric**

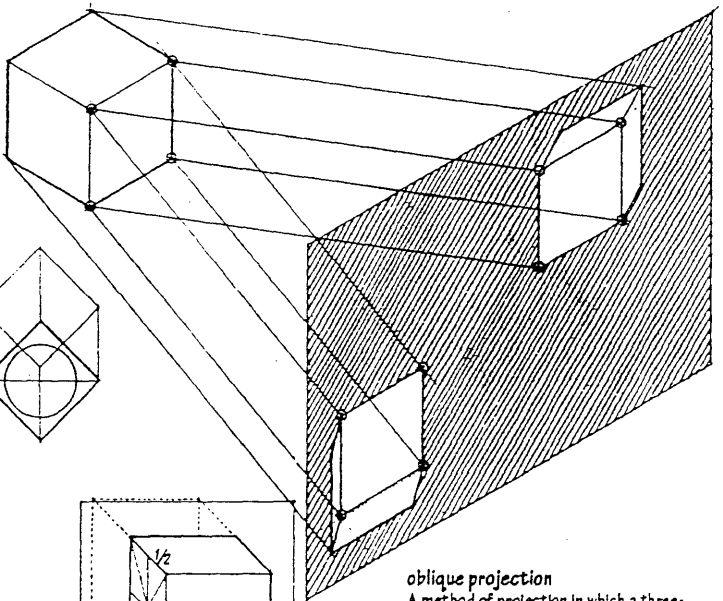
A parallel drawing of an axonometric projection, having all lines parallel to the three principal axes drawn to scale but diagonal and curved lines distorted.

**isometric**

A parallel drawing of an isometric projection, having all lines parallel to the principal axes drawn to true length at the same scale.

**isometric projection**

An axonometric projection of a three-dimensional object having its principal faces equally inclined to the picture plane so that its three principal axes are equally foreshortened.

**oblique projection**

A method of projection in which a three-dimensional object, having one principal face parallel to the picture plane, is represented by projecting parallel lines at some angle other than 90° to the picture plane.

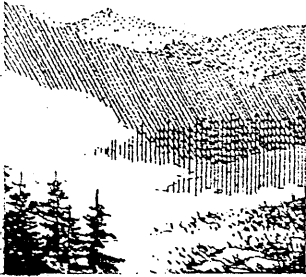
**oblique**

A parallel drawing of an oblique projection, having all lines and faces parallel to the picture plane drawn to exact scale, and all receding lines perpendicular to the picture plane shown at any convenient angle other than 90°, sometimes at a reduced scale to offset the appearance of distortion.

## DRAWING

### perspective

Any of various techniques for representing three-dimensional objects and spatial relationships on a two-dimensional surface as they might appear to the eye.

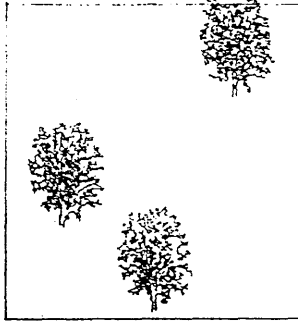


### aerial perspective

A technique for rendering depth or distance by muting the hue, tone, and distinctness of objects perceived as receding from the picture plane. Also called atmospheric perspective.

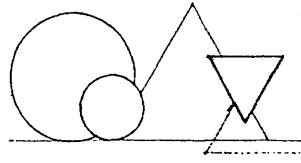
### pictorial space

The illusion of space or depth depicted on a two-dimensional surface by various graphic means, as aerial perspective, continuity of outline, or vertical location.



### vertical location

A technique for representing depth or distance by placing distant objects higher in the picture plane than objects perceived as being closer.

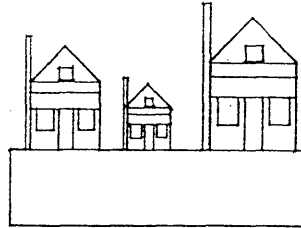


### continuity of outline

A technique for representing depth or distance by emphasizing the continuity of the contour of a shape perceived as being in front and concealing a part of another behind it.

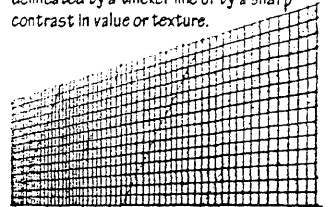
### spatial edge

An edge of an object or surface separated from its background by an interval of space, delineated by a thicker line or by a sharp contrast in value or texture.



### size perspective

A technique for representing depth or distance by reducing the size of objects perceived as receding from the picture plane.



### texture perspective

A technique for representing depth or distance by gradually increasing the density of the texture of a surface perceived as receding from the picture plane.

### linear perspective

A mathematical system for representing three-dimensional objects and spatial relationships on a two-dimensional surface by means of perspective projection.

### perspective projection

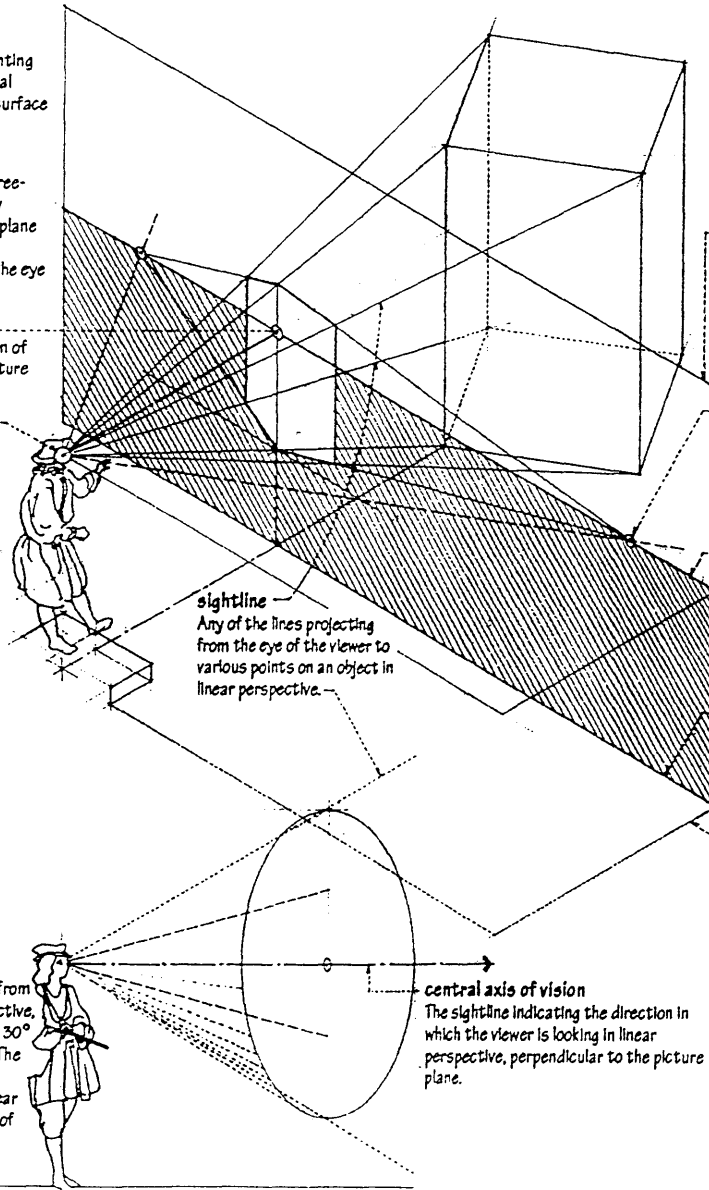
A method of projection in which a three-dimensional object is represented by projecting all its points to a picture plane by straight lines converging at an arbitrarily fixed point representing the eye of the viewer.

### center of vision

A point representing the intersection of the central axis of vision and the picture plane in linear perspective.

### station point

A fixed point in space representing a single eye of the viewer in linear perspective.



### picture plane

An imaginary transparent plane, coexistent with the drawing surface, on which the image of a three-dimensional object is projected. In linear perspective, any line or plane coincident with the picture plane can be drawn to exact scale.

### vanishing point

A point toward which receding parallel lines appear to converge in linear perspective, located at the point where a sightline parallel to the set of lines intersects the picture plane.

### horizon line

A line representing the intersection of the picture plane and a horizontal plane through the eye of the viewer in linear perspective.

### ground line

A horizontal line representing the intersection of the ground plane and the picture plane in linear perspective. Also called base line.

### ground plane

A horizontal plane of reference from which vertical measurements can be taken in linear perspective, usually the plane supporting the object depicted or on which the viewer stands.

### cone of vision

The field of vision radiating outward from the eye of the viewer in linear perspective, defined by sightlines forming a 15° to 30° angle with the central axis of vision. The cone of vision serves as a guide in determining what can be drawn in linear perspective without the appearance of distortion.

### central axis of vision

The sightline indicating the direction in which the viewer is looking in linear perspective, perpendicular to the picture plane.



**convergence**

The apparent movement of parallel lines toward a common vanishing point as they recede, used in linear perspective to convey an illusion of space and depth.

Parallel lines perpendicular to the picture plane will appear to converge at the center of vision.

Parallel lines parallel to the picture plane retain their orientation and will not appear to converge.

**perspective**

A drawing of the perspective projection of an object or scene, characterized chiefly by convergence and foreshortening.

**foreshortening**

The apparent contraction or distortion of a represented line or shape that is not parallel to the picture plane, conveying an illusion of extension or projection in space.

**diagonal vanishing point**

A vanishing point for a set of horizontal lines receding at a 45° angle to the picture plane in linear perspective. Also called diagonal point, distance point.

horizon line

Parallel lines rising upward as they recede will appear to converge somewhere above the horizon line.

**vanishing trace**

A line along which all sets of receding parallel lines lying in the same or parallel planes will appear to converge in linear perspective.

**measuring point**

A vanishing point for a set of parallel lines used in transferring scaled measurements in the picture plane to lines receding in linear perspective.

Parallel lines which are horizontal but not perpendicular to the picture plane will appear to converge somewhere on the horizon line.

**one-point perspective**

A linear perspective of a rectangular object or volume having a principal face parallel with the picture plane, so that vertical lines parallel to the picture plane remain vertical, horizontal lines parallel to the picture plane remain horizontal, and horizontal lines perpendicular to the picture plane appear to converge at the center of vision.

**isocephalic**

Having the heads of all figures at approximately the same level. Also, *isocephalous*.

**two-point perspective**

A linear perspective of a rectangular object or volume having two principal faces oblique to the picture plane, so that vertical lines parallel to the picture plane remain vertical and two horizontal sets of parallel lines oblique to the picture plane appear to converge at two vanishing points, one to the left and the other to the right.

**diagonal**

A straight line connecting two nonadjacent angles of a rectangle, used in subdividing a whole into proportionate parts or multiplying a basic unit of measurement or space.

**measuring line**

Any line coincident with or parallel to the picture plane, as the ground line, which can be used to take measurements in linear perspective.

Parallel lines sloping downward as they recede will appear to converge somewhere below the horizon line.

**anamorphosis**

A distorted image that appears in natural form only when viewed at a special angle or reflected from a curved mirror.

**graphic**

Of or relating to pictorial representation, esp. that which depicts in a clear and effective manner.

View at a shallow angle from this point.

**three-point perspective**

A linear perspective of a rectangular object or volume having all principal faces oblique to the picture plane, so that the three principal sets of parallel lines appear to converge at three different vanishing points.

# ELECTRICITY

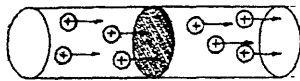
The science dealing with the physical phenomena arising from the existence and interaction of electric charges.

## electric charge

The intrinsic property of matter giving rise to all electric phenomena, occurring in two forms arbitrarily given positive and negative algebraic signs and measured in coulombs. Opposite charges attract while like charges repel each other.

## coulomb

The SI unit of electric charge, equal to the quantity of electricity transferred across a conductor by a current of one ampere in one second. Abbr.: C



## electromotive force

The energy per unit charge available for conversion from a chemical, mechanical, or other form of energy into electrical energy, or vice versa, in a conversion device as a battery, generator, or motor. Abbr.: emf

## potential difference

The voltage difference between two points that represents the work involved in the transfer of a unit charge from one point to the other.

## potential

The work required to move a unit charge from a reference point to a designated point.

## voltage

Potential difference or electromotive force expressed in volts; analogous to pressure in water flow.

## volt

The SI unit of potential difference and electromotive force, defined as the difference of electric potential between two points of a conductor carrying a constant current of one ampere, when the power dissipated between the points is equal to one watt. Abbr.: V

## current

The rate of flow of electric charge in a circuit per unit time, measured in amperes.

*Before the nature of electricity was fully understood, it was assumed that a direct current flowed from a positive point to a negative one. This convention is still used even though electrons flow in the opposite direction, from negative to positive.*

## ampere

The basic SI unit of electric current, equivalent to a flow of one coulomb per second or to the steady current produced by one volt applied across a resistance of one ohm. Abbr.: A

## amperage

The strength of an electric current measured or expressed in amperes; analogous to the rate of water flow.

## circuit

The complete path of an electric current, including the source of electric energy.

## series

An arrangement of components in an electric circuit in which the same current flows through each component in turn without branching.

## parallel

An arrangement of components in an electric circuit in which all positive terminals are connected to one conductor and all negative terminals are connected to a second conductor, the same voltage being applied to each component.

## resistance

The opposition of a conductor to the flow of current, causing some of the electric energy to be transformed into heat and usually measured in ohms. Abbr.: R

## ohm

The SI unit of electrical resistance, equal to the resistance of a conductor in which a potential difference of one volt produces a current of one ampere. Symbol:  $\Omega$

## Ohm's law

The law that for any circuit the electric current is directly proportional to the voltage and inversely proportional to the resistance.

## Joule's law

The principle that the rate of production of heat by a direct current is directly proportional to the resistance of the circuit and to the square of the current.

## battery

A group of two or more cells connected together to produce electric current.

## cell

A device for converting chemical into electric energy, usually consisting of a receptacle with electrodes in an electrolyte. Also called **electric cell**, **galvanic cell**, **voltaic cell**.

## electrolyte

A nonmetallic conducting medium in which current is carried by the movement of ions.

## electrode

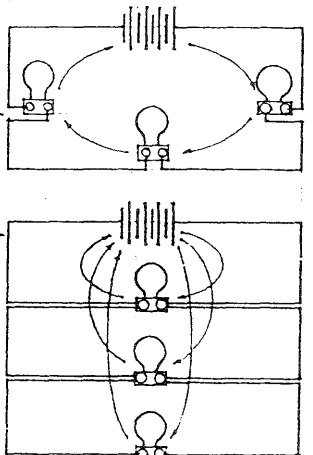
A conductor through which a current enters or leaves a nonmetallic medium.

## anode

The negative terminal of a primary cell or storage battery.

## cathode

The positive terminal of a primary cell or storage battery.



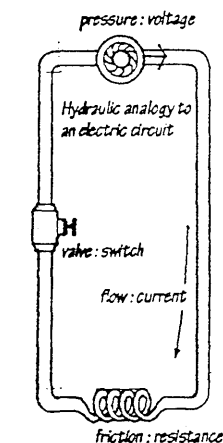
## resistivity

The resistance per unit length of a substance with a unit cross-sectional area. Also called **specific resistance**.

## conductivity

A measure of the ability of a substance to conduct electric current, equal to the reciprocal of the resistivity of the substance. Also called **specific conductance**.

$$I = V/R$$



$$W = V \times A$$

## power

The product of potential difference and current in a direct-current circuit. In an alternating current circuit, power is equal to the product of the effective voltage, the effective current, and the cosine of the phase angle between current and voltage.

## watt

The SI unit of power, equal to one joule per second or to the power represented by a current of one ampere flowing across a potential difference of one volt. Abbr.: W

## wattage

An amount of power, esp. the power required to operate an electrical device or appliance, expressed in watts.

## kilowatt

A unit of power, equal to 1,000 watts. Abbr.: kW

## kilowatt-hour

A unit of energy, equal to the energy transferred or expended by one kilowatt in one hour; a common unit of electric power consumption. Abbr.: kWh

**generator**

A machine that converts mechanical energy into electrical energy.

**alternator**

A generator for producing alternating current.

**electric motor**

A machine that converts electric power into mechanical energy.

**armature**

The main current-carrying winding of a motor or generator in which electromotive force is induced.

**brush**

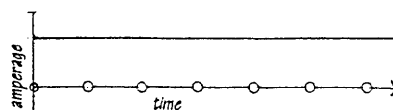
A copper or carbon conductor serving to maintain electric contact between fixed and moving elements in a motor or generator.

**core**

A mass of iron or other ferrous material in an electromagnet, induction coil, or transformer, serving to concentrate and intensify the magnetic field resulting from a current in a surrounding coil.

**coil**

A conductor wound in a spiral form to introduce inductance into a circuit.

**direct current**

An electric current flowing in one direction only and having a magnitude that does not vary or varies only slightly. Abbr.: DC

**alternating current**

An electric current that reverses direction at regularly recurring intervals, having a magnitude that varies in a sinusoidal manner. Abbr.: AC

**volt-ampere**

A unit of electric measurement, equal to the product of one volt and one ampere, equivalent to one watt for direct-current systems and a unit of apparent power for alternating-current systems. Abbr.: VA

**transformer**

An electric device consisting of two or more windings wound on the same core, which employs the principle of mutual induction to convert variations of alternating current in a primary circuit into variations of voltage and current in a secondary circuit.

**step-up transformer**

A transformer having fewer turns in the primary winding than in the secondary, serving to transform low voltage to high voltage.

**step-down transformer**

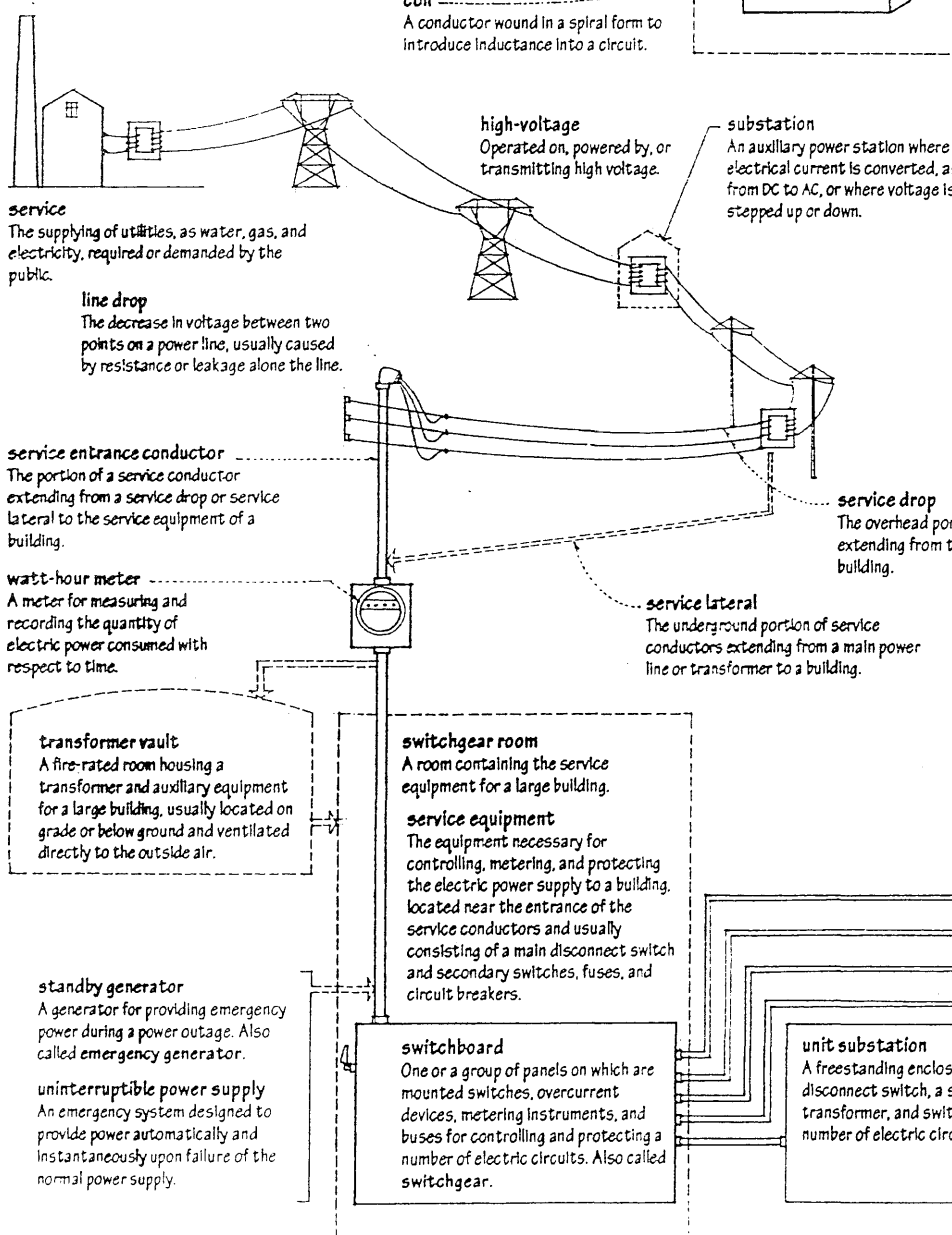
A transformer having a greater number of turns in the primary winding than in the secondary, serving to transform high voltage to low voltage.

**line voltage**

The voltage supplied by a power line, measured at the point of use.

**service conductor**

Any of several conductors extending from a main power line or transformer to the service equipment of a building.

**service**

The supplying of utilities, as water, gas, and electricity, required or demanded by the public.

**line drop**

The decrease in voltage between two points on a power line, usually caused by resistance or leakage along the line.

**service entrance conductor**

The portion of a service conductor extending from a service drop or service lateral to the service equipment of a building.

**watt-hour meter**

A meter for measuring and recording the quantity of electric power consumed with respect to time.

**transformer vault**

A fire-rated room housing a transformer and auxiliary equipment for a large building, usually located on grade or below ground and ventilated directly to the outside air.

**standby generator**

A generator for providing emergency power during a power outage. Also called emergency generator.

**uninterruptible power supply**

An emergency system designed to provide power automatically and instantaneously upon failure of the normal power supply.

**switchgear room**

A room containing the service equipment for a large building.

**service equipment**

The equipment necessary for controlling, metering, and protecting the electric power supply to a building, located near the entrance of the service conductors and usually consisting of a main disconnect switch and secondary switches, fuses, and circuit breakers.

**switchboard**

One or a group of panels on which are mounted switches, overcurrent devices, metering instruments, and buses for controlling and protecting a number of electric circuits. Also called switchgear.

**substation**

An auxiliary power station where electrical current is converted, as from DC to AC, or where voltage is stepped up or down.

**service drop**

The overhead portion of service conductors extending from the nearest utility pole to a building.

**service lateral**

The underground portion of service conductors extending from a main power line or transformer to a building.

**feeder**

Any of the conductors extending from the service equipment to various distribution points in a building.

**unit substation**

A freestanding enclosure housing a disconnect switch, a step-down transformer, and switchgear for a number of electric circuits.

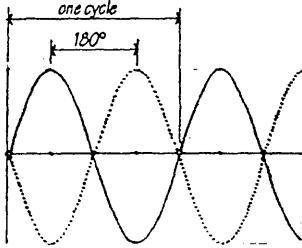
# ELECTRICITY

## phase

The fractional part of a period or cycle through which time has advanced, measured from a specified reference point and often expressed as an angle.

## ground

A conducting connection between an electric circuit or device and the earth or other point of zero potential.



## single-phase

Of or pertaining to a circuit energized by an alternating current with one phase or with phases differing by 180°.

## two-phase

Of or pertaining to a circuit energized by two alternating currents or voltages differing in phase by one quarter of a cycle or 90°.

## three-phase

Of or pertaining to a combination of three circuits energized by alternating currents or voltages differing in phase by one third of a cycle or 120°.

## live

Electrically connected to a source of voltage, or electrically charged so as to have a potential different from that of earth. Also, hot.

## dead

Not electrically connected to a source of voltage.

## neutral

Not electrically charged.

## fault

A local failure in the insulation or continuity of a conductor, or in the functioning of an electrical system.

## short circuit

An abnormal, usually accidental condition of low resistance between two points in an electric circuit, resulting in a flow of excess current. Also called short.

## shock

The muscular spasms caused by an electric current passing through the body.

## service switch

The main disconnect for the entire electrical system of a building, except for any emergency power systems.

## panel

A board on which are mounted the switches, fuses, and circuit breakers for controlling and protecting a number of similar branch circuits, installed in a cabinet and accessible from the front only. Also called panelboard.

## bus

A heavy conductor, usually in the form of a solid copper bar, used for collecting, carrying, and distributing large electric currents. Also called busbar.

## grounded conductor

Any conductor of an electrical system intentionally connected to a ground connection.

## grounding electrode

A conductor, as a metal ground rod, ground plate, or cold-water pipe, firmly embedded in the earth to establish a ground connection.

## fuse

A device containing a strip or wire of fusible metal that melts under the heat produced by excess current, thereby interrupting the circuit.

## fusible metal

Any of various metal alloys having a melting point below 300°F (150°C), used as solder and in various safety devices. Also called fusible alloy.

## circuit breaker

A switch that automatically interrupts an electric circuit to prevent excess current from damaging apparatus in the circuit or from causing a fire. A circuit breaker may be reclosed and reused without replacement of any components. Also called breaker.

## ground wire

A conductor connecting electric equipment or a circuit to a ground connection. Also called grounding conductor.

## plug fuse

A fuse housing a fusible link in a porcelain cup fitted with a threaded metal base.

## cartridge fuse

A fuse having a one-time or renewable fusible link enclosed in an insulating fiber tube.

## knife-blade fuse

A cartridge fuse having a metal blade at each end for making contact with the fusible link within.

## time-delay fuse

A fuse that delays opening to allow a short-term overload to pass, as when starting a motor.

## ground fault

A momentary, usually accidental, grounding of a conducting wire.

## ground-fault interrupter

A circuit breaker that senses currents caused by ground faults and instantaneously shuts off power before damage or injury can occur. Abbr.: gfi

**lightning rod**

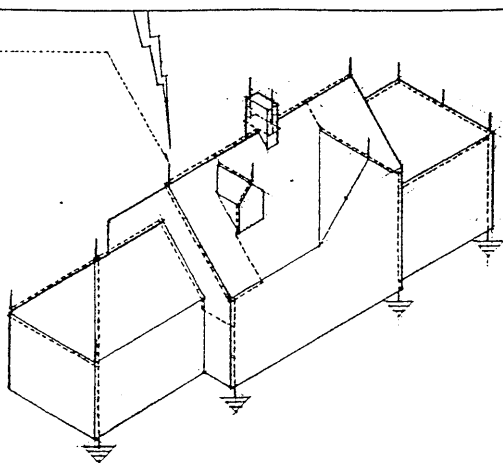
Any of several conducting rods installed at the top of a structure and grounded to divert lightning away from the structure. Also called **air terminal**.

**lightning arrester**

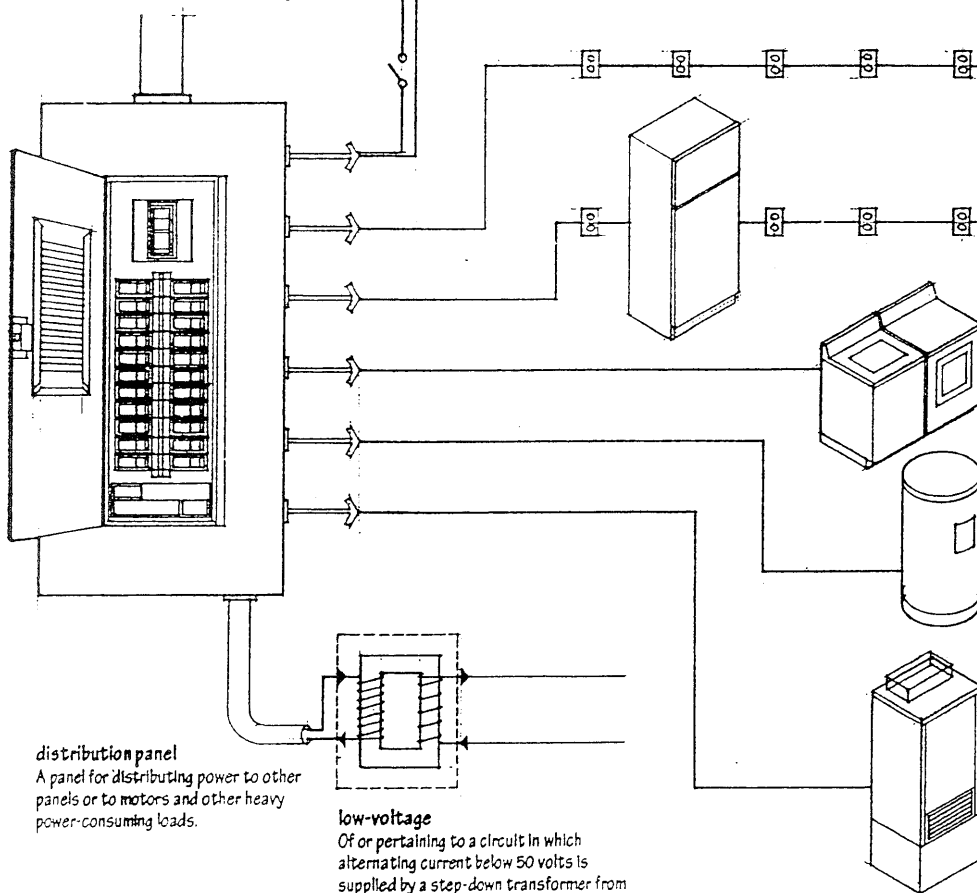
A device for protecting electric equipment from damage by lightning or other high-voltage currents, using spark gaps to carry the current to the ground without passing through the device.

**spark gap**

A space between two terminals or electrodes, across which a discharge of electricity may pass at a prescribed voltage.

**branch circuit**

The portion of an electrical system extending from the final overcurrent device protecting a circuit to the outlets served by the circuit.

**distribution panel**

A panel for distributing power to other panels or to motors and other heavy power-consuming loads.

**low-voltage**

Of or pertaining to a circuit in which alternating current below 50 volts is supplied by a step-down transformer from the normal line voltage, used in residential systems to control doorbells, intercoms, heating and cooling systems, and remote lighting fixtures. Low-voltage circuits do not require a protective raceway.

**load**

The power delivered by a generator or transformer, or the power consumed by an appliance or device.

**connected load**

The total load on an electrical system or circuit if all connected apparatus and equipment are energized simultaneously.

**maximum demand**

The greatest load delivered to an electrical system or circuit over a specified interval of time.

**demand factor**

The ratio of the maximum demand to the connected load of an electrical system, used in estimating the required capacity of the system to account for the probability that only a portion of the connected load may be applied at any time.

**diversity factor**

The ratio of the sum of the maximum demands on the various parts of an electrical system to the maximum demand on the whole.

**load factor**

The ratio of the average load on an electrical system over a specific period of time to the peak load occurring in that period.

**general purpose circuit**

A branch circuit that supplies current to a number of outlets for lighting and appliances.

**appliance circuit**

A branch circuit that supplies current to one or more outlets specifically intended for appliances.

**individual circuit**

A branch circuit that supplies current only to a single piece of electrical equipment.

# ELECTRICITY

## cable

A single insulated conductor or a bound or sheathed combination of conductors insulated from one another.

## armored cable

Electric cable consisting of two or more insulated conductors protected by a flexible, helically wound metal wrapping. Also called BX cable.

## mineral-insulated cable

Electric cable consisting of a tubular copper sheath containing one or more conductors embedded in a highly compressed, insulating refractory mineral.

## nonmetallic sheathed cable

Electric cable consisting of two or more insulated conductors enclosed in a nonmetallic, moisture-resistant, flame-retardant sheath. Also called Romex cable.

## coaxial cable

A cable for transmitting high-frequency telephone, digital, or television signals, consisting of an insulated conducting tube enclosing an insulated conducting core.

## shielded cable

An electric cable enclosed within a metallic sheath in order to reduce the effects of external electric or magnetic fields.

## conduit

A tube, pipe, or duct for enclosing and protecting electric wires or cable.

## rigid metal conduit

Heavy-walled, tubular steel conduit joined by screwing directly into a threaded hub with locknuts and bushings.

## electrical metallic tubing

Thin-walled, tubular steel conduit joined by compression or setscrew couplings. Abbr.: EMT

## flexible metal conduit

A flexible, helically wound metal conduit, used for connections to motors or other vibrating equipment. Also called Greenfield conduit.

## raceway

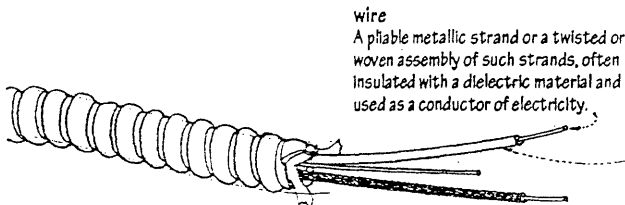
A channel expressly designed to hold and protect electric wires and cables.

## surface raceway

A raceway designed for exposed installation in dry, nonhazardous, noncorrosive locations.

## multi-outlet assembly

A surface-mounted raceway designed to house the electrical wires for a circuit and a series of receptacles.



## wire

A pliable metallic strand or a twisted or woven assembly of such strands, often insulated with a dielectric material and used as a conductor of electricity.

## conductor

A substance, body, or device that conducts heat, sound, or electricity.

## insulator

A material that is a poor conductor of electricity, used for separating or supporting conductors to prevent the undesired flow of current.

## breakdown voltage

The minimum applied voltage at which a given insulator breaks down and permits current to pass.

## dielectric strength

The maximum voltage that can be applied to a given material without causing it to break down, usually expressed in volts or kilovolts per unit of thickness.

## dielectric

A nonconducting substance.

## junction box

An enclosure for housing and protecting electric wires or cables that are joined together in connecting or branching electric circuits.

## knockout

A panel in a casing or box that can readily be removed, as by punching, hammering, or cutting, to provide an opening into the interior.

## grommet

A rubber or plastic washer inserted in a hole in a metal part to prevent grounding of a wire passing through the hole.

## bushing

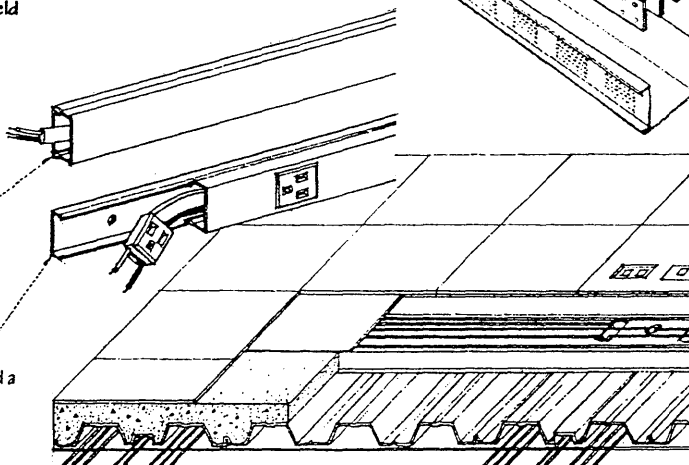
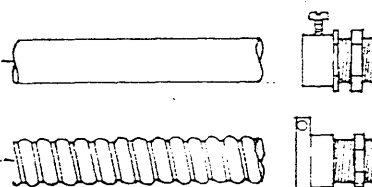
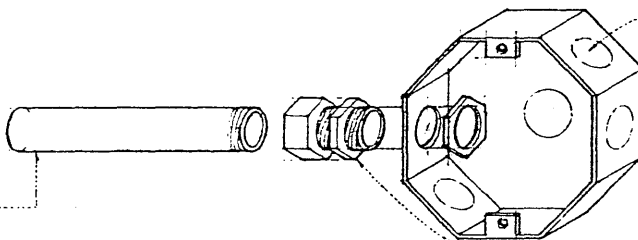
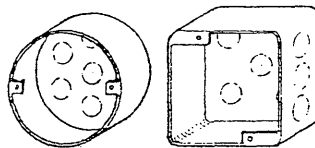
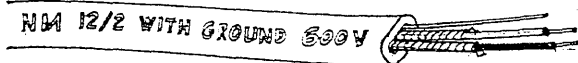
An insulating and protective lining for one or more conductors passing through a hole.

## duct

An enclosed runway for housing conductors or cables.

## bus duct

A rigid metal housing for a group of buses insulated from each other and the enclosure. Also called busway.



## underfloor raceway

A raceway suitable for installation under a floor, often used in office buildings to allow for the flexible placement of power, signal, and telephone outlets.

## cable tray

An open metal framework for supporting insulated electrical conductors.

**air switch**

A switch in which the interruption of a circuit occurs in air.

**knife switch**

A form of air switch in which a hinged copper blade is placed between two contact clips.

**float switch**

A switch controlled by a conductor floating in a liquid.

**mercury switch**

An especially quiet switch that opens and closes an electric circuit by shifting a sealed glass tube of mercury so as to uncover or cover the contacts.

**key switch**

A switch operated only by inserting a key.

**dimmer**

A rheostat or similar device for regulating the intensity of an electric light without appreciably affecting spatial distribution. Also called dimmer switch.

**rheostat**

A resistor for regulating a current by means of variable resistances.

**knob-and-tube wiring**

An obsolete wiring system consisting of single, insulated conductors secured to and supported on porcelain knobs and tubes.

**loom**

A flexible, nonmetallic, fire-resistant tubing for conductors in knob-and-tube wiring.

**lead**

A flexible, insulated conductor for electrically connecting an apparatus to another or to a circuit.

**pigtail**

A short, flexible conductor used in connecting a stationary terminal with a terminal having a limited range of motion.

**terminal**

A conductive element or device for establishing an electric connection to an apparatus.

**faceplate**

A protective plate surrounding an electric outlet or light switch.

**switch**

A device for making, breaking, or directing an electric current.

**toggle switch**

A switch in which a lever or knob, moving through a small arc, causes the contacts to open or close an electric circuit.

**three-way switch**

A single-pole, double-throw switch used in conjunction with another to control lights from two locations.

**four-way switch**

A switch used in conjunction with two three-way switches to control lights from three locations.

**outlet**

A point on a wiring system at which current is taken to supply an electric device or apparatus.

**outlet box**

A junction box designed to facilitate connecting an electric device or receptacle to a wiring system.

**convenience outlet**

An outlet usually mounted on a wall and housing one or more receptacles for portable lamps or appliances.

**receptacle**

A female fitting connected to a power supply and equipped to receive a plug. Also called socket.

**grounding outlet**

An outlet having an additional contact for a ground connection.

**plug**

A male fitting for making an electrical connection to a circuit by insertion in a receptacle.

**grounding plug**

A plug having a blade for a ground connection.

**polarized**

Designed so that a plug and receptacle can fit together in only one way.

**cord**

A small, flexible, insulated cable fitted with a plug to connect a portable lamp or appliance to a receptacle.

**wire nut**

A plastic connector containing a threaded metal fitting for screwing onto the intertwined ends of two or more conductors.

**connector**

Any of various devices for joining two or more conductors without a permanent splice

# ELEVATOR

**A moving platform or cage for carrying passengers or freight from one level of a building to another.**

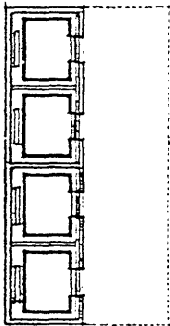
**lift**  
British term for elevator.

**passenger elevator**  
An elevator exclusively for the use of passengers.

**freight elevator**  
An elevator for carrying heavy cargo, on which the operator and the persons necessary for unloading and loading the freight are permitted to ride.

**dumbwaiter**  
A small elevator for conveying food, dishes, or other materials between the floors of a building.

**bank**  
A row of elevators in a high-rise building, controlled by a common operating system and responding to a single call button.



**rise**  
The vertical distance traversed by an elevator car from the lowest to the highest landings of the hoistway. Also called travel.

**electric elevator**  
An elevator system consisting of a car that is mounted on guide rails, supported by hoisting cables, and driven by electric hoisting machinery. Also called traction elevator.

**penthouse**  
A structure housing elevator machinery on the roof of a building.

**top car clearance**  
The vertical distance from the top of an elevator car to the nearest overhead obstruction when the car platform is level with the top landing.

**hoistway**  
A vertical enclosed space for the travel of one or more elevators. Also called elevator shaft.

**landing**  
The portion of a floor adjacent to an elevator hoistway, used for the receiving and discharge of passengers or freight.

**elevator car safety**  
A mechanical device for slowing down and stopping an elevator car in the event of excessive speed or free fall, actuated by a governor and clamping the guide rails by a wedging action.

**hoistway door**  
A door between a hoistway and an elevator landing, normally closed except when an elevator car is stopped at the landing.

**elevator pit**  
The portion of a hoistway extending from the level of the lowest landing to the floor of the hoistway.

**bottom car clearance**  
The vertical distance from the floor of an elevator pit to the lowest part of an elevator car platform when the car rests on fully compressed buffers.

**bulkhead**  
A boxlike structure on a roof providing access to a stairwell or an elevator shaft.

**control panel**  
A panel containing switches, buttons, and other equipment for regulating electrical devices.

**hoisting machinery**  
The machinery for raising and lowering an elevator car, consisting of a motor-generator set, traction machine, speed governor, brake, drive shaft, driving sheave, and gears, if used.

**driving sheave**  
A wheel or disk with a grooved rim, used as a pulley for hoisting.

**idle sheave**  
A pulley for tightening and guiding the hoisting cables of an elevator system. Also called deflector sheave.

**machine beam**  
One of the heavy steel beams supporting the hoisting machinery for an elevator.

**hoisting cable**  
One of the wire cables or ropes used for raising and lowering an elevator car.

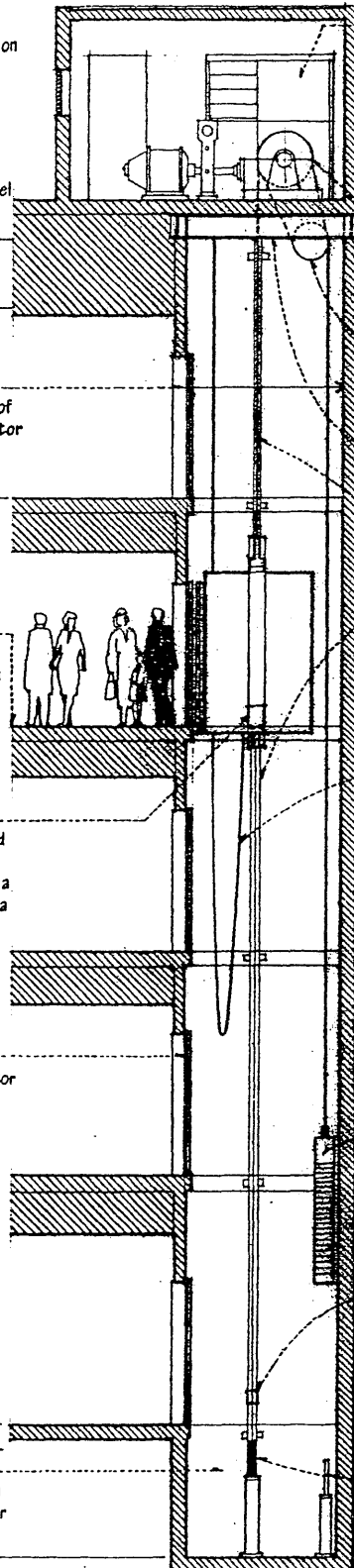
**guide rail**  
One of the vertical steel tracks controlling the travel of an elevator car or counterweight.

**traveling cable**  
One of the electric cables connecting an elevator car to a fixed electrical outlet in the hoistway.

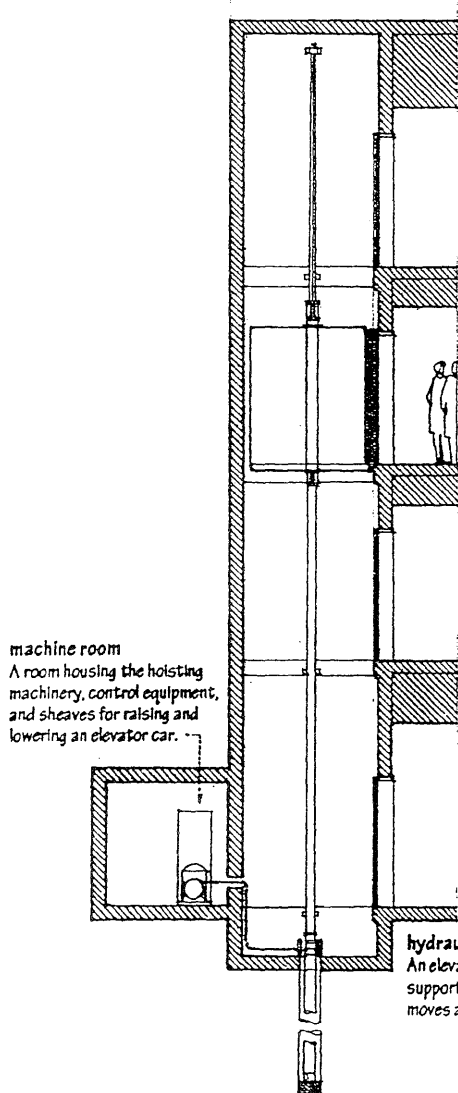
**counterweight**  
A weight balancing another weight, as the rectangular cast-iron blocks mounted in a steel frame to counterbalance the load placed on the hoisting machine by an elevator car.

**limit switch**  
A switch that automatically cuts off current to an electric motor when an object moved by it, as an elevator car, has passed a given point.

**buffer**  
A piston or spring device for absorbing the impact of a descending elevator car or counterweight at the extreme lower limit of travel.





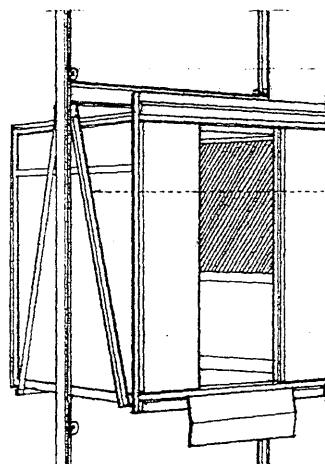


## machine room

A room housing the hoisting machinery, control equipment, and sheaves for raising and lowering an elevator car.

## hydraulic elevator

An elevator system consisting of a car supported by a piston that is moved by or moves against a fluid under pressure.

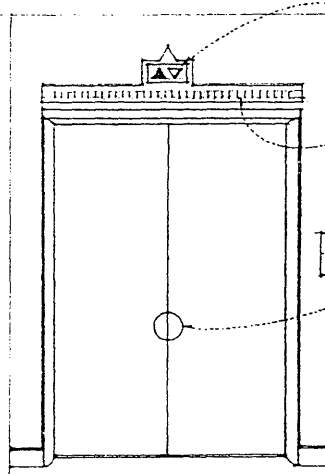


## elevator car

The load-carrying unit of an elevator, consisting of a car frame, platform, light, metal enclosure, and door or gate.

## car frame

The structural steel frame of an elevator car to which are attached the platform, guide shoes, elevator car safety, hoisting cables, and control equipment.



## lantern

A light, usually over the entrance to an elevator on each floor of a multistory building, that signals the approach of the elevator.

## annunciator

A signaling apparatus in an elevator car or at a landing that displays a visual indication of floor landings.

## call button

A push button for requesting an elevator.

## door interlock

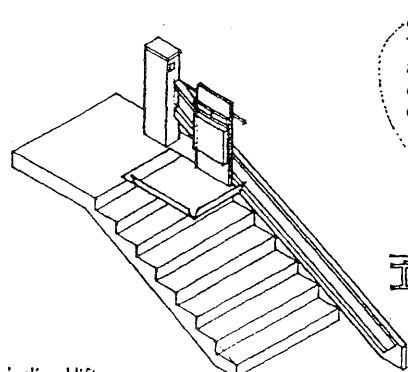
A safety device for preventing the operation of an elevator car unless the hoistway door is locked in the closed position.

## door contact

A safety device for preventing the operation of an elevator car unless its door or gate is fully closed. Also called gate contact.

## newel

The horizontal section of railing at the upper or lower end of an escalator.

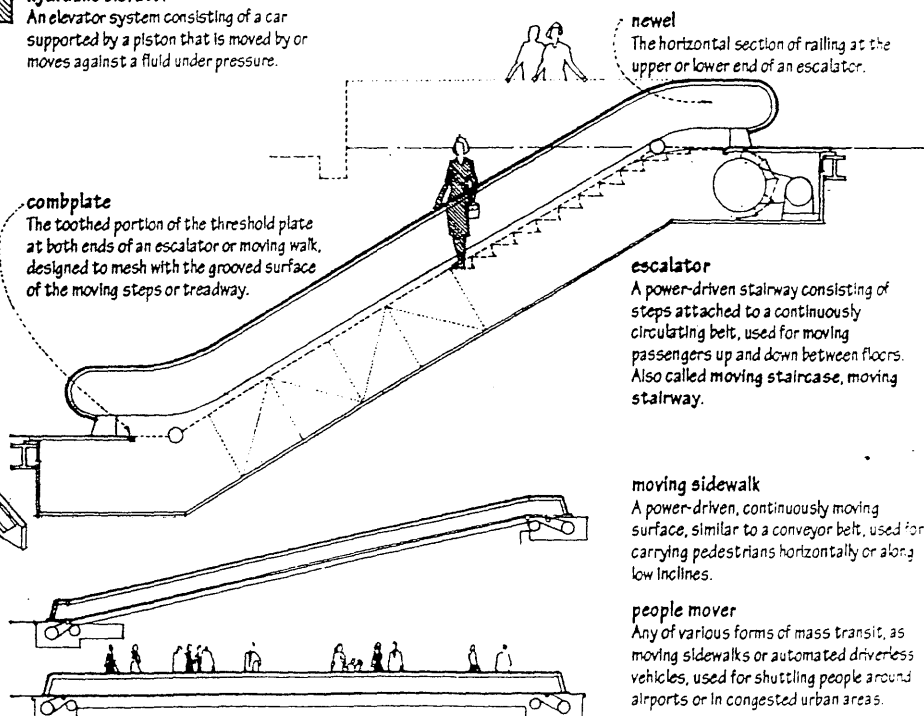


## inclined lift

A chair or platform mounted on a steel guide rail and driven by an electric motor, used for raising or lowering a person or goods along a stairway. Also called stair lift.

## complate

The toothed portion of the threshold plate at both ends of an escalator or moving walk, designed to mesh with the grooved surface of the moving steps or treadway.



## escalator

A power-driven stairway consisting of steps attached to a continuously circulating belt, used for moving passengers up and down between floors. Also called moving staircase, moving stairway.

## moving sidewalk

A power-driven, continuously moving surface, similar to a conveyor belt, used for carrying pedestrians horizontally or along low inclines.

## people mover

Any of various forms of mass transit, as moving sidewalks or automated driverless vehicles, used for shuttling people around airports or in congested urban areas.

## FASTENING

Holding together or uniting two or more parts or members, as by clamping with a mechanical fastener, by bonding with an adhesive, or by welding or soldering.

### nail

A straight, slender piece of metal having one end pointed and the other enlarged and flattened for hammering into wood or other building materials as a fastener.

4d	6d	8d	10d	12d	16d	20d	penny
1½"	2"	2½"	3"	3¼"	3½"	4"	The designated length of a nail, from twopenny to sixty penny. Symbol: d
38 mm	51 mm	64 mm	76 mm	83 mm	89 mm	102 mm	



### shank

The straight, narrow part of a nail or bolt, between the head and the point.

### eightpenny nail

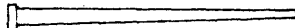
A nail 2½ inches (64 mm) long.

### sixteenpenny nail

A nail 3½ inches (89 mm) long.

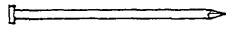
### cut nail

A nail having a tapering rectangular shank with a blunt point, made by cutting from a rolled sheet of iron or steel.



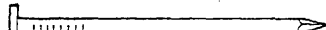
### wire nail

A nail made by cutting and shaping a piece of round or elliptical wire.



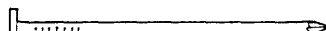
### common nail

A nail having a slender shank, a flat head, and a diamond point.



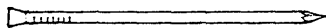
### box nail

A nail having a flat head and a shank more slender than a common nail of the same length.



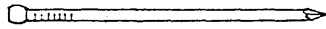
### casing nail

A nail having a small conical head and a shank more slender than a common nail of the same length, used in finish work in which the head may remain visible.



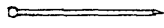
### finishing nail

A nail having a slender shank and a small, barrel-shaped head that is driven slightly below the surface and covered with putty or the like.



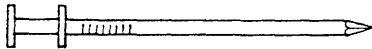
### brad

A small finishing nail.



### double-headed nail

A nail used in building temporary structures, as scaffolding and formwork, having a flange on its shank to prevent it from being driven in all the way and to leave the head free for pulling. Also called form nail, scaffold nail.



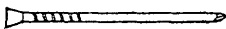
### concrete nail

A hardened-steel nail having a fluted or threaded shank and a diamond point for hammering into concrete or masonry. Also called masonry nail.



### flooring nail

A nail for fastening floor boards, having a small conical head, a mechanically deformed shank, and a blunt diamond point.



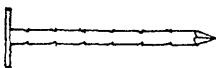
### ring-shank nail

A nail having a series of concentric grooves on its shank for increased holding power.



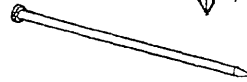
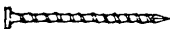
### roofing nail

A nail having a barbed, threaded, or cement-coated shank and a broad, flat head for fastening shingles or the like.



### drive screw

A metal fastener having a helically threaded shank that can be driven with a hammer and removed with a screw driver. Also called screw nail.



### spike

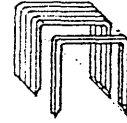
A heavy nail for fastening together heavy timbers, 4 to 14 in. (102 to 356 mm) long and proportionally thicker than a common nail.

### driftbolt

A spike having a round shank, driven into predrilled holes to fasten heavy timbers together. Also called drift pin.

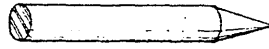
### staple

A U-shaped piece of metal or heavy wire with pointed ends, driven into a surface to secure sheet material or to hold a hasp, pin, or bolt.



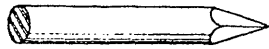
### corrugated fastener

A fastener consisting of a piece of corrugated sheet steel with one wavy edge sharpened, for uniting two pieces of wood, as in a miter joint. Also called wiggle nail.



### round point

An acute, conical point on a nail or spike.



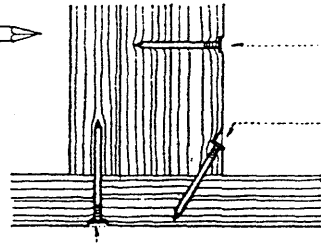
### diamond point

An acute, pyramidal point on a nail or spike.



### chisel point

A point on a nail or spike formed by two flat inclined sides meeting at a sharp angle.



### face-nail

To fasten by nailing perpendicular to the face of the work.

### toenail

To secure by nailing obliquely to the surfaces being joined. Alternate nails may be driven at opposite angles to provide increased holding power.

### end-nail

To fasten by nailing into the end of a board, parallel to the grain of the wood. End-nailing provides poor resistance to withdrawal.

### blind-nail

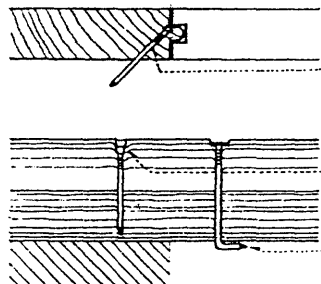
To secure by nailing in such a way that nailheads are not visible on the face of the work.

### set

To sink a nailhead slightly below the surface with a nail set.

### clinch

To secure a nail or screw in position by hammering down the protruding point.



### nailing strip

A strip of wood or other partly yielding material attached to a hard surface, as of steel or concrete, so that objects may be fastened to the surface.

## thread

The helical or spiral ridge of a screw, nut, or bolt.

## pitch

The distance between two corresponding points on adjacent threads of a screw, nut, or bolt.

## countersink

To enlarge the upper part of a drilled hole so that the head of screw or bolt will lie flush with or below the surface.

## pilot hole

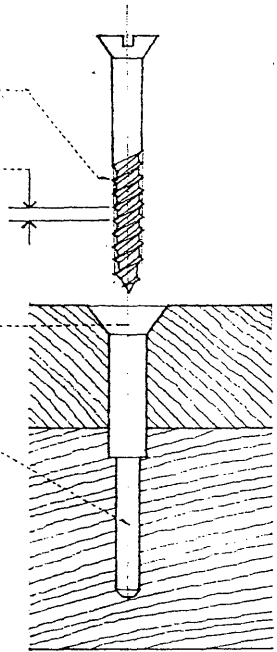
A guiding hole for a nail or screw, or for drilling a larger-size hole.

## tap

To cut screw threads into an opening.

## strip

To tear or damage the threads on a bolt or screw by applying too much force.



## flat head

A screw head having a flat upper surface and a conical bearing surface.

## oval head

A screw head having a shallow, spherical shape with a conical bearing surface.

## round head

A screw or bolt head having a spherical shape with a flat bearing surface. Also called **buttonhead**.

## truss head

A screw or bolt head having a shallow, spherical shape with a flat bearing surface.

## panhead

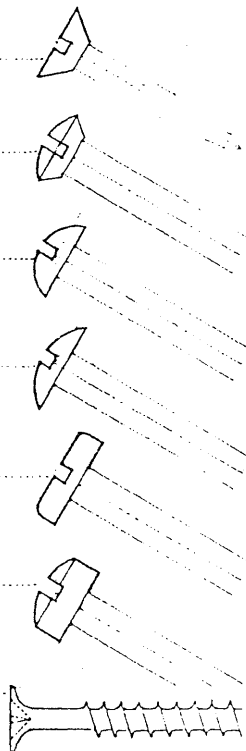
A screw or rivet head having a cylindrical shape with a rounded shoulder.

## fillister head

A cylindrical screw head having a slightly domed upper surface and a flat bearing surface.

## bugle head

A screw head having a flat upper surface and an underside shaped like the bell of a bugle.



## screw

A metal fastener having a tapered, helically threaded shank and a slotted head, designed to be driven into wood or the like by turning, as with a screwdriver.

## wood screw

A screw having a slotted head and a threaded point that permits it to form its own mating threads when driven into wood with a screwdriver.

## self-tapping screw

A coarse-threaded screw designed to tap its corresponding female thread as it is driven. Also called **tapping screw**.

## lag screw

A heavy, coarse-threaded screw having a square or hexagonal head driven by a wrench, used in areas inaccessible to the placement of a nut or where an exceptionally long bolt would be needed to penetrate a joint fully. Also called **coach screw**, **lag bolt**.

## machine screw

A metal fastener used with a nut or driven into a tapped hole, having a straight, threaded shank and a slotted or Phillips head for turning with a screwdriver.

## cap screw

A metal fastener for machine parts, having a straight, threaded shank held by threads tapped in the hole into which it is screwed.

## sheet-metal screw

A coarse-threaded screw for fastening sheet metal and other thin material.

## setscrew

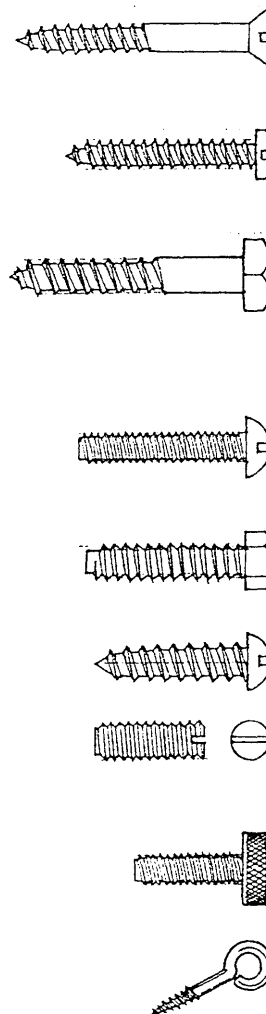
A screw, often without a head, threaded through a hole in one part tightly upon or into another part to prevent relative movement.

## thumbscrew

A screw having a flattened, knurled head designed to be turned by the thumb and forefinger.

## screw eye

A screw having a ring-shaped head.



## slotted head

A screw head having a single slot, driven by a flat-tipped screwdriver.

## Phillips head

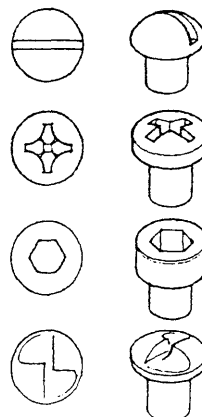
A screw head having two partial slots crossing at right angles, driven by a Phillips screwdriver.

## Allen head

A screw head having an axial hexagonal recess, driven by an Allen wrench.

## security head

A screw head designed to resist removal with a flat-tipped or Phillips screwdriver.



## FASTENING\*

### bolt

A threaded metal pin or rod, usually having a head at one end, designed to be inserted through holes in assembled parts and secured by a mating nut.

### carriage bolt

A bolt having a rounded head, a flat bearing surface, and a square shoulder for preventing rotation, used where the head may be inaccessible during tightening.

### machine bolt

A bolt having a flat bearing surface and a square or hexagonal head for turning with a wrench.



### square head

A bolt or screw head having a square shape designed to be turned with a wrench.



### neck

The part on the shank of a bolt next to the head, esp. when it has a special form.



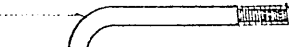
### hex head

A bolt or screw head having a hexagonal shape designed to be turned with a wrench.



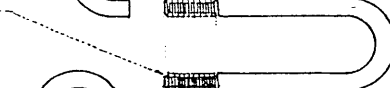
### stove bolt

A small, coarse-threaded machine screw.



### J-bolt

A J-shaped metal rod threaded at one end to receive a nut.



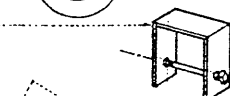
### U-bolt

A metal rod bent in the shape of a U and threaded at each end.



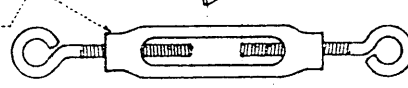
### eyebolt

A bolt having a ring-shaped head to receive a hook or rope.



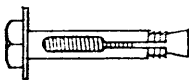
### clevis

A U-shaped fastener secured by a bolt or pin through holes in the end of the two arms.



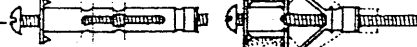
### turnbuckle

A metal link or sleeve internally threaded at each end, used for coupling and tightening two parts, as the threaded ends of two rods or stays.



### expansion bolt

An anchor bolt having a split casing that expands mechanically to engage the sides of a hole drilled in masonry or concrete.



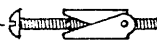
### Molly

Trademark for a brand of expansion bolt having a split, sleeve-like sheath threaded so that turning the bolt draws the ends of the sheath together and spreads the sides to engage a hole drilled in masonry or the inner surface of a hollow wall.



### expansion shield

A lead or plastic sleeve inserted into a predrilled hole and expanded by driving a bolt or screw into it. Also called expansion sleeve.



### toggle bolt

An anchor bolt having two hinged wings that close against a spring when passing through a predrilled hole and open as they emerge to engage the inner surface of a hollow wall.



### nut

A square or hexagonal metal block perforated with a threaded hole to fit around and secure a bolt or screw.



### lock nut

A nut specially constructed to provide extra friction between itself and a screw or bolt.



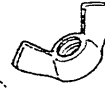
### castellated nut

A nut having radial slits on its outer face to allow a locking pin or wire to be inserted in both the nut and a hole in its bolt. Also called castle nut.



### cap nut

A nut having a hexagonal base and a domed top to cover the threaded end of a screw. Also called a con nut.



### wing nut

A nut having two flat projecting pieces that provide a grip for tightening with the thumb and forefinger. Also called thumbnut.



### washer

A perforated disk of metal, rubber, or plastic, used under the head of a nut or bolt or at a joint to distribute pressure, prevent leakage, or relieve friction.



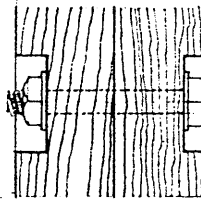
### lock washer

A washer specially constructed to prevent a nut from shaking loose.



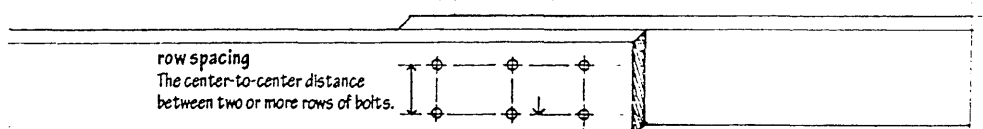
### load-indicating washer

A washer having small projections which are progressively flattened as a bolt is tightened, the gap between the head or nut and the washer indicating the tension in the bolt.



### counterbore

To increase the diameter of a portion of the length of a drilled hole to receive the head or nut of a bolt or screw.



### row spacing

The center-to-center distance between two or more rows of bolts.

### end distance

The distance between the end of a timber and the center of the nearest bolt hole.

### edge distance

The distance from the edge of a timber and the center of the nearest bolt hole.



### Lewis bolt

An anchor bolt having a wedge-shaped end around which concrete or lead is poured to hold it.



### fox bolt

An anchor bolt having a split end to receive a foxtail wedge as it is screwed into a blind hole.

**hanger**

Any of various U-shaped metal brackets for supporting the end of a beam, joist, purlin, or truss at a girder or wall. The supported member transfers its reaction to the hanger through bearing, but load transfer to the supporting member is through shear in the special nails securing the hanger.

**beam seat**

A U-shaped metal bracket for anchoring a timber beam to a concrete support.

**post cap**

A U-shaped metal bracket for securing a timber post to a supporting post. Also called column cap.

**post base**

A U-shaped metal bracket for supporting and anchoring a timber post to its base or foundation. Also called column base.

**dowel**

A cylindrical pin fitting snugly into holes in two adjacent pieces to prevent their slipping or to align them. Also called dowel pin.

**toothed plate**

A sheet-metal plate punched to produce a closely spaced grid of protruding teeth, used as a splice plate in the manufacture of light wood trusses.

**spike grid**

A flat or singly curved grid of spikes for joining heavy timbers, held in place by a single bolt. The resulting joint is resistant to loosening due to vibration, impact, and reversible lateral loads.

**framing anchor**

Any of various sheet-metal connectors for joining light wood framing members, using special nails which are loaded laterally rather than in withdrawal.

**hurricane anchor**

A framing anchor for tying a rafter or truss to a wall plate and securing it against lateral and uplifting wind and seismic forces. Also called hurricane tie.

**joist anchor**

A metal tie strap for securing the joists of a floor or roof diaphragm to a concrete or masonry wall in order to transmit lateral wind or seismic forces.

**floor anchor**

A metal tie strap for restraining a floor of a light wood frame structure against uplifting wind or seismic forces.

**sill anchor**

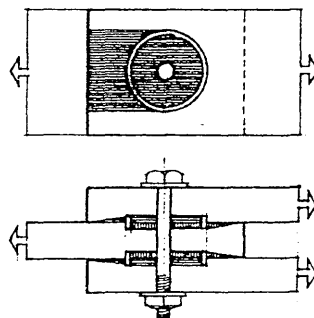
A framing anchor for securing a sill plate to a concrete slab or foundation wall.

**holddown**

A frame device for restraining a wood frame structure against uplifting wind or seismic forces, consisting of a stiffened steel angle bolted to a wall stud and secured by a threaded rod to a concrete foundation.

**timber connector**

A metal ring, plate, or grid for transferring shear between the faces of two timber members, used with a single bolt that serves to restrain and clamp the assembly together. Timber connectors are more efficient than bolts or lag screws used alone since they enlarge the area of wood over which a load is distributed.

**shear plate**

A timber connector consisting of a round plate of malleable iron inserted into a corresponding groove, flush with the face of a timber, and held in place by a single bolt. Shear plates are used in back-to-back pairs to develop shear resistance in demountable wood-to-wood connections, or singly in a wood-to-metal connection.

**split-ring**

A timber connector consisting of a metal ring inserted into corresponding grooves cut into the faces of the joining members and held in place by a single bolt. The tongue-and-groove split in the ring permits it to deform slightly under loading and maintain bearing at all surfaces, while the beveled cross section eases insertion and ensures a tight-fitting joint after the ring is fully seated in the grooves.

## FASTENING

### solder

To unite two pieces of metal by applying any of various nonferrous solders, usually a tin-lead alloy, at a temperature below 800°F (427°C).

### solder

Any of various fusible alloys applied in a molten state to the joint between two metal parts to unite them without heating the parts to the melting point. The molten solder flows into a joint by capillary attraction.

### braz

To unite two pieces of metal by applying any of various nonferrous solders, usually a copper-zinc alloy, at a temperature above 800°F (427°C).

### filler metal

The metal that is added during a welding, brazing, or soldering process, having a melting point either approximately the same as or below that of the metals being welded.

### weld

To unite or fuse two pieces of metal by heating and allowing the metals to flow together, sometimes with pressure and the addition of an intermediate or filler metal.

### gas welding

Any of a group of welding processes utilizing the heat produced by the combustion of a oxygen and a fuel gas, as acetylene.

### arc welding

Any of a group of welding processes utilizing the heat of an arc between an electrode and the base metal.

### arc

A sustained luminous discharge of electricity across a gap in a circuit or between two electrodes. Also called electric arc.

### shielded metal arc welding

A method of arc welding using a consumable metal electrode that releases an inert gas to form a shield around the arc. This shield protects the weld area from oxygen and nitrogen in the air that would cause rapid oxidation of the liquid metal.

### inert-gas shielded arc welding

A method of arc welding in which the weld area is shielded by the continuous flow of an inert gas from an external source, the filler metal being supplied by a consumable metal electrode or by a separate welding rod.

### flux-cored arc welding

A method of arc welding using a tubular steel electrode containing a core of vaporizing flux that forms a gaseous shield around the weld area.

### submerged arc welding

A method of arc welding in which the weld area is shielded by a blanket of fusible, granular metal that melts to form a layer of protective slag. The filler metal may be supplied by a consumable electrode or by a separate welding rod.

### resistance welding

Any of a group of welding processes utilizing the heat generated by resistance to the passage of a electric current.

### fillet weld

A weld with a triangular cross section joining two surfaces that meet in an interior right angle.

### base metal

The principal metal to be welded, brazed, soldered, or cut, as distinguished from filler metal.

### bead

A continuous deposit of fused metal. Also called weld bead.

### welding rod

A wire or rod of filler metal used in gas-welding and brazing processes, and in those arc-welding processes in which the electrode does not furnish the filler metal.

### flux

A substance, as rosin, applied to remove oxides from and prevent further oxidation of metal surfaces to be joined by welding, brazing, or soldering.

### lap weld

A weld made along the seams of two overlapping pieces of metal.

### butt weld

A weld between two pieces of metal butted together.

### partial-penetration weld

A butt weld having a depth less than the thickness of the smaller of the two members being joined.

### full-penetration weld

A butt weld having a depth equal to the thickness of the smaller of the two members being joined.

### puddle weld

A weld made by burning a hole in a piece of sheet metal and filling with a small pool of molten metal.

### single-bevel weld

A groove weld in which the edge of one abutting member is beveled from one side.

### double-bevel weld

A groove weld in which the edge of one abutting member is beveled from both sides.

### single-vee weld

A groove weld in which the edge of each abutting member is beveled from the same side.

### double-vee weld

A groove weld in which the edge of each abutting member is beveled from both sides.

### groove weld

A weld made in a preformed indentation between two abutting pieces of metal.

### rivet

A metal pin having a head at one end, used for uniting two or more plates by passing the shank through a hole in each piece and hammering down the plain end to form a second head.

### pneumatic riveter

A pneumatic hammer used with a rivet set to form the second head of a rivet.

### rivet set

A tool for shaping the second head of a rivet.

### drift

A round, tapering piece of metal for enlarging or aligning holes to receive rivets or bolts. Also called driftpin.

### aligning punch

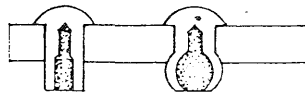
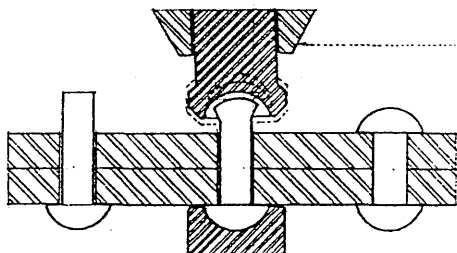
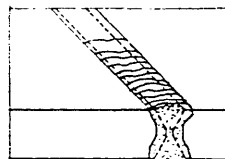
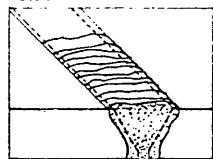
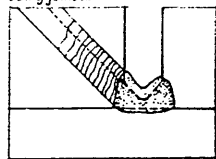
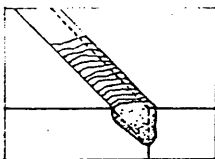
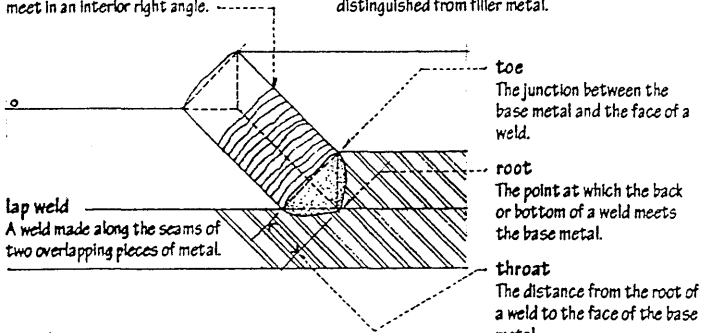
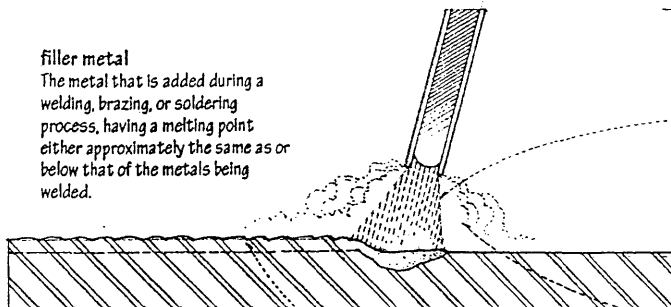
A drift for bringing holes in line to receive a rivet or bolt.

### dolly

A tool for receiving and holding the head of a rivet while the other end is being headed.

### explosive rivet

A rivet for a joint accessible from one side only, having an explosive-filled shank that is detonated by striking the head with a hammer to expand the shank on the far side of the hole.



## bonnet

A cover for an open fireplace, or a cowl, hood, or wind cap to increase the draft of a chimney.

## cowl

A hoodlike covering for increasing the draft of a chimney or ventilator.

## spark arrester

A device, consisting of wire netting or the like, used to stop or deflect sparks or embers thrown from an open fireplace or chimney.

## prefabricated flue

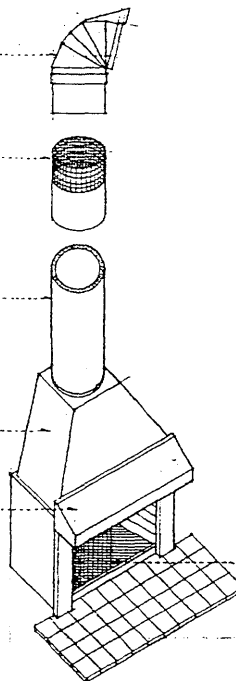
A metal vent for fuel-fired equipment, assembled from factory-made parts.

## smoke dome

The smoke chamber covering of a prefabricated metal fireplace unit.

## hood

A metal cover or canopy for a stove, fireplace, chimney, or ventilator.



## chimney

A vertical, incombustible structure containing a flue through which the smoke and gases of a fire or furnace are carried off to the outside and by means of which a draft is created, esp. the part of such a structure that rises above a roof.

## smokestack

A pipe for the escape of the smoke or gases of combustion.

## draft

A current of air in any enclosed space, as in a room, chimney, or stove, caused by the difference in temperature or pressure.

## downdraft

A downward current of air in a chimney or flue, often carrying smoke with it.

## fire screen

A screen placed in front of a fireplace to prevent sparks or embers from entering the room.

## chimney breast

A part of a chimney or fireplace that projects out from a wall, usually inside a building.

## chimney arch

An arch over a fireplace opening, supporting the breast.

## chimney bar

A steel lintel for carrying the masonry above the fireplace opening. Also called **camber bar**, **turning bar**.

## chimney cheek

The sides of a fireplace opening supporting the mantel.

## hearth

The floor of a fireplace, usually of brick, tile, or stone, often extending a short distance into a room.

## back hearth

The part of the hearth that is contained within the fireplace itself. Also called **inner hearth**.

## front hearth

The part of the hearth that projects into the room. Also called **outer hearth**.

A framed opening made in a chimney to hold an open fire.

## chimney cap

A raised cover for a chimney, usually in the form of a slab or cornice.

## chimney pot

A cylindrical pipe of earthenware or metal, fitted on top of a chimney to increase draft and disperse smoke.

## flue lining

A smooth-surfaced unit of heat-resistant fire clay or lightweight concrete, having a square, rectangular, or oval section, used for lining the flue of a chimney.

## targeting

A smooth lining of mortar or plaster for a chimney flue. Also, **parget**.

## flue

An incombustible passage or duct for smoke in a chimney.

## draft

A device for regulating the current of air in a stove or fireplace.

## damper

A movable plate for regulating the draft in a fireplace, stove, or furnace.

## smoke chamber

An enlarged area between the throat of a fireplace and the flue of a chimney.

## smoke shelf

A ledge at the bottom of a smoke chamber, so made as to deflect or break the downdrafts from the chimney.

## throat

The narrow opening between a fireplace and its flue or smoke chamber, often closed with a damper.

## firebox

The chamber containing the fire of a fireplace.

## trimmer arch

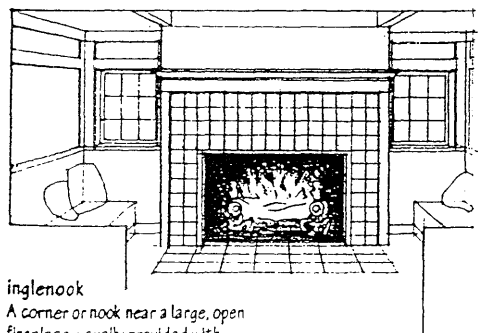
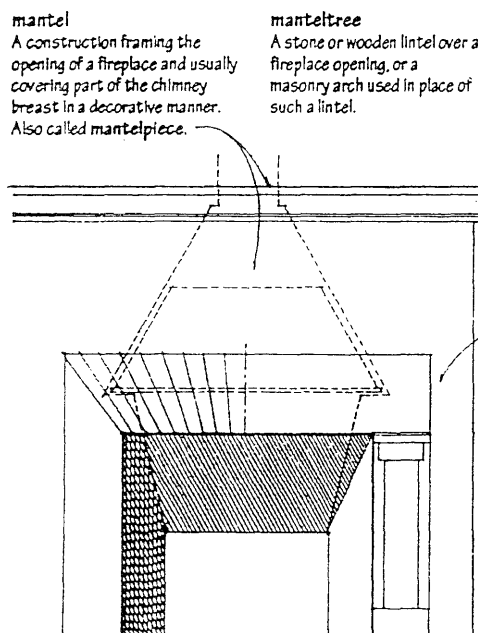
An arch, usually of brick and in the form of half of a segmental arch, between a chimney and a header in a floor structure to support a hearth.

## ashpit

A receptacle in the bottom of a fireplace or firebox for the collection and removal of ashes.

## ashpit door

A cast-iron door providing access to an ashpit for removing ashes, or to a chimney for removing soot.



## inglenook

A corner or nook near a large, open fireplace, usually provided with seating. Also called **chimney corner**.

## FIRE SAFETY

The measures taken to prevent fire or minimize the loss of life or property resulting from a fire, including limiting fire loads and hazards, confining the spread of fire with fire-resistant construction, the use of fire detection and extinguishing systems, the establishment of adequate firefighting services, and the training of building occupants in fire safety and evacuation procedures.

### fire hazard

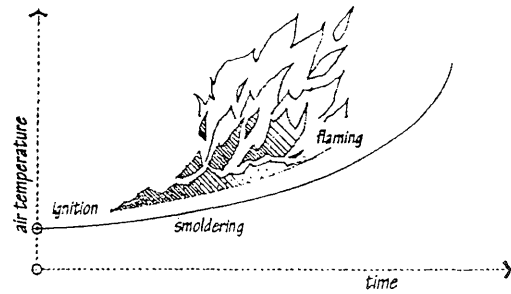
Any condition that increases the likelihood of a fire, obstructs access to firefighting equipment, or delays the egress of occupants in the event of fire.

### fire load

The amount of combustible material in a building, measured in pounds per square foot of floor area.

### combustible

Of or pertaining to a material capable of igniting and burning.



### ignition point

The lowest temperature at which a substance will undergo spontaneous combustion and continue to burn without additional application of external heat.

### flash point

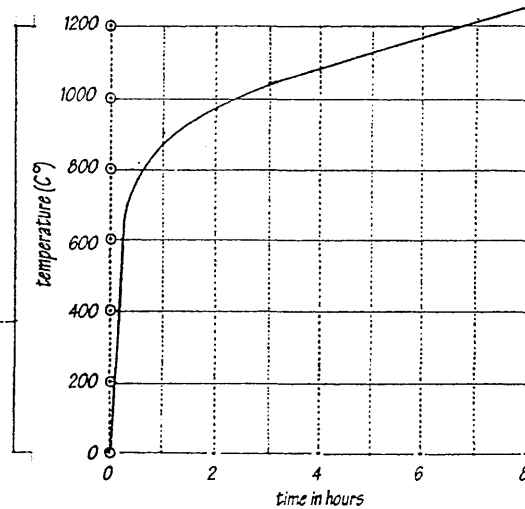
The lowest temperature at which a combustible liquid will give off sufficient vapor to ignite momentarily when exposed to flame.

### fire-rated

Noting or pertaining to a material, assembly, or construction having a fire-resistance rating required by its use. Also, fire-resistive.

### fire-resistance rating

The time in hours a material or assembly can be expected to withstand exposure to fire without collapsing, developing any openings which permit the passage of flame or hot gases, or exceeding a specified temperature on the side away from the fire, determined by subjecting a full-size specimen to temperatures according to a standard time-temperature curve.



### tunnel test

A test measuring the time it takes for a controlled flame to spread across the face of a test specimen, the amount of fuel the material contributes to the fire, and the density of the smoke developed by the fire. Also called Steiner tunnel test.

### flame-spread rating

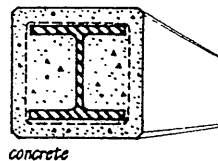
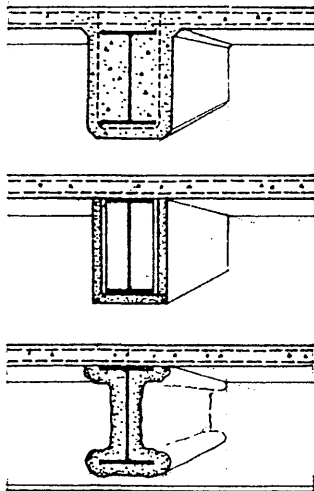
A rating of how quickly a fire can spread along the surface of an interior finish material. Red oak flooring has a flame-spread rating of 100 while a cement-asbestos board has a rating of 0.

### fuel-contribution rating

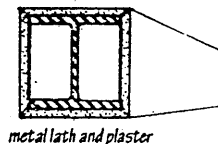
A rating of the amount of combustible substances an interior finish material can contribute to a fire.

### smoke-developed rating

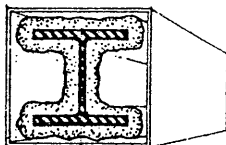
A rating of the amount of smoke an interior finish material can produce when it burns. Materials having a smoke-developed rating above 450 are not permitted to be used inside buildings.



concrete



metal lath and plaster



### spray-on fireproofing

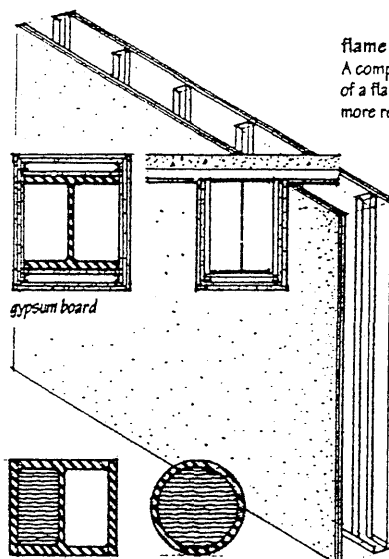
A mixture of mineral fibers and an inorganic binder, applied by air pressure with a spray gun to provide a thermal barrier to the heat of a fire.

### intumescent paint

A coating that, when exposed to the heat of a fire, swells to form a thick insulating layer of inert gas bubbles that retards flame spread and combustion.

### fireproofing

Any of various materials, as concrete, gypsum, or mineral fiber, used in making a structural member or system resistant to damage or destruction by fire.



gypsum board

### flame retardant

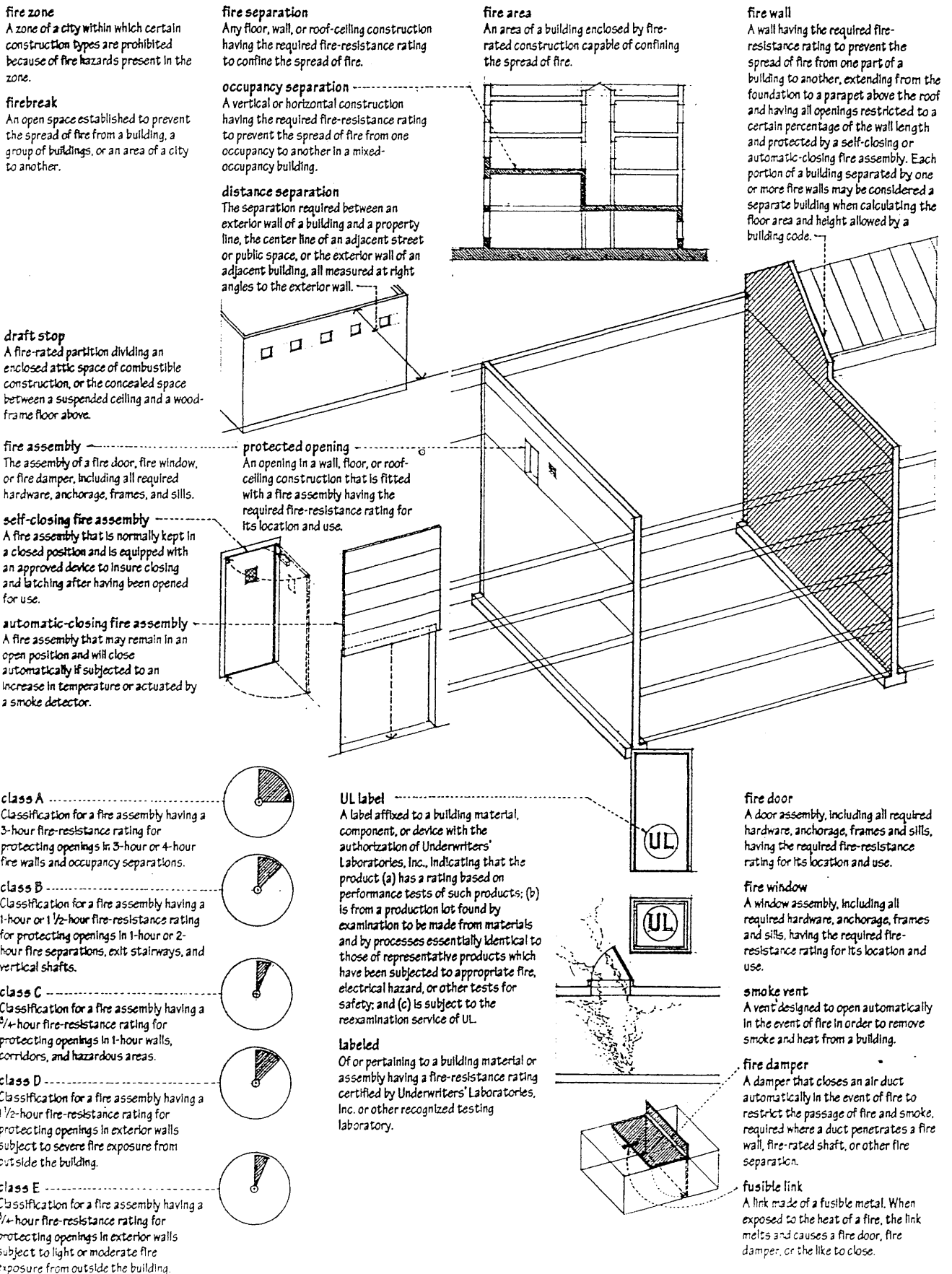
A compound used to raise the ignition point of a flammable material, thus making it more resistant to fire.



### liquid-filled column

A hollow structural steel column filled with water to increase its fire resistance. If exposed to flame, the water absorbs heat, rises by convection to remove the heat, and is replaced with cooler water from a storage tank or a city water main.





## FIRE SAFETY

### fire-alarm system

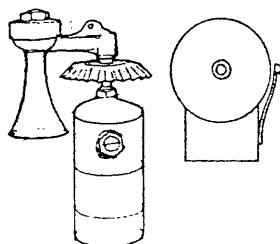
An electrical system installed in a building to automatically sound an alarm when actuated by a fire-detection system.

### fire-detection system

A system of thermostats or other approved sensors for detecting the presence of fire and automatically signaling an alarm.

### smoke detector

An electronic fire alarm that is activated by the presence of smoke.



### sprinkler system

Apparatus for automatically extinguishing fires in a building, consisting of a system of pipes in or below the ceilings, connected to a suitable water supply, and supplied with valves or sprinkler heads made to open automatically at a certain temperature.

### sprinklered

Of or pertaining to a building or building area that has or is protected by a properly maintained sprinkler system.

### sprinkler head

A nozzle in a sprinkler system for dispersing a stream or spray of water, usually controlled by a fusible link that melts at a predetermined temperature.

### automatic fire-extinguishing system

A system of devices and equipment which automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire.

### wet-pipe system

A sprinkler system containing water at sufficient pressure to provide an immediate, continuous discharge through sprinkler heads that open automatically in the event of fire.

### dry-pipe system

A sprinkler system containing pressurized air that is released when a sprinkler head opens in the event of fire, allowing water to flow through the piping and out the opened nozzle. Dry-pipe systems are used where the piping is subject to freezing.

### preaction system

A dry-pipe sprinkler system through which water flow is controlled by a valve operated by fire-detection devices more sensitive than those in the sprinkler heads. Preaction systems are used when an accidental discharge would damage valuable materials.

### deluge system

A sprinkler system having sprinkler heads open at all times, through which water flow is controlled by a valve operated by a heat-, smoke-, or flame-sensing device.

### standpipe

A water pipe extending vertically through a building to supply fire hoses at every floor.

### wet standpipe

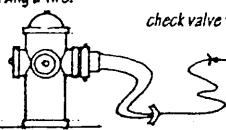
A standpipe containing water under pressure and fitted with fire hoses for emergency use by building occupants.

### dry standpipe

A standpipe containing no water and used by the fire department to connect fire hoses to a fire hydrant or pumper truck.

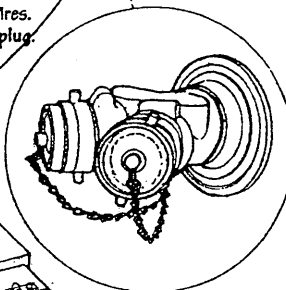
### fire hose

A heavy-duty hose for use in fighting a fire.



### hydrant

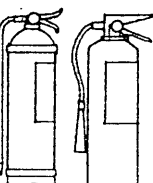
An upright pipe with one or more nozzles or spouts for drawing water from a main, esp. for fighting fires. Also called fire hydrant, fireplug.



### siamese

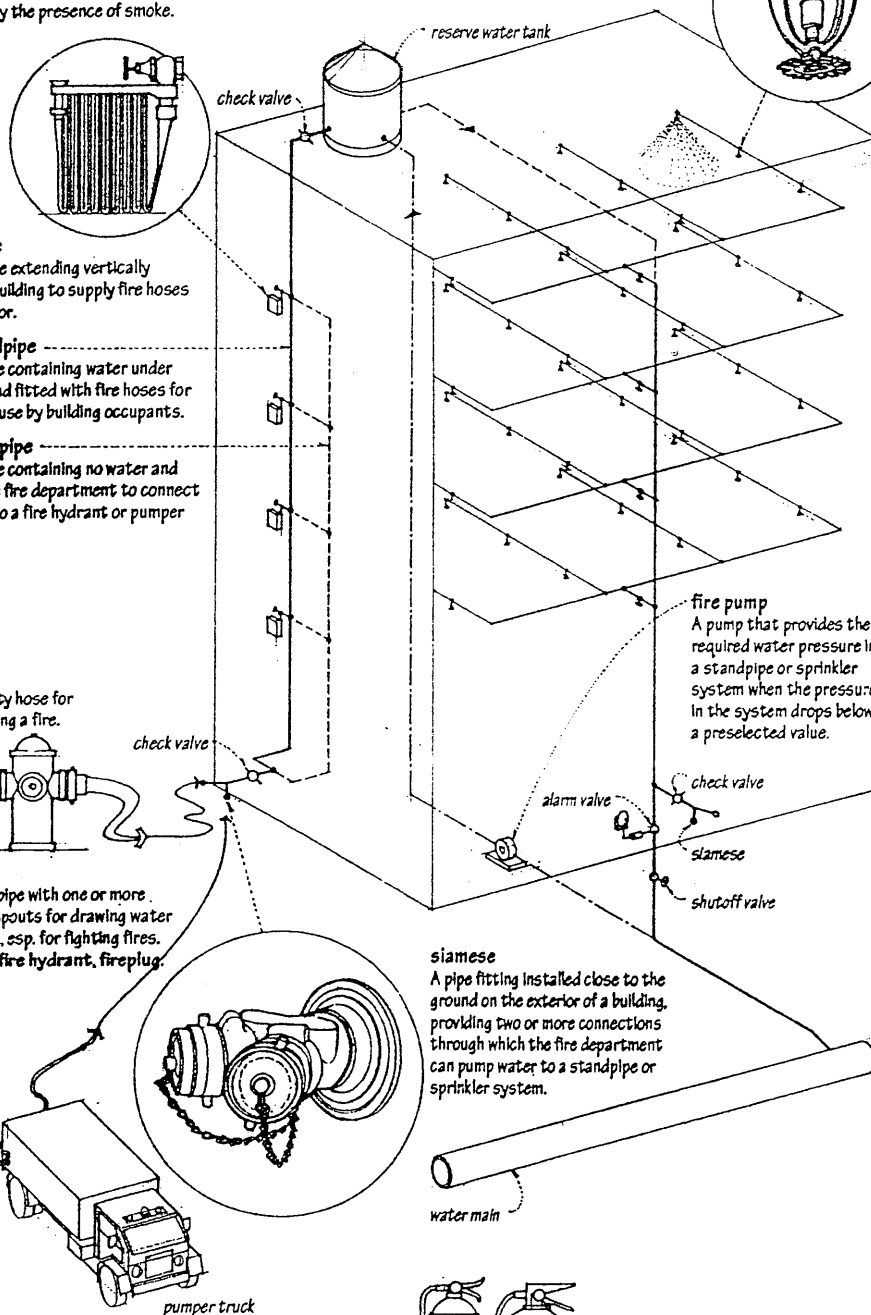
A pipe fitting installed close to the ground on the exterior of a building, providing two or more connections through which the fire department can pump water to a standpipe or sprinkler system.

### water main



### fire extinguisher

A portable apparatus for putting out a small fire by ejecting pressurized water or special chemicals, classified according to the type of fire it is able to extinguish.



### class A fire

A fire involving ordinary combustible materials, as wood, paper and cloth, on which the quenching or cooling effect of water is of primary importance.

### class B fire

A fire involving flammable liquids, as gasoline, oil and grease, which must be extinguished by excluding air and inhibiting the release of combustible vapors.

### class C fire

A fire involving live electrical equipment, which requires a nonconducting extinguishing medium.

### class D fire

A fire involving certain combustible metals, as magnesium or sodium, which requires a nonreactive, heat-absorbing extinguishing medium.

## exit access

That portion of a means of egress that leads to an exit. Building codes specify the maximum distance of travel to an exit and the minimum distance between exits when two or more are required.

## well

A shaft for air, light, stairs, or an elevator, extending vertically through the floors of a building.

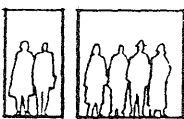
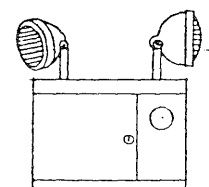


## exit light

An illuminated sign identifying a required exit.

## emergency lighting

A lighting system designed to supply the illumination required for safe egress from a building in the event of a power failure.



## occupant load

The total number of persons that may occupy a building or portion thereof at any one time, determined by dividing the floor area assigned to a particular use by the square feet per occupant permitted in that use. Building codes use occupant load to establish the required number and width of exits for a building.

## horizontal exit

A passage through or around a wall constructed as required for an occupancy separation, protected by an automatic-closing fire door, and leading to an area of refuge in the same building or on approximately the same level in an adjacent building.

## area of refuge

An area affording safety from fire or smoke coming from the area from which escape is made.

## exit corridor

A passageway serving as a required exit, enclosed by walls of fire-resistive construction. Building codes limit the length of dead-end corridors.

## exit door

A door providing access to a means of egress, swinging in the direction of exit travel, and usually equipped with a panic bar.

## exit passageway

A means of egress connecting a required exit or exit court with a public way, having no openings other than required exits and enclosed by fire-resistive construction as required for the walls, floors, and ceiling of the building served.

## exit discharge

That portion of a means of egress that leads from an exit to an exit court or public way.

## means of egress

A continuous path of travel from any point in a building to the outside at ground level.

## exit

An enclosed and protected path of escape for the occupants of a building in the event of fire, leading from an exit access to an exit discharge.

## smokeproof enclosure

The enclosing of an exit stairway by walls of fire-resistive construction, accessible by a vestibule or by an open exterior balcony, and ventilated by natural or mechanical means to limit the penetration of smoke and heat. Building codes usually require one or more of the exit stairways for a high-rise building be protected by a smokeproof enclosure.

## exit stairway

A stairway leading to an exit passageway, an exit court, or public way, enclosed by fire-resistive construction with self-closing fire doors that swing in the direction of exit travel.

## exterior exit balcony

A landing or porch projecting from the wall of a building and serving as a required means of egress.

## fire escape

An exit stairway down an outside wall of a building, constructed to the same standards as an interior exit stairway.

## exterior exit

An exit door opening directly to an exit court or public way.

## exit court

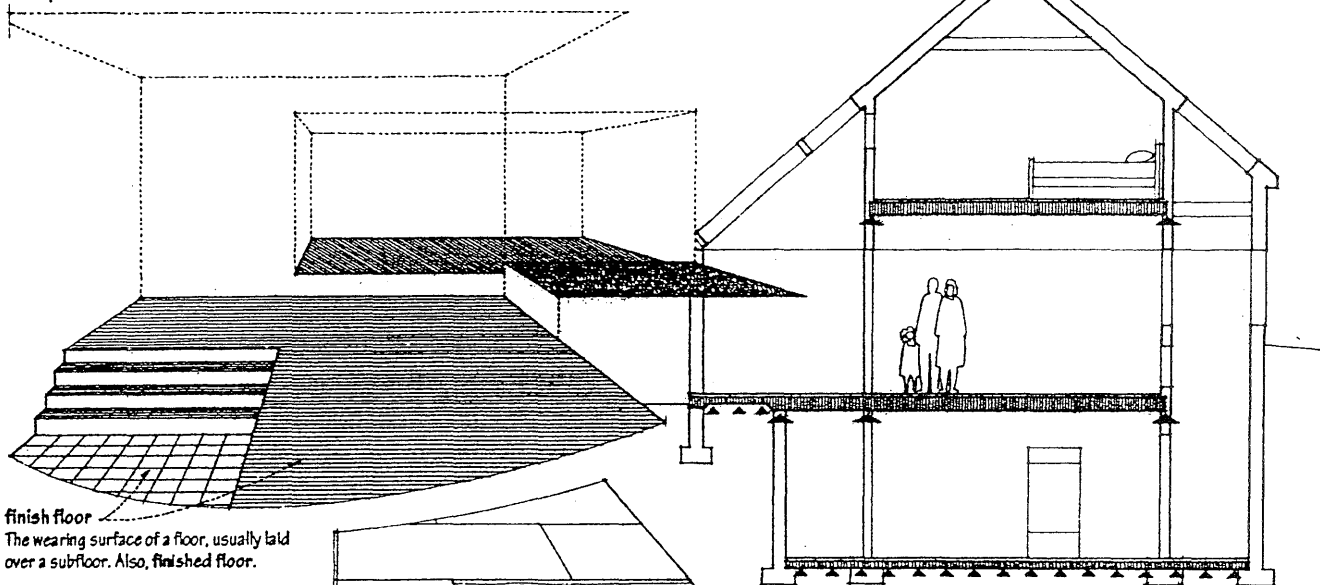
A yard or court providing egress to a public way for one or more required exits.

## public way

A street, alley, or similar parcel of land open to the sky and deeded, dedicated, or otherwise permanently appropriated for the free passage and use of the general public.

## FLOOR

The level, base surface of a room or hall upon which one stands or walks.



### finish floor

The wearing surface of a floor, usually laid over a subfloor. Also, finished floor.

### subfloor

A base for a finish floor, consisting of boards, plywood, or other structural sheathing laid over and fixed to the floor joists. A subfloor is often used as a working platform during construction and may also act as a structural diaphragm to transfer lateral loads to shear walls. Also called blind floor, rough floor.

### floor framing

The act, process, or manner of constructing the structural frame of a floor.

### joist

Any of a series of small, parallel beams for supporting floors, ceilings, or flat roofs.

### header

A framing member crossing and supporting the ends of joists, studs, or rafters, so as to transfer the weight to parallel joists, studs, or rafters.

### trimmer

A beam, joist, or rafter supporting one end of a header at the edge of an opening in a floor or roof frame.

### tailpiece

A relatively short beam, joist, or rafter supported by a wall at one end and by a header at the other. Also called stringer.

### rim joist

A joist set on top of the sill and forming the perimeter of a wood-framed floor. Also called header.

### bridging

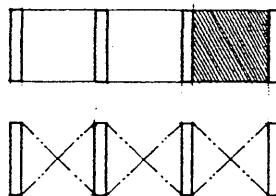
An arrangement of braces or blocking between joists or rafters to prevent their rotation or lateral displacement, esp. when their depth-to-width ratio exceeds 6. Bridging may not be required when the ends of the members are fixed against rotation and their edges are held in line by subflooring or sheathing.

### solid bridging

Bridging consisting of short boards fixed vertically between floor or roof joists.

### crossbridging

Bridging composed of diagonal braces set in pairs between floor or roof joists.

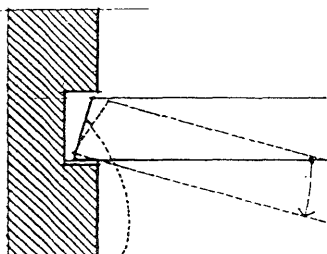


### beam fill

Material, as masonry or concrete, for filling the spaces between joists or beams in or on top of a masonry wall, stiffening the members, and providing increased fire resistance. Also, beam filling.

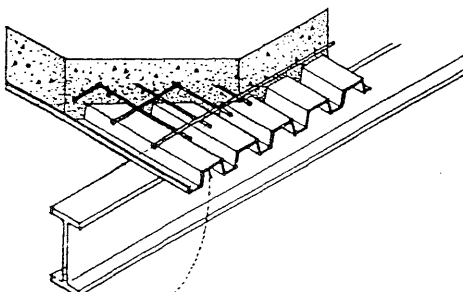
### beam pocket

An opening in the vertical face of a structural member to receive a beam.



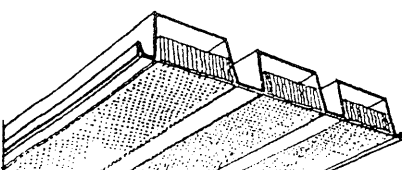
### firecut

An angular cut at the end of a joist or beam where it enters a masonry wall, allowing the member to fall without damaging the wall if it burns through somewhere along its length.



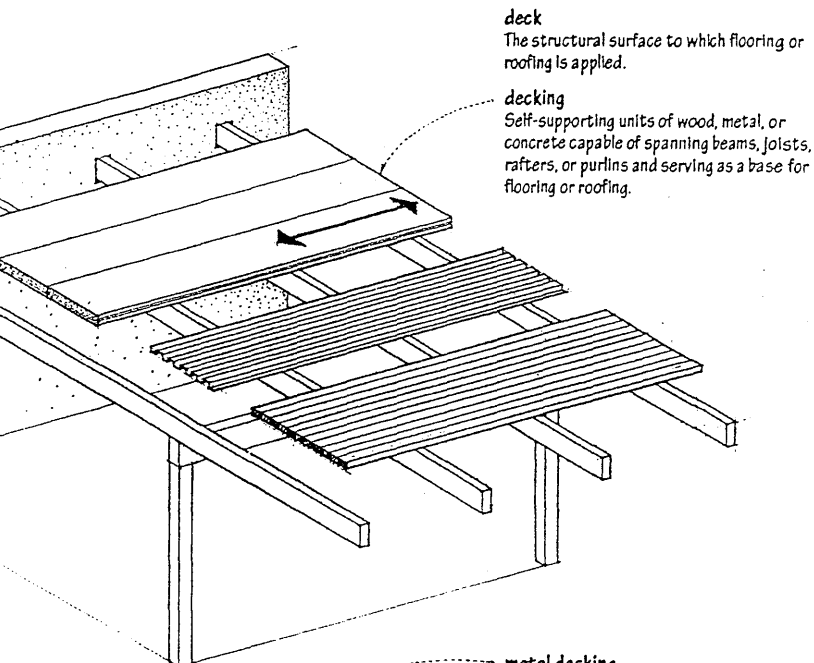
### form decking

Metal decking serving as permanent formwork for a reinforced concrete slab until the slab can support itself.



### acoustic decking

Metal decking containing glass fiber between the perforated webs of ribbed decking or in the perforated cells of cellular decking, used as a sound-absorbing ceiling.

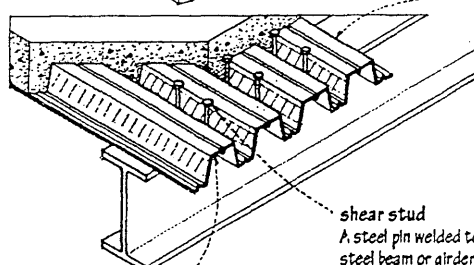


### deck

The structural surface to which flooring or roofing is applied.

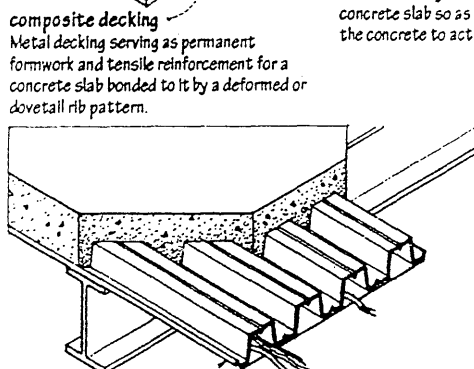
### decking

Self-supporting units of wood, metal, or concrete capable of spanning beams, joists, rafters, or purlins and serving as a base for flooring or roofing.



### metal decking

Sheet steel strengthened for use as floor or roof decking by cold-rolling a series of ribs or flutes into it, and usually galvanized for corrosion resistance. The spanning capability of metal decking depends on the thickness of the steel sheet and the depth of the corrugations.

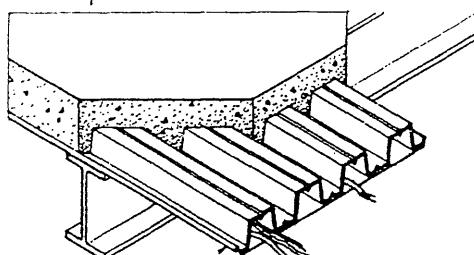


### composite decking

Metal decking serving as permanent formwork and tensile reinforcement for a concrete slab bonded to it by a deformed or dovetail rib pattern.

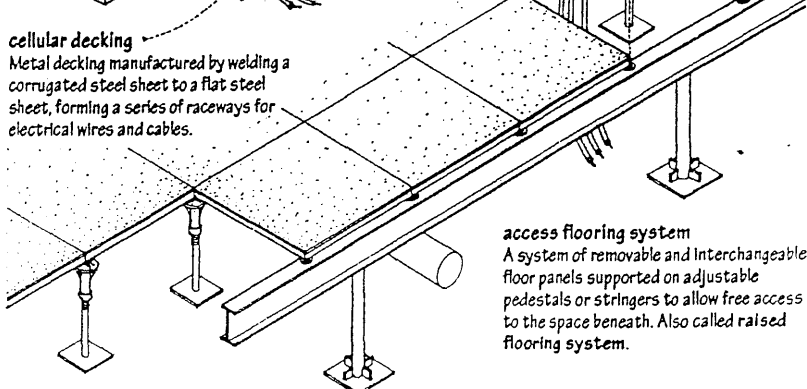
### shear stud

A steel pin welded to the top flange of a steel beam or girder and embedded in a concrete slab so as to cause the beam and the concrete to act as a structural unit.



### cellular decking

Metal decking manufactured by welding a corrugated steel sheet to a flat steel sheet, forming a series of raceways for electrical wires and cables.



### access flooring system

A system of removable and interchangeable floor panels supported on adjustable pedestals or stringers to allow free access to the space beneath. Also called raised flooring system.

## FLOOR

### finish flooring

Material used for the wearing surface of a floor, as hardwood, terrazzo, or floor tile.

### wood flooring

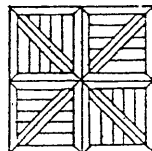
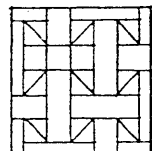
Finish flooring in the form of wood strips, planks, or blocks.

### strip flooring

Flooring composed of long, narrow wood strips, usually side- and end-matched.

### plank flooring

Flooring composed of boards wider than strip flooring, usually side- and end-matched.

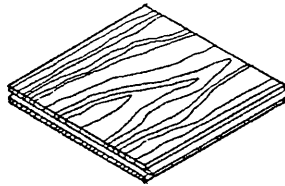
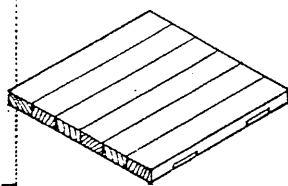
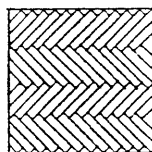
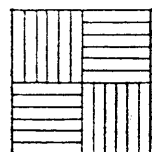
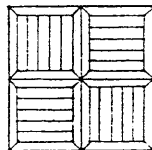
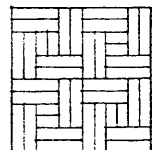


### parquet

A floor composed of short strips or blocks of wood forming a pattern, sometimes with inlays of other woods or other materials.

### parquetry

Mosaic work of wood used for floors and wainscoting.



### block flooring

Flooring composed of square units preassembled at the mill and usually installed with mastic over a wood subfloor or concrete slab.

### unit block

A flooring block made by joining short lengths of strip flooring edgewise, usually tongued on two adjoining sides and grooved on the other two to ensure proper alignment in setting.

### laminated block

A flooring block made by bonding three or more wood veneers with a moisture-resistant adhesive, usually tongued on two opposing sides and grooved on the other two to ensure proper alignment in setting.

### slat block

A flooring block made by assembling narrow slats or fingers of hardwood into larger units.

### terrazzo

A mosaic floor or paving composed of marble or other stone chips, set in a cementitious or resinous matrix and ground when dry.



### standard terrazzo

A ground and polished terrazzo finish consisting mainly of relatively small stone chips.

### Venetian terrazzo

A ground and polished terrazzo finish consisting mainly of large stone chips, with smaller chips filling the spaces between.



### rustic terrazzo

A uniformly textured terrazzo finish produced by washing the matrix prior to setting so as to expose the chips, which are not ground.

### Palladiana

A mosaic terrazzo finish consisting of cut or fractured marble slabs set by hand in the desired pattern, with smaller chips filling the spaces between.

### topping

The mixture of stone chips and cementitious or resinous matrix that produces a terrazzo surface.

### bonding agent

A chemical substance applied to a substrate to create a bond between it and a succeeding layer, as between a terrazzo topping and a subfloor.

### underbed

The mortar base on which a terrazzo topping is applied.

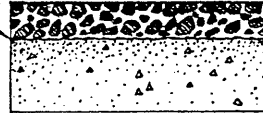
### resinous matrix

A latex, polyester, or epoxy binder combined with stone chips to form a terrazzo topping especially resistant to chemicals and abrasion.



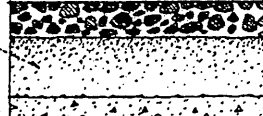
### thin-set terrazzo

A thin resinous terrazzo topping directly over a sound wood, metal, or concrete subfloor.



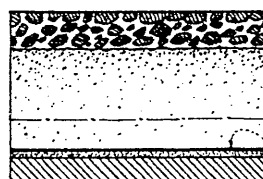
### monolithic terrazzo

A terrazzo topping installed directly over a rough-finished concrete slab. A chemical bonding agent is used if the concrete surface is too smooth for a mechanical bond.



### bonded terrazzo

A terrazzo topping installed over a mortar underbed that is bonded to a rough-finished concrete slab.



### sand-cushion terrazzo

A terrazzo system for controlling cracking when structural movement is expected, consisting of a terrazzo topping installed over a reinforced mortar underbed that is separated from the subfloor by an isolation membrane and a thin layer of sand.

## linoleum

A resilient floor covering formed by coating burlap or canvas with heated linseed oil, powdered cork, and rosin, and adding pigments to achieve the desired colors and patterns. Linoleum should be used only on a subfloor suspended above grade.

## vinyl sheet

A resilient floor covering composed principally of polyvinyl chloride in combination with mineral fillers, pigments, and a fiber, felt, or foam backing.

## vinyl tile

A resilient floor tile composed principally of polyvinyl chloride in combination with mineral fillers and pigments.

## cork tile

A resilient floor tile composed of granulated cork and synthetic resin binders, finished with a protective coat of wax or a film of clear polyvinyl chloride. Cork tile should be used only on a subfloor suspended above grade.

## rubber tile

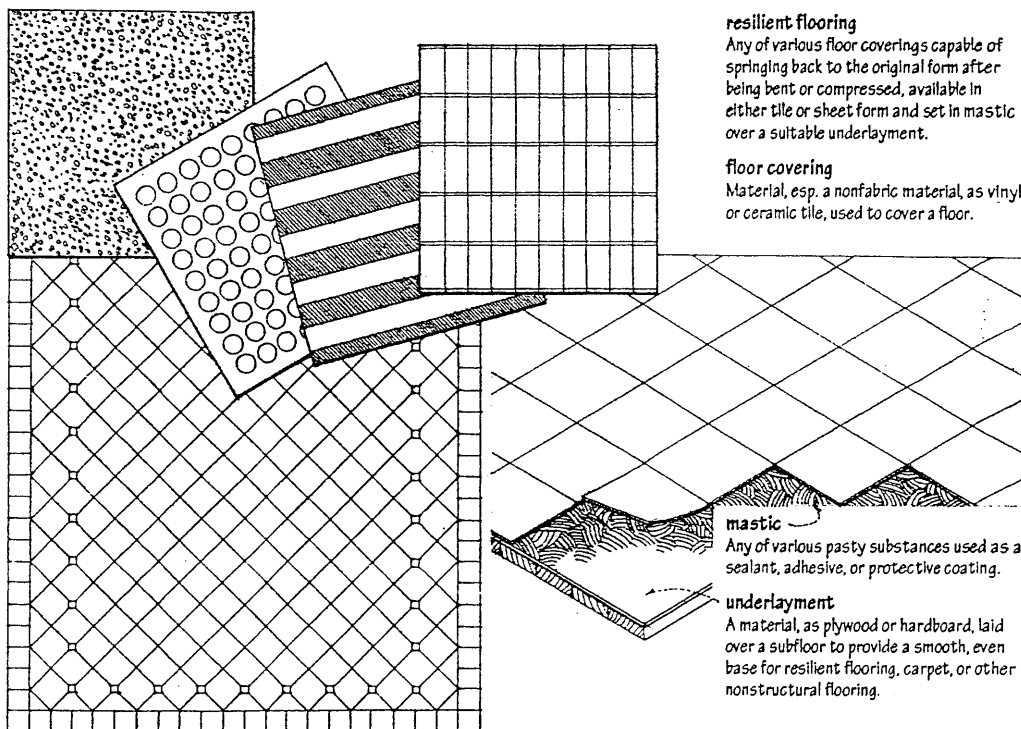
A resilient floor tile composed of natural or synthetic rubber with mineral fillers.

## resilient flooring

Any of various floor coverings capable of springing back to the original form after being bent or compressed, available in either tile or sheet form and set in mastic over a suitable underlayment.

## floor covering

Material, esp. a nonfabric material, as vinyl or ceramic tile, used to cover a floor.



## mastic

Any of various pasty substances used as a sealant, adhesive, or protective coating.

## underlayment

A material, as plywood or hardboard, laid over a subfloor to provide a smooth, even base for resilient flooring, carpet, or other nonstructural flooring.

## carpet

A heavy woven, knitted, needle-tufted, or felted fabric for covering a floor.

## pile weight

The average weight of pile yarn in a carpet, stated in ounces per square yard.

## pile density

The weight of pile yarn per unit volume of carpet, stated in ounces per cubic yard.

## pitch

The crosswise number of tuft-forming pile yarns in a 27-inch (686 mm) width of woven carpet.

## gauge

The spacing of tufts across the width of a tufted or knitted carpet, expressed in fractions of an inch.

## woven carpet

Carpet made by simultaneously interweaving the backing and pile yarns on a loom.

## tufted carpet

Carpet made by mechanically stitching pile yarn through a primary fabric backing and bonded with latex to a secondary backing.

## knitted carpet

Carpet made by looping the backing, stitching, and pile yarns with three sets of needles.

## fusion-bonded carpet

Carpet made by heat-fusing face yarns to a vinyl backing supported by other materials.

## flocked carpet

Carpet made by propelling short strands of pile fiber electrostatically against an adhesive-coated backing.

## needlepunched carpet

Carpet made by punching carpet fibers back and forth through a woven polypropylene sheet with barbed needles to form a felted fiber mat.

## carpet tile

A flooring tile made of carpeting material.

## pile

The upright tufts of yarn forming the surface of a carpet or fabric.

## loop pile

A carpet texture created by weaving, tufting, or knitting the pile yarn into loops.

## cut pile

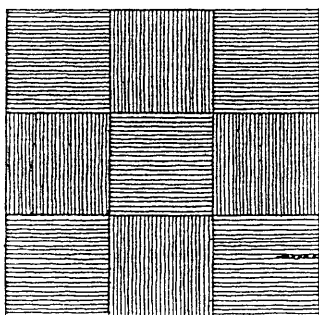
A carpet texture created by cutting each loop of pile yarn, producing a range of textures from informal shags to short, dense velvets.

## backing

The foundation material securing the pile yarns of a carpet and providing it with stiffness, strength, and dimensional stability.

## carpet pad

A pad of cellular rubber or felted animal hair, over which carpet is installed to increase resiliency, improve durability, and reduce impact sound transmission. Also called carpet cushion.



# FORCE

An influence on a body producing or tending to produce a change in shape or movement.

## vector

A quantity possessing both magnitude and direction, represented by an arrow whose length is proportional to the magnitude and whose orientation in space represents the direction.

## line of action

A line of indefinite length of which a force vector is a segment. A force acting on a rigid body may be regarded as acting anywhere along its line of action without altering the external effect of the force.

## components of a force

Two or more concurrent forces into which a single force may be resolved and having a net effect on a rigid body equivalent to that of the initial force. For convenience in structural analysis, these are usually the rectangular or Cartesian components of the initial force.

## moment

The tendency of a force to produce rotation of a body about a point or line, equal in magnitude to the product of the force and the moment arm and acting in a clockwise or counterclockwise direction.

## moment center

The point at which the axis of a moment intersects the plane of the forces causing the moment.

## moment arm

The perpendicular distance from the line of action of a force to the point or line about which a moment occurs. Also called force arm.

## couple

A force system of two equal, parallel forces acting in opposite directions and tending to produce rotation but not translation. The moment of a couple is equal in magnitude to the product of one of the forces and the perpendicular distance between the two forces.

## parallel forces

Nonconcurrent forces having parallel lines of action.

## nonconcurrent forces

Forces having lines of action that do not intersect at a common point, the vector sum of which is a single force that would cause the same translation and rotation of a body as the set of original forces.

## collinear forces

Concurrent forces having the same line of action, the vector sum of which is the algebraic sum of the magnitudes of the forces, acting along the same line of action.

## coplanar forces

Forces that operate in a single plane.

## concurrent forces

Forces having lines of action intersecting at a common point, the vector sum of which can be found by applying the parallelogram law.

## parallelogram law

The proposition that the vector sum of two concurrent forces can be described by the diagonal of a parallelogram having adjacent sides which represent the two force vectors being added.

## vector sum

A single vector equivalent to and producing the same effect on a body as the application of two or more given vectors. Also called resultant.

## triangle method

A graphic technique for finding the vector sum of two concurrent forces by displacing one force vector parallel to itself until its tail coincides with the head of the other and completing the triangle with a vector that represents the resultant force.

## polygon method

A graphic technique for finding the vector sum of a coplanar system of several concurrent forces by drawing to scale each force vector in succession, with the tail of each at the head of the one preceding it, and completing the polygon with a vector that represents the resultant force, extending from the tail of the first to the head of the last vector.

## center of gravity

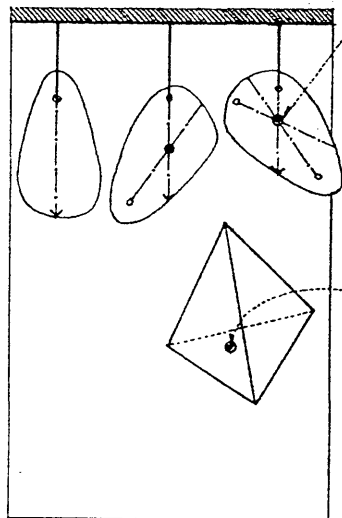
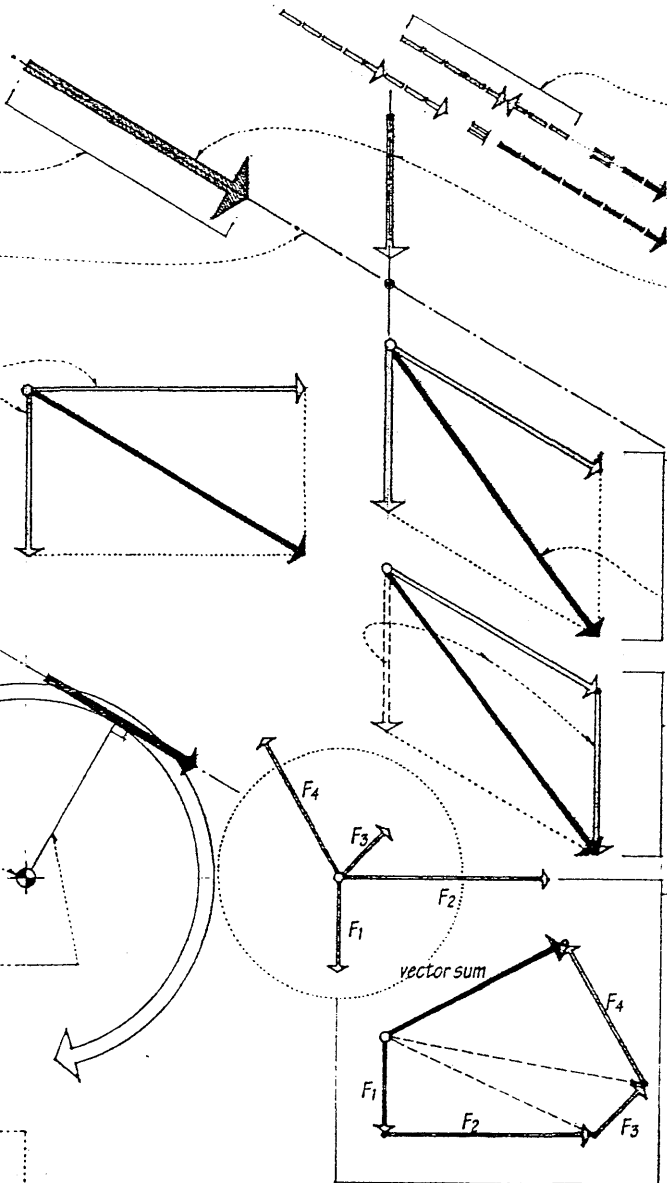
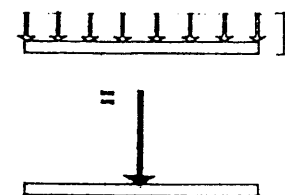
The point at which the entire weight of a body may be considered concentrated so that, if supported at this point, the body would remain in equilibrium in any position; coincident with the center of mass in a uniform gravitational field. A force whose line of action passes through the center of gravity of a body affects only its translational equilibrium; the body remains in rotational equilibrium.

## center of mass

The point at which the entire mass of a body may be considered concentrated such that the moment about any line through the point is zero.

## centroid

The center of a one- or two-dimensional figure, about which the sum of the displacements of all points in the figure is zero.







**translation**  
The uniform motion of a body in a straight line, without rotation or angular displacement.

**rotation**  
The circular motion of a body about an axis.

**lever**  
A rigid element that pivots about a fulcrum to exert a pressure or sustain a weight at a second point by a force applied at a third.

**fulcrum**  
The point or support about which a lever turns.

**mechanical advantage**  
The ratio of output force to the input force applied to a mechanism.

**free-body diagram**  
A graphic representation of the complete system of applied and reactive forces acting on a body or an isolated part of a structure. Every elementary part of a structural system has reactions that are necessary for the equilibrium of the part, just as the larger system has reactions at its supports that serve to maintain the equilibrium of the whole. Also called **equilibrium diagram**.

**mechanics**  
The branch of physics that deals with the effects of forces on bodies or material systems, comprised of statics and dynamics.

**statics**  
The branch of mechanics that deals with the relations of forces producing equilibrium among bodies or material systems.

**dynamics**  
The branch of mechanics that deals with the motion and equilibrium of bodies or material systems under the action of forces.

**statically equivalent**  
Having the same translational and rotational effect on a body.

**1 Newton's first law of motion**  
The physical law that a body remains at rest or in motion with a constant velocity unless an external force acts on the body. Also called **law of inertia**.

**inertia**  
The tendency of a body at rest to remain at rest or of a body in motion to retain its velocity along a straight line unless acted upon by an external force.

**equilibrant**  
The force required to bring a set of concurrent forces into equilibrium, equal in magnitude but opposite in direction to the resultant of the concurrent force system and acting along the same line of action.

**equilibrium**  
A state of balance or rest resulting from the equal action of opposing forces. For a rigid body to be in equilibrium, two conditions are necessary.  
First, the vector sum of all forces acting on it must equal zero, ensuring translational equilibrium:  
 $\Sigma F_x = 0; \Sigma F_y = 0; \Sigma F_z = 0$ .  
Second, the algebraic sum of all moments of the forces about any point or line must equal zero, ensuring rotational equilibrium:  
 $\Sigma M = 0$ .

**2 Newton's second law of motion**  
The physical law that the sum of the forces acting on a body is equal to the product of the mass of the body and the acceleration produced by the force, with motion in the direction of the resultant of the forces.

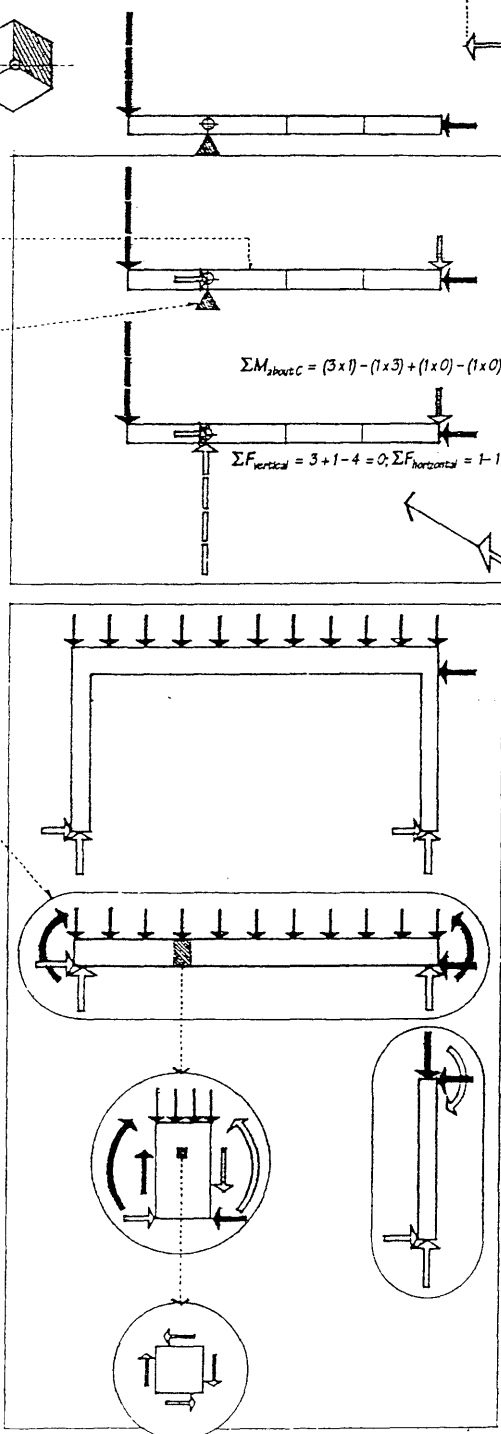
$$\text{force } (F) = \text{mass } (m) \times \text{acceleration } (a)$$

$$\text{mass } (m) = F/a = \text{weight } (w) / \text{gravitational force } (g)$$

**3 Newton's third law of motion**  
The physical law that for every force acting on a body, the body exerts a force having equal magnitude and the opposite direction along the same line of action as the original force. Also called the **law of action and reaction**.

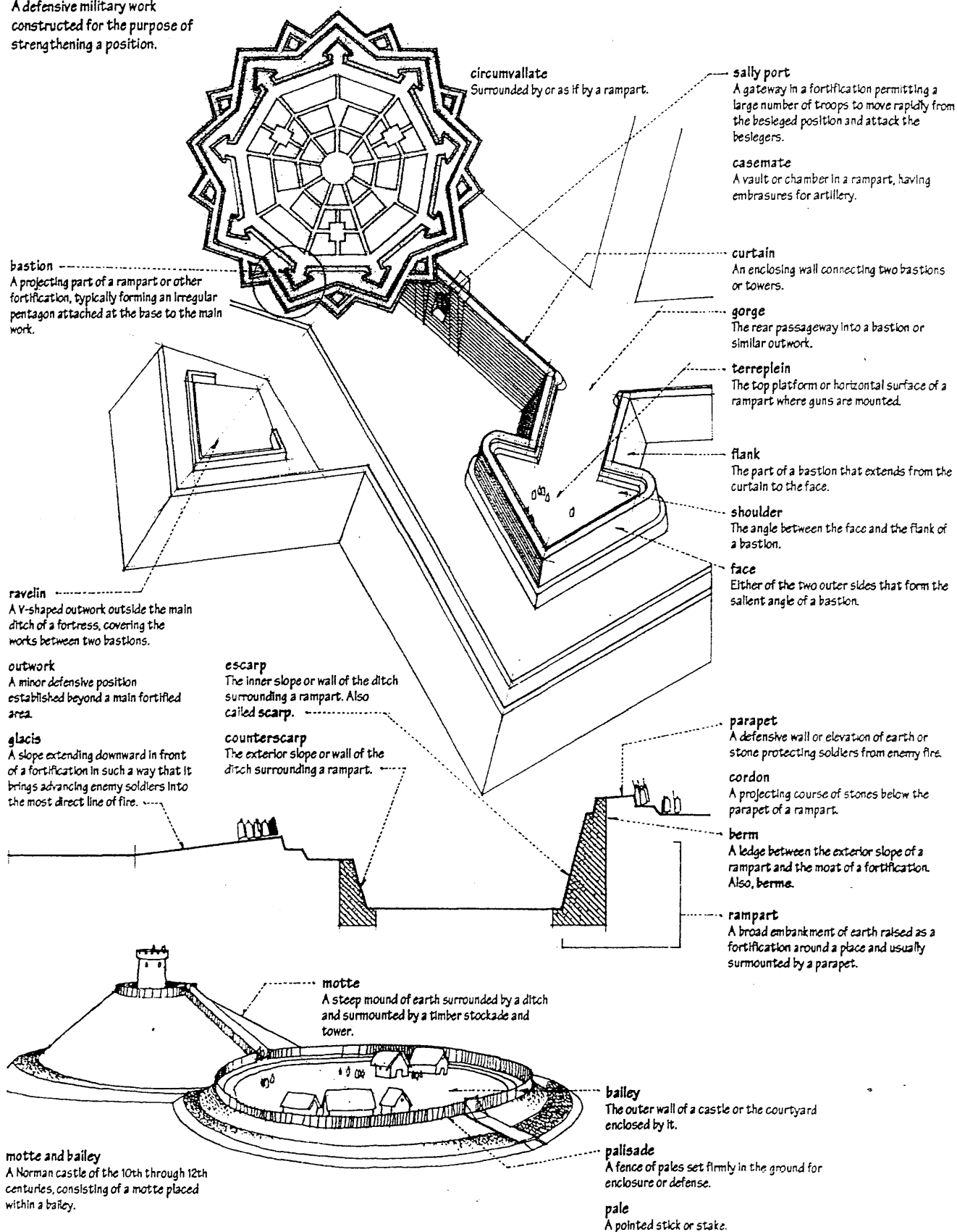
**applied force**  
An external force acting directly on a body.

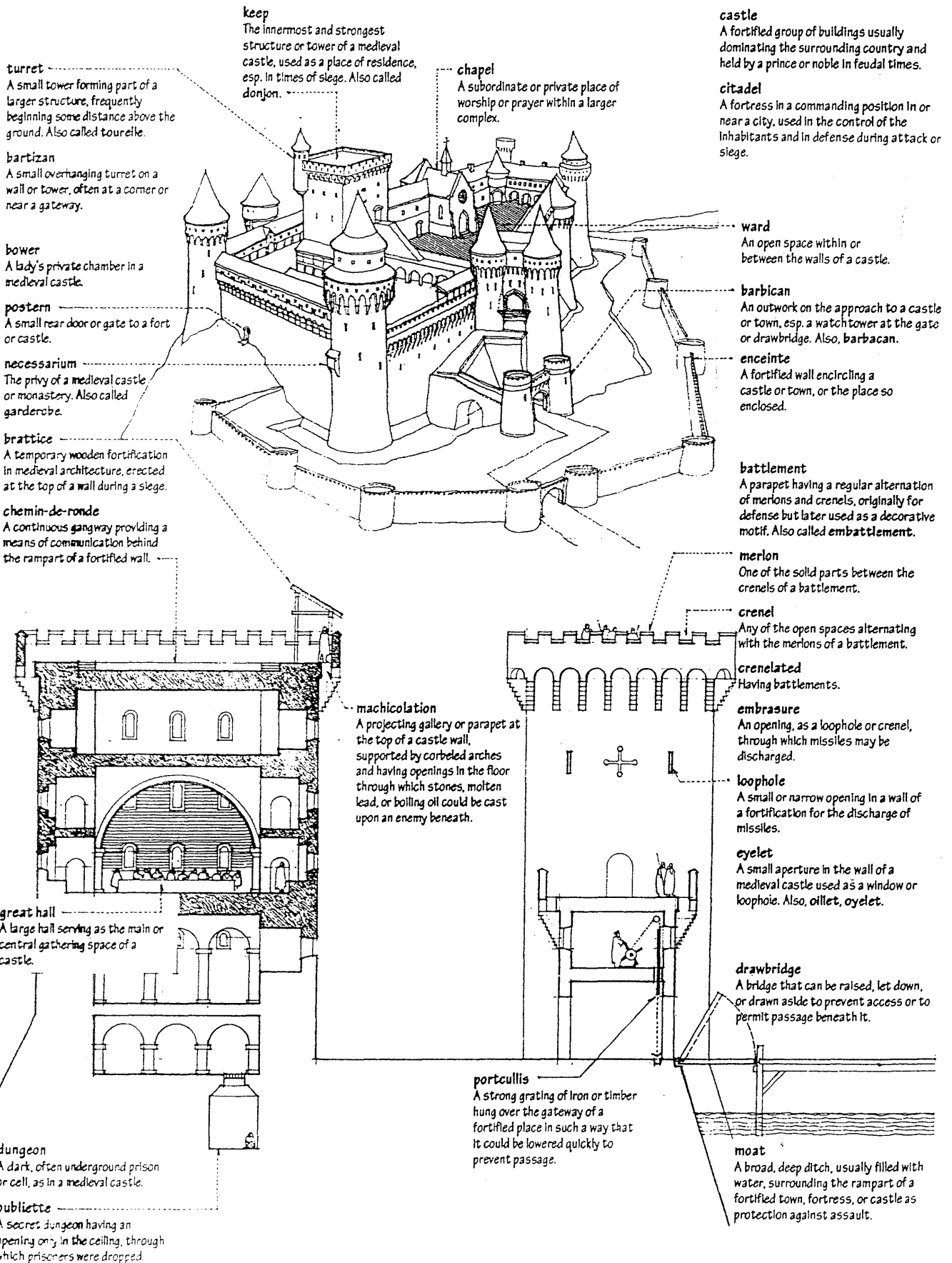
**reactive force**  
An external force generated by the action of one body on another.



## FORTIFICATION

A defensive military work constructed for the purpose of strengthening a position.





# FOUNDATION

The lowest division of a building or other construction, partly or wholly below the surface of the ground, designed to support and anchor the superstructure and transmit its loads directly to the earth.

## shallow foundation

A foundation system placed directly below the lowest part of a substructure and transferring building loads directly to the supporting soil by vertical pressure.

## footing

The part of a foundation bearing directly upon the supporting soil, set below the frostline and enlarged to distribute its load over a greater area.

## settlement

The gradual subsiding of a structure as the soil beneath its foundation consolidates under loading.

## consolidation

The gradual reduction in the volume of a soil mass resulting from the application of a sustained load and an increase in compressive stress.

## primary consolidation

A reduction in volume of a soil mass under the action of a sustained load, due chiefly to a squeezing out of water from the voids within the mass and a transfer of the load from the soil water to the soil solids. Also called primary compression.

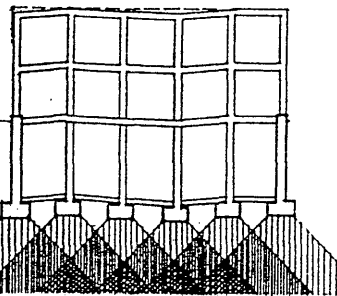
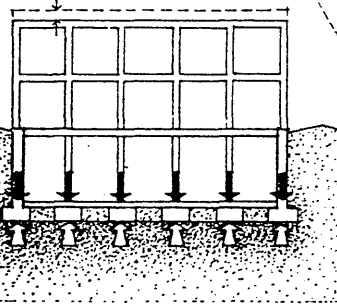
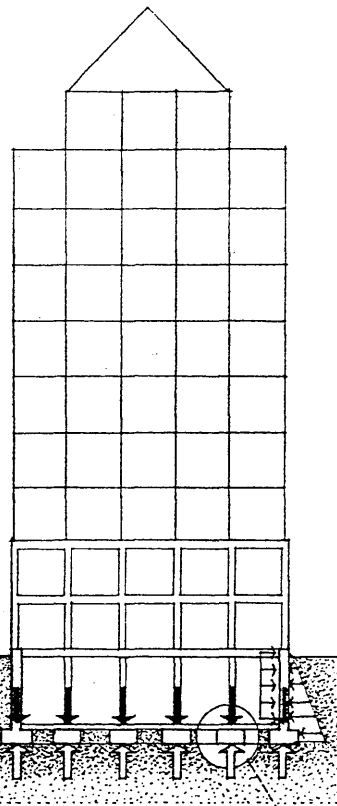
## secondary consolidation

A reduction in volume of a soil mass under the action of a sustained load, due chiefly to adjustment of the internal structure of the soil mass after most of the load has been transferred from the soil water to the soil solids.

## differential settlement

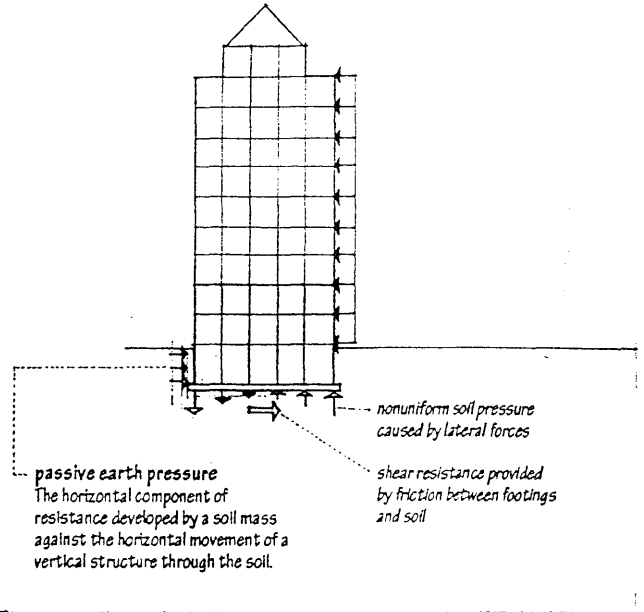
The relative movement of different parts of a structure caused by uneven settlement or failure of its foundation.

Overlapping soil stresses may be caused by closely spaced footings or by adjacent footings located at different levels.



## arching

The transfer of stress from a yielding part of a soil mass to adjoining, less yielding or restrained parts of the mass.



## passive earth pressure

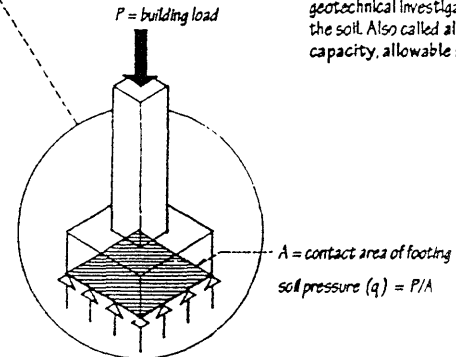
The horizontal component of resistance developed by a soil mass against the horizontal movement of a vertical structure through the soil.

## active earth pressure

The horizontal component of pressure that a soil mass exerts on a vertical retaining structure.

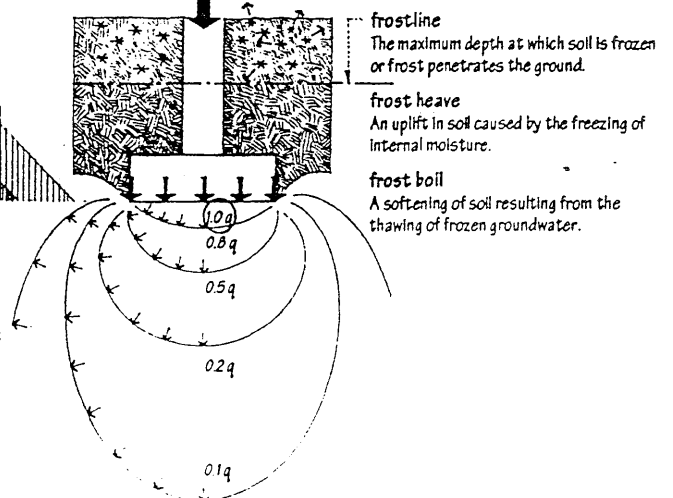
## soil pressure

The actual pressure developed between a footing and the supporting soil mass, equal to the quotient of the magnitude of the forces transmitted and the area of contact. Also called contact pressure.



## allowable bearing pressure

The maximum unit pressure a foundation is permitted to impose vertically or laterally on a supporting soil mass. Allowable bearing pressures for various soil classifications are conservative values permitted by building codes in the absence of geotechnical investigation and testing of the soil. Also called allowable bearing capacity, allowable soil pressure.



## frostline

The maximum depth at which soil is frozen or frost penetrates the ground.

## frost heave

An uplift in soil caused by the freezing of internal moisture.

## frost boil

A softening of soil resulting from the thawing of frozen groundwater.

## foundation wall

A wall occurring below the floor nearest grade, designed to support and anchor the superstructure.

## ground slab

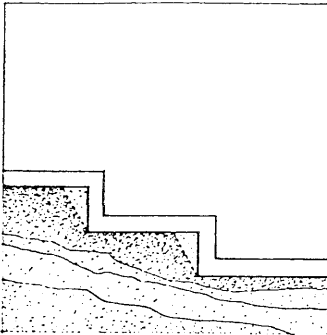
A concrete slab placed over a dense or compacted base and supported directly by the ground, usually reinforced with welded wire fabric or a grid of reinforcing bars to control any cracking caused by drying shrinkage or thermal stresses. Separate or integral footings are required for heavy or concentrated loads. Over problem soils, the slab must be designed as a mat or raft foundation. Also called slab on grade.

## base course

A layer of coarse granular materials placed and compacted on undisturbed soil or prepared fill to prevent the capillary rise of moisture to a concrete ground slab.

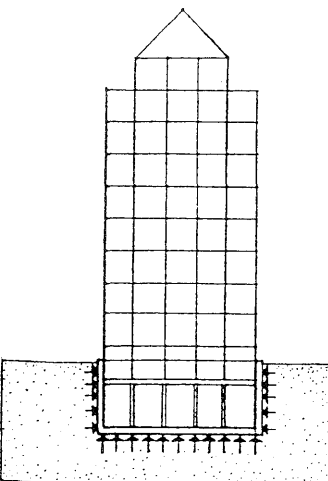
## substratum

Something that underlies or serves as a base or foundation. Also called substrate.



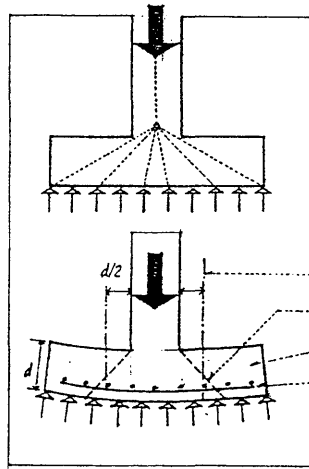
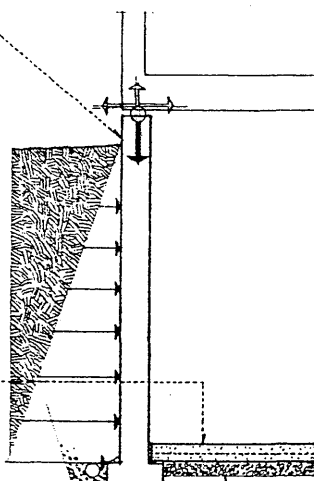
## stepped footing

A continuous or strip footing that changes levels in stages to accommodate a sloping site or bearing stratum.



## floating foundation

A foundation used in yielding soil, having for its footing a raft placed deep enough that the weight of the excavated soil is equal to or greater than the weight of the construction supported.



## spread footing

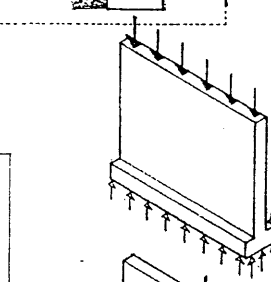
A concrete footing extended laterally to distribute the foundation load over a wide enough area that the allowable bearing capacity of the supporting soil is not exceeded.

critical section assumed for shear

actual punching shear

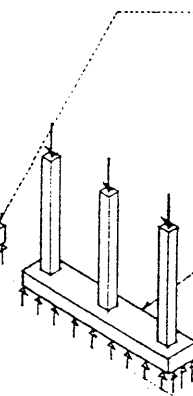
compression

tension



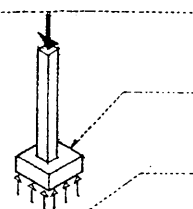
## strip footing

The continuous spread footing of a foundation wall.



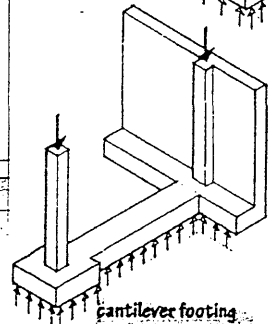
## isolated footing

A single spread footing supporting a freestanding column or pier.



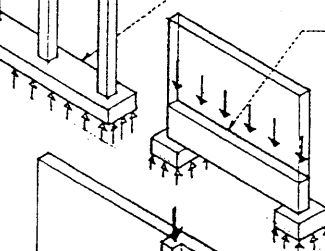
## continuous footing

A reinforced concrete footing extended to support a row of columns.



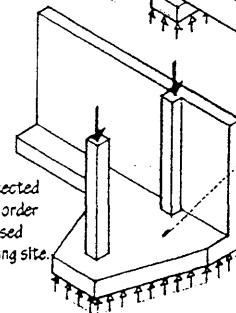
## cantilever footing

A reinforced concrete footing connected by a tie beam to another footing in order to balance an asymmetrically imposed load, as at the perimeter of a building site. Also called strap footing.



## grade beam

A reinforced concrete beam supporting a superstructure at or near ground level and transferring the load to isolated footings, piers, or piles. Also called ground beam.



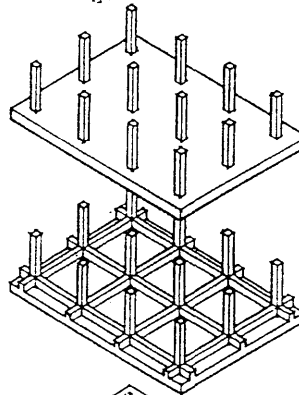
## combined footing

A reinforced concrete footing for a perimeter column or foundation wall extended to support an interior column load.

To avoid rotation or differential settlement, continuous and cantilever footings are proportioned to generate uniform soil pressure.

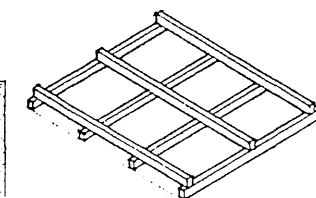
## raft

A mat providing a footing on yielding soil, usually for an entire building, placed so that the weight of the displaced soil exceeds the weight of the construction.



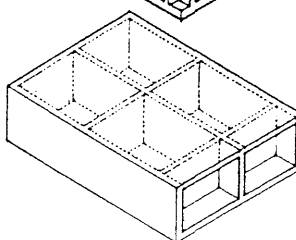
## mat

A thick, slablike footing of reinforced concrete supporting a number of columns or an entire building.



## grillage

A framework of crossing beams for spreading heavy loads over large areas. Also called grid.



## ribbed mat

A mat foundation reinforced by a grid of ribs above or below the slab.

## cellular mat

A composite structure of reinforced concrete slabs and basement walls serving as a mat foundation.

## FOUNDATION

### deep foundation

A foundation system that extends down through unsuitable soil to transfer building loads to a more appropriate bearing stratum well below the superstructure.

### pile foundation

A system of piles, pile caps, and tie beams for transferring building loads down to a suitable bearing stratum, used esp. when the soil mass directly below the construction is not suitable for the direct bearing of footings.

### bearing stratum

A stratum of soil or rock on which a footing bears, or to which a building load is transferred by a pile or caisson.

### pile

A long slender column of wood, steel, or reinforced concrete, driven or hammered vertically into the earth to form part of a foundation system.

### end-bearing pile

A pile depending principally on the bearing resistance of soil or rock beneath its foot for support. The surrounding soil mass provides a degree of lateral stability for the long compression member. Also called point-bearing pile.

### allowable pile load

The maximum axial and lateral loads permitted on a pile, as determined by a dynamic pile formula, a static load test, or a geotechnical investigation of the foundation soil.

### pile eccentricity

The deviation of a pile from its plan location or from the vertical, resulting in a reduction of its allowable load.

### pile tolerance

The permitted deviation of a pile from the vertical, for which a reduction in allowable load is not required.

### friction pile

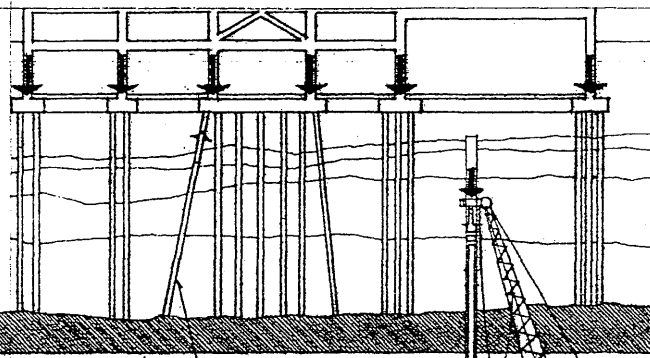
A pile depending principally on the frictional resistance of surrounding earth for support.

### skin friction

The friction developed between the sides of a pile and the soil into which the pile is driven, limited by the adhesion of soil to the pile sides and the shear strength of the surrounding soil mass.

### negative friction

An additional load on a pile resulting from settling of fill, which tends to drag the pile downward into the soil.

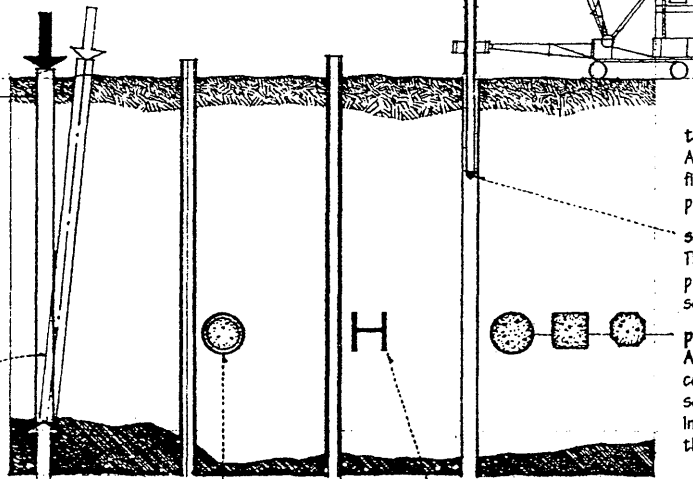


### batter pile

A pile driven at a specified angle to the vertical in order to provide resistance against lateral forces.

### drive band

A steel band encircling the head of a timber pile to prevent it from splitting when driven. Also called pile ring.



### pipe pile

A heavy steel pipe driven with the lower end either open or closed by a heavy steel plate or point and filled with concrete. An open-ended pipe pile requires inspection and excavation before being filled with concrete.

### H-pile

A steel H-section driven as a pile, sometimes encased in concrete to a point below the water table to prevent corrosion. H-sections can be welded together in the driving process to form any length of pile.

### anvil

The component of a pile hammer, located just below the ram, that transfers the driving force to the pile head.

### cushion

A cap for protecting a pile head as well as the pile hammer during a driving operation. Also called cushion block, cushion head.

### pile driver

A machine for driving piles, usually composed of a tall framework supporting machinery for lifting a pile in position before driving, a driving hammer, and vertical rails or leads for guiding the hammer.

### timber pile

A log driven usually as a friction pile, often fitted with a steel shoe and a drive band to prevent it from splitting or shattering.

### shoe

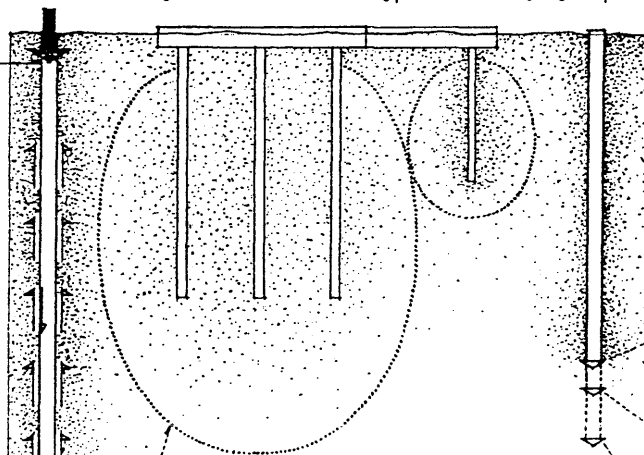
The hard, pointed or rounded foot of a pile or caisson for piercing underlying soil. Also called drive shoe.

### precast concrete pile

A precast, often prestressed concrete column, having a round, square, or polygonal section and sometimes an open core, driven into the earth by a pile driver until it meets the required resistance.

### composite pile

A pile constructed of two materials, as a timber pile having a concrete upper section to prevent the portion of the pile above the water table from deteriorating.



### pressure bulb

A zone in a loaded soil mass bounded by an arbitrarily selected isobar of stress, as from a single or number of friction piles.

### isobar

A line connecting points of equal pressure.

### dynamic pile formula

Any of several formulas by which the allowable axial load on a pile can be calculated from the energy required for a pile hammer to advance the pile foot a specified distance into the subsoil.

### static load test

A test for determining the allowable axial load on a single pile, usually a fraction of the load required to reach a yield point, a point of resistance, or a point of refusal.

### point of resistance

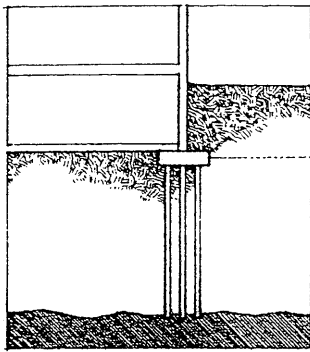
The point at which a pile load causes a specified net settlement after being applied continuously for a specified period of time.

### point of refusal

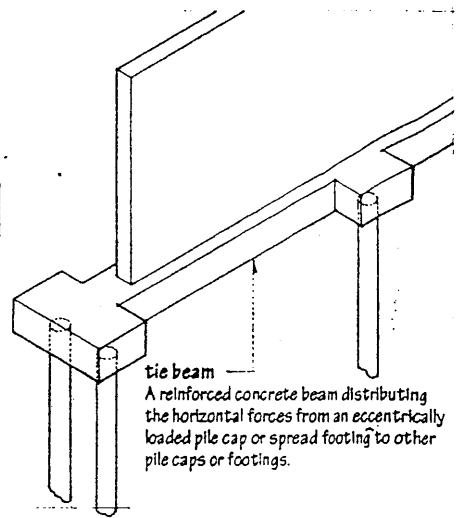
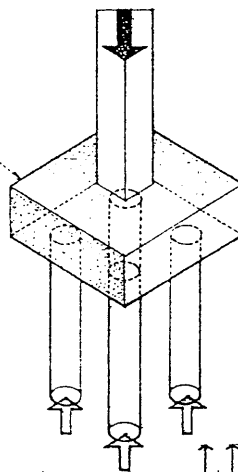
The point at which no additional settlement takes place after a pile has been loaded continuously for a specified period of time.

### yield point

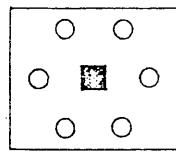
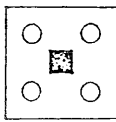
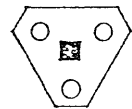
The point at which an increase in pile load produces a disproportionate increase in settlement.



**pile cap**  
A reinforced concrete slab or mat joining the heads of a cluster of piles to distribute the load from a column or grade beam equally among the piles.



**tie beam**  
A reinforced concrete beam distributing the horizontal forces from an eccentrically loaded pile cap or spread footing to other pile caps or footings.



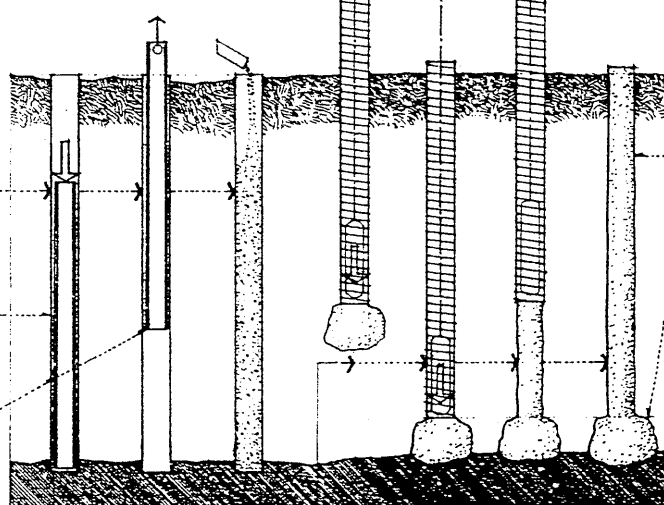
examples of pile layouts

**cast-in-place concrete pile**  
A pile constructed by placing concrete into a shaft in the ground.

**cased pile**  
A concrete pile constructed by driving a steel pipe or casing into the ground until it meets the required resistance and then filling it with concrete.

**casing**  
A cylindrical steel section, sometimes corrugated or tapered for increased stiffness, driven or dropped in place to serve as a form for a cast-in-place concrete pile.

**mandrel**  
A heavy steel tube or core that is inserted into a thin-walled casing to prevent it from collapsing in the driving process, and then withdrawn before concrete is placed in the casing.



**pedestal pile**  
A cast-in-place concrete pile having an enlarged foot to increase its bearing area and strengthen the bearing stratum by compression, formed by forcing concrete out at the bottom of the casing into the surrounding soil.

**bulb**  
A bulge cast or formed at the bottom of a cast-in-place concrete pile to enlarge its bearing area and strengthen the bearing stratum by compression.

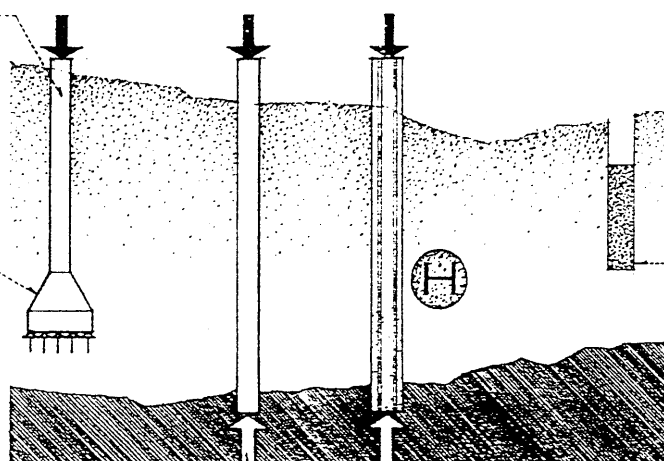
**uncased pile**  
A concrete pile constructed by driving a concrete plug into the ground along with a steel casing until it meets the required resistance, and then ramming concrete into place as the casing is withdrawn.

**pier**  
A cast-in-place concrete foundation formed by boring with a large auger or excavating by hand a shaft in the earth to a suitable bearing stratum and filling the shaft with concrete.

**caisson**  
A pier, esp. when the boring is 2 ft. (610 mm) or larger in diameter to permit inspection of the bottom.

**bell**  
The base of a caisson enlarged to increase its bearing area.

**bell bucket**  
An attachment to an earth auger having expanding blades for excavating a bell at the bottom of a caisson shaft.



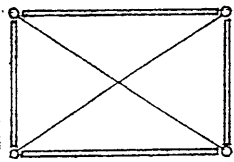
**socketed caisson**  
A caisson that is drilled into a stratum of solid rock rather than belled.

**rock caisson**  
A socketed caisson having a steel H-section core within a concrete-filled pipe casing.

**sand pile**  
A base for a footing in soft soil, made by compacting sand in a cavity left by a timber pile.

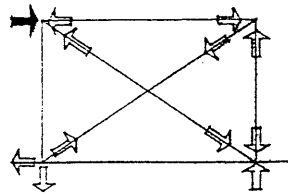
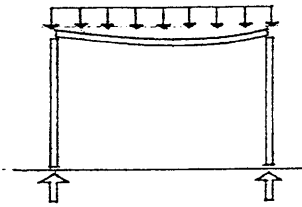
## FRAME

A skeletal structure of relatively slender members designed to give shape and support to a building or other construction.



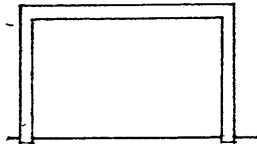
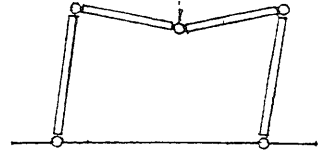
### braced frame

A structural frame whose resistance to lateral forces is provided by diagonal or other type of bracing.



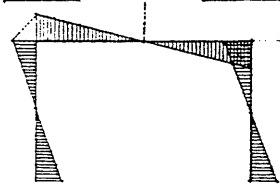
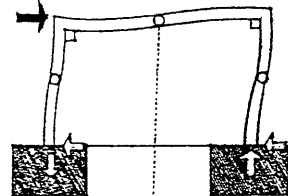
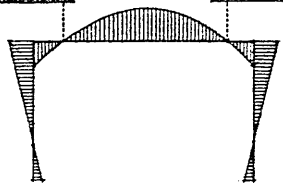
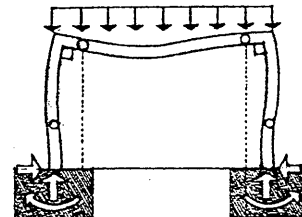
### plastic hinge

A virtual hinge that develops when all fibers are fully yielded at a cross section of a structural member.



### rigid frame

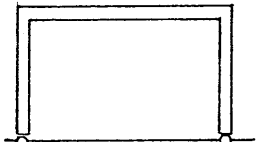
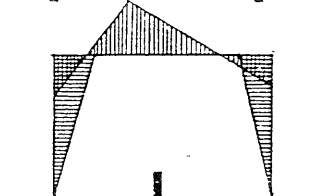
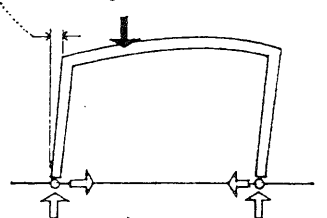
A structural frame of linear members rigidly connected at their joints. Applied loads produce axial, bending, and shear forces in all members of the frame since the rigid joints restrain the ends of the members from rotating freely. In addition, vertical loads cause a rigid frame to develop horizontal thrusts at its base. A rigid frame is statically indeterminate and rigid only in its plane. Also called moment-resisting frame.



### fixed frame

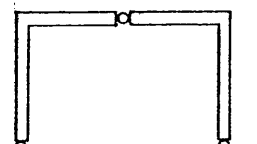
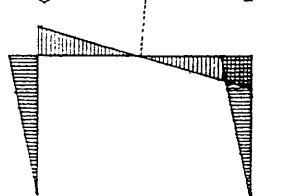
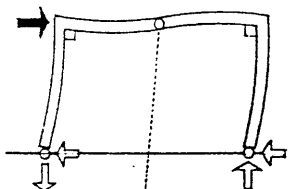
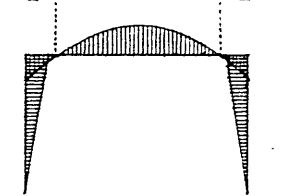
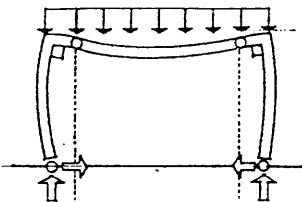
A rigid frame connected to its supports with fixed joints. A fixed frame is more resistant to deflection than a hinged frame but also more sensitive to support settlements and thermal expansion and contraction.

**sideway**  
The lateral displacement produced in a rigid frame by lateral loads or asymmetrical vertical loading.



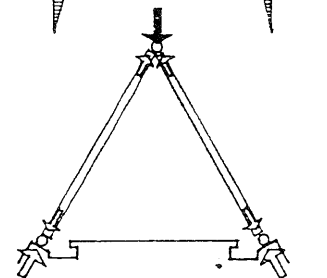
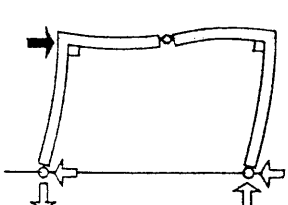
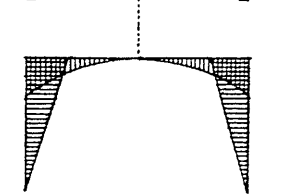
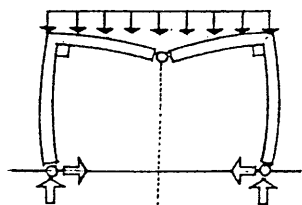
### hinged frame

A rigid frame connected to its supports with pin joints. The pin joints prevent high bending stresses from developing by allowing the frame to rotate as a unit when strained by support settlements, and to flex slightly when stressed by changes in temperature.



### three-hinged frame

A structural assembly of two rigid sections connected to each other and to its supports with pin joints. While more sensitive to deflection than either the fixed or hinged frame, the three-hinged frame is least affected by support settlements and thermal stresses. The three pin joints also permit the frame to be analyzed as a statically determinate structure.



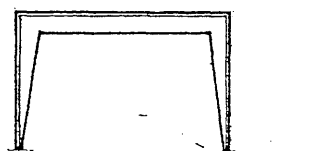
### A-frame

A building constructed with a steep triangular frame resting directly on a foundation.

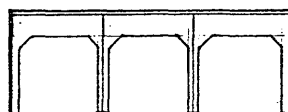


**knee**  
The junction of the top and either of the uprights of a bent.

**bent**  
A braced or rigid frame designed to carry vertical and lateral loads transverse to the length of a framed structure.



**portal**  
A rigid frame of two columns and a beam defining a single bay. Also called single-bay frame.



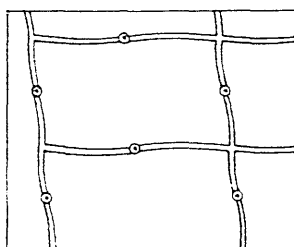
**multibay frame**  
A rigid frame having a continuous beam supported by and rigidly connected to three or more columns.

### Vierendeel truss

A framed beam structure having vertical web members rigidly connected to parallel top and bottom chords. A Vierendeel truss is not a true truss since its members are subject to nonaxial bending forces. Also called Vierendeel girder.

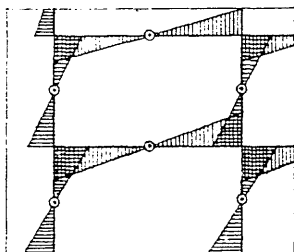
### portal method

A method for analyzing a multistory frame as a cantilever dominated by shear racking. The portal method assumes that a point of inflection occurs at the midlength of all members in the frame, and that the frame acts as a series of independent portals to which the total lateral shear at each level is distributed in proportion to the floor area each column supports. Imaginary pin joints can be inserted at each point of inflection, making the frame a statically determinate structure.



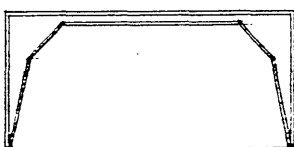
### cantilever method

A method for analyzing a multistory frame as a cantilever subject to bending. The cantilever method assumes that a point of inflection occurs at the midlength of all members in the frame, and that the axial force in each column of a story is proportional to its horizontal distance from the centroid of all the columns on that level. Imaginary pin joints can be inserted at each point of inflection, making the frame a statically determinate structure.



### moment distribution method

A method for analyzing an indeterminate structure through an iterative process of fixing a rigid joint in space, determining the fixed-end moments at the joint, then releasing the joint to allow it to rotate, and studying the transference of moments and rotations to other joints.



### indeterminate

Of or pertaining to a structure having more than the minimum number of members, connections, or supports needed for stability, resulting in more unknown forces than there are static equations for solution.

### degree of indeterminacy

The difference between the number of unknown forces in an indeterminate structure and the number of static equations available for solution.

### determinate

Of or pertaining to a structure able to be analyzed completely by means of the principles of statics.

### redundancy

A structural member, connection, or support not required for a statically determinate structure.

### degree of redundancy

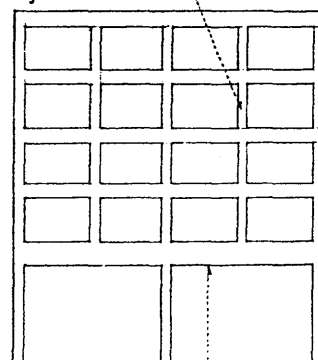
The number of members beyond that required for the stability of a statically determinate structure.

### multistory frame

A vertical series of superimposed rigid frames.

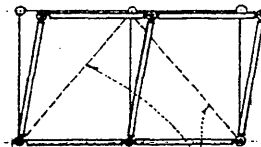
### transfer column

A discontinuous column in a multistory frame, supported at some intermediate level where its load is transferred to adjacent columns.



### transfer girder

A girder supporting a transfer column.



### degree of freedom

The number of members required to stabilize a collapse mechanism.

# FRAME

## framing

The act, process, or manner of fitting and joining together relatively slender members to give shape and support to a structure.

## framework

A skeletal structure of parts fitted and joined together in order to support, define, or enclose.

## skeleton construction

A system of construction utilizing a framework of columns and beams to transmit building loads down to the foundation.

## plank-and-beam construction

Floor or roof construction utilizing a framework of timber beams to support wood planks or decking.

## post-and-beam construction

Wall construction utilizing a framework of vertical posts and horizontal beams to carry floor and roof loads. Also called post-and-lintel construction.

## pole construction

A system of construction employing a vertical structure of pressure-treated wood poles which are firmly embedded in the ground as a pier foundation.

## light frame construction

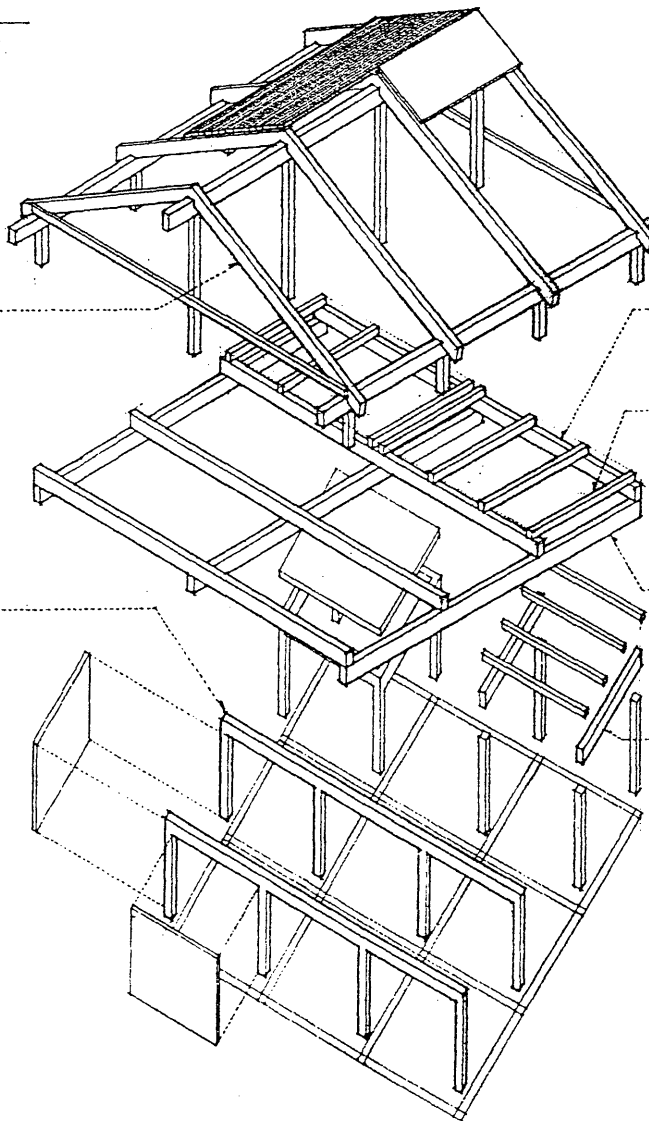
A system of construction utilizing closely spaced and sheathed members of dimension lumber or light-gauge metal to form the structural elements of a building.

\*See balloon frame

floor framing

platform frame

roof framing



## principal beam

Any large beam in a structural frame that supports secondary beams or joists. Also called primary beam.

## secondary beam

Any beam that transmits its load to a principal beam.

## tertiary beam

Any beam that transmits its load to a secondary beam.

## girder

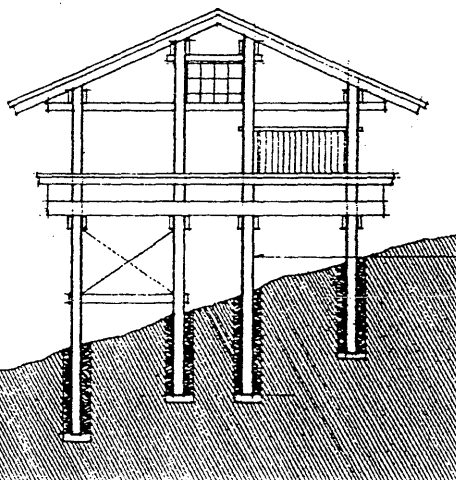
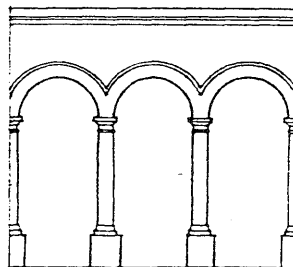
A large principal beam designed to support concentrated loads at isolated points along its length.

## trabeate

Of or pertaining to a system of construction employing beams or lintels. Also, trabeated.

## arcuate

Of or pertaining to a system of construction employing arches or arched forms. Also, arcuated.



## pole house

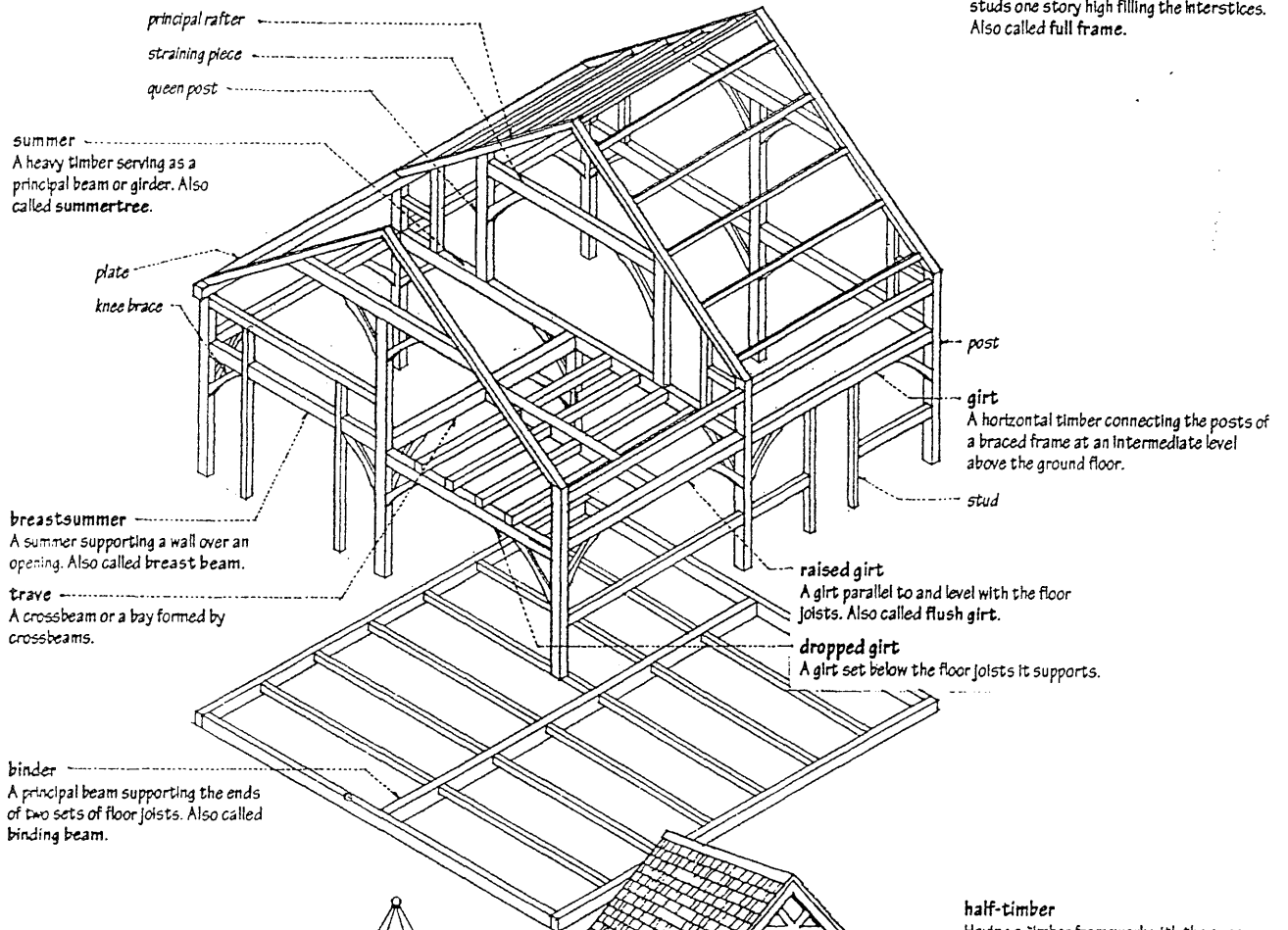
A house of pole construction.

## pole

A long, cylindrical, often slender piece of wood or metal.

## still

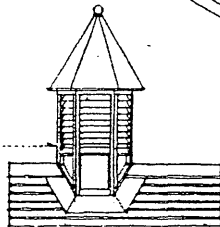
One of several piles or posts for supporting a structure above the surface of land or water.



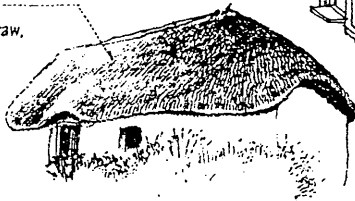
**braced frame**

A building frame employing a heavy, braced framework of solid girts mortised into solid posts the full height of the frame, with studs one story high filling the interstices. Also called **full frame**.

**louver**  
A lantern or turret on the roof of a medieval building having slatted apertures for the escape of smoke and admission of air.



**thatch**  
A material for covering a roof, as straw, rushes, or palm leaves, fastened together so as to shed water and sometimes to provide thermal insulation. Also, **thatching**.



**half-timber**

Having a timber framework with the spaces filled with masonry or plaster. Also, **half-timbered**.

**open-timbered**

Constructed so that a framework of timbers is exposed.



**solar**

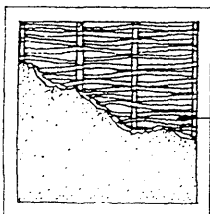
A room or apartment on an upper floor of a medieval English house. Also, **sollar**, **soller**.

**jetty**

An upper story of a building projecting beyond the one below. Also, **jutty**.

**pan**

A major vertical division of a wall, esp. a nogged panel of half-timber construction.



**wattle and daub**

A form of wall construction, consisting of wattles covered and plastered with clay or mud. Also, **wattle and dab**.

**wattle**

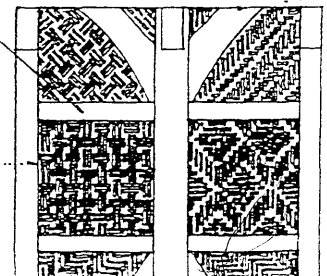
A framework of rods or poles interwoven with thin branches, twigs, and reeds, used in the construction of walls and fences.

**nog**

One of a number of short wooden pieces inserted between the principal members of a half-timbered wall to strengthen the frame and retain the brick infill. Also, **nogging**.

**nogging**

Brick masonry used to fill the spaces between the members of a timber frame.



# GEOMETRY

**A branch of mathematics that deals with the properties, measurement, and relationships of points, lines, angles, and solids, deduced from their defining conditions by means of certain assumed properties of space.**

**point**  
A dimensionless geometric element that has no property but location, as the intersection of two lines.

**y-axis**  
The axis along which ordinates or y-values are measured in a Cartesian coordinate system. Also called axis of ordinates.

**z-coordinate**  
A coordinate determined by measuring parallel to the z-axis.

**z-axis**  
The axis along which z-values are measured in a three-dimensional Cartesian coordinate system.

**rectangular coordinate system**  
A Cartesian coordinate system in which the axes or coordinate planes are perpendicular.

**x-axis**  
The axis along which abscissas or x-values are measured in a Cartesian coordinate system. Also called axis of abscissas.

**abscissa**  
A coordinate determined by measuring parallel to the x-axis. Also called x-coordinate.

**coordinate**  
Any of a set of numbers that serve to specify the location of a point on a line, surface, or in space by reference to a fixed figure or system of lines.

**Cartesian coordinate**  
Any of the coordinates for locating a point on a plane by its distance from each of two intersecting lines, or in space by its distance from each of three planes intersecting at a point.

**ordinate**  
A coordinate determined by measuring parallel to the y-axis. Also called y-coordinate.

**Euclidean geometry**  
Geometry based upon the postulates of Euclid, esp. the postulate that only one line may be drawn through a given point parallel to a given line.

**radius vector**  
A straight line segment that joins a variable point to the fixed origin of a polar coordinate system.

**polar angle**  
The angle formed by the polar axis and a radius vector in a polar coordinate system.

**polar axis**  
The reference axis from which the polar angle is measured in a polar coordinate system.

**polar coordinate system**  
A system for locating a point on a plane by its radius vector and polar angle.

**line**  
A geometric element generated by a moving point and having extension without breadth or thickness.

**vertical**  
Perpendicular to the plane of the horizon.

**oblique**  
Neither parallel nor perpendicular to a given line or surface.

**horizontal**  
Parallel to or operating in a plane parallel to the horizon.

**parallel**  
Extending in the same direction, equidistant at all points, and never converging or diverging.

**skew lines**  
Any lines in space that are neither parallel nor intersecting.

**angle**  
The space between two lines diverging from a common point, or within two planes diverging from a common line; the figure so formed.

**vertex**  
The point at which the sides of an angle intersect.

**angle**  
The amount of rotation needed to bring one line or plane into coincidence with another, measured in radians or in degrees, minutes, and seconds.

**radian**  
A unit of angular measure equal to the central angle subtending an arc equal in length to the radius:  $360/2\pi$  or approx.  $57.3^\circ$ .

**degree**  
A unit of angular measure, equal to  $1/360$ th of a complete angle or turn, or of the circumference of a circle.

**minute**  
The 60th part of a degree of angular measure.

**second**  
The 60th part of a minute of angular measure.

**right angle**  
An angle of  $90^\circ$  formed by the perpendicular intersection of two straight lines.

**acute angle**  
An angle less than  $90^\circ$ .

**obtuse angle**  
An angle greater than  $90^\circ$ , but less than  $180^\circ$ .

**height**  
Extent or distance upward from a given level to a fixed point.

**vertex**  
The point opposite to and farthest from the base of a plane figure.

**altitude**  
The perpendicular distance from the base of a geometric figure to the opposite vertex, parallel side, or parallel surface.

**base**  
The line or surface forming the part of a geometric figure that is most nearly horizontal or on which it is supposed to stand, from which an altitude can be constructed.

**triangle**  
A polygon having three sides and three angles.

**isosceles**  
Having two sides of equal length.

**acute**  
Composed only of acute angles.

**obtuse**  
Having an obtuse angle.

**scalene**  
Having three unequal sides.

**coincident**  
Occupying the same place in space or time.

**congruent**  
Coinciding at all points when superimposed.

**similar**  
Having corresponding sides proportional and corresponding angles equal.

**reentrant**  
Reentering or pointing inward, as an interior angle of a polygon that is greater than  $180^\circ$ .

**salient**  
An outward projecting angle or part.

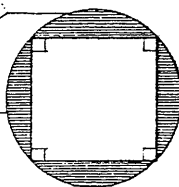
**exterior angle**  
The angle formed between any side of a polygon and an extended adjacent side.

**interior angle**  
The angle formed inside a polygon between any two adjacent sides.

**cant**  
An oblique line or surface, as one formed by cutting off the corner of a square or cube.

**quadrilateral**  
A polygon having four sides and four angles.

**rectangle**  
A parallelogram having four right angles, esp. one with sides of unequal lengths.



**plane geometry**  
The branch of geometry that deals with plane figures.

**plane**  
A surface generated by a straight line moving at a constant velocity with respect to a fixed point, such that a straight line joining any two of its points lies wholly in the surface.

**figure**  
A combination of geometric elements disposed in a particular form or shape.

**polygon**  
A closed plane figure having three or more straight sides.

**rectilinear**  
Forming, formed by, or characterized by straight lines.

**rectangular**  
Having edges, surfaces, or faces that meet at right angles.

**aspect ratio**  
In any rectangular configuration, the ratio of the longer dimension to the shorter.

**diagonal**  
A line connecting two nonadjacent angles or vertices of a polygon or polyhedron.

**square**  
A regular polygon having four equal sides and four right angles.

**parallelogram**  
A quadrilateral having both pairs of opposite sides parallel to each other.

**trapezoid**  
A quadrilateral having only two sides parallel.

**trapezium**  
A quadrilateral having no two sides parallel.

**pentagon**  
A polygon having five sides and five angles.

**hexagon**  
A polygon having six sides and six angles.

**octagon**  
A polygon having eight sides and eight angles.

**apothem**  
A perpendicular from the center of a regular polygon to one of its sides.

**Pythagorean theorem**  
The theorem that the square of the length of the hypotenuse of a right triangle equals the sum of the squares of the lengths of the other two sides.  
$$c^2 = a^2 + b^2$$

**regular**  
Having all sides equal (equilateral) and all angles equal (equiangular).

**trigonometry**  
The branch of mathematics that deals with the properties of triangles and trigonometric functions, and of their applications.

**trigonometric function**  
A function of an angle, as sine or cosine, expressed as the ratio of the sides of a right triangle.

**sine**  
The trigonometric function defined as the ratio of the side opposite a given angle to the hypotenuse.

**cosine**  
The trigonometric function defined as the ratio of the side adjacent to a given angle to the hypotenuse.

**tangent**  
The trigonometric function defined as the ratio of the side opposite a given angle to the side adjacent to the angle.

**secant**  
The trigonometric function defined as the ratio of the hypotenuse to the side adjacent to a given angle.

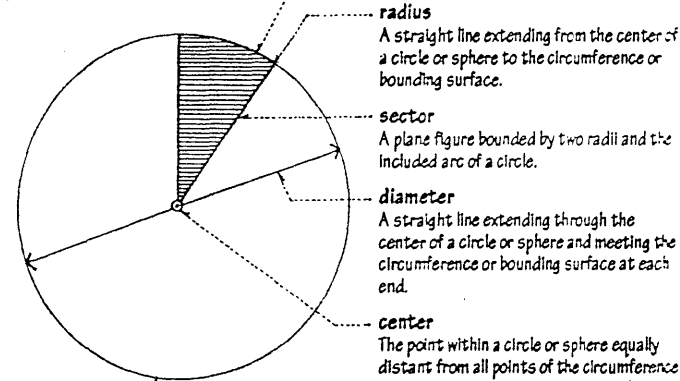
**cosecant**  
The trigonometric function defined as the ratio of the hypotenuse to the side opposite a given angle.

**cotangent**  
The trigonometric function defined as the ratio of the side opposite a given angle to the side adjacent to the angle.

# GEOMETRY

## circle

A closed plane curve every point of which is equidistant from a fixed point within the curve.

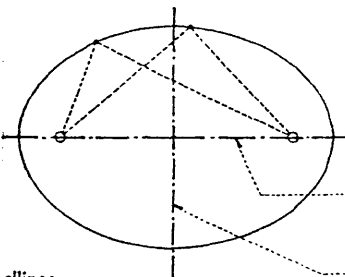


## circumference

The boundary line of a closed curvilinear figure, esp. the perimeter of a circle.

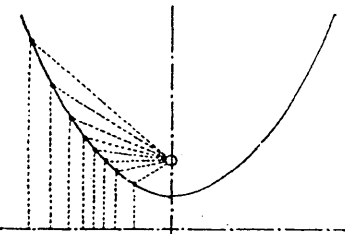
## pi

The symbol  $\pi$  denoting the ratio between the circumference of a circle and its diameter, a constant equal to 3.14159+.



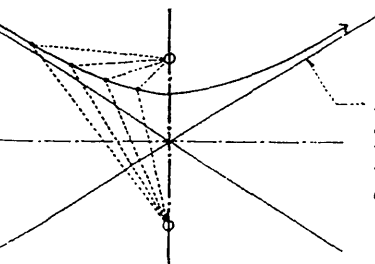
## ellipse

A closed plane curve generated by a point moving in such a way that the sums of its distances from two fixed points, the foci, is a constant.



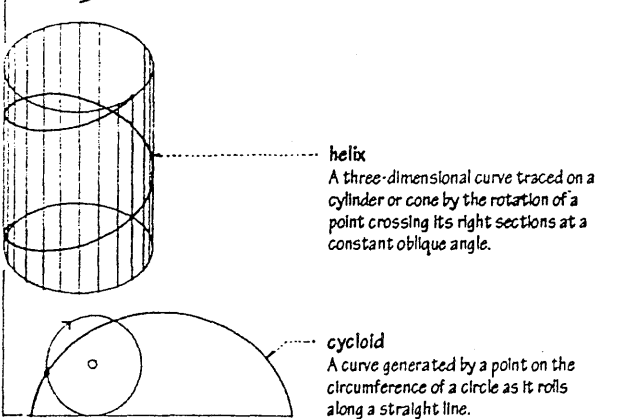
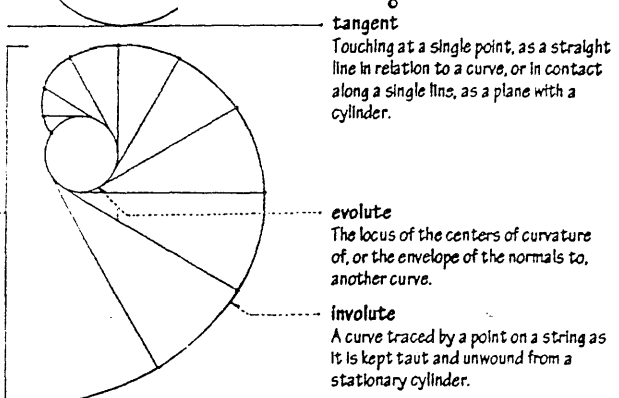
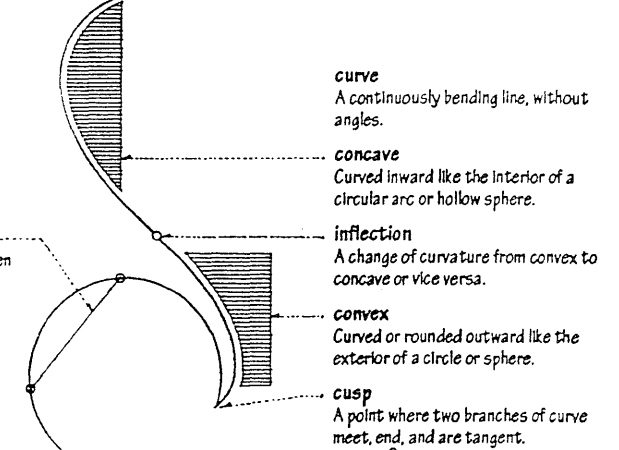
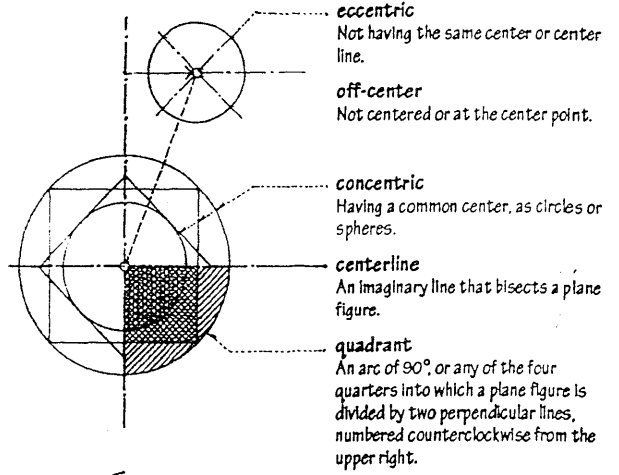
## parabola

A plane curve generated by a point so moving that it remains equidistant from a fixed line and a fixed point not on the line.



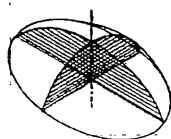
## hyperbola

A plane curve generated by a point so moving that the difference of the distances from two fixed points in the plane remains constant.



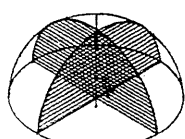
# spheroid

A solid geometrical figure similar in shape to a sphere, as an ellipsoid.



## ellipsoid

A solid figure all plane sections of which are ellipses.

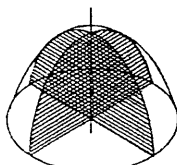


## prolate spheroid

A spheroid generated by rotating an ellipse about its major axis.

## prolate

Elongated along the polar diameter.

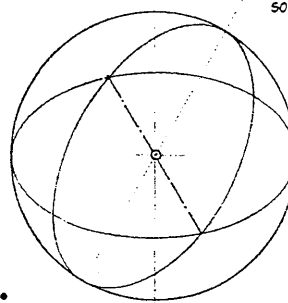


## oblate spheroid

A spheroid generated by rotating an ellipse about its minor axis.

## oblate

Flattened at the poles.



# solid geometry

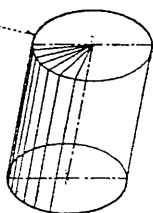
The branch of geometry that deals with solid figures and three-dimensional space.

## sphere

A solid generated by the revolution of a semicircle about its diameter, whose surface is at all points equidistant from the center.

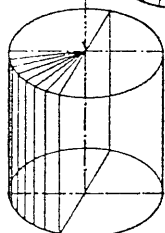
# cylinder

A solid bounded by two parallel planes and a surface generated by a straight line moving parallel to a fixed straight line and intersecting a closed plane curve in one of the planes.



## right circular cylinder

A cylinder generated by a rectangle about one of its sides.



# solid

A geometric figure having the three dimensions of length, breadth, and thickness. Also called body.

## volume

The extent of a three-dimensional object or the amount of space that it occupies, measured in cubic units.

## surface

Any figure having only two dimensions, as a plane or curved two-dimensional locus of points defining the boundary of a solid.

## generator

An element that generates a geometric figure, esp. a straight line that generates a surface by moving in a specified fashion. Also called generatrix.

## directrix

A fixed line used in the description of a curve or surface.

## center

The point within a regular polygon equally distant from the vertices.

## edge

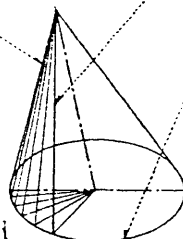
A line at which a surface terminates or at which two surfaces of a solid meet.

## vertex

A point in a geometric solid common to three or more sides.

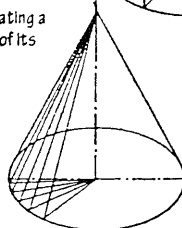
# cone

A solid whose surface is generated by a straight line, the generator, passing through a fixed point, the vertex, and moving along the intersection with a closed plane curve, the directrix.



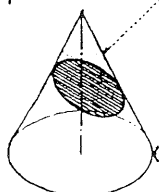
## right circular cone

A cone generated by rotating a right triangle about one of its legs.



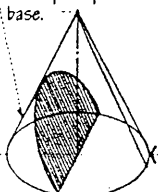
# truncated

Having the apex, vertex, or end cut off by a plane, esp. by one parallel to the base.



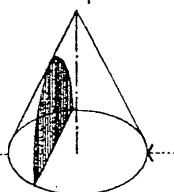
## frustum

The portion of a conical solid left after cutting off the top with a plane parallel to the base.



# conic section

A plane curve formed by the intersection of a right circular cone with a plane.



## ellipse

A conic section formed by the intersection of a right circular cone with a plane that cuts through both the axis and the surface of the cone.

## parabola

A conic section formed by the intersection of a right circular cone with a plane parallel to a generator of the cone.

## hyperbola

A conic section formed by the intersection of a right circular cone with a plane that makes a greater angle with the base than does the generator of the cone.

# polyhedron

A solid geometric figure bounded by plane faces.

## regular

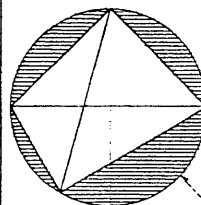
Having all faces congruent regular polygons and all solid angles congruent.

## pyramid

A polyhedron having a polygonal base and triangular faces meeting at a common point or vertex.

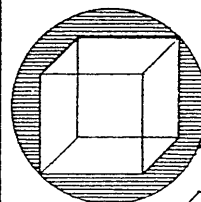
## tetrahedron

A regular polyhedron bounded by four plane faces.



## cube

A solid bounded by six equal square sides, the angle between any two adjacent faces being a right angle.



## hexahedron

A regular polyhedron having six faces.

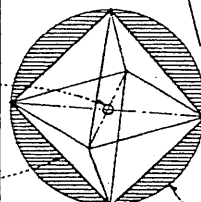
## prism

A polyhedron having ends that are parallel, congruent polygons and sides that are parallelograms.



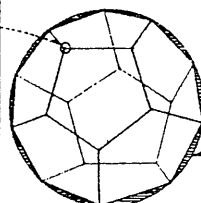
## Platonic solid

One of the five regular polyhedrons: tetrahedron, hexahedron, octahedron, dodecahedron, or icosahedron.



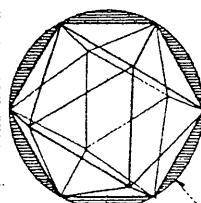
## octahedron

A regular polyhedron having eight faces.



## dodecahedron

A regular polyhedron having 12 faces.



## icosahedron

A regular polyhedron having 20 faces.

# GLASS

A hard, brittle, usually transparent or translucent substance, produced by fusing silica together with a flux and a stabilizer into a mass that cools to a rigid condition without crystallization.

## crown glass

An old form of window glass formed by blowing and whirling a hollow sphere of glass into a flat, circular disk with a center lump left by the worker's rod.

## sheet glass

A flat, soda-lime-silica glass fabricated by drawing the molten glass from a furnace (drawn glass), or by forming a cylinder, dividing it lengthwise, and flattening it (cylinder glass). The fire-polished surfaces are not perfectly parallel, resulting in some distortion of vision.

## plate glass

A flat, soda-lime-silica glass formed by rolling molten glass into a plate (rolled glass) that is subsequently ground and polished after cooling.

## float glass

A flat, soda-lime-silica glass that is extremely smooth and nearly distortion-free, manufactured by pouring molten glass onto a surface of molten tin and allowing it to cool slowly. Float glass is the successor to plate glass and accounts for the majority of flat-glass production.

## insulating glass

A glass unit consisting of two or more sheets of glass separated by hermetically-sealed airspaces.

## hermetic

Made airtight by fusing or sealing.

## tinted glass

Glass having a chemical admixture to absorb a portion of the radiant heat and visible light that strike it. Iron oxide gives the glass a pale blue-green tint; cobalt oxide and nickel imparts a grayish tint; selenium infuses a bronze tint. Also called heat-absorbing glass.

## reflective glass

Glass having a thin, translucent metallic coating bonded to the exterior or interior surface to reflect a portion of the light and radiant heat that strike it.

## low-emissivity glass

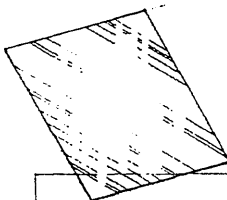
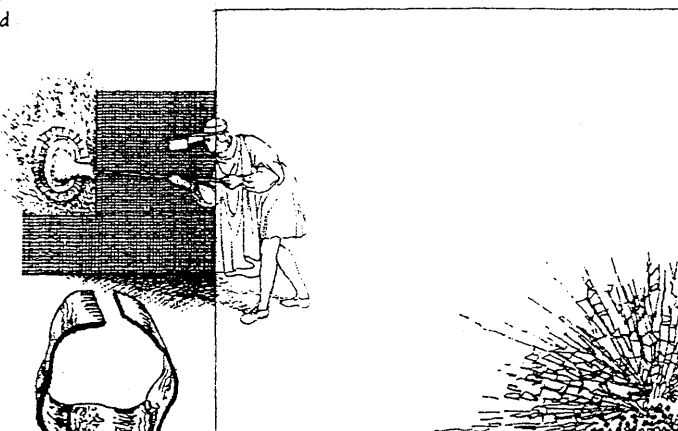
Glass that transmits visible light while selectively reflecting the longer wavelengths of radiant heat, produced by depositing a low-emissivity coating either on the glass itself or over a transparent plastic film suspended in the sealed air space of insulating glass. Also called low-e glass.

## emissivity

The relative ability of a surface to emit radiant heat, measured against a black body at the same temperature.

## shading coefficient

The ratio of solar heat transmission through a particular glass to the solar heat transmission through double-strength clear glass.

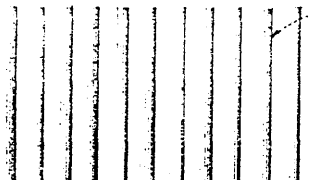
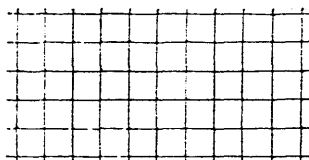
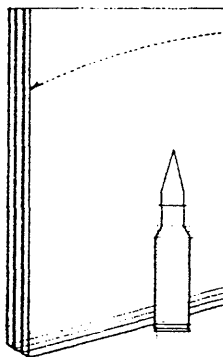
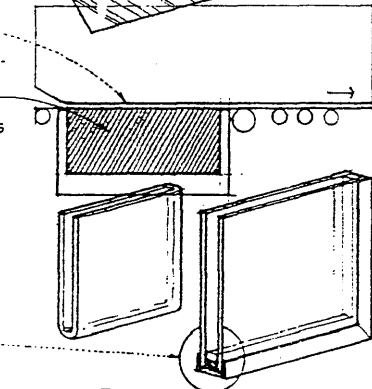


## single-strength glass

Sheet glass having a thickness of 3/32 in. (2.4 mm).

## double-strength glass

Sheet glass having a thickness of 1/8 in. (3.2 mm).



## annealed glass

Glass that is cooled slowly to relieve internal stresses.

## heat-strengthened glass

Annealed glass that is partially tempered by a process of reheating and sudden cooling. Heat-strengthened glass has about twice the strength of annealed glass of the same thickness.

## tempered glass

Annealed glass that is reheated to just below the softening point and then rapidly cooled to induce compressive stresses in the surfaces and edges of the glass and tensile stresses in the interior. Tempered glass has three to five times the resistance of annealed glass to impact and thermal stresses but cannot be altered after fabrication. When fractured, it breaks into relatively harmless particles.

## laminated glass

Two or more plies of flat glass bonded under heat and pressure to interlayers of polyvinyl butyral resin that retains the fragments if the glass is broken. Also called safety glass.

## security glass

Laminated glass having exceptional tensile and impact strength, consisting of multiple plies of glass bonded under heat and pressure to interlayers of polyvinyl butyral resin.

## acoustical glass

Laminated or insulating glass used for sound control.

## wire glass

Flat or patterned glass having a square or diamond wire mesh embedded within it to prevent shattering in the event of breakage or excessive heat. Wire glass is considered a safety glazing material.

## patterned glass

Glass having an irregular surface pattern formed in the rolling process to obscure vision or to diffuse light. Also called figured glass.

## obscure glass

Glass having one or both sides acid-etched or sandblasted to obscure vision.

## spandrel glass

An opaque glass for concealing the structural elements in curtain wall construction, produced by fusing a ceramic frit to the interior surface of tempered or heat-strengthened glass.

## glass block

A translucent, hollow block of glass with clear, textured, or patterned faces, made by fusing two halves together with a partial vacuum inside and used for glazing openings.

## glass brick

A solid, impact-resistant glass block unit, sometimes having an insert or coated to reduce solar heat transmission.



**face glazing**

The setting of a glass pane in a rabbeted frame, holding it in place with glazier's points, and sealing it with a beveled bead of putty or glazing compound.

**face putty**

The putty or glazing compound formed on the exterior side of a glass pane.

**bedding**

A thin layer of putty or glazing compound laid in the rabbet of a window sash to give a pane of glass an even backing.

**glazier's point**

A small, pointed piece of sheet metal for holding a glass pane in a wood sash until the face putty has hardened. Also called glazing brad, sprig.

**putty**

A compound of whiting and linseed oil, of doughlike consistency when fresh, used in securing windowpanes or patching woodwork defects.

**glazing compound**

An adhesive compound used as putty, formulated so as not to become brittle with age.

**glass size**

The size of a glass pane or unit required for glazing an opening, allowing for adequate edge clearances. Also called glazing size.

**united inches**

The sum of one length and one width of a rectangular glass pane or unit, measured in inches.

**edge block**

One of the small blocks of synthetic rubber placed between the side edges of a glass pane or unit and a frame to center it, maintain a uniform width of sealant, and limit lateral movement caused by building vibrations or thermal expansion or contraction. Also called centering shim, spacer.

**face clearance**

The distance between the face of a glass pane or unit and the nearest face of its frame or stop, measured normal to the plane of the glass.

**bite**

The amount of overlap between the edge of a glass pane or unit and a window frame, stop, or lock-strip gasket.

**edge clearance**

The distance between the edge of a glass pane or unit and a window frame, measured in the plane of the glass.

**glass mullion system**

A glazing system in which sheets of tempered glass are suspended from special clamps, stabilized by perpendicular stiffeners of tempered glass, and joined by a structural silicone sealant and sometimes by metal patch plates.

**double glazing**

The installation of two parallel panes of glass with a sealed air space between to reduce the transmission of heat and sound.

**glazing**

The panes or sheets of glass or other transparent material made to be set in frames, as in windows, doors, or mirrors.

**wet glazing**

The setting of glass in a window frame with glazing tape or a liquid sealant.

**glazing tape**

A preformed ribbon of synthetic rubber having adhesive properties and used in glazing to form a watertight seal between glass and frame.

**cap sealant**

An adhesive liquid of synthetic rubber injected into the joint between a glass pane or unit and a window frame, curing to form a watertight seal. Also called cap bead.

**glazing bead**

A wood molding or metal section secured against the edge of a glass pane or unit to hold it in place. Also called glazing stop.

**heel bead**

An adhesive liquid of synthetic rubber injected between a glass pane or unit and a glazing bead, curing to form an airtight seal.

**dry glazing**

The setting of glass in a window frame with a compression gasket instead of glazing tape or a liquid sealant.

**compression gasket**

A preformed strip of synthetic rubber or plastic compressed between a glass pane or unit and a window frame to form a watertight seal and cushion for the glass.

**lockstrip gasket**

A preformed gasket of synthetic rubber for securing a glass pane or unit in a window frame or opening, held in compression by forcing a keyed locking strip into a groove in the gasket.

**flush glazing**

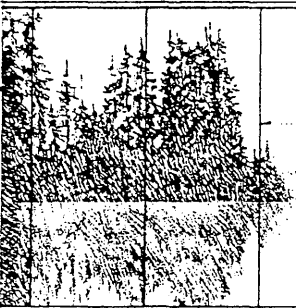
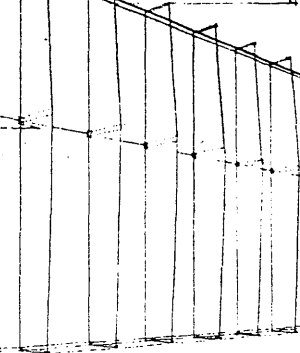
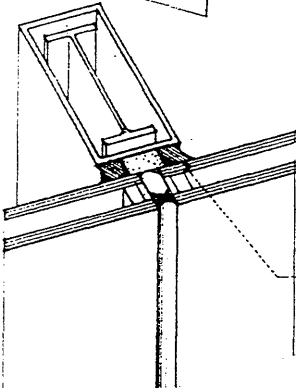
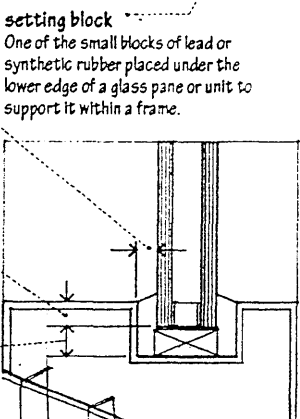
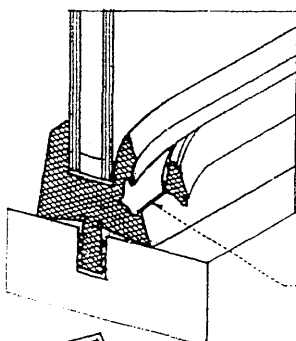
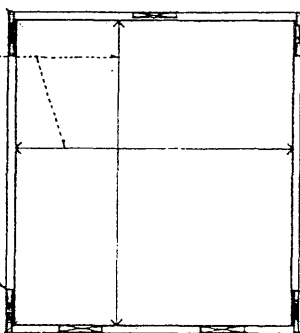
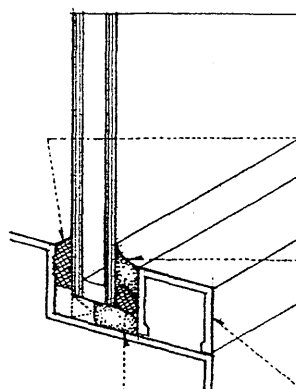
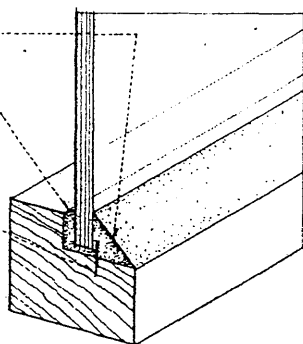
A glazing system in which the framing members are set entirely behind the glass panes or units to form a flush exterior surface, the glass adhering to the framing with a structural silicone sealant.

**structural sealant**

A high-strength silicone sealant capable of adhering glass to a supporting frame.

**butt-joint glazing**

A glazing system in which the glass panes or units are supported at the head and sill in a conventional manner, with their vertical edges being joined with a structural silicone sealant without mullions.



## HARDWARE

The metal tools, fastenings, and fittings used in construction.

### rough hardware

Bolts, screws, nails, and other metal fittings that are concealed in a finished construction.

### finish hardware

Exposed hardware serving a decorative as well as a utilitarian purpose, as the locks, hinges, and other accessories for doors, windows, and cabinetwork. Also called architectural hardware.

### door hardware

The finish hardware required for hanging and operating a door.

### door closer

A hydraulic or pneumatic device for controlling the closing of a door and preventing it from slamming. Also called door check.

### overhead concealed closer

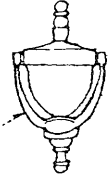
A door closer concealed in the head of a doorframe.

### backcheck

A device in a hydraulic door closer for slowing the speed with which a door may be opened.

### knocker

A hinged ring, bar, or knob on a door for use in knocking.



### doorplate

A small identifying plate on the outside door of a house or room, bearing the occupant's name, the house or apartment number, or the like.

### push plate

A protective plate of metal or plastic mounted vertically on the lock stile of a door.

### door pull

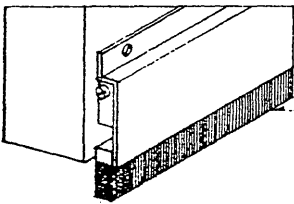
A handle for opening a door.

### pull bar

A bar fixed across a glazed door, used for opening or closing the door and providing protection for the glass.

### kick plate

A protective metal plate fastened to the bottom of a door to resist blows and scratches.

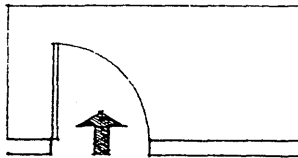


### floor closer

A door closer installed in a recess in the floor.

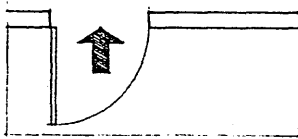
### automatic door bottom

A horizontal bar at the bottom of a door that drops automatically when the door is closed in order to seal the threshold and reduce noise transmission.



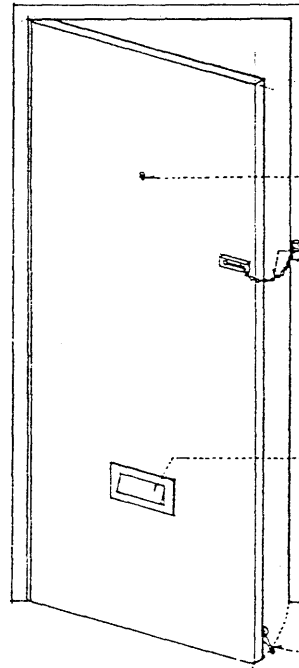
### left-hand

Having the hinges on the left of an inward opening door when seen from the exterior of the building or room to which the doorway leads.



### left-hand reverse

Having the hinges on the left of an outward opening door when seen from the exterior of the building or room to which the doorway leads.



### judas

A peephole, as in an entrance door or the door of a prison cell. Also called judas hole.

### door chain

A short chain with a removable slide fitting that can be attached between the inside of a door and the doorjamb to prevent the door from being opened more than a few inches without the chain being removed.

### mail slot

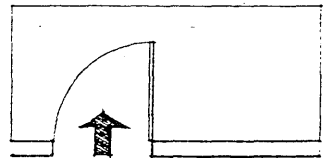
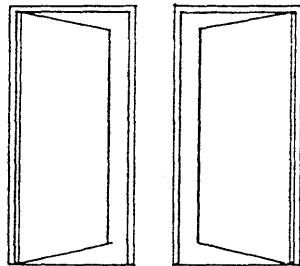
A small opening in an exterior door or wall, often with a hinged closer, through which mail is delivered. Also called letter slot.

### doorstop

A device for holding a door open, as a wedge or small weight.

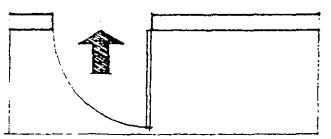
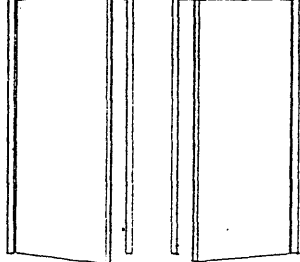
### bumper

A projecting rim, guard, pad, or disk for absorbing shock or preventing damage from bumping.



### right-hand

Having the hinges on the right of an inward opening door when seen from the exterior of the building or room to which the doorway leads.



### right-hand reverse

Having the hinges on the right of an outward opening door when seen from the exterior of the building or room to which the doorway leads.

**mortise hinge**

A butt hinge mortised into the abutting surfaces of a door and doorjamb.

**half-mortise hinge**

A hinge having one leaf mortised into the edge of the door and the other surface-mounted on the doorframe.

**half-surface hinge**

A hinge having one leaf mortised into the doorframe and the other surface-mounted on the face of the door.

**flap hinge**

A hinge having two leaves surface-mounted to the adjacent faces of a door and doorframe. Also called **backflap hinge**, **full-surface hinge**.

**template hinge**

A mortise hinge manufactured to fit the recess and match the arrangement of holes of hollow metal doors and frames.

**ball-bearing hinge**

A hinge equipped with ball bearings between the knuckles to reduce friction and ensure ease of operation.

**fast-pin hinge**

A hinge having a nonremovable pin.

**loose-pin hinge**

A hinge having a removable pin so that a door can be unhung by separating the two leaves.

**loose-joint hinge**

A hinge having a knuckle formed from half of each leaf, with the upper half removable from the pin. Also called **lift-off hinge**.

**pin**

A pin or bolt on which something turns, as the gudgeon of a hinge.

**gudgeon**

A socket for the pin of a hinge.

**spring hinge**

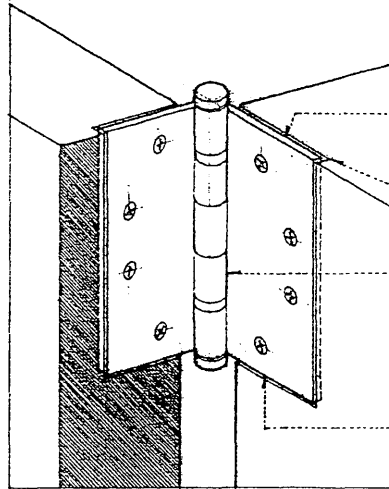
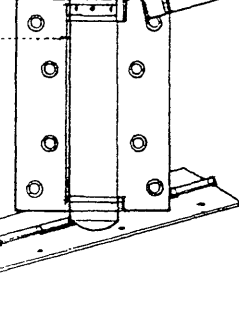
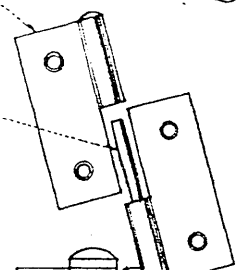
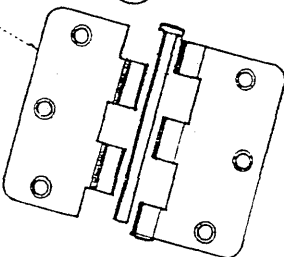
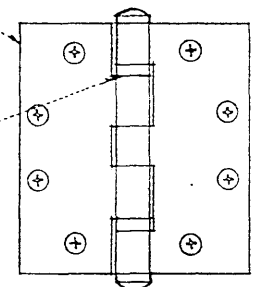
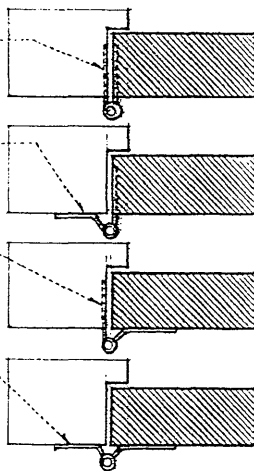
A hinge containing a coiled spring in its barrel for closing a door automatically.

**double-acting hinge**

A hinge permitting a door to swing in either direction, usually fitted with springs to bring the door to a closed position after opening.

**piano hinge**

A long, narrow hinge that runs the full length of the two surfaces to which its leaves are joined. Also called **continuous hinge**.

**hinge**

A jointed device, usually consisting of two leaves joined together by a pin, on which a door, gate, or shutter swings, turns, or moves.

**leaf**

A hinged, sliding, or otherwise movable part of a door, hinge, or tabletop.

**gain**

A notch cut into a surface to receive a leaf of a hinge. Also called **sinking**.

**knuckle**

The cylindrical, projecting joint of a hinge through which the pin passes.

**butt hinge**

A hinge composed of two plates secured to the abutting surfaces of a door and doorjamb. Also called **butt**.

**strap hinge**

A hinge having two long leaves for securing to the adjacent faces of a door and doorjamb.

**cross-garnet**

A T-shaped strap hinge with the crosspiece as the stationary member and the long stem being the movable leaf. Also called **T-hinge**.

**dovetail hinge**

A strap hinge having leaves which are narrower at their junction than at their other extremities.

**parliament hinge**

An H-shaped hinge having a protruding knuckle so that a door can stand away from the wall when fully opened.

**paumelle**

A hinge having a single, pivoting joint.

**olive knuckle hinge**

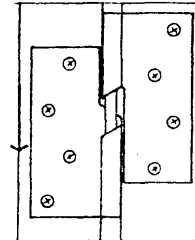
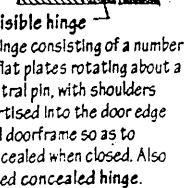
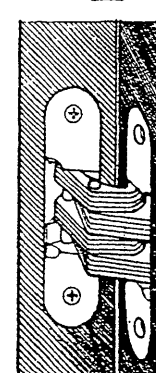
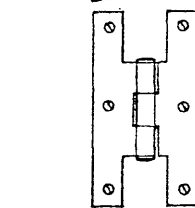
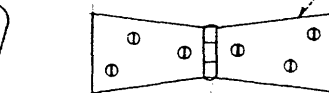
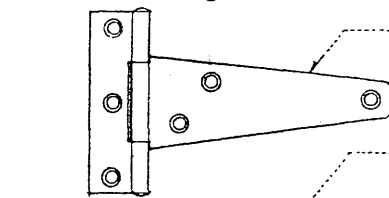
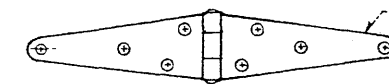
A paumelle having an oval-shaped knuckle. Also called **olive hinge**.

**gravity hinge**

A hinge that closes automatically by means of gravity.

**rising hinge**

A gravity hinge causing a door to rise slightly when opened.



# HARDWARE

## lock

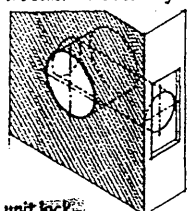
A device for securing a door, drawer, or lid in position when closed, consisting of a bolt or combination of bolts propelled and withdrawn by a key- or combination-operated mechanism.

## rim lock

A lock fastened to the face of a door, as opposed to one built into its edge.

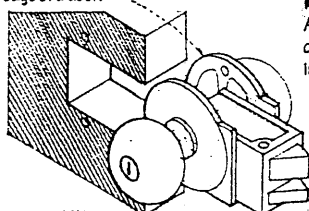
## cylinder lock

A lock housed within two holes bored at right angles to each other, one through the face of a door and the other in the door edge.



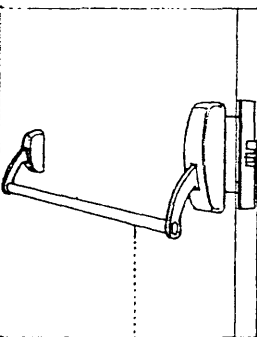
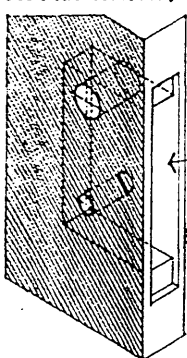
## unit lock

A lock housed within a rectangular notch cut into the edge of a door.



## mortise lock

A lock housed within a mortise cut into a door edge so that the lock mechanism is covered on both sides.

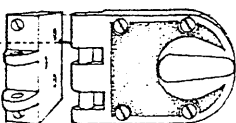


## panic bar

A horizontal bar that spans the interior of an emergency exit door at waist height and that opens the latch when pressure is applied. Also called panic bolt, panic hardware.

## lockset

An assembly of parts making up a complete locking system, including knobs, plates and a locking mechanism.



## doorknob

The knob-shaped handle by which a door is opened or closed.

## keyhole

A hole in a lock case or escutcheon for inserting a key.

## escutcheon

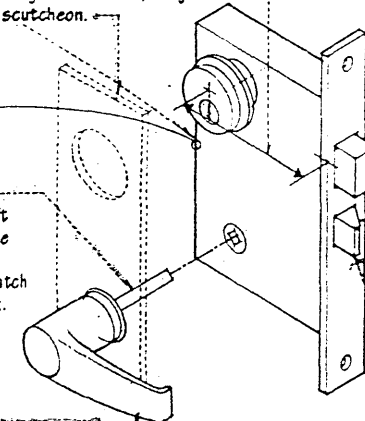
A protective or ornamental plate, as around a keyhole, doorknob, drawer pull, or light switch. Also, scutcheon.

## rose

An ornamental plate surrounding the shaft of a doorknob at the face of a door.

## backset

The horizontal distance from the face of a lock through which the bolt passes to the centerline of the knob stem, keyhole, or lock cylinder.



## lever handle

A horizontal handle for operating the bolt of a lock.

## strike

A metal plate on a doorjamb having a hole for receiving the end of a lock bolt when the door is closed. Also called strike plate.

## lip

The projecting edge or rim of a strike.

## box strike

A metal box recessed into a doorjamb to receive the end of a lock bolt when the door is closed.

## latch

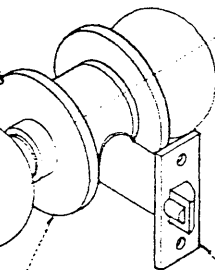
A device for holding a door closed, consisting essentially of a bar that falls or slides into a groove or hole.

## key

A small metal instrument specially cut to fit into a lock and move its bolt.

## bit

One of the projecting blades cut to engage with and actuate either or both the bolt and the tumblers of a lock.



## faceplate

The edge plate or surface through which the bolt of a lock passes. Also called ~~selvage~~.

## bolt

A metal bar or rod in the mechanism of a lock that is propelled or withdrawn, as by turning a knob or key.

## deadbolt

A lock bolt having a square head that is moved into position by the turning of a knob or key rather than by spring action. Also called ~~deadlock~~.

## bevel

The oblique end of a latchbolt that hits a strike plate.

## latchbolt

A lock bolt having a beveled head that is moved into position by a spring except when retracted by a doorknob, or when pushed against the lip of the strike plate as the door is closed.

## flush bolt

A bolt set flush with the face or edge of a door.

## extension bolt

A flush bolt fitted into a mortise in a door, sliding into a socket in the head or the sill.

## coordinator

A device for ensuring that the inactive leaf of a pair of doors is permitted to close before the active leaf.

## cylinder

A cylindrical device for retaining the bolt of a lock until the tumblers have been pushed out of its way.

## tumbler

An obstructing part in a lock that prevents a bolt from being propelled or withdrawn until it is moved by the action of a key.

## lever tumbler

A flat metal tumbler having a pivoting motion actuated by the turning of a key.

## cam

A disk or cylinder having an irregular form that rotates or slides to impart motion to a roller moving against its edge or to a pin free to move in a groove on its face.

## keyway

A slot in a lock for receiving and guiding a key.

## ward

A projecting ridge of metal in a lock or keyhole that prevents the insertion of any key that does not have a corresponding notch.

## reversible lock

A lock having a latchbolt that can be reversed for installation in either a right-hand or left-hand door.

## bevel

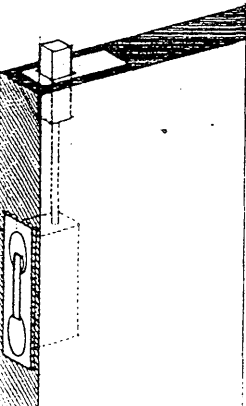
The side of a lock facing in the same direction as the bevel at the end of the latchbolt.

## regular bevel

The bevel of a bolt or lock on a door opening into the building or room to which the doorway leads.

## reverse bevel

The bevel of a bolt or lock on a door opening outward from the building or room to which the doorway leads.



## temperature

A measure of the warmth or coldness of a substance, object, or environment with reference to some standard value.

## thermometer

An instrument for measuring temperature, consisting typically of a glass tube with a numbered scale and a bulb containing a liquid, as mercury, that rises and falls with changes in temperature.

## British thermal unit

The quantity of heat required to raise the temperature of one pound (0.4 kg) of water 1°F. Abbr.: Btu

## therm

A unit of heat equal to 100,000 British thermal units.

## calorie

A unit of heat equal to the quantity of heat required to raise the temperature of one gram of water 1°C at a pressure of one atmosphere, equivalent to 4.186 joules. Abbr.: cal. Also called gram calorie, small calorie.

## kilocalorie

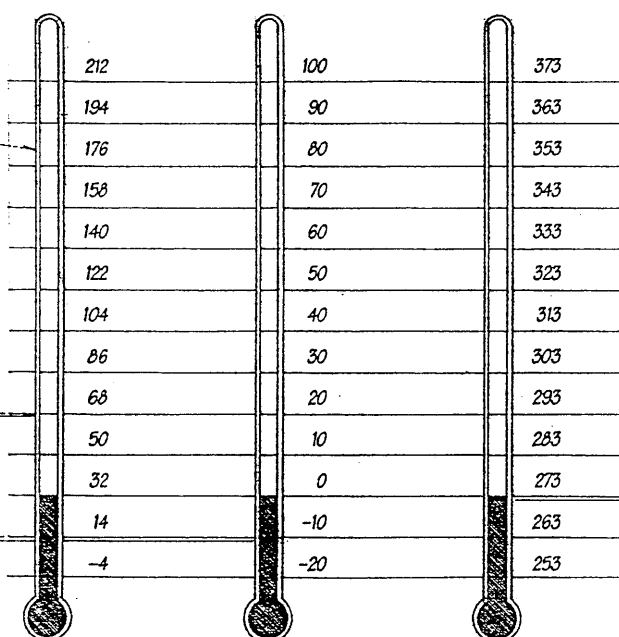
A unit of heat equal to the quantity of heat required to raise the temperature of one kilogram of water 1°C at a pressure of one atmosphere, equivalent to 1000 small calories. Abbr.: Cal. Also called kilogram calorie, large calorie.

## heat capacity

The quantity of heat required to raise the temperature of a substance by one degree.

## specific heat

Heat capacity per unit mass of a substance; the number of Btu required to raise the temperature of one pound of a substance 1°F, or the number of calories per gram per degree centigrade.



## Fahrenheit scale

A temperature scale in which 32°F represents the freezing point and 212°F the boiling point of water under standard atmospheric pressure.

When you know degrees Fahrenheit, first subtract 32 and then multiply by  $\frac{5}{9}$  to find degrees Celsius.

## Celsius scale

A temperature scale divided into 100 degrees, in which 0°C represents the freezing point and 100°C the boiling point of water under standard atmospheric pressure. Also called Centigrade scale.

When you know degrees Celsius, first multiply by  $\frac{9}{5}$  and then add 32 to find degrees Fahrenheit.

## Kelvin scale

An absolute scale of temperature having a zero point of -273.16°C.

## absolute scale

A temperature scale based on absolute zero with scale units equal in magnitude to centigrade degrees.

## absolute zero

The hypothetical lowest limit of physical temperature characterized by complete absence of heat, equal to -273.16°C or -459.67°F.

## absolute temperature

Temperature as measured on a absolute scale.

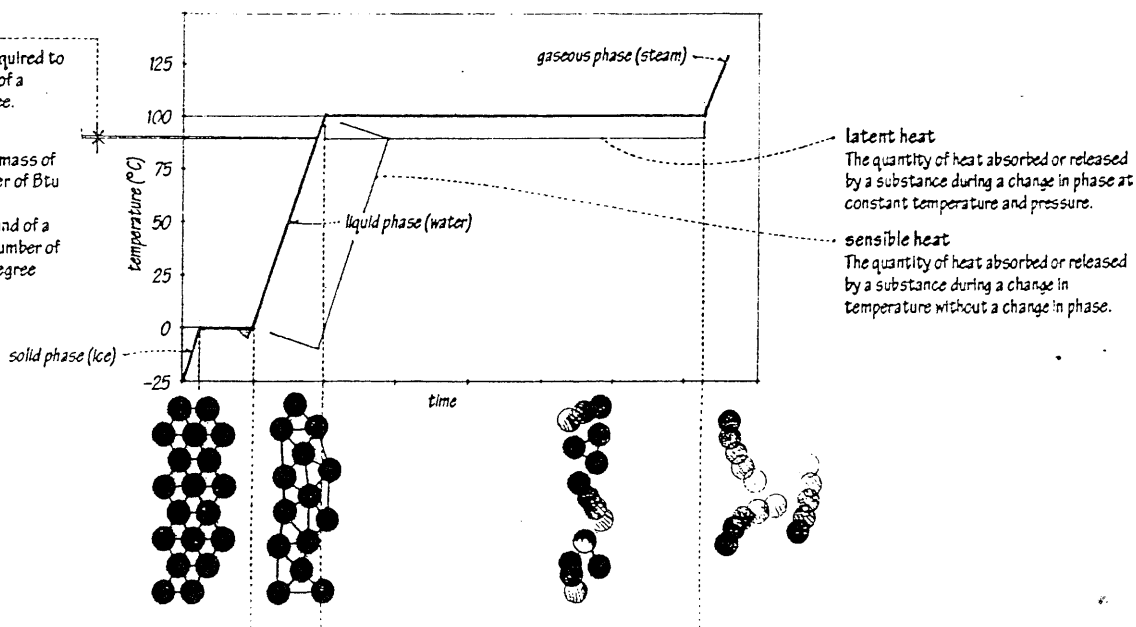
A form of energy associated with the random motion of atoms or molecules, capable of being transmitted by convection, conduction, or radiation and causing substances to rise in temperature, fuse, expand, or evaporate.

## kelvin

The base SI unit of temperature equal to  $\frac{1}{273.16}$  of the triple point of water. Symbol: K

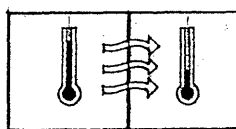
## triple point

The particular temperature and pressure at which the liquid, gaseous, and solid phases of a substance can exist in equilibrium.



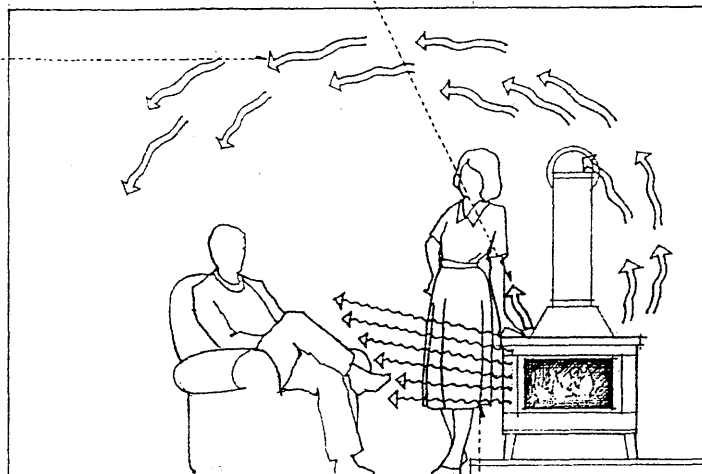
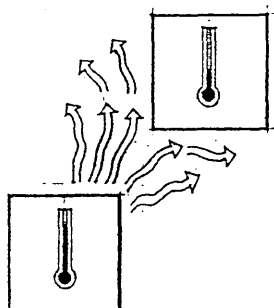
## conduction

The transfer of heat from the warmer to the cooler particles of a medium or of two bodies in direct contact, occurring without perceptible displacement of the particles themselves.



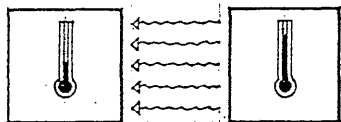
## convection

The transfer of heat by the circulatory motion of the heated parts of a liquid or gas owing to a variation in density and the action of gravity.



## radiation

The process in which energy in the form of waves or particles is emitted by one body, passed through an intervening medium or space, and absorbed by another body.

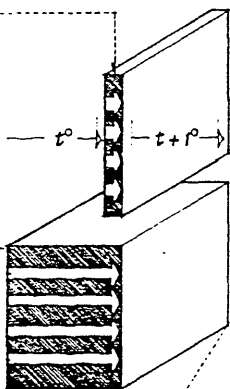


## thermal conductivity

The time rate of heat flow through a unit area of a given material of unit thickness when the temperature difference across the thickness is one unit of temperature.

## thermal conductance

The time rate of heat flow through a unit area of a given material when the temperature difference across a specified thickness of the material is one unit of temperature.



$$C = 1/R$$

## thermal resistance

The reciprocal of thermal conductance, expressed as the temperature difference required to cause heat to flow through a unit area of a material of given thickness at the rate of one heat unit per unit time.

## R-value

A measure of thermal resistance of a given material, used esp. to specify the performance of thermal insulation. The total R-value for a building component or assembly is the sum of the R-values for each layer in the component or assembly.

## thermal transmittance

The time rate of heat flow through a unit area of a building component or assembly when the difference between the air temperatures on the two sides of the component or assembly is one unit of temperature. Also called coefficient of heat transfer.

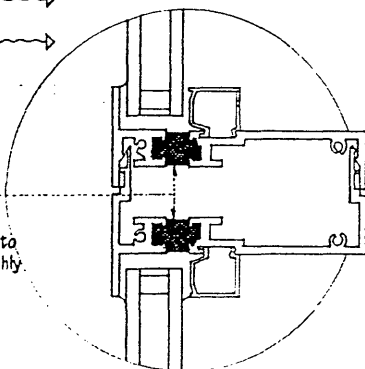
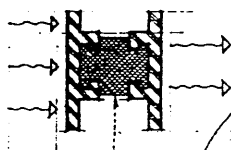
## U-value

A measure of the thermal transmittance of a building component or assembly, equal to the reciprocal of the total R-value of the component or assembly.

$$1/R(\text{total}) = U$$

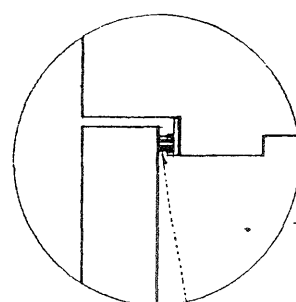
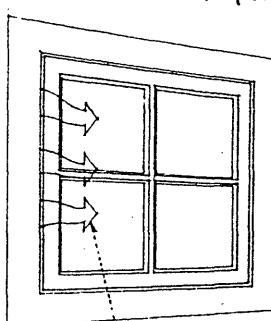
## thermal break

An element of low thermal conductivity placed in an assembly to reduce the flow of heat between highly conductive materials. Also called thermal barrier.



## infiltration

The flow of outside air into an interior space through cracks around windows and doors or other openings in the envelope of a building.



## weather strip

A strip of metal, felt, vinyl, or foam rubber, placed between a door or window sash and its frame to provide a seal against windblown rain and air infiltration. Also, weather stripping.

**mineral wool**

Any of various lightweight, inorganic, fibrous materials used esp. for thermal and sound insulation, as glass wool and rock wool.

**glass wool**

Spun glass fibers resembling wool and used for thermal insulation and air filters.

**fiberglass**

A material consisting of extremely fine filaments of glass, woven into fabric, massed for use as a thermal and acoustical insulator, or embedded to reinforce various materials.

**Fiberglas**

Trademark for a brand of fiberglass.

**rock wool**

Mineral wool made by blowing steam or air through molten slag or rock.

**foamed plastic**

Plastic, as polyurethane or polystyrene, made light and cellular by the introduction of pockets of gas or air and used as thermal insulation. Also called expanded plastic, plastic foam.

**polyurethane foam**

A rigid expanded polyurethane having a closed-cell structure and used as thermal insulation.

**molded polystyrene**

A rigid polystyrene foam having an open-cell structure and used as thermal insulation.

**extruded polystyrene**

A rigid polystyrene foam having a closed-cell structure and used as thermal insulation.

**Styrofoam**

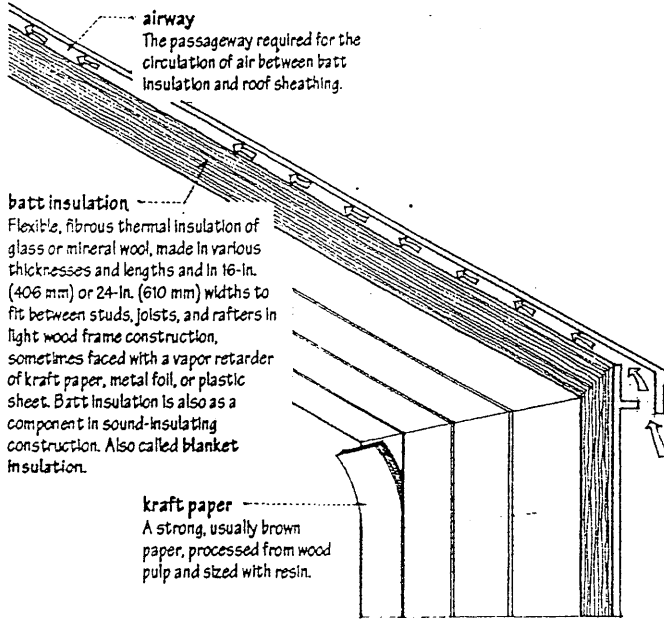
Trademark for a brand of foamed plastic made from polystyrene.

**foam glass**

Cellular glass made by foaming softened glass and molding it into boards or blocks for use as thermal insulation.

**wood wool**

Fine wood shavings, usually of pine or chemically treated wood fibers, used as an insulating material, as a binder in plaster, and for packing. Also called excelsior.



**thermal insulation**

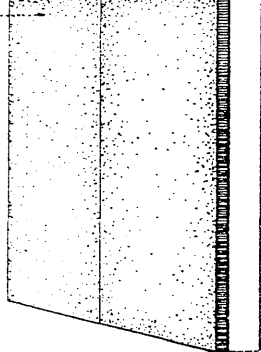
A material providing high resistance to heat flow, as mineral wool, vermiculite, or foamed plastic, fabricated in the form of batts, blankets, boards, or loose fill.

**weatherize**

To make a house or building secure against cold or stormy weather, as by adding thermal insulation or storm windows, or by sealing joints.

**rigid board insulation**

A preformed, nonstructural insulating board of foamed plastic or cellular glass. Cellular glass insulation is fire-resistant, impervious to moisture, and dimensionally stable, but has a lower thermal-resistance value than foamed plastic insulations, which are flammable and must be protected by a thermal barrier when used on the interior surfaces of a building. Rigid insulation having closed-cell structures, as extruded polystyrene and cellular glass, are moisture-resistant and may be used in contact with the earth.



**fiberboard**

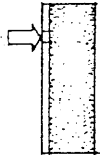
An insulating board made of wood or cane fibers compressed and cemented into rigid sheets, used as an inexpensive wall finish or as ceiling tiles.

**fiberboard sheathing**

Insulating fiberboard treated or impregnated with asphalt for water resistance and used primarily for sheathing light wood frame walls.

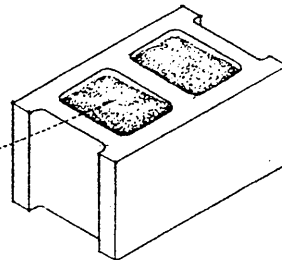
**foamed-in-place insulation**

Thermal insulation in the form of a foamed plastic, as polyurethane, that is sprayed or injected into a cavity where it adheres to the surrounding surfaces.



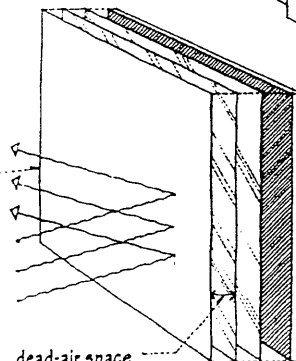
**loose-fill insulation**

Thermal insulation in the form of mineral wool fibers, granular vermiculite or perlite, or treated cellulosic fibers, poured by hand or blown through a nozzle into a cavity or over a supporting membrane.



**reflective insulation**

Thermal insulation in the form of a material of high reflectivity and low emissivity, as paper-backed aluminum foil or foil-backed gypsum board, used in conjunction with a dead-air space to reduce the transfer of heat by radiation.



**emissivity**

The ability of a surface to emit heat by radiation, equal to the ratio of the radiant energy emitted to that emitted by a black body at the same temperature.

**dead-air space**

An unventilated air space in which the air does not circulate.

# HEAT

## thermal comfort

Human comfort as determined by the ability of the body to dissipate the heat and moisture it produces by metabolic action.

### effective temperature

A temperature representing the combined effect of ambient temperature, relative humidity, and air movement on the sensation of warmth or cold felt by the human body, equivalent to the dry-bulb temperature of still air at 50% relative humidity which induces an identical sensation.

### wet-bulb temperature

The temperature recorded by the wet-bulb thermometer in a psychrometer.

### dew point

The temperature at which air becomes saturated with water vapor. Also called dew-point temperature.

### comfort zone

The range of dry-bulb temperature, relative humidity, mean radiant temperature, and air movement judged to be comfortable by a majority of Americans and Canadians tested. This comfort zone varies with climate, the season of the year, the type of clothing worn, and the activity level of the individual. Also called comfort envelope.

### psychrometric chart

A chart relating the wet-bulb and dry-bulb readings from a psychrometer to relative humidity, absolute humidity, and dew point.

### dry-bulb temperature

The temperature recorded by the dry-bulb thermometer in a psychrometer.

### psychrometer

An instrument for measuring atmospheric humidity, consisting of two thermometers, the bulb of one being dry and the bulb of the other being kept moist and ventilated so that the cooling that results from evaporation makes it register a lower temperature than the dry one, with the difference between the readings being a measure of atmospheric humidity.

### relative humidity

The ratio of the amount of water vapor actually present in the air to the maximum amount that the air could hold at the same temperature, expressed as a percentage. Abbr.: rh

### absolute humidity

The mass of water vapor present in a unit volume of air.

### specific humidity

The ratio of the mass of water vapor in air to the total mass of the mixture of air and water vapor.

### hygrometer

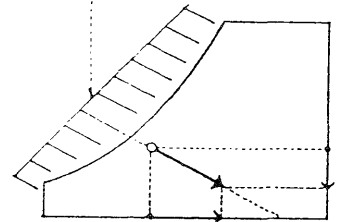
Any of various instruments for measuring the humidity of the atmosphere.

### humidity ratio

The ratio of the mass of water vapor to the mass of dry air in a mixture of air and water vapor. Also called mixing ratio.

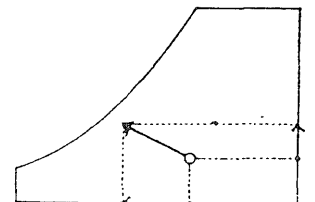
### enthalpy

A measure of the total heat contained in a substance, equal to the internal energy of the substance plus the product of its volume and pressure. The enthalpy of air is equal to the sensible heat of the air and the water vapor present in the air plus the latent heat of the water vapor, expressed in Btu per pound (kilojoules per kilogram) of dry air. Also called heat content.



### adiabatic heating

A rise in temperature occurring without the addition or removal of heat, as when excess water vapor in the air condenses and the latent heat of vaporization of the water vapor is converted to sensible heat in the air.

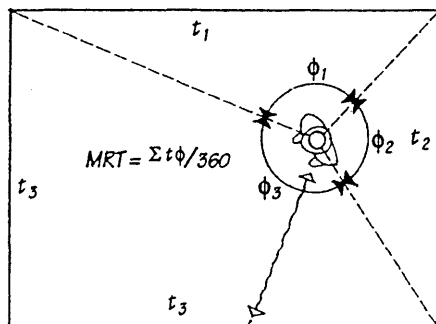


### evaporative cooling

A drop in temperature occurring without the addition or removal of heat, as when water evaporates and the sensible heat of the liquid is converted to latent heat in the vapor. Also called adiabatic cooling.

### mean radiant temperature

The sum of the temperatures of the surrounding walls, floor, and ceiling of a room, weighted according to the solid angle subtended by each at the point of measurement. Mean radiant temperature is important to thermal comfort since the human body receives radiant heat from or loses heat by radiation to the surrounding surfaces if their mean radiant temperature is significantly higher or lower than the air temperature.



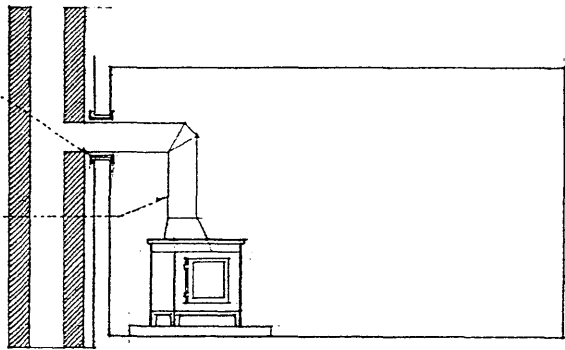
### radiant heat

Heat energy transmitted by the radiation of electromagnetic waves in contrast to heat transmitted by conduction or convection.



**thimble**  
A protective sleeve of sheet metal passing through the wall of a chimney, for holding the end of a stovepipe.

**stovepipe**  
A pipe, usually of sheet metal, serving as a stove chimney or connecting a stove with a chimney flue.



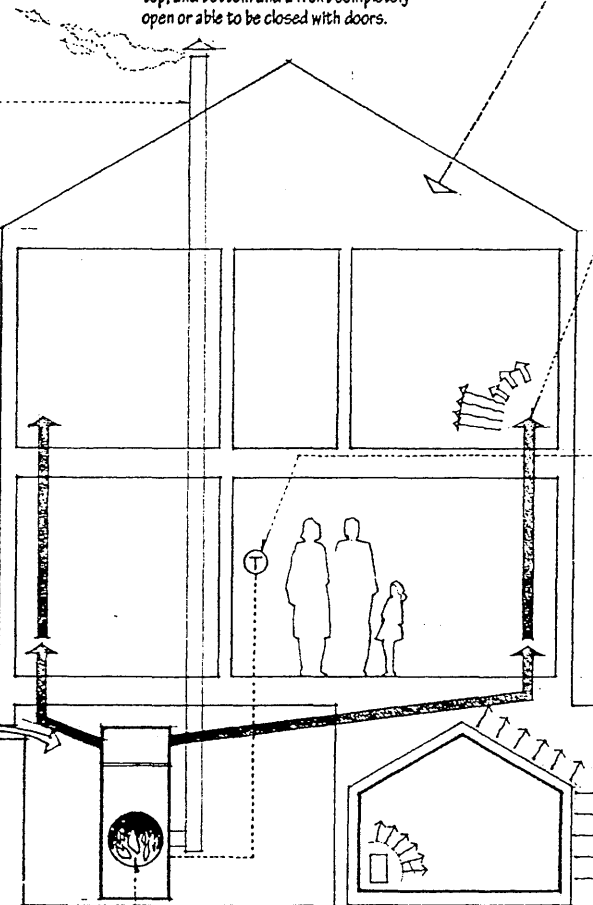
**Franklin stove**  
A cast-iron stove resembling an open fireplace but having enclosed sides, back, top, and bottom and a front completely open or able to be closed with doors.

**mechanical system**  
Any of the systems that provide essential services to a building, as water supply, sewage disposal, electric power, heating, ventilation, air-conditioning, vertical transportation, or fire fighting.

**space heating**  
The heating of a limited area, as a room, esp. by means of a heat source located within the space.

**central heating**  
A mechanical system that supplies heat to an entire building from a single source through a network of ducts or pipes.

**vent**  
A pipe by which products of combustion are carried from a furnace or other appliance to the outside.



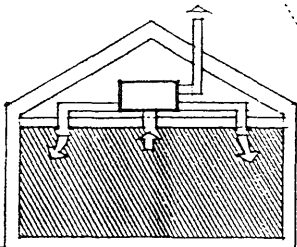
**heating medium**  
A fluid substance, as warm air, hot water, or steam, capable of conveying heat from a source to the space being heated.

**thermostat**  
A device that automatically responds to changes in temperature and activates switches controlling such equipment as furnaces, refrigerators, and air conditioners.

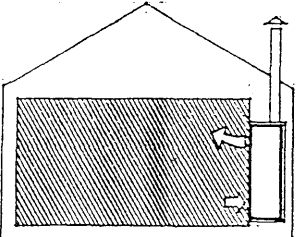
**thermocouple**  
A device for measuring temperature in which a pair of dissimilar metals, as copper and iron, are joined so that a potential difference generated between the points of contact is a measure of the temperature difference between the points.

**bimetallic element**  
A material made by bonding two metallic strips having different coefficients of expansion, used in temperature-indicating and temperature-controlling devices.

**combustion air**  
The air required for combustion of fuel in a furnace.



**horizontal furnace**  
A furnace designed for installation in a low attic or crawlspace.



**wall furnace**  
A furnace recessed in or mounted on a wall and supplying heated air directly to a space without the use of ducts.

**furnace**  
An apparatus in which heat is produced, as for heating a house or producing steam.

**electric furnace**  
A furnace in which the heat required is produced through electricity.

**gas furnace**  
A furnace using gas as a fuel.

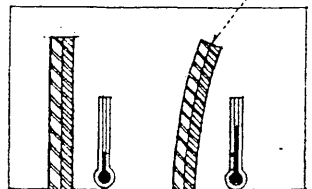
**oil burner**  
A furnace or boiler that burns fuel oil.

**conversion burner**  
A burner designed for installation in a furnace that originally used another fuel.

**heating load**  
The hourly rate of net heat loss in an enclosed space, expressed in Btu per hour and used as the basis for selecting a heating unit or system.

**heating degree day**  
A degree-day below the standard temperature of 65°F (19°C), used in estimating fuel or power consumption by a heating system.

**degree day**  
A unit that represents one degree of departure in the mean daily outdoor temperature from a given standard temperature.



# HEAT

## forced warm-air heating

A system for heating a building by means of air heated in a furnace and distributed by a fan through ductwork to registers or diffusers.

## extended plenum system

A perimeter heating system in which a main duct conveys warm air to a number of branch ducts, each serving a single floor register.

## bonnet

A chamber at the top of a hot-air furnace from which the leaders emerge. Also called plenum.

## leader

A duct for conveying warm air from a furnace to a stack or branch duct. Also called main, trunk.

## manifold

A pipe or duct fitting having several outlets for making multiple connections.

## gathering

A tapered section of a duct or flue forming a transition between two sections, one of which has a greater area than the other.

## boot

A duct fitting forming a transition between two sections which vary in cross-sectional shape.

## duct

A pipe or conduit of sheet metal or fiberglass for conducting heated or conditioned air. Also called air duct.

## ductwork

A system of ducts, connectors, and dampers for conveying air in a heating, ventilating, or air-conditioning system. Also called ducting.

## stack

A vertical duct for conveying warm air from a leader to a register on an upper floor.

## chase

A continuous space or recess built into a wall or through a floor for pipes or ducts.

## grille

A grating or perforated screen for covering, concealing, or protecting a wall, floor, or ceiling opening.

## register

A device for controlling the flow of warm or conditioned air from an outlet, composed of a grill with a number of parallel blades that may be adjusted so as to overlap and close the opening.

## flexible duct

A pliable, airtight fitting installed between two ducts, or between a fan and a duct, to prevent the transmission of noise and vibrations along the ductwork.

## duct liner

A fiberglass blanket for lining the inside of a duct to reduce noise and serve as thermal insulation.

## perimeter heating

A heating system that distributes warm air to registers placed in or near the floor along exterior walls.

## perimeter loop system

A perimeter heating system in which a loop of ductwork, usually embedded in a concrete ground slab, distributes warm air to each floor register.

## perimeter radial system

A perimeter heating system in which a leader from a centrally located furnace carries warm air directly to each floor register.

## throw

The distance a projected airstream travels from an outlet to a point where its velocity is reduced to a specified value.

## terminal velocity

The average velocity of a projected airstream at the end of the throw.

## drop

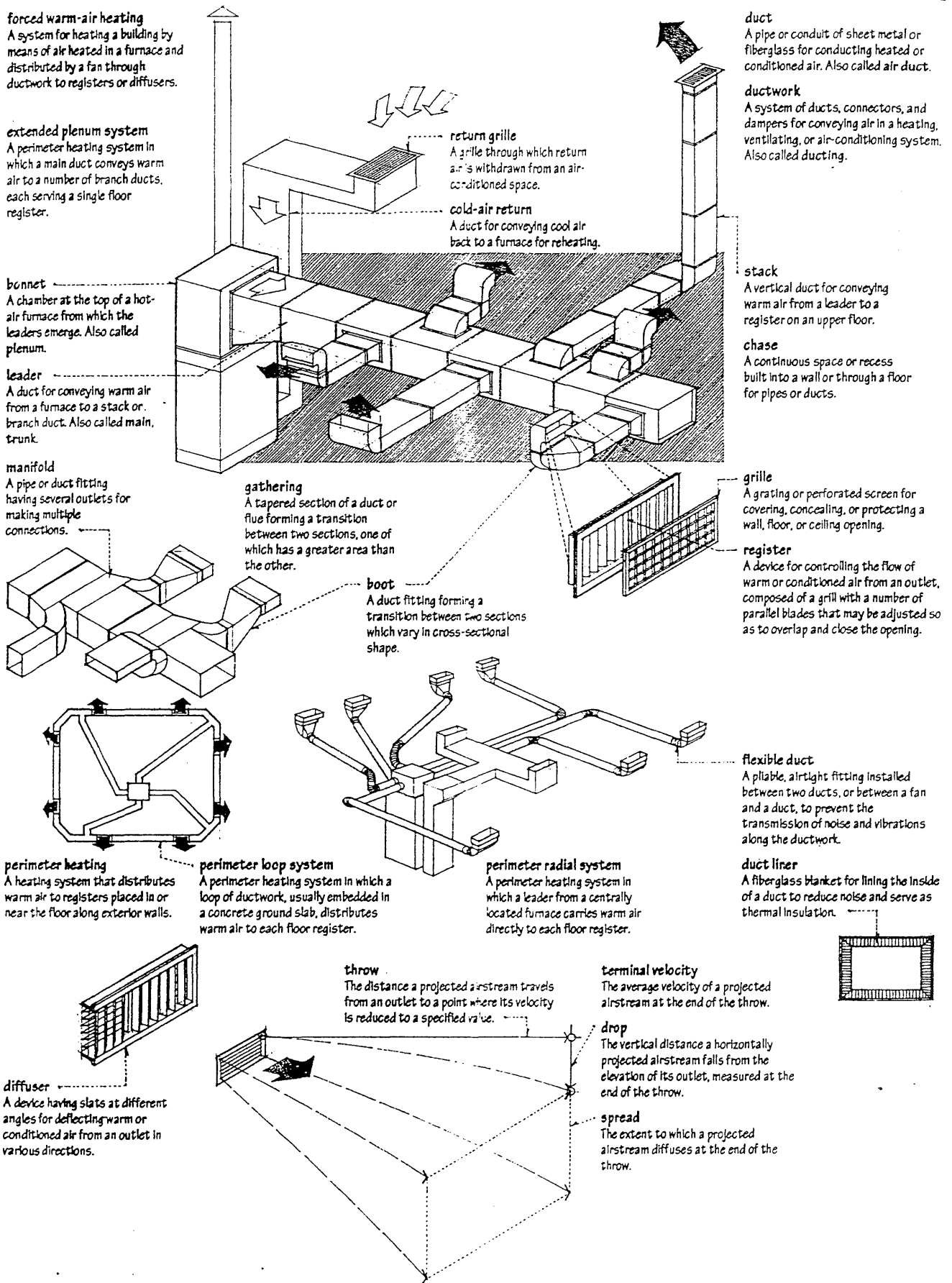
The vertical distance a horizontally projected airstream falls from the elevation of its outlet, measured at the end of the throw.

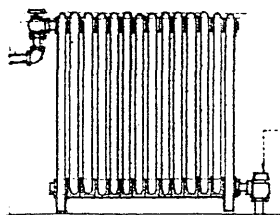
## spread

The extent to which a projected airstream diffuses at the end of the throw.

## diffuser

A device having slats at different angles for deflecting warm or conditioned air from an outlet in various directions.





**radiator**  
A heating device consisting of a series or coil of pipes through which hot water or steam passes.

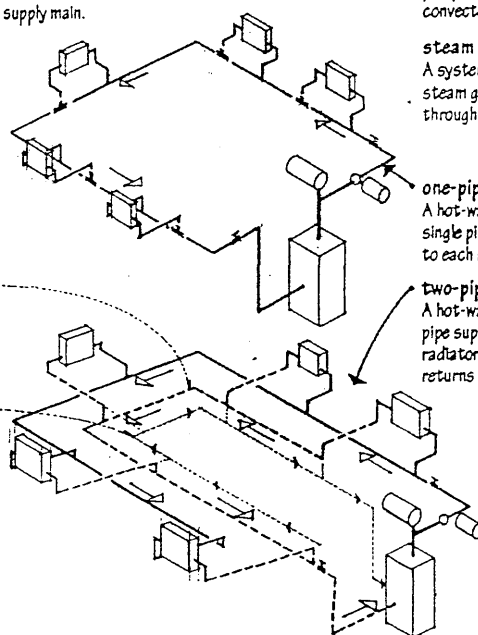
**bucket trap**  
A valve for eliminating air and condensed moisture from a radiator without allowing steam to escape. Also called **steam trap**.

**bleeder**  
A valve for draining a pipe, radiator, or tank. Also called **bleeder valve**.

**reverse return**  
A two-pipe hot-water system in which the lengths of the supply and return pipes for each radiator or convactor are nearly equal.

**direct return**  
A two-pipe hot-water system in which the return pipe from each radiator or convactor takes the shortest route back to the boiler.

**dry return**  
A return pipe in a steam-heating system that carries both air and water of condensation.

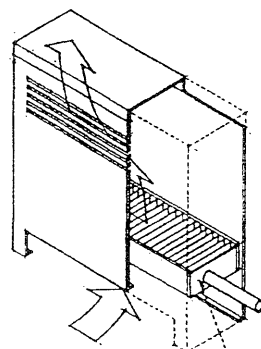


**hot-water heating**  
A system for heating a building by means of water heated in a boiler and circulated by a pump through pipes to radiators or convectors. Also called **hydronic heating**.

**steam heating**  
A system for heating a building by means of steam generated in a boiler and circulated through pipes to radiators.

**one-pipe system**  
A hot-water heating system in which a single pipe supplies hot water from a boiler to each radiator or convactor in sequence.

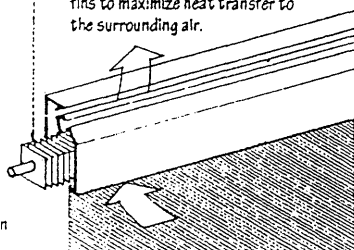
**two-pipe system**  
A hot-water heating system in which one pipe supplies hot water from a boiler to the radiators or convectors and a second pipe returns the water to the boiler.



**convactor**  
A heating unit in which air heated by contact with a radiator or fin tube circulates by convection.

**fin tube**  
A type of radiator having horizontal tubes with closely spaced vertical fins to maximize heat transfer to the surrounding air.

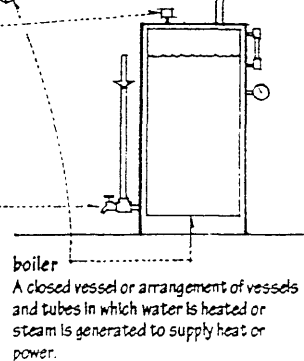
**baseboard heater**  
A long, narrow hydronic or electric convactor designed for installation along the base of a wall.



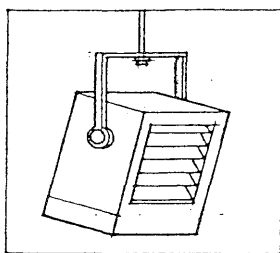
**safety valve**  
A relief valve that opens when actuated by a gas or vapor pressure above a predetermined level, allowing the gas or vapor to escape until its pressure is reduced to a safe or acceptable level.

**relief valve**  
A valve that opens when actuated by static pressure above a predetermined level in order to reduce the pressure to it.

**petcock**  
A small faucet or valve for draining or releasing compression in pipes, radiators, and boilers.



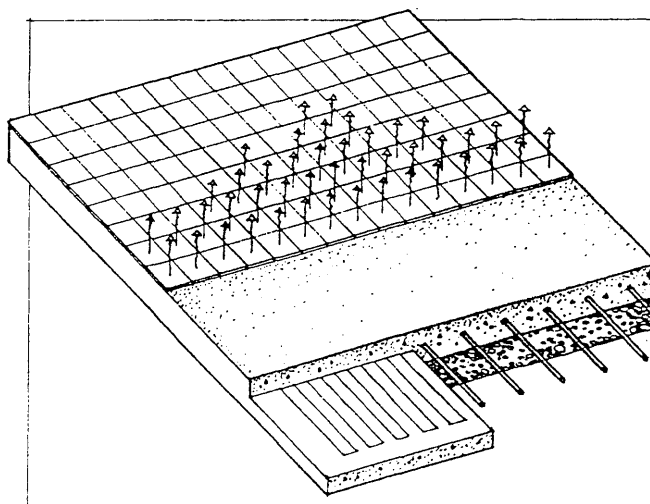
**boiler**  
A closed vessel or arrangement of vessels and tubes in which water is heated or steam is generated to supply heat or power.



**unit heater**  
A self-contained electric or gas-fired space heater, consisting of a heating element, fan, and a directional outlet.

**space heater**  
A device for heating the space in which it is located, esp. a unit that has no external heating ducts or connection to a chimney.

**quartz heater**  
An electric space heater having heating elements sealed in quartz-glass tubes that produce infrared radiation in front of a reflective backing.



**radiant heating**  
A system for heating by radiation from a surface, esp. one that is heated by means of electric resistance or hot water.

**electric heat**  
Heat generated by the resistance of a conductor to the flow of electric current.

**panel heating**  
The radiant heating of a room or building by means of wall, floor, baseboard, or ceiling panels containing electrical conductors, hot-water pipes, or hot-air ducts.

# HEAT

## air conditioning

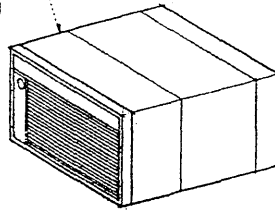
A system or process for simultaneously controlling the temperature, humidity, purity, distribution, and motion of the air in an interior space, esp. one capable of cooling.

## air conditioner

Any device or apparatus for controlling, esp. lowering, the temperature and humidity of a space.

## packaged air conditioner

A factory-assembled air conditioner having a fan, filters, compressor, condenser, and evaporator coils for cooling. For heating, the unit may operate as a heat pump or contain auxiliary heating elements.



## load

The demand placed on a heating, ventilating, or air-conditioning system in order to maintain the desired conditions of thermal comfort in a building.

## cooling load

The hourly rate of heat gain in an enclosed space, expressed in Btu per hour and used as the basis for selecting an air-conditioning unit or system.

## cooling degree-day

A degree-day above the standard temperature of 75°F (24°C), used in estimating energy requirements for air-conditioning and refrigeration.

## cooling medium

A fluid substance, as chilled water or cool air, for removing heat, as from the interior spaces of a building.

## ton of refrigeration

The cooling effect obtained when 1 ton of ice at 32°F (0°C) melts to water at the same temperature in 24 hours, equivalent to 12,000 Btu/hr. (3.5 kW).

## energy efficiency rating

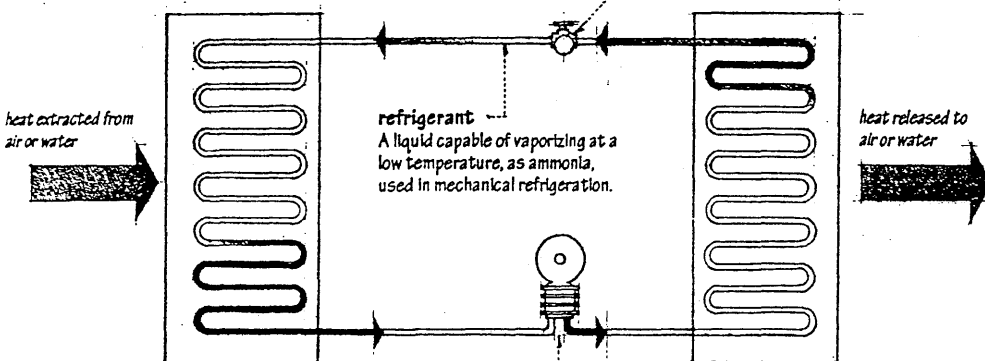
An index of the efficiency of a refrigerating unit, expressing the Btu removed per watt of electrical energy input.

## compressive refrigeration

A refrigeration process in which cooling is effected by the vaporization and expansion of a liquid refrigerant.

## expansion valve

A valve that reduces the pressure and evaporation temperature of a refrigerant as it flows to the evaporator.



**refrigerant**  
A liquid capable of vaporizing at a low temperature, as ammonia, used in mechanical refrigeration.

## evaporator

The component of a refrigeration system in which the refrigerant absorbs heat from a cooling medium and changes from a liquid to a gas.

## compressor

A pump or other machine for reducing the volume and increasing the pressure of a gas.

## condenser

A device for reducing a vapor or gas to liquid or solid form.

## coolant

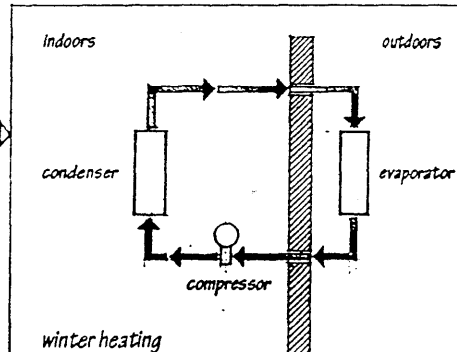
A fluid agent for reducing the temperature of a system below a specified value by conducting away the heat produced in the operation of the system.

## heat sink

A medium or environment for the absorption or dissipation of unwanted heat.

## heat pump

A device that uses a compressible refrigerant to transfer heat from one reservoir to another, with the process being reversible so that it can be used for both heating and cooling a building.

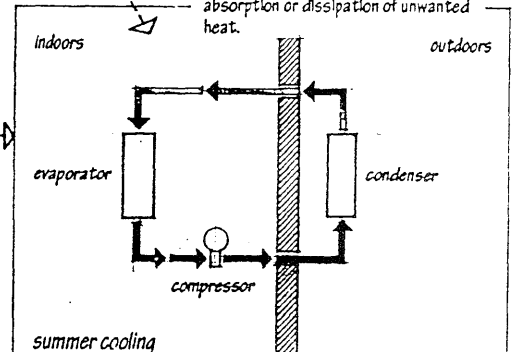


condenser

evaporator

compressor

winter heating



evaporator

condenser

compressor

summer cooling

## absorption refrigeration

A refrigeration process that uses a generator and an absorber instead of a compressor to transfer heat.

## evaporator

heat extracted by means of a heat exchanger to produce chilled water for cooling

## absorber

The component of an absorption-refrigeration system that uses a saline solution to draw water vapor from the evaporator, cooling the remaining water in the process.

## heat exchanger

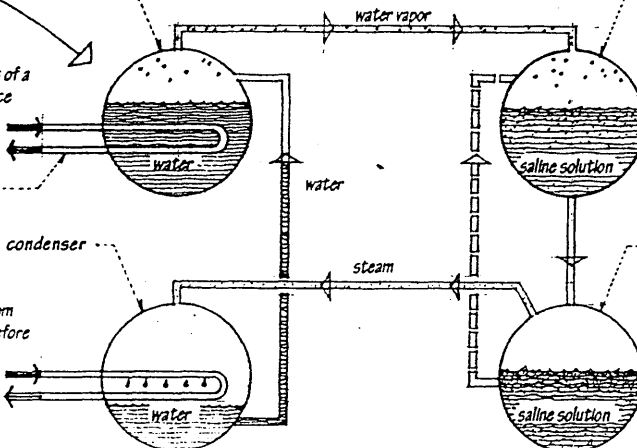
A device for transferring the heat of a fluid flowing on one side of a barrier to a fluid flowing on the other.

## condenser

waste heat extracted from steam as it condenses before returning to evaporator

## generator

The component of an absorption-refrigeration system that uses a heat source to remove excess water vapor from a saline solution.

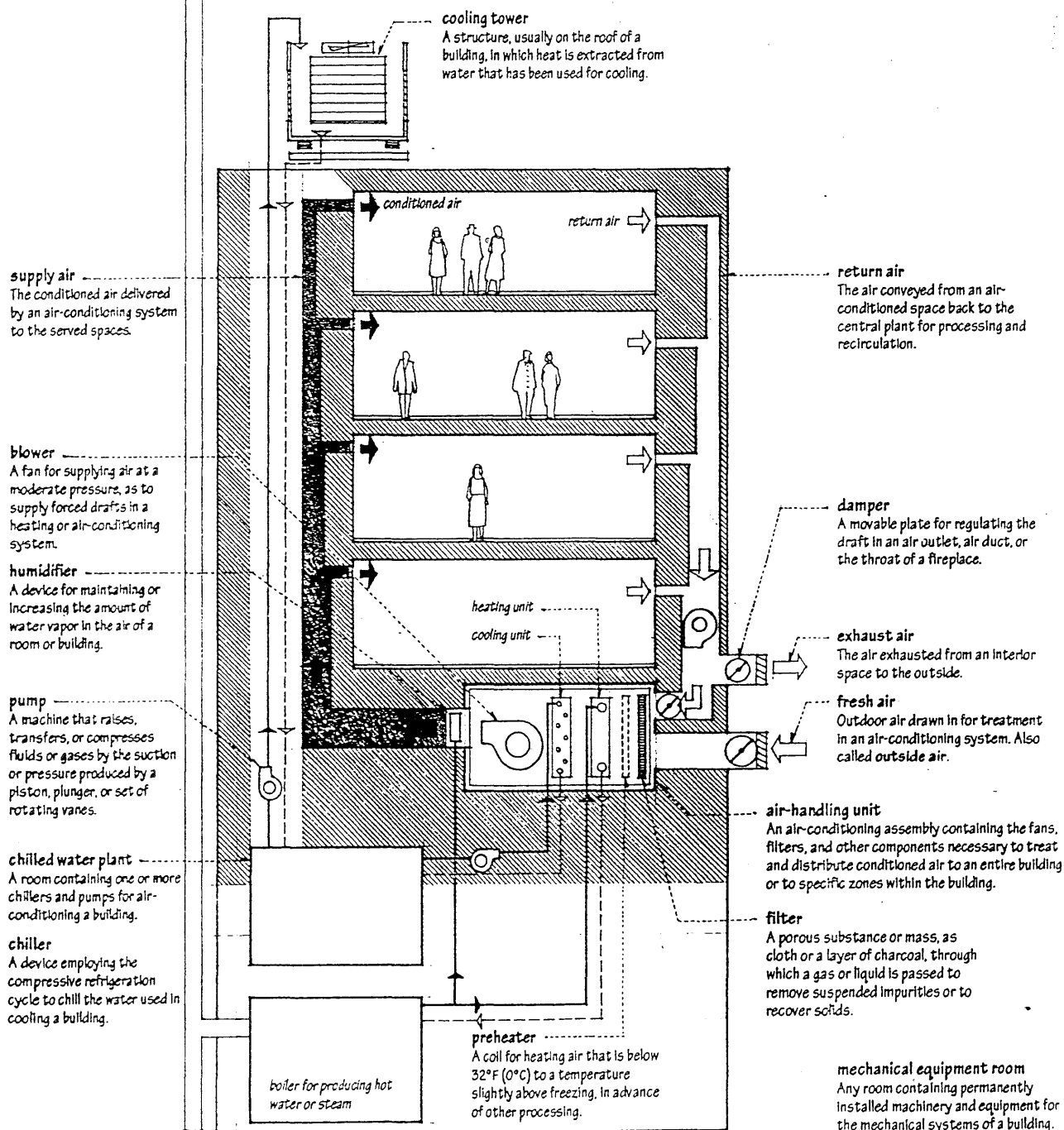


**central air conditioning**

An air-conditioning system that treats air at a central location and distributes the conditioned air to an entire building by means of fans and ductwork.

**HVAC**

Abbreviation for heating, ventilating, and air conditioning.



# HEAT

## all-water system

An air-conditioning system in which either hot or chilled water is piped to fan-coil units in the served spaces, where air is circulated locally.

### two-pipe system

An all-water system in which one pipe supplies the hot or chilled water to fan-coil units, and the other pipe returns it to the boiler or chilled water plant.

### four-pipe system

An all-water system in which separate hot-water and chilled-water piping circuits provide for simultaneous heating and cooling as needed in various zones of a building.

## all-air system

An air-conditioning system in which central fans distribute conditioned air to the served spaces by means of ductwork.

### single-duct system

An all-air system in which a single duct conveys conditioned air to the served spaces.

### constant-air-volume system

An all-air system in which a master thermostat automatically regulates the quantity of conditioned air supplied to each zone.

### variable-air-volume system

An all-air system in which a thermostatically controlled variable-volume box regulates the quantity of conditioned air supplied to each zone.

### dual-duct system

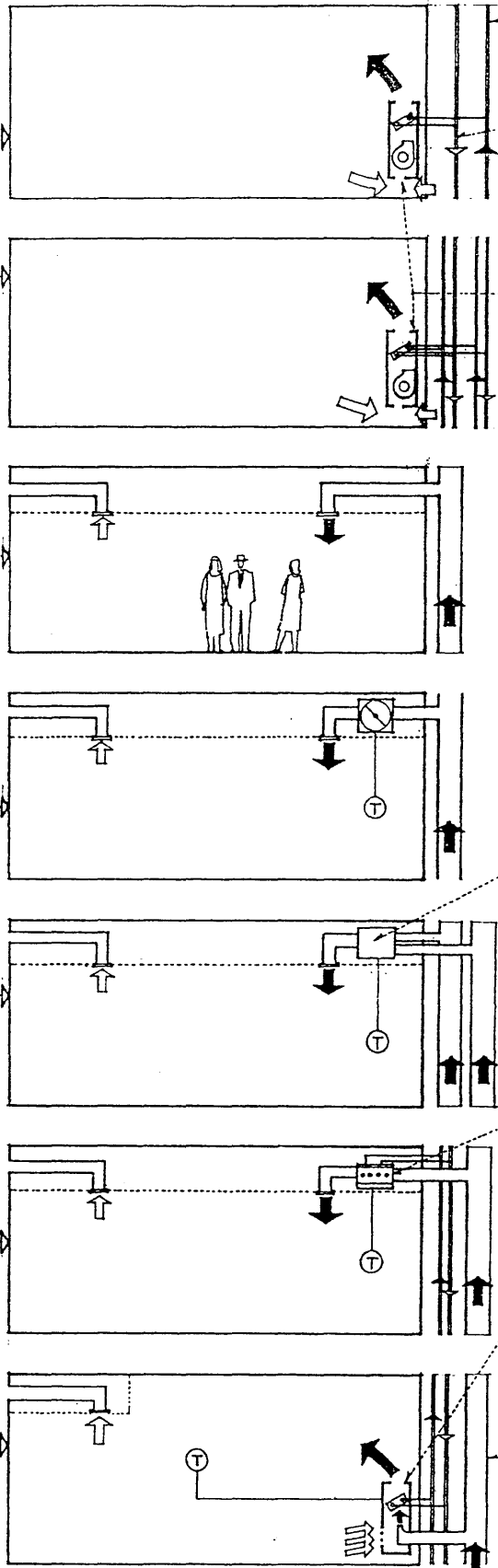
An all-air system in which separate cold-air and warm-air supply ducts meet at a mixing box where the air is blended before distribution to each zone.

### terminal reheat system

An all-air system in which a reheat coil regulates the temperature of the air being furnished to each individually controlled zone.

## air-water system

An air-conditioning system in which high-velocity ducts supply conditioned air from a central plant to each zone where it mixes with room air and is further heated or cooled in an induction or fan-coil unit.



## supply pipe

A pipe for conveying hot or chilled water from the boiler or chilled-water plant to a fan-coil unit.

## return pipe

A pipe for conveying water from a fan-coil unit to the boiler or chilled-water plant.

## terminal unit

Any of various devices for delivering a heating or cooling medium to a space.

## fan-coil unit

A terminal unit containing an air filter, heating or cooling coils, and a centrifugal fan for drawing in a mixture of room air and outside air.

## coil

A connected series of pipes or tubing in rows or layers, often having fins attached to dissipate heat.

## multizone system

A central air-handling unit capable of serving up to eight zones simultaneously.

## zone

A space or group of spaces in a building whose temperature and air quality is regulated by a single control.

## mixing box

A chamber for proportioning and blending cold and warm air under thermostatic control to reach the desired temperature.

## reheat coil

An electric or hot-water coil for raising the temperature of the air in the supply duct of an air-conditioning system.

## induction unit

A terminal unit in which primary air draws in room air through a filter and the mixture passes over coils that are either heated or chilled by secondary water from a boiler or chilled water plant.

## high-velocity duct

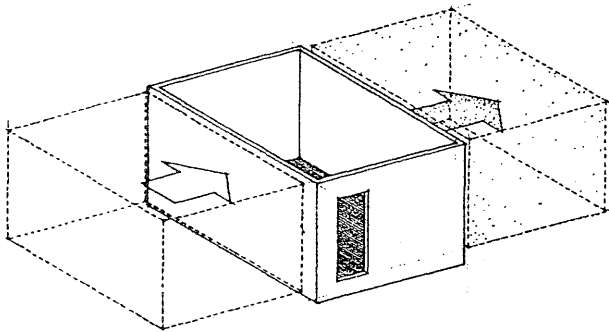
A small duct capable of conveying primary air at a velocity of 2,400 ft. (730 m) per minute or higher.

## primary air

The conditioned air supplied at a high pressure and high velocity by a central air handling unit.

**vent**

An opening, as in a wall, serving as an outlet for air, smoke, fumes, or the like.



**air change**

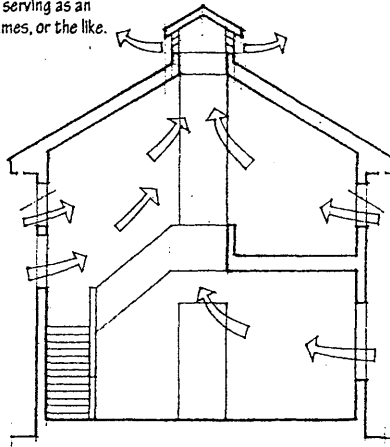
The replacement of the volume of air contained within a room with an equivalent volume of fresh air within a given period of time. The term **air changes-per-hour** is often used to specify ventilation standards.

**ventilate**

To provide a room with fresh air to replace air that has been used or contaminated.

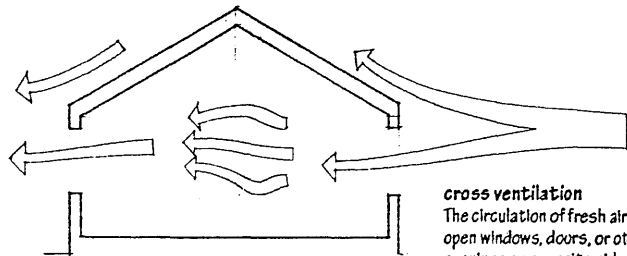
**natural ventilation**

The process of ventilating a space by the natural movement of air rather than by mechanical means.



**chimney effect**

The tendency of air or gas in a shaft or other vertical space to rise when heated, creating a draft that draws in cooler air or gas from below.



**cross ventilation**

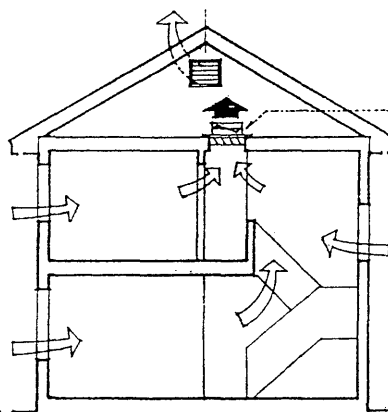
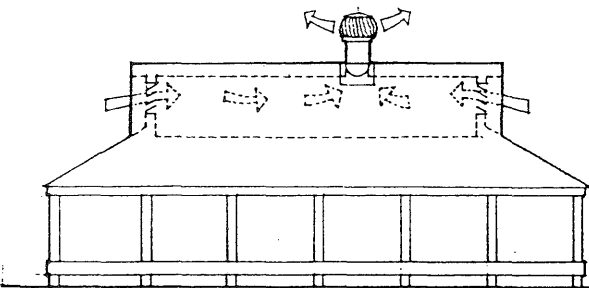
The circulation of fresh air through open windows, doors, or other openings on opposite sides of a room.

**ventilator**

A louvered opening or motor-driven fan for replacing stagnant air with fresh air.

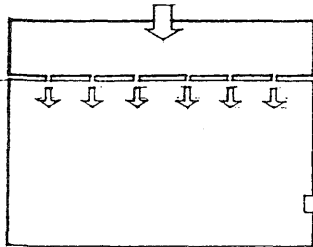
**attic ventilator**

A wind- or motor-driven fan for assisting the natural air flow through an attic space.



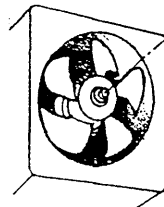
**whole-house ventilator**

A motor-driven fan for pulling stale air from the living areas of a house and exhausting it through attic vents.



**plenum ventilation**

A system of mechanical ventilation in which fresh air is forced into the space to be ventilated from a chamber (plenum chamber) at a pressure slightly higher than atmospheric pressure, so as to expel stale air.



**fan**

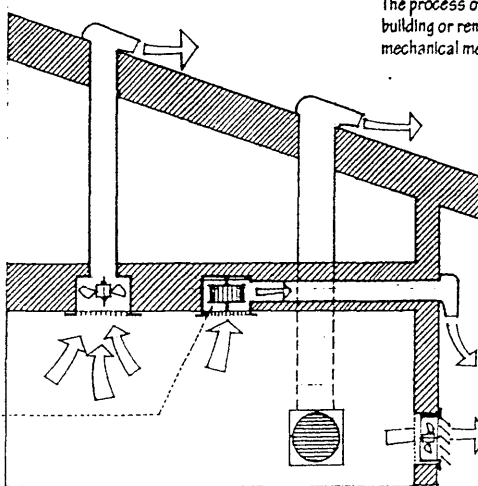
A device that rotates an array of blades or vanes about an axis in order to produce a current of air.

**exhaust fan**

A fan for ventilating an interior space by drawing air from the interior and expelling it outside.

**centrifugal fan**

A fan that receives air along its axis and discharges it radially.



**mechanical ventilation**

The process of supplying fresh air to a building or removing stale air from it by mechanical means, as with fans.

## HISTORY

A systematic, often chronological narrative of significant events as relating to a particular people, country, or period, often including an explanation of their causes.

### civilization

An advanced state of human society marked by a relatively high level of cultural, technical, and political development.

### society

An enduring and cooperating large-scale community of people having common traditions, institutions, and identity, whose members have developed collective interests and beliefs through interaction with one another.

### culture

The integrated pattern of human knowledge, beliefs, and behaviors built up by a group of human beings and transmitted from one generation to the next.

### style

A particular or distinctive form of artistic expression characteristic of a person, people, or period.

### expression

The manner in which meaning, spirit, or character is symbolized or communicated in the execution of an artistic work.

### prehistoric

Of, pertaining to, or existing in the time prior to the recording of human events, knowledge of which is gained mainly through archaeological discoveries, study, and research.

### Stone Age

The earliest known period of human culture, preceding the Bronze Age and the Iron Age and characterized by the use of stone implements and weapons.

### Neolithic

Of or relating to the last phase of the Stone Age, characterized by the cultivation of grain crops, domestication of animals, settlement of villages, manufacture of pottery and textiles, and use of polished stone implements: thought to have begun c3000–8000 B.C.



### Lascaux Cave

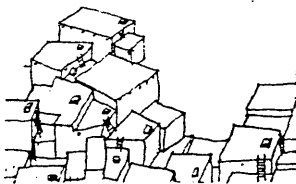
A cave in Lascaux, France, containing wall paintings and engravings thought to date from c13,000–8500 B.C.

### Mesopotamia

An ancient region in western Asia between the Tigris and Euphrates rivers, comprising the lands of Sumer and Akkad and occupied successively by the Sumerians, Babylonians, Assyrians, and Persians: now part of Iraq.

### Fertile Crescent

An agricultural region arching from the eastern shores of the Mediterranean Sea in the west to Iraq in the east: the location of humankind's earliest cultures.



### Catal Hüyük

A Neolithic settlement in Anatolia, dated 6500–5000 B.C. One of the world's earliest cities, it had mud-brick fortifications and houses, frescoed shrines, a fully developed agriculture, and extensive trading in obsidian, the chief material for tool-making.

### Anatolia

A vast plateau between the Black, Mediterranean, and Aegean Seas, synonymous with the peninsula of Asia Minor: today comprises most of Turkey.

### Bronze Age

A period of human history that began c4000–3000 B.C., following the Stone Age and preceding the Iron Age, characterized by the use of bronze implements.



### Yang-shao

A Neolithic culture in China centered around the fertile plains of the Yellow River, characterized by pit dwellings and fine pottery painted in geometric designs.

### Sumerian architecture

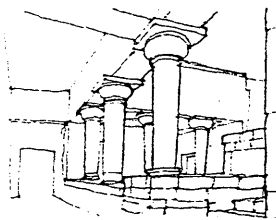
The architecture developed by the Sumerians who dominated southern Mesopotamia from the 4th to the end of the 3rd millennium B.C., characterized by monumental temples of sun-dried brick faced with burnt or glazed brick, often built upon the ruins of their predecessors.

### Sumer

An ancient region in southern Mesopotamia, where a number of independent cities and city-states were established as early as 5000 B.C. A number of its cities, as Eridu, Uruk, and Ur, are major archeological sites.

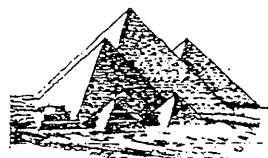
### tell

An artificial mound accumulated from the remains of one or more ancient settlements: often used in the Middle East as part of a place name.



### Egyptian Architecture

The architecture of the ancient civilization that flourished along the Nile River in northwest Africa from before 3000 B.C. to its annexation by Rome in 30 B.C., characterized esp. by the axial planning of massive masonry tombs and temples, the use of trabeated construction with precise stonework, and the decoration of battered walls with pictographic carvings in relief. A preoccupation with eternity and the afterlife dominated the building of these funerary monuments and temples, which reproduced the features of domestic architecture but on a massive scale using stone for permanence.



### Minoan architecture

The architecture of the Bronze Age civilization that flourished on Crete from about 3000 to 1100 B.C., named after the legendary King Minos of Knossos and characterized by the elaborate palaces at Knossos and Phaistos.

3000 BC • • • • •

### Harappa

A Bronze Age culture that flourished in the Indus valley c2300–1500 B.C.



### Chinese architecture

The indigenous architecture of a vast country in eastern Asia whose civilization has continually evolved and survived longer than any other nation in the world. Despite the marked diversity in the architecture of various regions caused by differences in geographic and climatic conditions, a unique system of wood frame construction gradually took shape over several millennia of innovation and synthesis and exerted a profound influence over the architecture of Korea, Japan, and Southeast Asia.

### Preclassic

Of or pertaining to Mesoamerican culture from 2200 B.C. to A.D. 100.

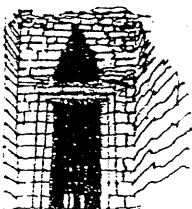


**Hittite architecture**

The architecture of the Hittite Empire which dominated Asia Minor and northern Syria from about 2000 to 1200 B.C., characterized by fortifications of cyclopean stone masonry and gateways with portal sculptures.

**Code of Hammurabi**

A Babylonian legal code instituted by Hammurabi in the mid-18th century B.C., based on principles absorbed from Sumerian culture.

**Mycenaean architecture**

The architecture of the Aegean civilization that spread its influence from Mycenae in southern Greece to many parts of the Mediterranean region from about 1600 to 1100 B.C., characterized by shaft graves, monumental beehive tombs, and palaces fortified with cyclopean walls.

**Assyrian architecture**

The Mesopotamian architecture developed under the Assyrian king-emperors of the 9th to 7th centuries B.C. Within city walls strengthened by towers with crenelated battlements, palaces took precedence over religious buildings. Vaulting played a greater role than in southern Mesopotamia and polychrome glazed brickwork showed the influence of Egyptian decoration.

**Greek architecture**

The architecture of the civilization that flourished on the Greek peninsula, in Asia Minor, on the north coast of Africa, and in the western Mediterranean until the establishment of Roman dominion in A.D. 146, characterized by a system of construction based on rules of form and proportion. Temples of post-and-lintel construction were continually refined in a quest for perfection and their design influenced a wide range of secular, civic buildings.

**Neo-Babylonian architecture**

The Mesopotamian architecture that developed after the decline of the Assyrian Empire, deriving much from Assyrian architecture and enhanced by figured designs of heraldic animals in glazed brickwork.

**Hanging Gardens of Babylon**

A series of irrigated ornamental gardens planted on the terraces of the Citadel, the palace complex in ancient Babylon; regarded as one of the Seven Wonders of the World.

**Persian architecture**

The architecture developed under the Achaemenid dynasty of kings who ruled ancient Persia from 550 B.C. until its conquest by Alexander the Great in 331 B.C., characterized by a synthesis of architectural elements of surrounding countries, as Assyria, Egypt, and Ionian Greece.

**Persian**

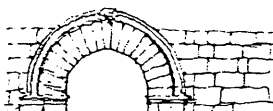
A telamon portrayed in Persian dress.

**Parthian architecture**

The architecture developed under Parthian rule in Iran and western Mesopotamia, from the 3rd century B.C. to the 3rd century A.D., combining classical with indigenous features.

**Etruscan architecture**

The architecture of the Etruscan people in west-central Italy from the 8th to 3rd centuries B.C., before the rise of Rome. Its construction methods, esp. that of the true stone arch, influenced later Roman architecture.

**Hellenic**

Of or pertaining to ancient Greek history, culture, and art, esp. before the time of Alexander the Great.

**Hellenistic**

Of or pertaining to Greek history, culture, and art from the time of Alexander the Great's death in 323 B.C. through the 1st century B.C., during which Greek dynasties were established in Egypt, Syria, and Persia, and Greek culture was modified by foreign elements.

**4 BC****Indian architecture**

The architecture of the Indian subcontinent, from the Indus valley culture of the Harappa to the Mauryan era, and later to periods of foreign domination and indigenous rule, characterized esp. by Hindu and Buddhist monuments, sometimes sharing the same site, and rhythmic, stratified multiplication of motifs and profuse carved ornamentation, often combining the religious and the sensuous.

**Maurya**

A member of an ancient Indian people who united northern India and established an empire c320 B.C.; architecture from this period shows the cultural influence of Achaemenid Persia and the first use of dressed stone.

**Zhou**

A Chinese dynasty, c1050 B.C.–256 B.C., marked by the division of China into separate feudal states and the emergence of Confucianism and Taoism, which gave thrust to all subsequent Chinese culture. Also, Chou.

**Confucianism**

A philosophy that dominated China until the early 20th century; an ethical system based on the teachings of the Chinese philosopher, Confucius, c551–478 B.C., emphasizing love for humanity, harmony in thought and conduct, devotion to family, and reverence for parents, including the spirits of one's ancestors.

**Taoism**

Chinese philosophy and religion considered next to Confucianism in importance. Based on the teachings of the Chinese philosopher, Lao-tzu, c604–531 B.C., it emphasizes a life of simplicity and noninterference with the course of natural events in order to attain a happy existence in harmony with the Tao. As a religion, it dates from A.D. 143, becoming popular during the decline of the Han dynasty and the introduction of Buddhism to China.

**Tao**

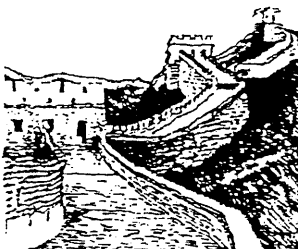
The Way; the creative principle that orders the universe.

**Great Wall of China**

A fortified wall commenced under the Zhou dynasty to protect China against nomads from the north and serve as a means of communication. Various sections were built and connected until, during the Ming dynasty, 1368–1644, it extended for 1,500 miles (2,415 km), from southern Kansu province to the coast east of Peking. Rebuilt and refaced repeatedly, it is the only human-made construction visible from outer space.

**Qin**

A dynasty in China, 221–206 B.C., marked by the emergence of a centralized government and the construction of much of the Great Wall of China. Also, Ch'in.

**Olmec architecture**

The architecture of the Mesoamerican civilization which flourished c1200–500 B.C. In the tropical lowlands of the Mexican Gulf Coast, characterized by temple-pyramids and large ceremonial centers.

**Chavin**

A Peruvian culture lasting from c1000 B.C. to c200 B.C., based on the worship of the jaguar god and characterized by excellent stone sculpture, elaborate gold work, and remarkable ceramics; named after the town of that name in central Peru, where a complex of massive stone buildings with subterranean galleries surround formal courtyards.

**Mochica**

A pre-Incan culture that flourished on the northern coast of Peru from c200 B.C. to A.D. 700, noted for its fine pottery and the colossal Temple of the Sun, a terraced pyramid made entirely of adobe bricks. Also called Moche.

## HISTORY

### Classical architecture

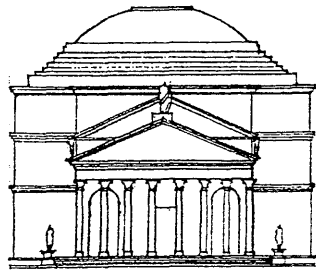
The architecture of ancient Greece and Rome, on which the Italian Renaissance and subsequent styles, as the Baroque and the Classic Revival, based their development.

### Roman architecture

The architecture of the ancient Roman people, characterized by massive brick and concrete construction employing such features as the semicircular arch, the barrel and groin vaults, and the dome, a simplicity and grandeur of massing often combined with elaborate detailing, the elaboration of the Greek orders as purely decorative motifs for the adornment of facades and interiors, and the use of marble linings, mosaics, and molded stucco in interiors.

### Rome

A city in the central part of Italy which, according to tradition, was founded by Romulus and Remus in 750 B.C.: ancient capital of the Roman Empire and site of Vatican City, the seat of authority of the Roman Catholic Church.



### Sassanian architecture

The architecture prevalent in Persia under the Sassanian dynasty that ruled A.D. 226–651, forming a link between the older Mesopotamian traditions and the Byzantine, and characterized by palaces with elliptical vaults and domes set on squinches and stuccoed masonry walls articulated by pilasters and cornices.

### Early Christian architecture

The final phase of Roman architecture, following the adoption of Christianity as the state religion by Constantine in A.D. 313 and lasting until the coronation of Charlemagne in A.D. 800 as emperor of the Holy Roman Empire, characterized by churches planned for congregational worship, esp. the basilica: coincident with and related to the rise of Byzantine architecture.

### Byzantine architecture

The architecture of the eastern sphere of the later Roman Empire, developing from late Roman and early Christian antecedents in the 5th century and influencing church building in Greece, Italy, and elsewhere for more than a thousand years: characterized by masonry construction, round arches, shallow domes carried on pendentives, and the extensive use of rich frescoes, colored glass mosaics, and marble revetments to cover whole interiors.

### Medieval architecture

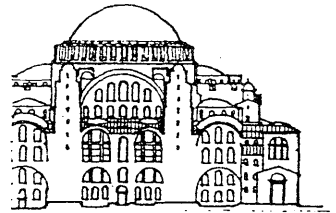
The architecture of the European Middle Ages, comprising the architecture of the Byzantine, pre-Romanesque, Romanesque, and Gothic periods.

### Middle Ages

The time in European history between classical antiquity and the Renaissance, often dated from A.D. 476 when Romulus Augustulus, the last Roman emperor of the Western Roman Empire, was deposed, to about 1500.

### Dark Ages

The early part of the Middle Ages, from about A.D. 476 to c.1100.



## AD 100

### Gupta

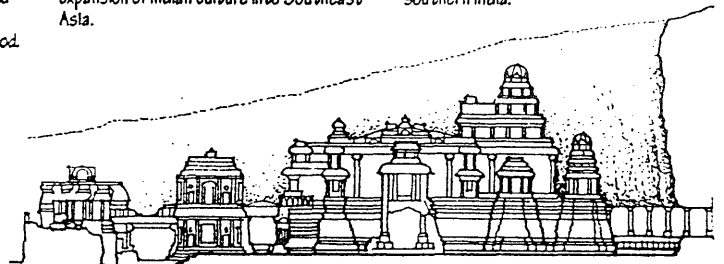
The dynasty of the Mauryan empire in northern India, A.D. 320–540, whose court was the center of classical Indian art and literature; the earliest substantial architectural remains are from this period.

### Pallava

A Hindu state established in southern India about A.D. 350; contributed to the expansion of Indian culture into Southeast Asia.

### Dravidian

A style of Indian architecture in the Pallava period, named after the language spoken in southern India.



### Pre-Columbian

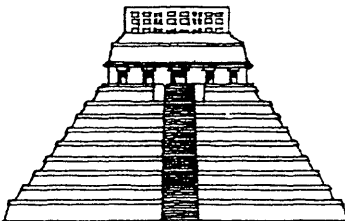
Of or pertaining to the Americas before the voyages of Columbus.

### Mesoamerica

The area extending from central Mexico and the Yucatán Peninsula to Honduras and Nicaragua in which pre-Columbian civilizations flourished. These cultures excelled in astronomy and the measurement of time, and shared temple-pyramids and a pantheon of deities including sun, wind, and rain gods.

### Classic

Of or pertaining to Mesoamerican culture from A.D. 100 to 900.



### Mayan architecture

The architecture of the Mesoamerican civilization of the Yucatán Peninsula, Guatemala, and part of Honduras, from the 1st century A.D. to its peak in the 9th century, characterized by magnificent ceremonial centers with temple-pyramids, ritual ball courts, spacious plazas, and palaces with sculptured facades.



### Zapotec architecture

The eclectic architecture of the Amerindian civilization which flourished c.500 B.C.–A.D. 1000 in the highland valley of Oaxaca in southern Mexico, assimilating influences from the Olmecs and from Teotihuacán during the Classic period.

### Tiahuanaco

A pre-Incan culture existing from about 300 B.C. to A.D. 900, chiefly in Peru and Bolivia, characterized by monolithic stone carving, polychrome pottery, and bronze artifacts.

### Romanesque architecture

A style of architecture emerging in Italy and western Europe in the 9th century and lasting until the advent of Gothic architecture in the 12th century, comprising a variety of related regional styles and characterized by heavy, articulated masonry construction with narrow openings, the use of the round arch and barrel vault, the development of the vaulting rib and shaft, and the introduction of central and western towers for churches.

### Carolingian architecture

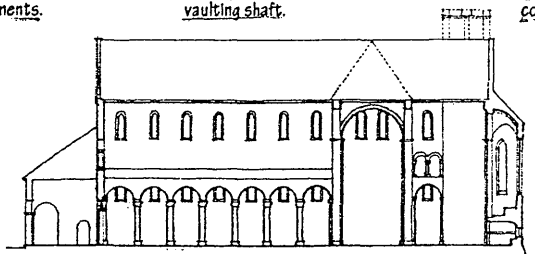
The early Romanesque architecture of the Frankish dynasty that reigned in France A.D. 751–987 and in Germany until A.D. 911, characterized by a revival of the forms of classical antiquity modified by ecclesiastical requirements.

### Lombard architecture

The early Romanesque architecture of northern Italy during the 7th and 8th centuries, characterized by the use of Early Christian and Roman forms and the development of the ribbed vault and vaulting shaft.

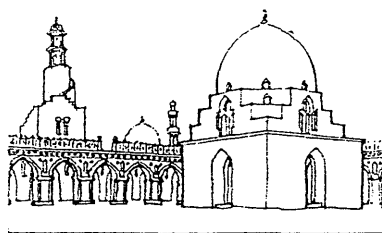
### Ottoman architecture

The early Romanesque architecture of the German dynasty that ruled as emperors of the Holy Roman Empire from A.D. 962–1002, characterized by the development of forms derived from Carolingian and Byzantine concepts.



### Islamic architecture

The architecture of the Muslim peoples from the 7th century on, developing in the wake of Muhammadan conquests of diverse territories from Spain in the west to India in the east and absorbing elements of art and architecture from each region: characterized by the development of the mosque as a distinct building type, masonry domes and tunnel vaults, round and horseshoe arches, and rich surface decorations incorporating calligraphy and floral motifs in a geometric framework because of the ban on human and animal representations. Also referred to as Muslim architecture.



### Anglo-Saxon architecture

The early Romanesque architecture of England before the Norman Conquest in 1066, characterized by the translation of timber prototypes into stone.

### Norman architecture

The Romanesque architecture introduced from Normandy into England before the Norman Conquest and flourishing until the rise of Gothic architecture c1200, characterized by the building of great Benedictine abbeys, the two-tower facade supplementing a central tower over the crossing, and the use of geometric ornamentation.

### Norman Conquest

The conquest of England by the Normans under William the Conqueror, in 1066.

### Islam

The religious faith of Muslims, based on the teachings of the prophet Muhammad, the central themes of which are belief in the one God, Allah, the existence of Paradise and Hell, and the universal Judgment Day to come. Also, the civilization built on Islamic faith. Also called Muhammadanism.

### Muhammad

Arab prophet and founder of Islam, A.D. 570–632. Also, Mohammed.

### Moorish architecture

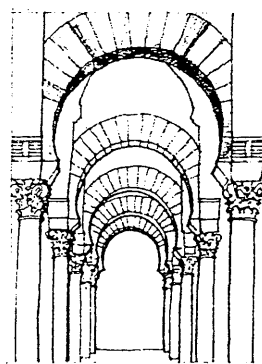
The Islamic architecture of North Africa and esp. of the regions of Spain under Moorish domination, characterized by the building of large mosques and elaborate fortress-palaces.

### Moor

A member of the Muslim people of northwest Africa who invaded Spain in the 8th century and occupied it until 1492.

### Mozarabic style

A style of Spanish architecture produced from the 9th to 15th centuries by Christians under Moorish influence, characterized by the horseshoe arch and other Moorish features.

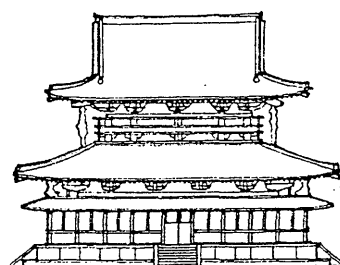


### Nara

A period in Japanese history, A.D. 710–794, characterized by the adoption of Chinese culture and form of government: named after the first permanent capital and chief Buddhist center in ancient Japan.

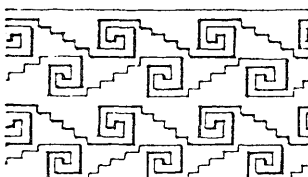
### Japanese architecture

The architecture of the civilization that emerged on the Japanese archipelago off the east coast of Asia, characterized by a synthesis of seminal ideas from China and native conditions producing a distinctive style characterized by lightness, delicacy, and refinement.



### Heian

Of or pertaining to the period in Japan, A.D. 785–1185, characterized by the modification and naturalization of ideas and institutions that were earlier introduced from China. During this time indigenous feudalism superseded Chinese-based social order and Japanese architecture developed in isolation from China.



### Mixtec architecture

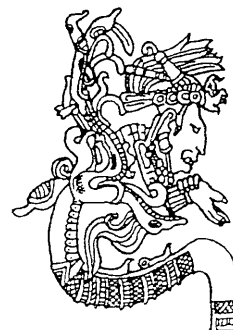
The architecture of the Amerindian culture centered in the Oaxaca Valley of Mexico from about A.D. 800 to the Spanish conquest, characterized by great stone masses, the use of interior stone columns, and the highly detailed fretwork of interior and exterior friezes.

### Toltec architecture

The architecture of the Amerindian people who settled in central Mexico around A.D. 900 and who are traditionally credited with laying the foundation of Aztec culture: characterized by colossal basalt telemones of Toltec warriors, colonnades several ranks deep, and stone panels carved with human-headed jaguars and symbols of Quetzalcóatl, set in plain wall surfaces.

### Quetzalcóatl

Priest-ruler of the Toltec people, who was deified as the feathered-serpent god called by that name.



## Gothic architecture

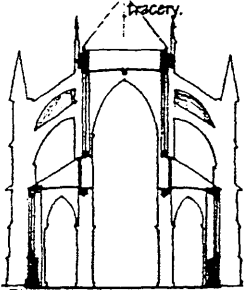
The style of architecture originating in France in the 12th century and existing in the western half of Europe through the middle of the 16th century, characterized by the building of great cathedrals, a progressive lightening and heightening of structure, and the use of the pointed arch, ribbed vault, and a system of richly decorated fenestration.

### Early French style

The first of the three phases of French Gothic architecture, characterized by the pointed arch and geometric tracery.

### Early English style

The first of the three phases of English Gothic architecture from the late 12th through the 13th centuries, characterized by the lancet window and plate tracery.



### Rayonnant style

The middle phase of French Gothic architecture from the end of the 13th through the late 14th centuries, characterized by circular windows with radiating lines of tracery.

### Decorated style

The second of the three phases of English Gothic architecture from the late 13th through the late 14th centuries, characterized by rich tracery, elaborate ornamental vaulting, and refinement of stonecutting techniques.

### Geometric style

The early development of the Decorated style in the late 13th and early 14th centuries, characterized by the use of geometric tracery.

### Curvilinear style

The later development of the Decorated style in the second half of the 14th century, characterized by use of curvilinear tracery.

## Renaissance

The activity, spirit, or time of the humanistic revival of classical art, literature, and learning originating in Italy in the 14th century and extending to the 17th century, marking the transition from the medieval to the modern world.

### Flamboyant style

The final phase of French Gothic architecture from the late 14th through the middle of the 16th centuries, characterized by flamelike tracery, intricacy of detailing, and frequent complication of interior space.

### Perpendicular style

The final phase of English Gothic architecture prevailing from the late 14th through the early 16th centuries, characterized by perpendicular tracery, fine intricate stonework, and elaborate fan vaults. Also called Rectilinear style.

### minster

Originally, a monastery church; later, any large or important church, as a cathedral or the principal church of a town.

## Renaissance architecture

The various adaptations of Italian Renaissance architecture that occurred throughout Europe until the advent of Mannerism and the Baroque in the 16th and 17th centuries, characterized by the use of Italian Renaissance forms and motifs in more or less traditional buildings.

### Italian Renaissance architecture

The group of architectural styles that originated in Italy in the 15th and 16th centuries, characterized by an emphasis on symmetry, exact mathematical relationships between parts, and an overall effect of simplicity and repose.

### Early Renaissance

A style of Italian Renaissance art and architecture developed during the 15th century, characterized by the development of linear perspective, chiaroscuro, and in building, by the free and inventive use of classical details.



### duomo

Italian designation for a true cathedral.

## 1100

### Mudéjar architecture

A style of Spanish architecture produced from the 13th to 16th centuries by Mudéjars and Christians working within the Muslim tradition, characterized by a fusion of Romanesque and Gothic with Islamic elements.

### Mudéjar

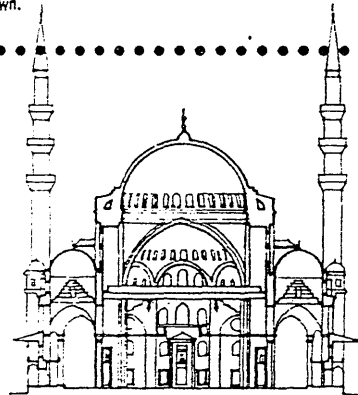
A Muslim permitted to remain in Spain after the Christian reconquest, esp. during the 8th to 13th centuries.

### Seljuk architecture

The Islamic architecture of several Turkish dynasties that ruled over central and western Asia from the 11th to 13th centuries, much influenced by Persian architecture.

### Ottoman architecture

The Islamic architecture of the Ottoman Empire from the 14th century on, much influenced by Byzantine architecture.



### Quattrocento architecture

The Italian Renaissance architecture of the 15th century.

### Chimu

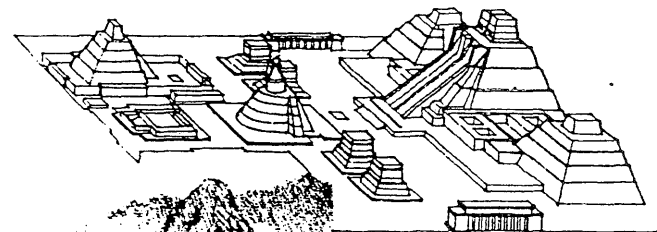
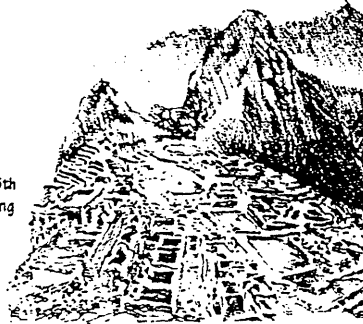
An Amerindian people inhabiting the northern coast of Peru and having a highly developed urban culture that lasted from about A.D.1000 to its destruction by the Incas c1470.

### Postclassic

Of or pertaining to Mesoamerican culture from A.D. 900 to the Spanish conquest in 1519.

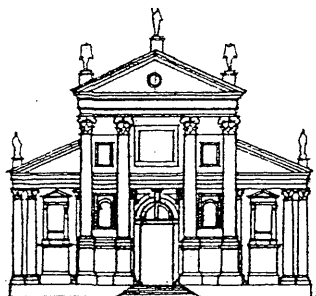
### Inca architecture

The architecture of the Quechuan people who migrated into the Cuzco area about A.D. 1100 and ruled Peru until the Spanish conquest in the 16th century, characterized esp. by strong simple forms of smooth ashlar or polygonal masonry which was cut, finished, and fitted with great precision without the use of iron chisels.



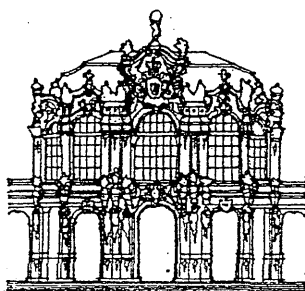
### Aztec architecture

The architecture of the Amerindian people who settled near the shore of Lake Texcoco in central Mexico c1352 and who rose to dominance c1450; characterized chiefly by the pyramid supporting twin temples on a common platform, approached by parallel stairways. The destruction of Aztec architecture by the Spanish conquistadors have left few remains.



### High Renaissance

A style of Italian Renaissance art and architecture developed in the late 15th and early 16th centuries, characterized by an emphasis on draftsmanship, the illusion of sculptural volume in painting, and in building, by the imitative use of whole orders and compositional arrangements in the classical style, with great attention to the formulation of compositional rules after the precepts of Vitruvius and the precedents of existing ruins.

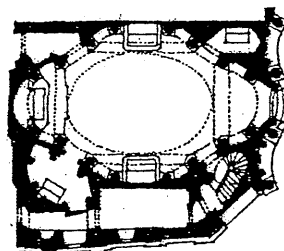


### Tudor architecture

A transitional style of English architecture that developed during the reign of the royal house of Tudor in the second half of the 16th century, characterized by the Tudor arch and the application of Renaissance details to buildings otherwise late Perpendicular in style.

### Baroque architecture

A style of architecture originating in Italy in the early 17th century and variously prevalent in Europe and the New World for a century and a half, characterized by free and sculptural use of the classical orders and ornament, dynamic opposition and interpenetration of spaces, and the dramatic combined effects of architecture, sculpture, painting, and the decorative arts.



### Rococo

A style of decorative art that evolved from the Baroque, originating in France about 1720 and distinguished by fanciful, curved spatial forms and elaborate, profuse designs of shellwork and foliage intended for a delicate overall effect.

### classicism

The principles or styles characteristic of the culture, art, and literature of ancient Greece and Rome.

### Classic Revival

Art and architecture in the style of the ancient Greeks and Romans, as that of the Italian Renaissance and the neoclassical movements in England and the United States in the late 18th and early 19th centuries. Also, Classical Revival.

### Neoclassicism

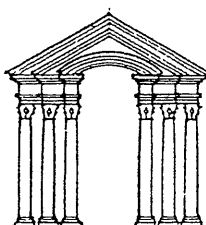
The classicism prevailing in the architecture of Europe, America, and various European colonies during the late 18th and early 19th centuries, characterized by the introduction and widespread use of Greek and Roman orders and decorative motifs, the subordination of detail to simple, strongly geometric compositions, and the frequent shallowness of relief in ornamental treatment of facades.

### Cinquecento architecture

The Italian Renaissance architecture of the 16th century.

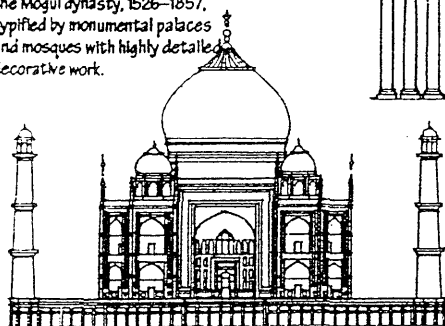
### Mannerism

A transitional style in European architecture in the late 16th century, particularly in Italy, characterized by the unconventional use of classical elements. In the fine arts, Mannerism was chiefly characterized by a distortion of perspective, elongated forms, and intense, often strident color.



### Mogul architecture

The Indo-Islamic architecture of the Mogul dynasty, 1526–1857, typified by monumental palaces and mosques with highly detailed decorative work.



### chinoiserie

A style of ornament prevalent chiefly in 18th-century Europe, characterized by intricate patterns and extensive use of motifs identified as Chinese.

### Georgian architecture

The prevailing style of architecture, furniture, and crafts current in England and the North American colonies, esp. from 1714 to 1811, derived from classical, Renaissance, and Baroque forms; named after the four kings named George who reigned successively during this period.

### Colonial architecture

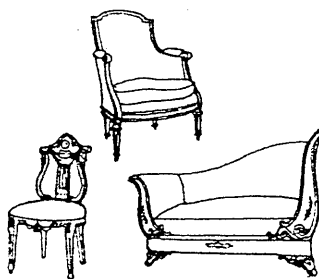
The style of architecture, decoration, and furnishings of the British colonies in America in the 17th and 18th centuries, mainly adapted to local materials and demands from prevailing English styles.

### Federal style

The Classic Revival style of the decorative arts and architecture current in the U.S. from c1780 to c1830.

### Regency style

The neoclassic style of architecture, furnishings, and decoration during the period in British history, 1811–20, during which George, Prince of Wales (later George IV) was regent; similar to the Directoire and Empire styles and characterized by close imitation of ancient Greek forms as well as by less frequent and looser adaptations of ancient Roman, Gothic, Chinese, and ancient Egyptian forms.



### Directoire style

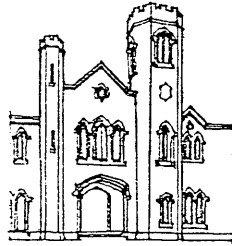
A style of French furnishings and decoration preceding the Empire style, characterized by an increasing use of Greco-Roman forms along with an introduction, toward the end, of Egyptian motifs; named after the Directory, the body of five directors forming the executive power of France from 1795–99.

### Empire style

The neoclassic style of architecture, furnishings, and decoration prevailing in France and imitated in various other countries during the first French Empire, c1800–30, characterized by the use of delicate but elaborate ornamentation imitated from Greek and Roman examples and by the occasional use of military and Egyptian motifs.

## Gothic Revival

A movement aimed at reviving the spirit and forms of Gothic architecture, originating in the late 18th century but flourishing mainly in the 19th century in France, Germany, England and to a lesser extent in the U.S. Gothic remained the accepted style for churches well into the 20th century.



## Steamboat Gothic

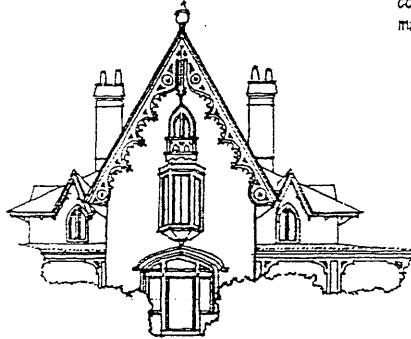
A florid architectural style used for homes built in the middle of the 19th century in the Ohio and Mississippi river valleys, suggesting the gingerbread-decorated construction of riverboats of the Victorian period.

## gingerbread

Heavily, gaudily, and superfluously ornamented, esp. in architecture.

## collegiate Gothic

A secular version of Gothic architecture, as in the older colleges of Cambridge and Oxford.



## Victorian architecture

The revival and eclectic architecture, decor, and furnishings popular in English-speaking countries during the reign of Queen Victoria of England, 1837–1901, characterized by rapid changes of style as a consequence of aesthetic controversy and technological innovations, by the frequent presence of ostentatious ornament, and by an overall trend from classicism at the start to romanticism and eclecticism at the middle of the period and thence to classicism again.

## Carpenter Gothic

A style of Victorian Gothic architecture in the 19th century adapted by artisan-builders to the resources of contemporary woodworking tools and machinery.

## Beaux-Arts architecture

A style of architecture favored by the École des Beaux-Arts in late 19th-century France and adopted in the U.S. and elsewhere c1900, characterized by symmetrical plans and the eclectic use of architectural features combined so as to give a massive, elaborate, and often ostentatious effect. The term is often used in a pejorative sense to designate excessive formalism disregarding considerations of structural truth, advanced aesthetic theory, rational planning, or economy.

## eclecticism

A tendency in architecture and the decorative arts to freely mix various historical styles with the aim of combining the virtues of diverse sources, or of increasing allusive content, particularly during the second half of the 19th century in Europe and the U.S.

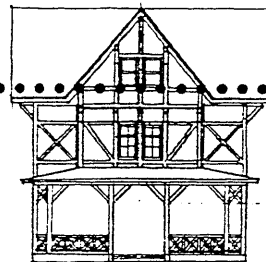
## eclectic

Of or pertaining to works of architecture and the decorative arts that derive from a wide range of historic styles, the style in each instance being chosen for its deemed appropriateness to local tradition, geography, or culture.

1800

## Rationalism

A design movement of the mid-19th century that emphasized the decorative use of materials and textures and the development of ornament as an integral part of a structure rather than as applied adornment.



## Stick style

An eclectic style of American architecture in the second half of the 19th century, characterized esp. by the use of vertical board siding with battens or grids of boards over horizontal siding to express the frame construction beneath.

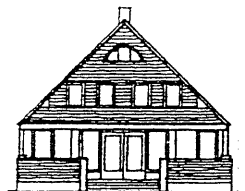


## Arts and Crafts Movement

A movement that originated in England c1860 as a reaction against poor-quality mass-produced goods, conceiving of craft and decoration as a single entity in the handcrafting of both utilitarian and decorative objects.

## Shingle style

An American style of domestic architecture during the second half of the 19th century, characterized by the extensive use of wood shingles as exterior cladding over a timber frame and frequently asymmetrical and fluid plan arrangements.



## Mission Style

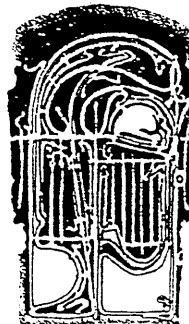
A style of architecture associated with that of early Spanish colonial missions in Mexico and the southwestern U.S., mainly in the 18th century.

## Richardsonian Romanesque

The revival of the Romanesque style in the U.S. by Henry Hobson Richardson, 1838–86, and his followers, characterized by heavy arches, rusticated masonry walls, and dramatic asymmetrical effects.

## Rundbogenstil

A style of architecture in the mid-19th century, esp. in Germany, characterized by the use of the round-arch motif and combining in various degrees elements from the Early Christian, Byzantine, Romanesque, and Early Renaissance styles: from the German term for round-arched style.



## Art Nouveau

A style of fine and applied art current in the late 19th and early 20th centuries, characterized by fluid, undulating motifs, often derived from natural forms.

## Stile Liberty

The Italian version of Art Nouveau, named after the firm of Liberty and Co. in London.

## Sezession

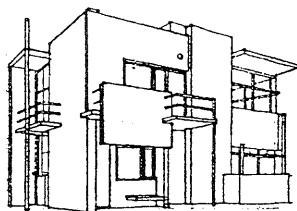
The Austrian version of Art Nouveau, so named because its adherents seceded from the official Academy of Art in Vienna.

## Modernismo

The Spanish, particularly Catalan, version of Art Nouveau.

## Jugendstil

Art Nouveau as practiced in German-speaking countries: from the German term for youth style.



### de Stijl

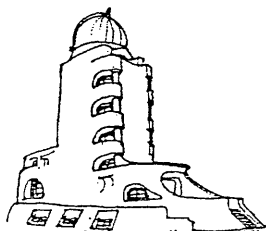
A school of art that was founded in the Netherlands in 1917, embracing painting, sculpture, architecture, furniture, and the decorative arts, marked esp. by the use of black and white with the primary colors, rectangular forms, and asymmetry. From 'the style', the name of a magazine published by participants in the movement.

### cubism

A style of painting and sculpture developed in the early 20th century, characterized by an emphasis on formal structure, the reduction of natural forms to their geometrical equivalents, and the organization of the planes of a represented object independently of representational requirements.

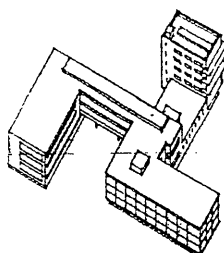
### Bauhaus

A school of design established in Weimar, Germany, in 1919 by Walter Gropius, moved to Dessau in 1926, and closed in 1933 as a result of Nazi hostility. The concepts and ideas developed at the Bauhaus were characterized chiefly by the synthesis of technology, craft, and design aesthetics, with an emphasis on functional design in architecture and the applied arts.



### abstract expressionism

A movement in experimental, nonrepresentational painting originating in the U.S. in the 1940's, embracing many individual styles marked in common by freedom of technique, a preference for dramatically large canvases, and a desire to give spontaneous expression to the unconscious.

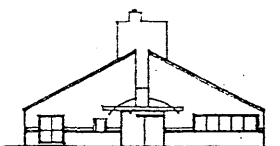


### International Style

A functional architecture devoid of regional characteristics, developed in the 1920's and 1930's in Western Europe and the U.S. and applied throughout the world: characterized by simple geometric forms, large untextured, often white surfaces, large areas of glass, and general use of steel or reinforced concrete construction.

### brutalism

A movement in architecture in the 1950's, emphasizing the aesthetic use of basic building processes, esp. of cast-in-place concrete, with no apparent concern for visual amenity.



### post-modernism

A movement in architecture and the decorative arts that developed in the 1970's in reaction to the principles and practices of modernism, esp. the influence of the International Style, encouraging the use of elements from historical vernacular styles and often playful illusion, decoration, and complexity.

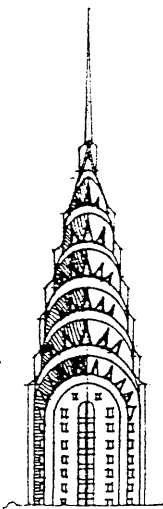
### decorated shed

A design concept characterized by buildings of utilitarian design but having fronts intended to elevate their importance or to announce their functions.

## 1900

### Chicago School

A group of U.S. architects active c1880-1910 and known for major innovations in high-rise construction and for the development of modern commercial building design.

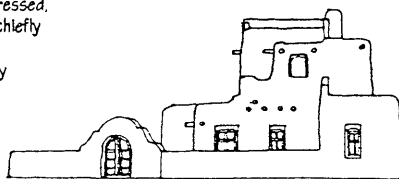


### Organic architecture

A philosophy of architectural design that emerged in the early 20th century, asserting that a building should have a structure and plan that fulfill its functional requirements, harmonize with its natural environment, and form an intellectually lucid, integrated whole. The shapes or forms in such a work are often of irregular contour and seem to resemble or suggest forms found in nature.

### Art Deco

A style of decorative art developed originally in the 1920's with a revival in the 1960's, marked chiefly by geometric motifs, streamlined and curvilinear forms, sharply defined outlines, often bold colors, and the use of synthetic materials, as plastics: shortened from Exposition Internationale Des Arts Décoratifs et Industriels Modernes, an exposition of modern and decorative arts held in Paris, France, in 1925. Also called Style Moderne.

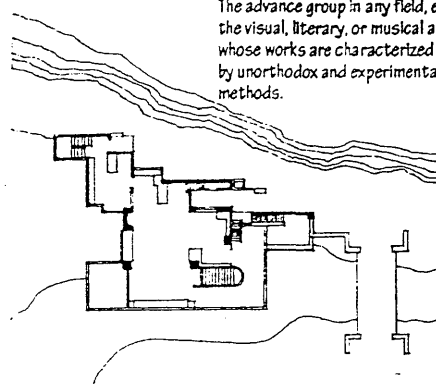


### vernacular architecture

A style of architecture exemplifying the commonest building techniques based on the forms and materials of a particular historical period, region, or group of people.

### avant-garde

The advance group in any field, esp. in the visual, literary, or musical arts, whose works are characterized chiefly by unorthodox and experimental methods.



### high-tech

A style of design incorporating industrial, commercial, and institutional fixtures, equipment, materials, or other elements having the utilitarian appearance characteristic of industrial design.

### deconstruction

A philosophical and critical movement that started in the 1960's, esp. in the study of literature, questioning traditional assumptions about the ability of language to represent reality and emphasizing that a text has no stable reference because words essentially refer only to other words. A reader must therefore approach a text by eliminating any abstract reasoning or ethnocentric assumptions through an active role of defining meaning, sometimes by a reliance on etymology and new word construction.

# HOUSE

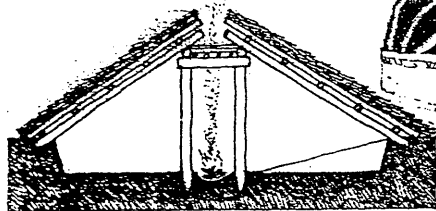
A building in which people live.

## shelter

Something beneath, behind, or within which a person is protected from storms or other adverse conditions.

## hut

A small, simple dwelling or shelter, esp. one made of natural materials.



## pit dwelling

A primitive form of shelter consisting of a pit excavated in the earth and roofed over. Also called pit house.

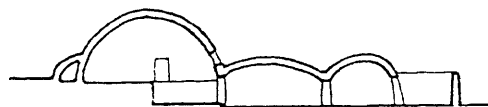
## lake dwelling

A dwelling, esp. of prehistoric times, built on piles or other supports over the water of a lake.



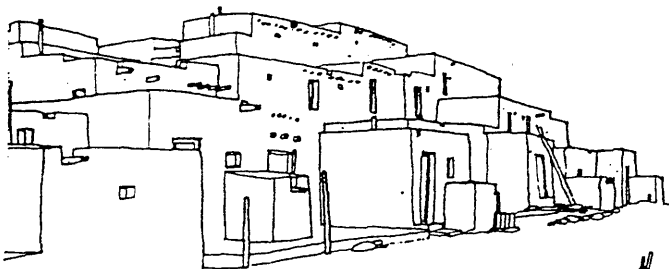
## longhouse

A communal dwelling characteristic of many early cultures, esp. that of the Iroquois and various other North American Indian peoples, consisting of a wooden, bark-covered framework often as much as 100 ft. (30.5 m) in length.



## igloo

An Eskimo house, usually built of blocks of hard snow or ice in the shape of a dome, or when permanent, of sod, wood, or stone. Also, iglu.

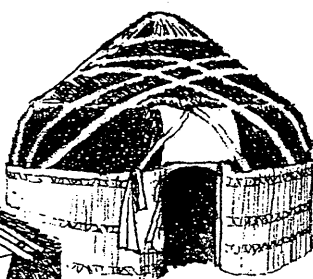


## pueblo

A communal dwelling and defensive structure of the Pueblo Indians of the southwestern U.S., built of adobe or stone, typically many-storied, and terraced, with entry through the flat roofs of the chambers by ladder. Pueblo structures were built on the desert floor, in valleys, or in the more easily defended cliff walls of mesas.

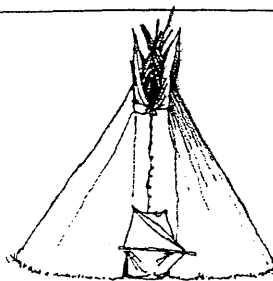
## mesa

A natural flat-topped elevation with one or more clifflike sides, common in arid and semiarid parts of the southwestern U.S. and Mexico.



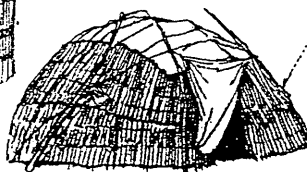
## yurt

A circular, tentlike dwelling of the Mongol nomads of central Asia, consisting of a cylindrical wall of poles in a lattice arrangement with a conical roof of poles, both covered by felt or animal skins.



## teepee

A tent of the American Indians, made usually from animal skins laid on a conical frame of long poles and having an opening at the top for ventilation and a flap door. Also, teepee.



## wigwam

An American Indian dwelling, usually of round or oval shape, formed of poles overlaid with bark, rush mats, or animal skins.

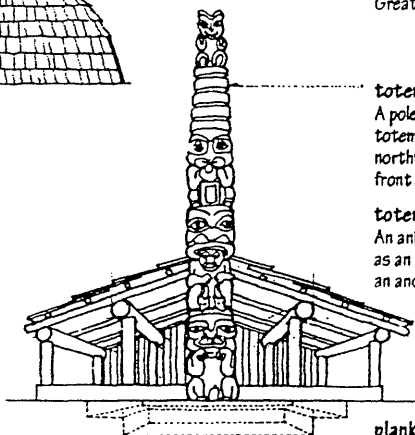


## hogan

A Navaho Indian dwelling constructed usually of earth and logs and covered with mud and sod.

## sod house

A house built of strips of sod, laid like brickwork, and used esp. by settlers on the Great Plains when timber was scarce.



## totem pole

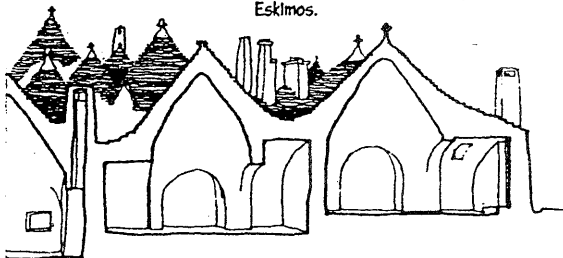
A pole or post carved and painted with totemic figures, erected by Indians of the northwest coast of North America, esp. in front of their houses.

## totem

An animal, plant, or natural object serving as an emblem of a family or clan by virtue of an ancestral relationship.

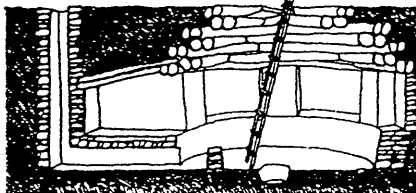
## plank house

A large, usually rectangular house constructed of timber planks, built and used by Indians and, less frequently, by Eskimos.



## trullo

A circular stone shelter of the Apulia region of southern Italy, roofed with conical constructions of corbeled dry masonry, usually whitewashed and painted with figures or symbols. Many trulli are over 1,000 years old and still in use today, usually located among vineyards to serve as storage structures or as temporary living quarters during the harvest.



## kiva

A large underground or partly underground chamber in a Pueblo Indian village, used by the men for religious ceremonies or councils.



**compluvium**

A roof opening in an ancient Roman house, through which rainwater discharged into a cistern in the atrium beneath it.

**displuviate**

Having roofs sloping downward toward the compluvium.

**impluvium**

A cistern set in the atrium of an ancient Roman house to receive rainwater from the compluvium.

**atrium**

The main or central inner hall of an ancient Roman house, open to the sky at the center and usually having a pool for the collection of rainwater. Also called *cavaedium*.

**peristyle**

A colonnade surrounding a building or a courtyard.

**shoin-zukuri**

A ceremonial style of Japanese residential architecture in the Kamakura period, deriving its name from the characteristic shoin or study-bay and marked by a hierarchical arrangement of public and private rooms.

**zashiki**

Reception room: the main room in a traditional Japanese house, used for receiving and entertaining guests. Its importance is evident in the presence of a tokonoma, tana, and shoin.

**tana**

In Japanese residential architecture, a recess with built-in shelving, usually adjoining a tokonoma.

**shoji**

One of a series of sliding translucent panels used in Japanese architecture between the exterior and the interior, or between two interior spaces, consisting of a light wooden framework covered on one side with rice paper; the lower section is occasionally filled by a thin wooden panel.

**tatami**

A thick straw mat, covered with smooth, finely woven reeds and bound with plain or decorated bands of silk, cotton, or hemp, serving as a floor covering and a standard for designating room size in a traditional Japanese house. Tatami measured approximately 3 x 6 ft. (0.9 x 1.8 m), but varied in actual dimensions according to region and method for determining column spacing.

**ken**

A linear unit for regulating column spacing in traditional Japanese construction, initially set at 6 ft. or 1.8 m, but later varying according to room width as determined by tatami units.

**shoin**

An elevated bay or projected window with a raised sill serving as a desk for writing or reading, usually placed at a right angle to the tokonoma in the reception room of a shoin-zukuri style residence.

**kakemono**

A vertical hanging scroll containing either text or a painting, intended to be viewed on a wall and rolled when not in use.

**engawa**

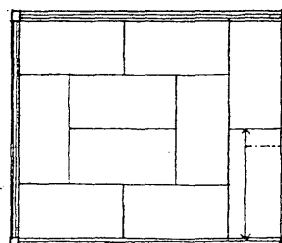
An extension of the floor on one or more sides of a Japanese-style house, usually facing a garden and serving as a passageway or sitting space.

**tokonoma**

Picture recess: a shallow, slightly raised alcove for the display of a kakemono or flower arrangement. One side of the recess borders the outside wall of the room through which light enters, while the interior side adjoins the tana. As the spiritual center of a traditional Japanese house, the tokonoma is located in its most formal room.

**tokobashira**

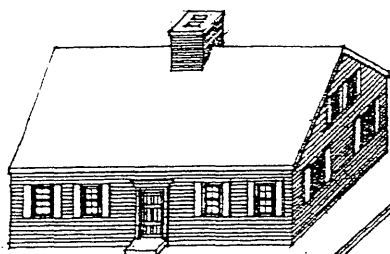
A post marking the front of the partition between the tokonoma and the tana, sometimes of exquisite wood of particular grain and shape.



# HOUSE

## detached dwelling

A house having no wall in common with another house.



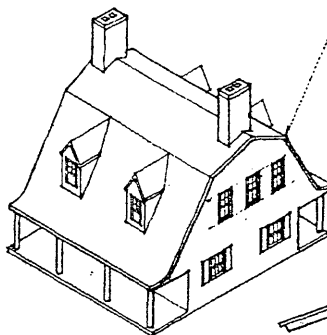
### Cape Cod

A style of cottage developed mainly on Cape Cod, Massachusetts, in the 18th and early 19th centuries, typically a rectangular, one- or one-and-a-half-story, wood-frame house with white clapboarded or shingle walls, a gable roof with low eaves and usually no dormer, a large central chimney, and a front door located on one of the long sides.



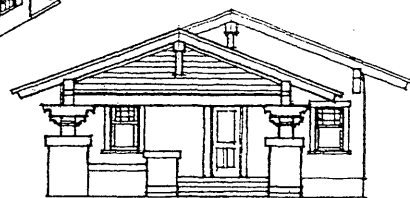
### saltbox

A type of wood-framed house found esp. in New England, generally two full stories high in front and one story high in back, the roof having about the same pitch in both directions so that the ridge is well toward the front of the house.



### Dutch Colonial

Of or pertaining to the domestic architecture of Dutch settlers in New York and New Jersey in the 17th century, often characterized by gambrel roofs having curved eaves over porches on the long sides.

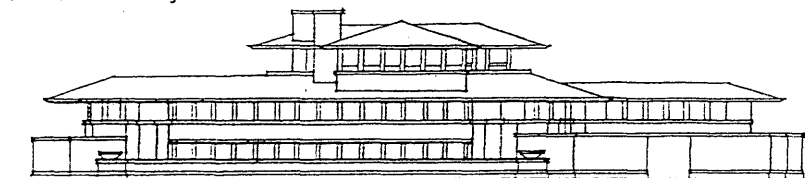


### bungalow

A derivative of the Indian bungalow, popular esp. in the first quarter of the 20th century, usually having one or one-and-a-half stories, a widely bracketed gable roof, a large porch, and often built of rustic materials.

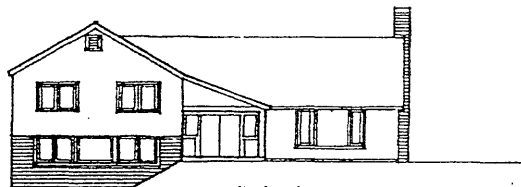
### bungalow court

A group of three or more detached, one-story, single-family dwellings, arranged with common utilities and accessories under a common ownership.



### Prairie School

A group of early 20th-century architects, notably Frank Lloyd Wright, who designed houses and other buildings with emphasized horizontal lines responding to the flatness of the Midwestern prairie.



### split-level

A house having a room or rooms somewhat above or below adjacent rooms, with the floor levels usually differing by approximately half a story.

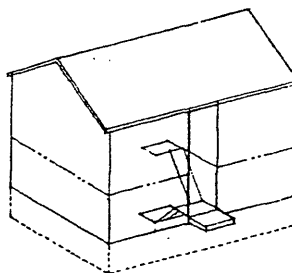


### rambler

A one-story house with a low-pitched roof, esp. one built in the suburbs.

### tract house

A house forming part of a real-estate development, usually having a plan and appearance common to some or all of the houses in the development.



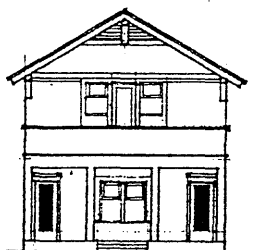
### bi-level

A two-story house having the lower level sunken below grade and an entry at grade halfway between the two floor levels.



### semidetached dwelling

A house joined by a party wall to another house or row of houses.

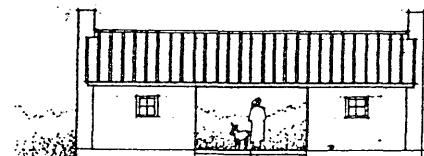


### duplex house

A house having separate apartments for two families, esp. a two-story house having a complete apartment on each floor and two separate entrances. Also called duplex.

### triplex

A building having three apartments, an apartment having three floors, or a multiplex of three theaters.



### dogtrot

A breezeway linking two parts of a house.

### breezeway

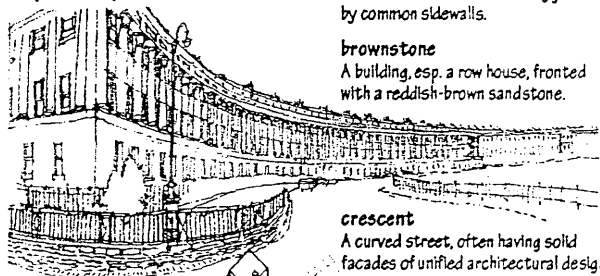
A porch or roofed passageway open on the sides, for connecting two buildings or parts of a building.

**condominium**

An apartment house, office building, or other multiple-unit complex, the units of which are individually owned, each owner receiving a recordable deed to the individual unit purchased, including the right to sell or mortgage that unit, and sharing in the joint ownership of any common elements, as hallways, elevators, mechanical and plumbing systems, or the like.

**cooperative**

A building owned and managed by a nonprofit corporation in which shares are sold, entitling the shareholders to occupy units in the building. Also called *co-op*, *cooperative apartment*.

**townhouse**

One of a row of houses in a city joined by common sidewalls.

**brownstone**

A building, esp. a row house, fronted with a reddish-brown sandstone.

**crescent**

A curved street, often having solid facades of unified architectural design.

**terrace**

A row of houses or residential street on or near the top of a slope.

**terrace house**

One of a row of houses situated on a terraced site.

**cluster housing**

A group of buildings and esp. houses built close together to form relatively compact units on a sizable tract in order to preserve open spaces larger than the individual yard for common recreation.

**commons**

A tract of land owned or used jointly by the residents of a community, usually a central square or park in a city or town.

**multifamily**

Designed or suitable for use by several or many families.

**housing unit**

A house, apartment, suite of rooms, or a single room, occupied or intended for occupancy as separate living quarters.

**mew**

A street having small apartments converted from stables. Also, mews.

**row house**

One of a row of houses having at least one sidewall in common with a neighboring dwelling, and usually uniform or nearly uniform plans, fenestration, and architectural treatment.

**penthouse**

An apartment or residence on the top floor or roof of a building, often set back from the outer walls and opening onto a terrace.

**duplex apartment**

An apartment with rooms on two connected floors. Also called *duplex*.

**flat**

An apartment or suite of rooms on one floor forming a residence.

**walk-up**

An apartment above the ground floor in a building that has no elevator.

**garden apartment**

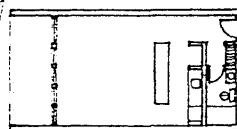
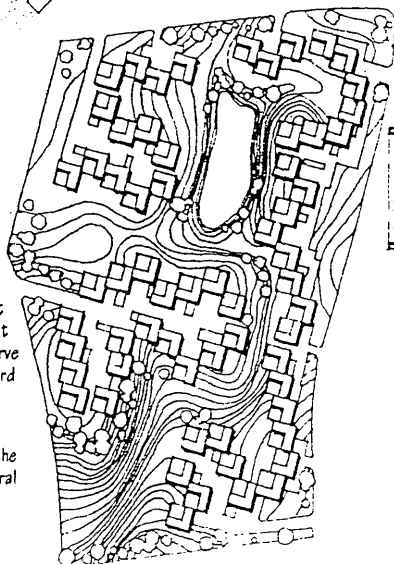
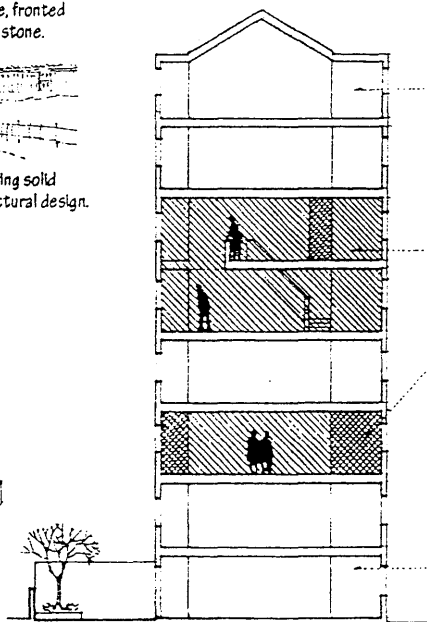
An apartment on the ground floor of an apartment building having access to a backyard or garden.

**apartment house**

A building containing a number of apartment units. Also called *apartment building*.

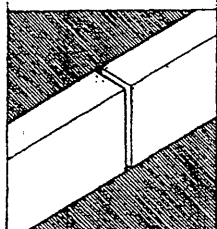
**studio apartment**

An apartment consisting of a single, multifunctional room, a kitchen or kitchenette, and a bathroom. Also called *efficiency apartment*.

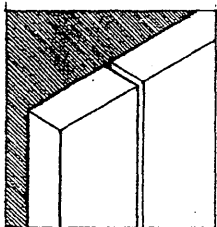


# JOINERY

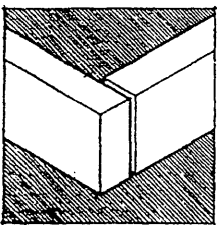
The art or craft of forming joints, esp. in woodwork.



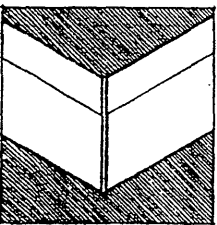
**end joint**  
Any joint formed by uniting two members end to end so as to increase their length. Also called lengthening joint.



**edge joint**  
Any joint formed by uniting two members edge to edge so as to increase their width.



**angle joint**  
Any joint formed by uniting two members at a corner so as to change direction.



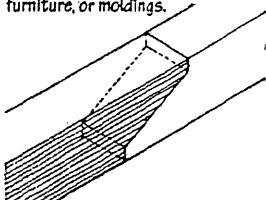
**miter joint**  
A joint between two members meeting at an angle, made by cutting each of the butting surfaces to an angle equal to half the angle of junction.

**easement**  
A curved joint forming a smooth transition between surfaces that would otherwise intersect at an angle.

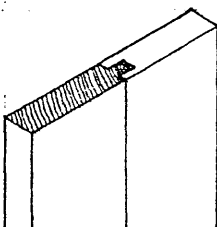
**eased edge**  
A slightly rounded edge.

## woodwork

The work produced by the carpenter's and joiner's art, generally applied to objects or parts of a wooden structure, as stairways, furniture, or moldings.

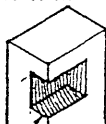


**scarf joint**  
A lengthening joint made by overlapping the tapered, notched, or halved ends of two members and holding them in place with bolts, straps, keys, or fishplates, to resist tension or compression.

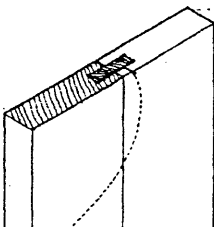


**tongue and groove**  
A joint made by fitting a raised area or tongue on the edge of one member into a corresponding groove in the edge of another member to produce a flush surface. Abbr.: T & G

**dado**  
A rectangular groove cut in a member to receive the end of another.

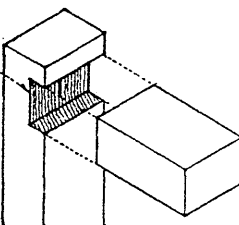


**stopped dado**  
A dado that is not cut across the full width of a member.



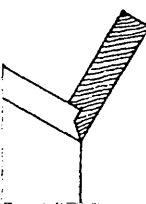
**square splice**  
A halved scarf joint used esp. to resist tension, having a thicker and a thinner section for each member, the thicker one being on the end.

**spline**  
A thin strip of material inserted into the grooved edges of two members to make a butt joint between them. Also called feather.

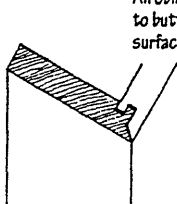


**dado joint**  
A joint made by inserting the end or edge of one member into a corresponding dado in the other. Also called housed joint.

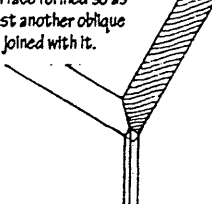
**miter**  
An oblique surface formed so as to butt against another oblique surface to be joined with it.



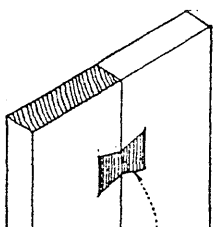
**shoulder miter**  
A miter joint having a raised surface to limit motion between the joined parts.



**tongued miter**  
A miter joint that incorporates a tongue and groove.

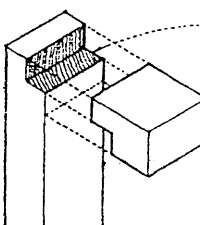


**quirk**  
An acute angle or groove separating one element from another.



**finger joint**  
A lengthening joint formed by interlacing finger-like projections on the ends of the joined members.

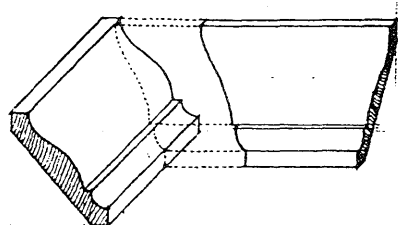
**butterfly wedge**  
A fastener in the form of a double dovetail for joining two members at their edges. Also called butterfly.



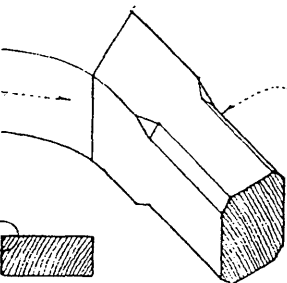
**rabbit**  
A channel, groove, or notch cut along or near one edge of a member so that something else can be fitted into it. Also, rebate.

**route**  
To groove or hollow out with a gouge or machine.

**rabbit joint**  
A joint between rabbeted parts.

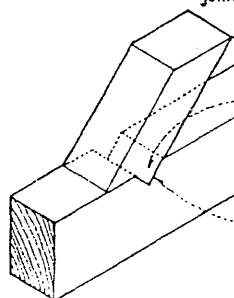


**coped joint**  
A joint between two moldings made by undercutting the end of one of them to the profile of the other. Also called scribed joint.



**stop chamfer**  
A chamfer that narrows gradually to merge with a sharp arris. Also, stopped chamfer.

**chamfer**  
A beveled surface, usually formed or cut at a 45° angle to the adjacent principal faces.

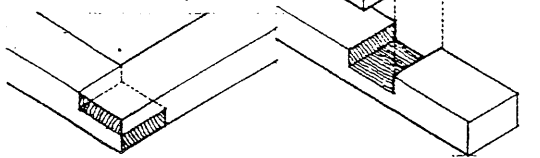


**joggle**  
A projection on one of two joining members fitting into a corresponding recess in the other to prevent slipping.

**dap**  
A notch cut in a timber to receive a timber connector or part of another timber.

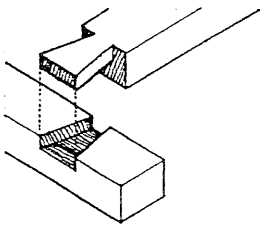
## halved joint

A lap joint formed by cutting away half of each member at the place of joining so that a flush surface results. Also called half-lap joint.



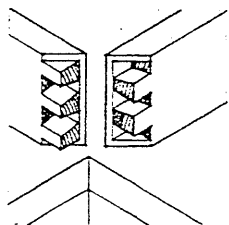
## end-lap joint

An angle joint formed by halving each member for a length equal to the width of the other.



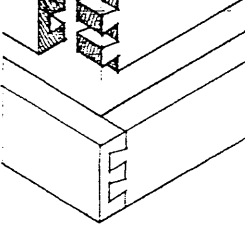
## cross-lap joint

A halved joint formed by two crossing members.



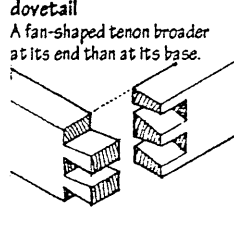
## mitered halving

An end-lap joint incorporating a miter on one face.



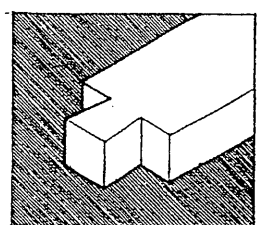
## plain lap

A lap joint formed by overlapping two members without any change in form.



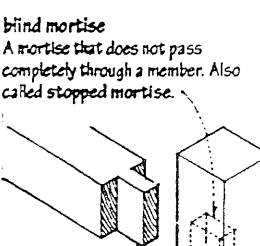
## lap joint

Any of various joints formed by overlapping the ends or edges of two members.



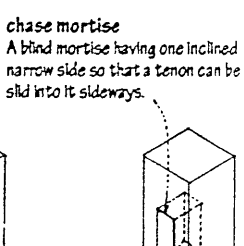
## dovetail halving

A halved joint made by fitting a dovetail at the end of one member into a corresponding mortise in the second member.



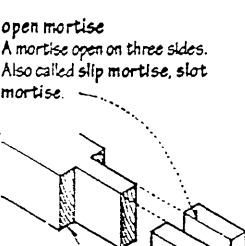
## secret dovetail

A corner dovetail joint showing only the line of a miter. Also called miter dovetail.



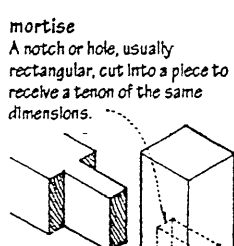
## lap dovetail

A corner dovetail joint visible on one face only. Also called half-blind dovetail.



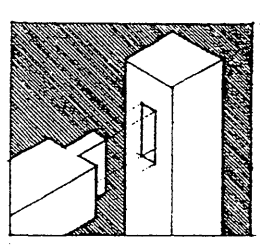
## common dovetail

A corner dovetail joint visible on both faces.



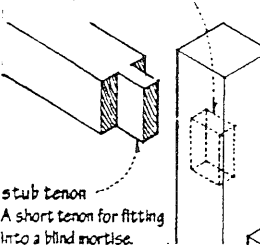
## dovetail joint

A joint formed by one or more dovetails fitting tightly within corresponding mortises.



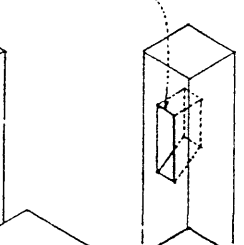
## blind mortise

A mortise that does not pass completely through a member. Also called stopped mortise.



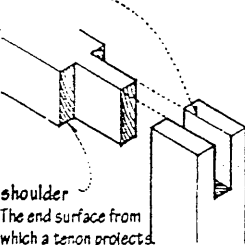
## chase mortise

A blind mortise having one inclined narrow side so that a tenon can be slid into it sideways.



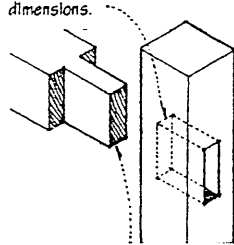
## open mortise

A mortise open on three sides. Also called slip mortise, slot mortise.



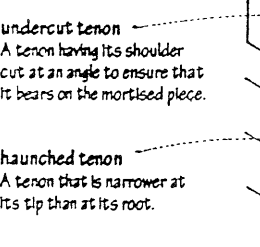
## mortise

A notch or hole, usually rectangular, cut into a piece to receive a tenon of the same dimensions.



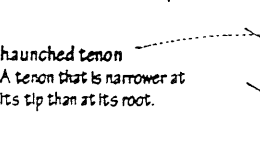
## stub tenon

A short tenon for fitting into a blind mortise.



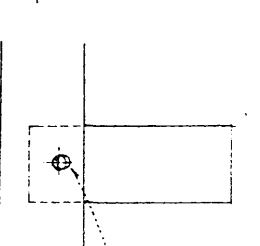
## undercut tenon

A tenon having its shoulder cut at an angle to ensure that it bears on the mortised piece.



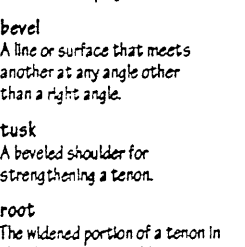
## haunched tenon

A tenon that is narrower at its tip than at its root.



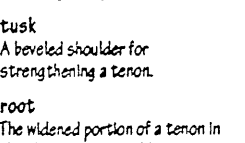
## shoulder

The end surface from which a tenon projects.



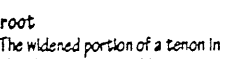
## bevel

A line or surface that meets another at any angle other than a right angle.



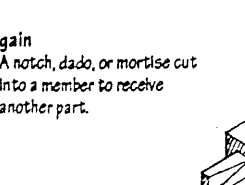
## tusk

A beveled shoulder for strengthening a tenon.



## root

The widened portion of a tenon in the plane of the shoulders.



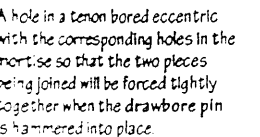
## gain

A notch, dado, or mortise cut into a member to receive another part.



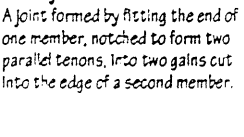
## drawbore

A hole in a tenon bored eccentric with the corresponding holes in the mortise so that the two pieces being joined will be forced tightly together when the drawbore pin is hammered into place.



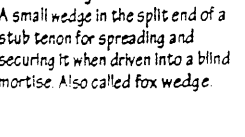
## bridle joint

A joint formed by fitting the end of one member, notched to form two parallel tenons, into two gains cut into the edge of a second member.



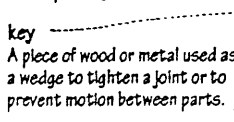
## foxtail wedge

A small wedge in the split end of a stub tenon for spreading and securing it when driven into a blind mortise. Also called fox wedge.



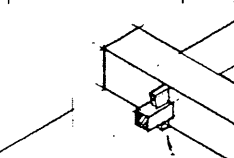
## through tenon

A tenon that extends completely through or beyond the piece into which its corresponding mortise is cut.



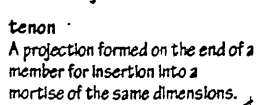
## key

A piece of wood or metal used as a wedge to tighten a joint or to prevent motion between parts.



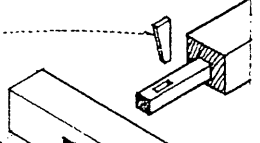
## mortise joint

Any of various joints between two members made by housing a tenon in a mortise. Also called mortise-and-tenon joint.



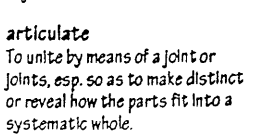
## tenon

A projection formed on the end of a member for insertion into a mortise of the same dimensions.



## keyed joint

A joint fastened or secured by a key.



## articulate

To unite by means of a joint or joints, esp. so as to make distinct or reveal how the parts fit into a systematic whole.



# LIGHT

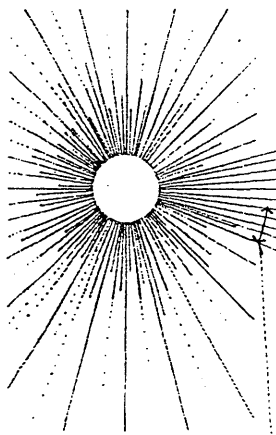
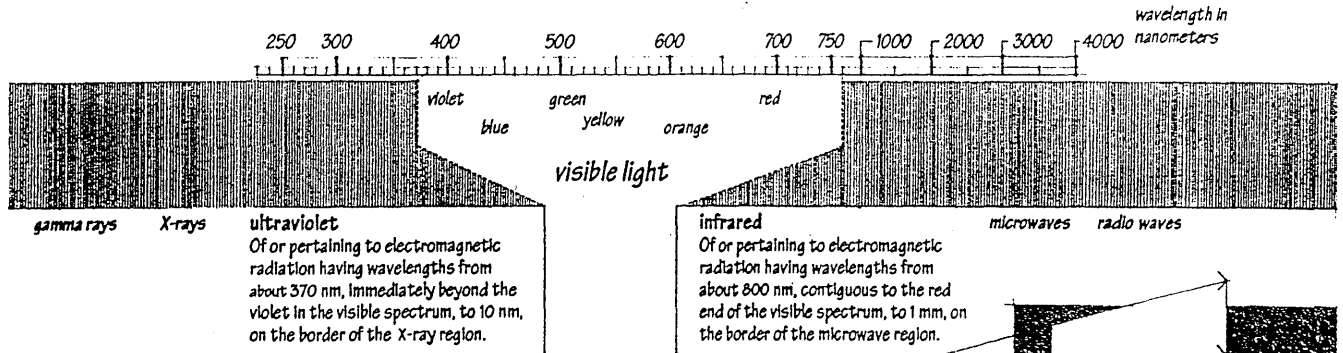
Electromagnetic radiation that the unaided human eye can perceive, having a wavelength in the range from about 370 to 800 nm and propagating at a speed of 186,281 mi./sec (299,972 km/sec).

## nanometer

A unit of length equal to one billionth of a meter, used esp. to express the wavelengths of light in or near the visible spectrum. Abbr.: nm

## angstrom

A unit of length equal to one ten-billionth of a meter, used esp. to express the wavelengths of radiation. Symbol: Å



## luminous intensity

The luminous flux emitted per unit solid angle by a light source, expressed in candelas.

## candlepower

Luminous intensity expressed in candelas.

## candle

A unit of luminous intensity used prior to 1948, equal to the luminous intensity of a wax candle of standard specifications.

## candela

The basic SI unit of luminous intensity, equal to the luminous intensity of a source that emits monochromatic radiation of frequency  $540 \times 10^{12}$  hertz and that has a radiant intensity of  $\frac{1}{683}$  watt per steradian. Also called standard candle. Abbr.: Cd

## solid angle

An angle formed by three or more planes intersecting at a common point.

## steradian

A solid angle at the center of a sphere subtending an area on the surface equal to the square of the radius of the sphere. Abbr.: sr

## luminous flux

The rate of flow of visible light per unit time, expressed in lumens.

## lumen

The SI unit of luminous flux, equal to the light emitted in a solid angle of one steradian by a uniform point source having an intensity of one candela. Abbr.: lm

## cosine law

The law that the illumination produced on a surface by a point source is proportional to the cosine of the angle of incidence. Also called Lambert's law.

## inverse square law

One of several laws relating two quantities such that one quantity varies inversely as the square of the other, as the law that the illumination produced on a surface by a point source varies inversely as the square of the distance of the surface from the source.

## illumination

The intensity of light falling at any given place on a lighted surface, equal to the luminous flux incident per unit area and expressed in lumens per unit of area. Also called illuminance.

## lux

The SI unit of illumination, equal to one lumen per square meter. Abbr.: lx

## foot-candle

A unit of illumination on a surface that is everywhere one foot from a uniform point source of one candela and equal to one lumen incident per square foot. Abbr.: FC

## luminance

The quantitative measure of brightness of a light source or an illuminated surface, equal to the luminous intensity per unit projected area of the source or surface viewed from a given direction.

## lambert

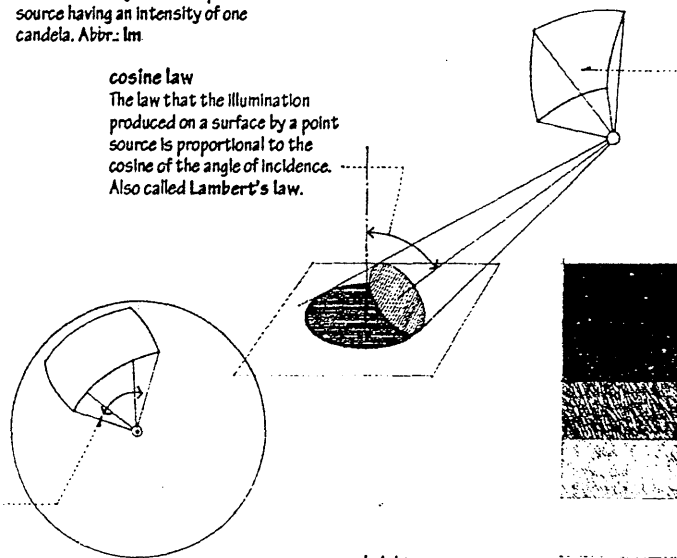
A unit of luminance or brightness equal to 0.32 candela per square centimeter. Abbr.: L

## foot-lambert

A unit of luminance or brightness equal to 0.32 candela per square foot. Abbr.: fL

## brightness

The sensation by which an observer is able to distinguish between differences in luminance.



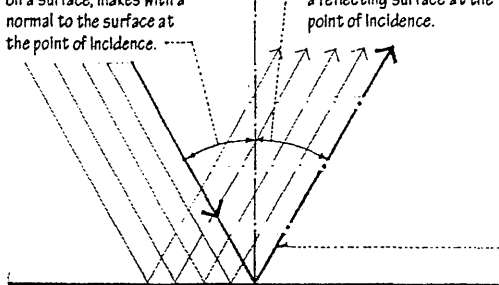
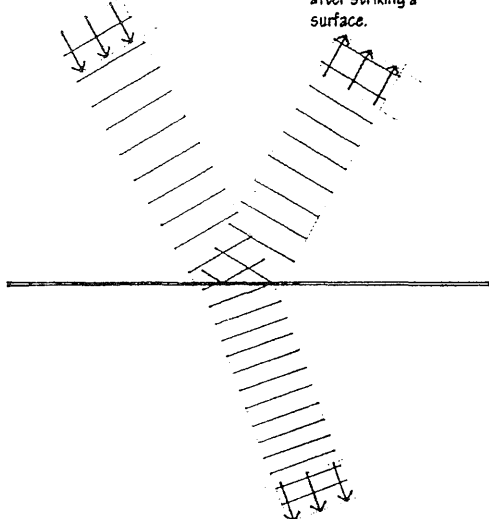
**incidence**  
The striking of a ray of light or sound wave on a surface.

**reflection**  
The return of light, sound, or radiant heat after striking a surface.

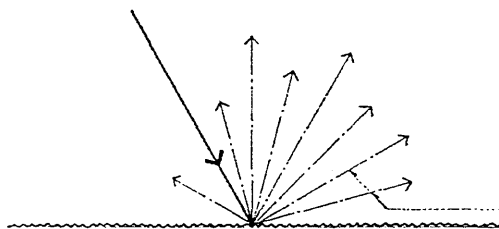
**angle of incidence**  
The angle that a straight line, as a ray of light falling on a surface, makes with a normal to the surface at the point of incidence.

**angle of reflection**  
The angle that a reflected ray makes with a normal to a reflecting surface at the point of incidence.

**law of reflection**  
The principle that when light or sound is reflected from a smooth surface, the angle of incidence is equal to the angle of reflection, and the incident ray, the reflected ray, and the normal to the surface all lie in the same plane.



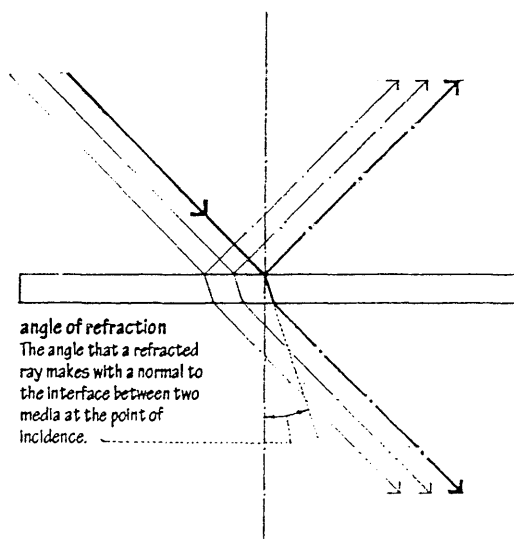
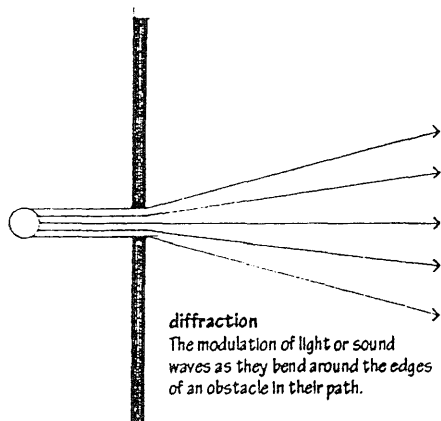
**specular**  
Directed from a smooth, polished surface.



**diffusion**  
A scattered reflection of light from an irregular surface or an erratic dispersion through a translucent material.

**diffuse**  
Dispersed from an irregular surface.

**refraction**  
The change of direction of a ray of light as it passes obliquely from one medium into another in which its velocity is different.

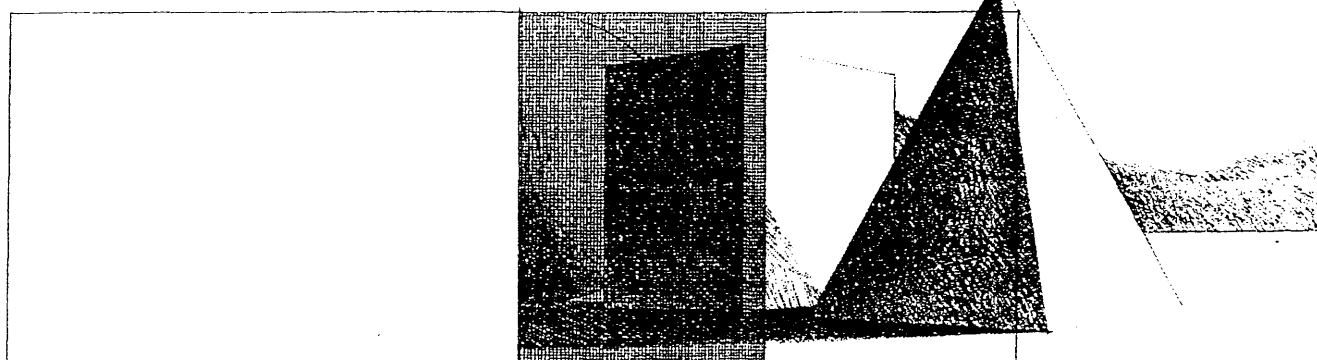


**angle of refraction**  
The angle that a refracted ray makes with a normal to the interface between two media at the point of incidence.

**reflectance**  
The ratio of the radiation reflected by a surface to the total incident on the surface.

**absorptance**  
The ratio of the radiation absorbed by a surface to the total incident on the surface.

**transmittance**  
The ratio of the radiation transmitted through and emerging from a body to the total incident on it, equivalent to one minus the absorptance.



**opaque**  
Impenetrable to light.

**translucent**  
Transmitting and diffusing light so that bodies on the opposite side are not clearly visible.

**transparent**  
Capable of transmitting light so that bodies situated beyond or behind can be distinctly seen.

# LIGHT

## Lamp

Any of various devices for producing light or heat, as by electricity or gas.

## incandescent lamp

A lamp in which a filament gives off light when heated to incandescence by an electric current. Also called light bulb.

## filament

The threadlike conductor of an electric lamp that is heated to incandescence by the passage of an electric current.

## incandescence

The emission of visible light by a body when heated to a high temperature.

## extended-service lamp

A lamp designed for reduced energy consumption and a life longer than the conventionally set value for its general class. Also called long-life lamp.

## efficacy

A measure of the effectiveness with which a lamp converts electric power into luminous flux, equal to the ratio of flux emitted to power input and expressed in lumens per watt.

## rated life

The average life in hours of a given type of lamp, based on laboratory tests of a representative group under controlled conditions.

## three-way lamp

An incandescent lamp having two filaments so that it can be switched to three successive degrees of illumination.

## tungsten lamp

An incandescent lamp having a tungsten filament.

## tungsten-halogen lamp

A tungsten lamp having a quartz bulb containing a small amount of a halogen that vaporizes on heating and redeposits any evaporated tungsten particles back onto the filament. Also called halogen lamp, quartz lamp.

## IR lamp

A tungsten-halogen lamp having an infrared dichroic coating for reflecting infrared energy back to the filament, raising lamp efficiency, and reducing radiant heat in the emitted light beam.

## infrared lamp

An incandescent lamp having a higher percentage of its radiant power in the infrared region than a standard incandescent lamp, often having a red glass bulb to reduce the radiated visible light.

## bulb

The glass housing of an incandescent lamp, filled with an inert gas mixture, usually of argon and nitrogen, to retard evaporation of the filament. Its shape is designated by a letter, followed by a number that indicates the lamp diameter.

## lamp diameter

The maximum diameter of a lamp bulb, measured in eighths of an inch.

## maximum overall length

The dimension in inches from the base of a lamp to the point on the bulb farthest away, or the base-to-base dimension of a lamp having a base at each end.

## light center length

The distance in inches from the center of the filament of a lamp and a reference plane on the lamp base.

## lamp base

The part of a lamp that connects to a lamp holder.

## lamp holder

A device for mechanically supporting and making electrical contact with a lamp. Also called lamp socket.

## A bulb

The standard rounded shape for the bulbs of general-service incandescent lamps.

## B bulb

A flame-shaped bulb for low-wattage, decorative incandescent lamps.

## C bulb

A cone-shaped bulb for low-wattage, decorative incandescent lamps.

## CA bulb

A candle-shaped bulb for low-wattage, decorative incandescent lamps.

## R bulb

A reflector bulb of blown glass for incandescent and high-intensity-discharge lamps, having an internal reflective coating and either a clear or frosted glass front to provide the desired beam spread.

## PAR bulb

A parabolic aluminized reflector bulb of cast glass for incandescent and high-intensity-discharge lamps, having a precisely formed internal reflector and a lensed front to provide the desired beam spread.

## ER bulb

An ellipsoidal reflector bulb for incandescent lamps, having a precisely formed internal reflector that collects light and redirects it into a dispersed pattern at some distance in front of the light source.

## A/5B bulb

An A bulb having a hemispherical, reflective silver bowl opposite the lamp base to decrease glare.

## G bulb

A globe-shaped bulb for incandescent lamps, having a low brightness for exposed use.

## PS bulb

A pear-shaped bulb for large incandescent lamps.

## S bulb

A straight-sided bulb for low-wattage, decorative incandescent lamps.

## TB bulb

A quartz bulb for tungsten-halogen lamps, similar in shape to the A bulb but having an angular profile.

## MR bulb

A multifaceted reflector bulb for tungsten-halogen lamps, having highly polished reflectors arranged in discrete segments to provide the desired beam spread.



**ballast**

A device for maintaining the current through a fluorescent or HID lamp at the desired constant value, and sometimes also providing the required starting voltage and current.

**starter**

A device used with a ballast to provide the starting voltage for a preheat fluorescent lamp.

**T bulb**

A tubular bulb for incandescent, fluorescent, and high-intensity-discharge lamps.

**circulene lamp**

A doughnut-shaped fluorescent lamp for circular luminaires.

**U-bent lamp**

A U-shaped fluorescent lamp for square or rectangular luminaires.

**compact fluorescent lamp**

Any of various small, improved efficiency fluorescent lamps having a single, double, or U-shaped tube, and often an adapter for fitting an incandescent lampholder.

**color temperature**

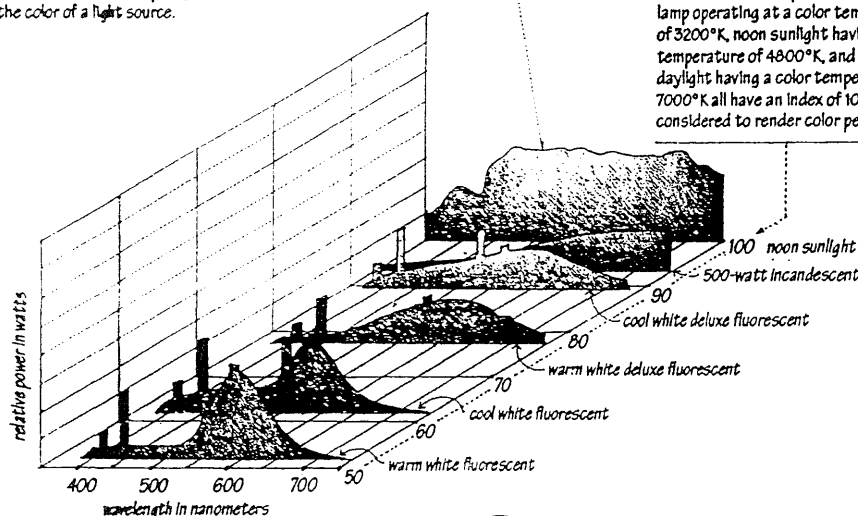
The temperature at which a blackbody emits light of a specified spectral distribution, used to specify the color of a light source.

**spectral distribution curve**

A curve plotting the radiant energy in each wavelength of a particular light source.

**color rendering index**

A measure of the ability of an electric lamp to render color accurately when compared with a reference light source of similar color temperature. A tungsten lamp operating at a color temperature of 3200°K, noon sunlight having a color temperature of 4800°K, and average daylight having a color temperature of 7000°K all have an index of 100 and are considered to render color perfectly.

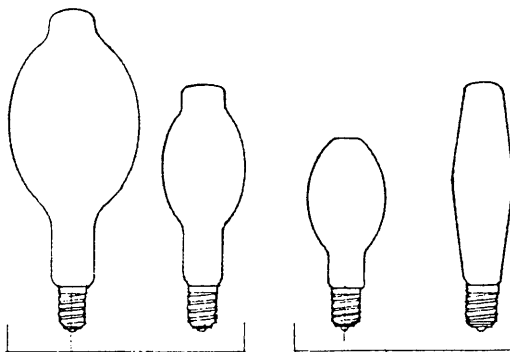


**neon lamp**

A cold-cathode lamp emitting a glow when a high voltage is applied across two electrodes in a neon-filled glass tube.

**cold-cathode lamp**

A discharge lamp having cathodes that emit electrons without having to be heated.



**BT bulb**

A bulged tubular bulb for high-intensity-discharge lamps.

**E bulb**

An ellipsoidal bulb for high-intensity-discharge lamps.

**discharge lamp**

A lamp in which light is produced by the discharge of electricity between electrodes in a gas-filled glass enclosure.

**fluorescent lamp**

A tubular discharge lamp in which light is produced by the fluorescence of phosphors coating the inside of the tube.

**fluorescence**

The emission of radiation, esp. of visible light, by a substance during exposure to external radiation.

**preheat lamp**

A fluorescent lamp that requires a separate starter to preheat the cathodes before opening the circuit to the starting voltage.

**rapid-start lamp**

A fluorescent lamp designed to operate with a ballast having a low-voltage winding for continuous heating of the cathodes, which allows the lamp to be started more rapidly than a preheat lamp.

**instant-start lamp**

A fluorescent lamp designed to operate with a ballast having a high-voltage transformer to initiate the arc directly without any preheating of the cathodes.

**high-output lamp**

A rapid-start fluorescent lamp designed to operate on a current of 800 milliamperes, resulting in a corresponding increase in luminous flux per unit length of lamp.

**very-high-output lamp**

A rapid-start fluorescent lamp designed to operate on a current of 1500 milliamperes, providing a corresponding increase in luminous flux per unit length of lamp.

**high-intensity discharge lamp**

A discharge lamp in which a significant amount of light is produced by the discharge of electricity through a metallic vapor in a sealed glass enclosure. Also, HID lamp.

**mercury lamp**

A high-intensity discharge lamp producing light by means of an electric discharge in mercury vapor. Also called mercury-vapor lamp.

**sodium lamp**

A high-intensity discharge lamp producing light by means of an electric discharge in sodium vapor. Also called sodium-vapor lamp.

**low-pressure sodium lamp**

A sodium lamp producing a yellow, glareless light and used esp. to illuminate roadways. Also, LPS lamp.

**high-pressure sodium lamp**

A sodium lamp producing a broader-spectrum, golden-white light than a low-pressure sodium lamp. Also, HPS lamp.

**metal halide lamp**

A high-intensity discharge lamp similar in construction to a mercury lamp, but having an arc tube to which various metal halides are added to produce more light and improve color rendering.

# LIGHT

## luminaire

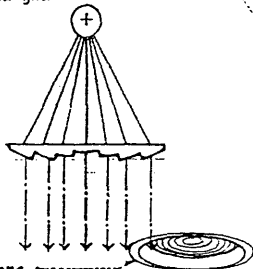
A lighting unit consisting of one or more electric lamps with all of the necessary parts and wiring for positioning and protecting the lamps, connecting the lamps to a power supply, and distributing the light. Also called lighting fixture.

## reflector

A surface for reflecting light, heat, or sound, esp. the device on a luminaire having such a surface for controlling the distribution of light emitted by a lamp.

## lens

A piece of transparent material, as glass or plastic, having two opposite surfaces either or both of which are curved, used in luminaires to focus, disperse, or collimate the emitted light.

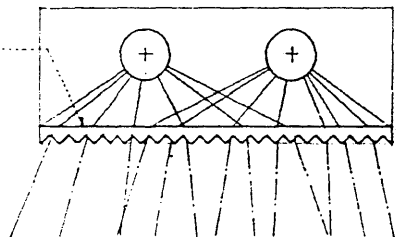


## Fresnel lens

A lens having concentric, prismatic grooves to concentrate light from a small source.

## prismatic lens

A lens having a multifaceted surface with parallel prisms to redirect the rays from a light source.

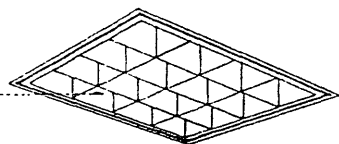


## louver

A finned or vaned device for controlling the radiation from a light source.

## eggcrate

A louvered construction divided into cell-like areas and used for redirecting the light emitted by an overhead source.

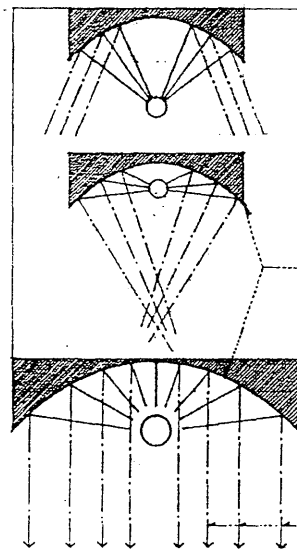
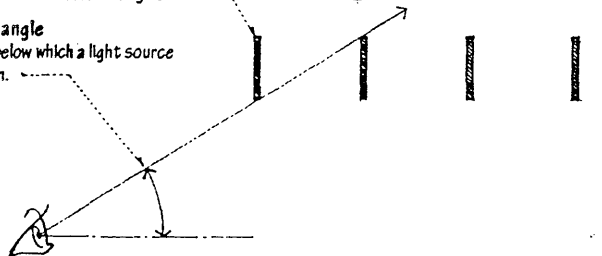


## baffle

A louvered device for shielding a light source from view at certain angles.

## shielding angle

The angle below which a light source can be seen.



## parabolic reflector

A reflector having a parabolic surface to collimate, spread, or focus the rays from a light source, depending on the location of the source.

## collimate

To make rays of light parallel.



## elliptical reflector

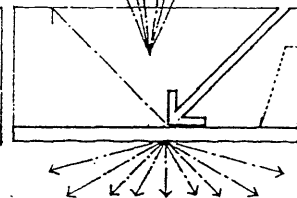
A reflector having an elliptical surface to focus the rays from a light source.

## ridged baffle

A series of circular ridges for reducing the brightness of a light source at an aperture.

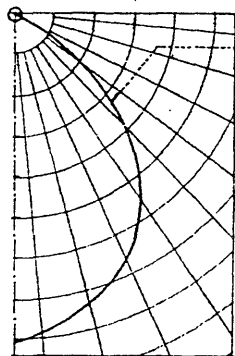
## diffuser

Any of a variety of translucent materials for filtering glare from a light source and distributing the light over an extended area.



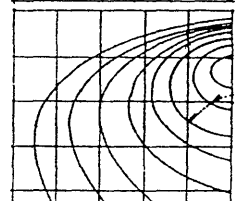
## candlepower distribution curve

A polar plot of the luminous intensity emitted by a lamp, luminaire, or window in a given direction from the center of the light source, measured in a single plane for a symmetrical light source, and in a perpendicular, parallel, and sometimes a 45° plane for an asymmetrical source.



## isochart

A graphic plot of the pattern of illumination produced on a surface by a lamp or luminaire.



## isolux line

A line through all points on a surface where the level of illumination is the same. Called isofootcandle line if illumination is expressed in footcandles.

## luminaire efficiency

The ratio of luminous flux emitted by a luminaire to the total flux emitted by the lamps in the luminaire.

## wall washer

A downlight mounted close to the plane of a wall and equipped with a reflector, baffle, or lens to illuminate the vertical surface.

## floodlight

A lamp designed to project or diffuse a comparatively uniform level of illumination over a large area. Also called flood, flood lamp.

## downlight

A luminaire consisting of a lamp set in a metal cylinder, recessed into or mounted on a ceiling to direct a beam of light downward.

## spotlight

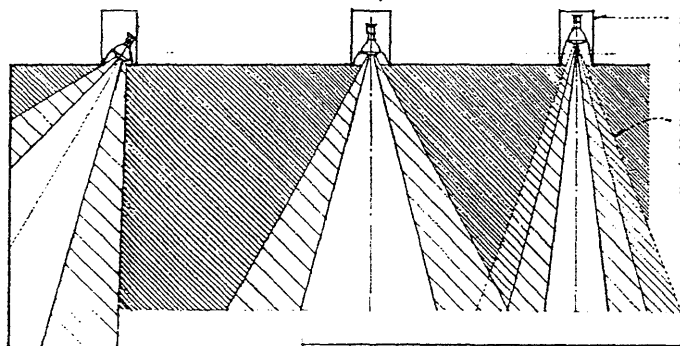
A lamp designed to project a strong, focused beam of light on an object or area. Also called spot.

## spill

Superfluous or useless light rays, as from a spotlight or other focused light source. Also called spill light.

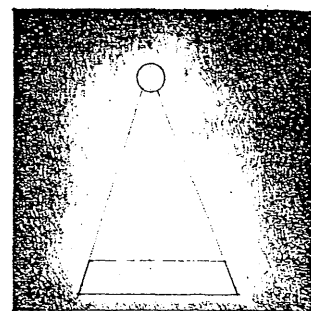
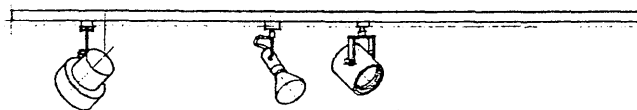
## point source

A light source having a maximum dimension less than one fifth the distance from the source to the surface illuminated.



## track lighting

Lighting provided by adjustable spotlights mounted along a narrow, ceiling- or wall-mounted metal track through which current is conducted.



## cove lighting

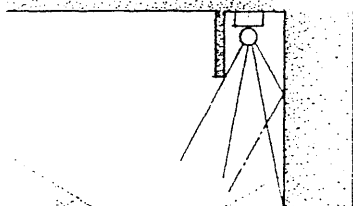
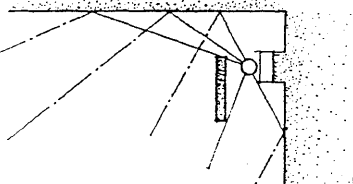
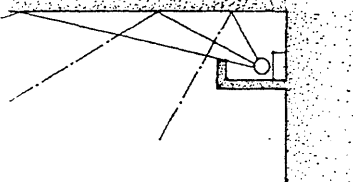
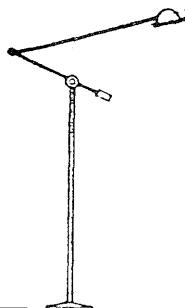
Indirect lighting directed upward from an interior cornice at the edge of a ceiling.

## valance lighting

Indirect lighting directed upward or downward from a light source concealed by a horizontal board or band.

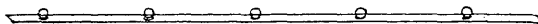
## cornice lighting

Indirect lighting directed downward from an interior cornice at the edge of a ceiling.



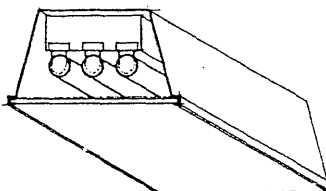
## light strip

A rigid or flexible tape with exposed low-voltage light sources of 1 to 10 watts.



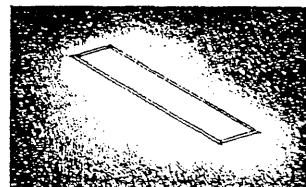
## troffer

A luminaire having a trough-shaped reflector holding one or more fluorescent lamps.



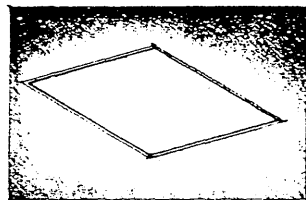
## linear source

A light source having one dimension significantly greater than its other dimensions, as a fluorescent lamp.



## area source

A light source having significant dimensions in two directions, as a large window or a luminous ceiling.

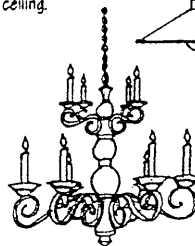
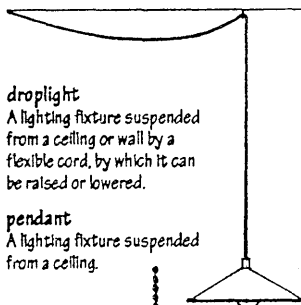


## droplight

A lighting fixture suspended from a ceiling or wall by a flexible cord, by which it can be raised or lowered.

## pendant

A lighting fixture suspended from a ceiling.

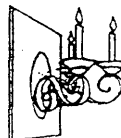


## chandelier

A decorative lighting fixture suspended from a ceiling, usually having branched supports for a number of lamps.

## sconce

A decorative wall bracket for candles or other lights.



## bridge lamp

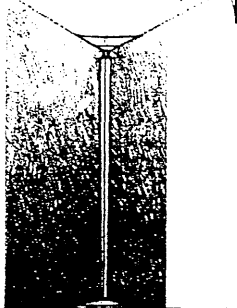
A floor lamp having the light source on a hinged, horizontally adjustable arm.

## gooseneck lamp

A desk lamp having a flexible shaft resembling the neck of a goose.

## torchère

A floor lamp having its light source within a reflecting bowl that directs the light upward. Also, torchère, torchier.



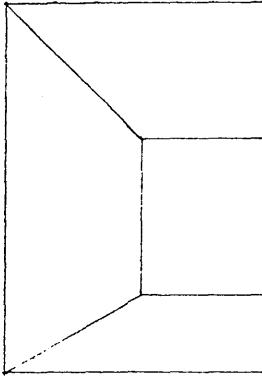
# LIGHT

## lighting

The science, theory, or method of providing illumination through the use of electric lamps.

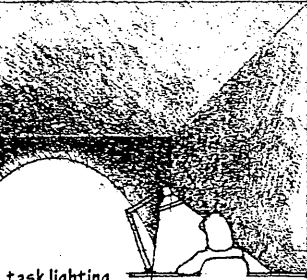
### general lighting

Lighting designed to provide a uniform level of illumination throughout an area.



### local lighting

Lighting designed to provide a relatively high level of illumination over a small area, with a surrounding area of lower intensity from spill light.

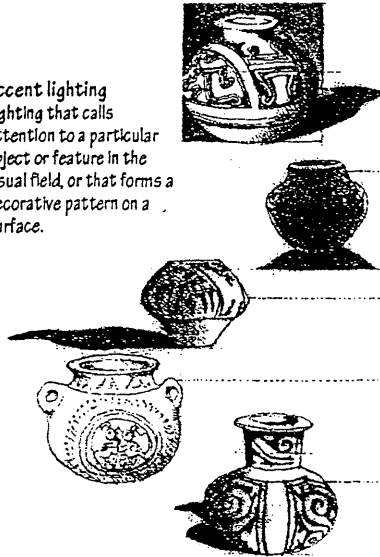


### task lighting

Lighting designed to provide strong illumination for a visually demanding activity, as reading or drafting.

### accent lighting

Lighting that calls attention to a particular object or feature in the visual field, or that forms a decorative pattern on a surface.



### highlight

To emphasize by illuminating with a strong light.

### backlight

To illuminate something from behind in order to enhance depth or to separate the subject from its background.

### sidelight

Light coming or produced from the side.

### soft light

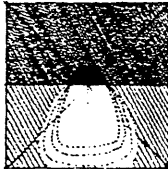
Diffuse light that produces little contrast and poorly defined shadows on the subject.

### hard light

Direct light that produces high contrast and distinct shadows on the subject.

### direct lighting

Lighting in which luminaires distribute 90% to 100% of the emitted light downward on the surface or area to be illuminated.



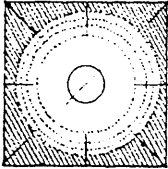
### semidirect lighting

Lighting in which luminaires distribute 60% to 90% of the emitted light downward.



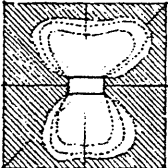
### general diffuse lighting

Lighting from luminaires that emit an approximately equal distribution of light upward and downward.



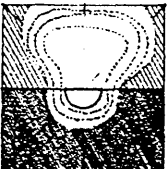
### direct-indirect lighting

General diffuse lighting in which little light is emitted in the horizontal plane of the luminaires.



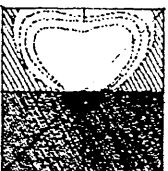
### semi-indirect lighting

Lighting in which luminaires distribute 60% to 90% of the emitted light upward.



### indirect lighting

Lighting in which luminaires distribute 90% to 100% of the emitted light upward, esp. to avoid glare or prevent shadows.



## glare

The sensation produced by any brightness within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss of visibility.

### adaptation

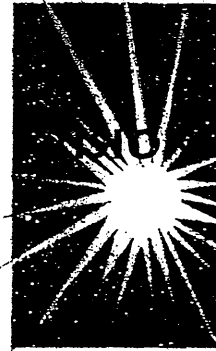
The regulating by the pupil of the quantity of light entering the eye, resulting in a change in the sensitivity of the eye's photoreceptors to light.

### visual comfort probability

A rating of the likelihood that a lighting system will not cause direct glare, expressed as the percentage of people who may be expected to experience visual comfort when seated in the least favorable visual position.

### brightness ratio

The ratio between the luminance of an object and that of its background. Also called **contrast ratio**.



### blinding glare

Glare so intense that, for an appreciable length of time after it has been removed, visibility is lost.

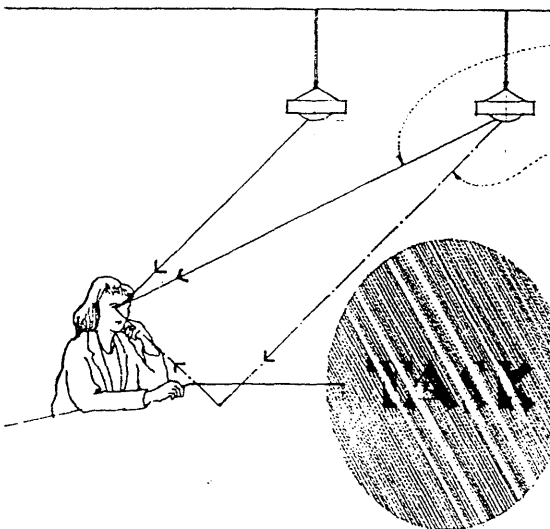
### disability glare

Glare that reduces visibility or impairs visual performance, often accompanied by discomfort.

### discomfort glare

Glare that produces discomfort but does not necessarily interfere with visibility or visual performance.

# CONTRAST



### direct glare

Glare resulting from a high brightness ratio or an insufficiently shielded light source in the visual field.

### reflected glare

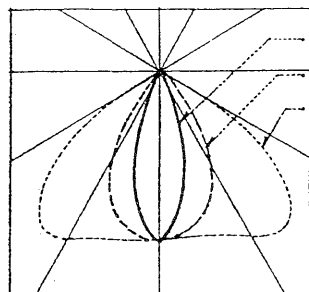
Glare resulting from the specular reflection of a light source within the visual field. Also called **indirect glare**.

### veiling reflectance

Reflected glare on a task surface that reduces the contrast necessary for seeing details.

**beam spread**

The angle of a light beam that intersects the candlepower distribution curve at points where the luminous intensity equals a stated percent of a maximum reference intensity.



**beam**

A group of nearly parallel rays of light.

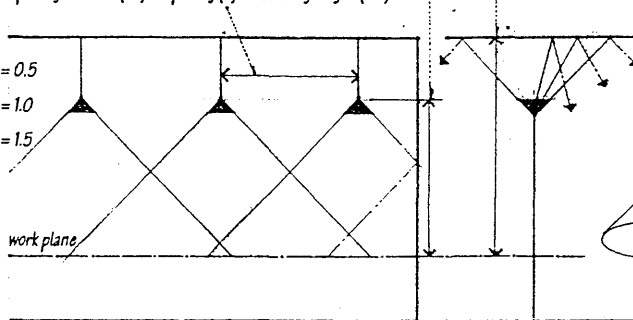
**throw**

The effective length of a beam of light.

**spacing criteria**

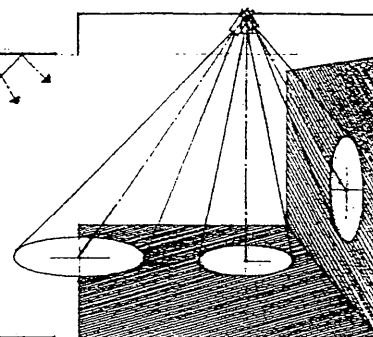
A formula for determining how far apart luminaires may be installed for uniform lighting of a surface or area, based on mounting height.

$$\text{spacing criteria (sc)} = \text{spacing (s)} / \text{mounting height (mh)}$$



**point method**

A procedure for calculating the illumination produced on a surface by a point source from any angle, based on the inverse square and cosine laws.



**ceiling cavity**

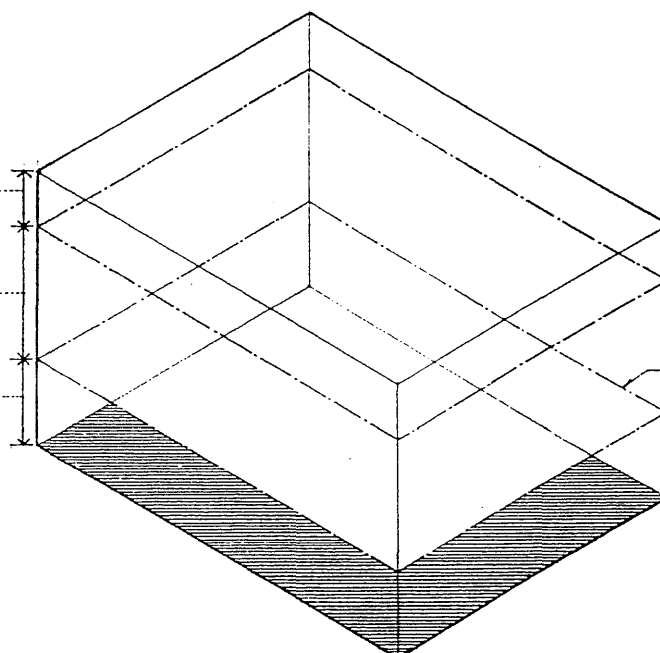
The cavity formed by the ceiling, a plane of suspended luminaires, and the wall surfaces between these two planes.

**room cavity**

The cavity formed by a plane of luminaires, the work plane, and the wall surfaces between these two planes.

**floor cavity**

The cavity formed by the work plane, the floor, and the wall surfaces between these two planes.



**room cavity ratio**

A single number derived from the dimensions of a room cavity for use in determining the coefficient of utilization.

**light loss factor**

Any of several factors used in calculating the effective illumination provided by a lighting system after a given period of time and under given conditions. Formerly called maintenance factor.

**coefficient of utilization**

The ratio of the luminous flux reaching a specified work plane to the total lumen output of a luminaire, taking into account the proportions of a room and the reflectances of its surfaces.

**recoverable light loss factor**

A light loss factor that may be recovered by relamping or maintenance, as lamp lumen depreciation, luminaire dirt depreciation, and room surface dirt depreciation.

**lumen method**

A procedure for determining the number and types of lamps, luminaires, or windows required to provide a uniform level of illumination on a work plane, taking into account both direct and reflected luminous flux. Also called zonal cavity method.

**work plane**

The horizontal plane at which work is done and on which illumination is specified and measured, usually assumed to be 30 in. (762 mm) above the floor.

**lamp lumen depreciation**

A light loss factor representing the decrease in luminous output of a lamp during its operating life, expressed as a percentage of initial lamp lumens.

**luminaire dirt depreciation**

A light loss factor representing the decrease in luminous output of a luminaire resulting from the accumulation of dirt on its surfaces, expressed as a percentage of the illumination from the luminaire when new or clean.

**room surface dirt depreciation**

A light loss factor representing the decrease in reflected light resulting from the accumulation of dirt on a room's surfaces, expressed as a percentage of the light reflected from the surfaces when clean.

$$\text{average maintained illuminance} = \frac{\text{initial lamp lumens} \times \text{CU} \times \text{RLLF} \times \text{NRLLF}}{\text{work area}}$$

$$\text{initial lamp lumens} = \text{lumens per lamp} \times \text{lamps per luminaire}$$

**nonrecoverable light loss factor**

Any of several permanent light loss factors that take into account the effects of temperature, voltage drops or surges, ballast variations, and partition heights.

# LIGHT

## daylighting

The science, theory, or method of providing illumination through the use of light of day.

## daylight

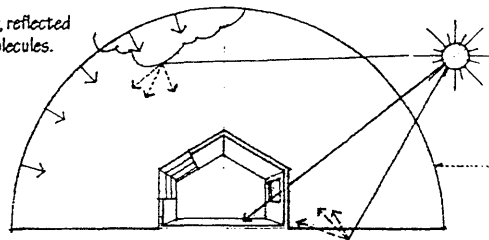
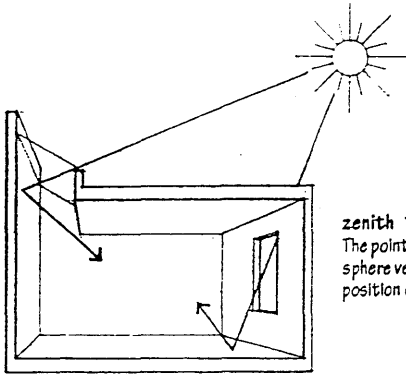
To provide an interior space with daylight from both direct and indirect sources.

## skylight

The light from the sky, reflected and diffused by air molecules.

## sunlight

The direct light of the sun.



## clear sky

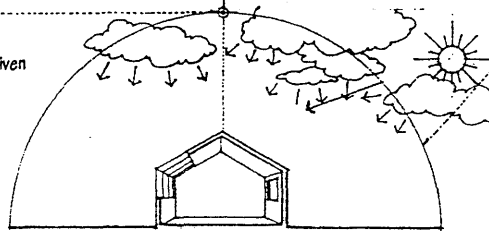
A sky having less than 30% cloud cover with the solar disk unobstructed. Also, the CIE standard for a reference cloudless sky condition, having the greatest luminance near the sun and least luminance 90° from the sun.

## ground light

Sunlight or skylight reflected by surfaces below the plane of the horizon.

## zenith

The point on the celestial sphere vertically above a given position or observer.



## cloudy sky

A sky having between 30% and 70% cloud cover, with the solar disk obstructed.

## overcast sky

A sky having 100% cloud cover. Also, the CIE standard for a reference sky having a luminance distribution three times brighter near the zenith than at the horizon.

## CIE

Commission Internationale de l'Éclairage, an international commission developing definitions, standards, and procedures for the art, science, and technology of lighting.

## IES

Illuminating Engineering Society, a professional society in North America devoted to the development and dissemination of standards and procedures relating to the art, science, and technology of lighting.

## artificial sky

A hemispherical dome or similar enclosure illuminated by concealed light sources that simulate the luminance distribution of a clear or overcast sky, used for studying and testing daylighting techniques on architectural models placed near its center.

## heliogon

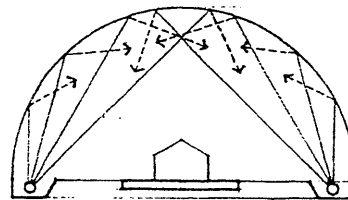
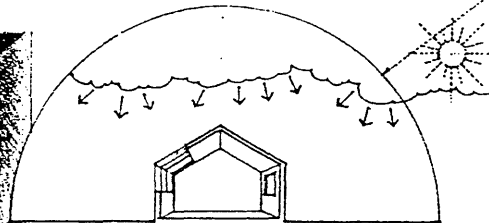
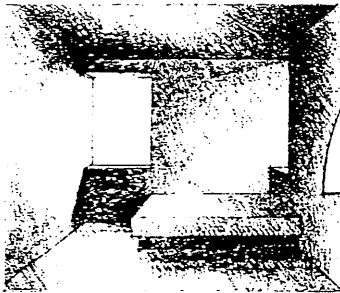
A device for orienting an architectural model to a light source representing the sun, calibrated with respect to latitude, time of day, and season of the year and used for studying daylighting techniques and shadows cast by the sun.

## counterlight

Light originating from sources facing each other, as from windows in opposite walls.

## crosslight

Light originating from sources not facing each other, as from windows in adjacent walls.



## daylight factor method

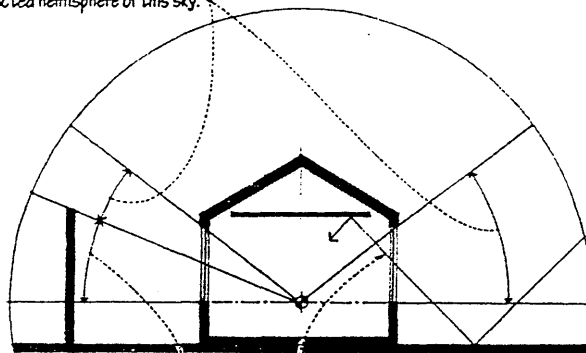
A method for calculating the performance of a daylighting system, based on the daylight factor.

## sky component

A component of the daylight factor, equal to the ratio of daylight illumination at a point on a given plane received directly from a sky of assumed or known luminance distribution to the simultaneously measured illuminance on a horizontal plane from an unobstructed hemisphere of this sky.

## daylight factor

A measure of daylight illuminance, expressed as the ratio of daylight illumination at a point on a given plane to the simultaneously measured illuminance on a horizontal plane from an unobstructed sky of assumed or known luminance distribution.



## external reflected component

A component of the daylight factor, equal to the ratio of the daylight illumination at a point on a given plane received directly from exterior reflecting surfaces to the simultaneously measured illuminance on a horizontal plane from an unobstructed sky of assumed or known luminance distribution.

## internal reflected component

A component of the daylight factor, equal to the ratio of the daylight illumination at a point on a given plane received directly or indirectly from interior reflecting surfaces to the simultaneously measured illuminance on a horizontal plane from an unobstructed sky of assumed or known luminance distribution.

