

Any of the forces to which a structure is subjected.

### concentrated load

A load acting on a very small area or particular point of a supporting structural element.

### distributed load

A load extending over the length or area of the supporting structural element.

### uniformly distributed load

A distributed load of uniform magnitude.

### static load

A load applied slowly to a structure until it reaches its peak value without fluctuating rapidly in magnitude or position. Under a static load, a structure responds slowly and its deformation reaches a peak when the static force is maximum.

### occupancy load

The live load on a structure resulting from the weight of people, furniture, stored material, and other similar items in a building. Building codes specify minimum live loads for various uses and occupancies.

### snow load

The live load resulting from the weight of snow accumulating on a roof. Snow loads vary with geographic location, site exposure, wind conditions, and roof geometry.

### water load

The live load of water that may accumulate on a roof because of its form, deflection, or the clogging of its drainage system.

### live load

Any moving or movable load on a structure resulting from occupancy, collected snow and water, or moving equipment. A live load typically acts vertically downward, but may act horizontally as well to reflect the dynamic nature of a moving load.

### dead load

The static load acting vertically downward on a structure, comprising the self-weight of the structure and the weight of building elements, fixtures, and equipment permanently attached to it.

### water pressure

The uplifting force a water table exerts on a foundation system.

### earth pressure

The horizontal force a soil mass exerts on a vertical retaining structure.

### settlement load

A load imposed on a structure by subsidence of a portion of the supporting soil and the resulting differential settlement of its foundation.

### equivalent load

A load substituted by a building code for an actual load, derived on the basis of statistical evidence for given types of buildings. For safety, the equivalent load is usually a multiple of the load that would produce failure or unacceptable deflection.

### load combination

The dead load and two or more live loads assumed to occur simultaneously on a structure when their combined effect can be reasonably expected to be less than the sum of their separate actions.

1.00 (dead + live + snow loads)

0.75 (dead + live + snow + wind or seismic loads)

### load reduction

A reduction in design loading allowed by building codes for certain load combinations, based on the assumption that not all live loads will act simultaneously on a structure at their full value. After all possible load combinations are considered, a structure is designed to carry the most severe but realistic distribution, concentration, and combination of loads.

### erection stress

The stress induced on a building unit or component by loads applied during the erection process.

### erection bracing

The temporary bracing required to secure the units or components of a building until permanently fastened in place.

### wind load

### earthquake load

### moving load

A kinetic load of short duration due to moving vehicles, equipment, and machinery. Building codes treat this load as a static load, compensating for its dynamic nature by amplifying the static load. Also called impact load.

### impact factor

A factor by which the effect of a static load is multiplied to approximate the effect of applying the same load dynamically.

### dynamic load

A load applied suddenly to a structure, often with rapid changes in magnitude and location. Under a dynamic load, a structure develops inertial forces in relation to its mass and its maximum deformation does not necessarily correspond to the maximum magnitude of the applied force.

### construction load

A temporary load on a structure occurring during its erection, as from wind or the weight of construction equipment and stored materials.

# LOAD

## Lateral load

A load acting horizontally on a structure, as a wind or earthquake load.

## earthquake load

The forces exerted on a structure by an earthquake.

## earthquake

A series of longitudinal and transverse vibrations induced in the earth's crust by the abrupt movement of plates along fault lines. The shocks of an earthquake propagate along the earth's surface in the form of waves and attenuate logarithmically with distance from its source.

## epicenter

A point directly above the hypocenter, from which the shock waves of an earthquake apparently emanate.

## hypocenter

The point of origin of an earthquake. Also called focus.

## fault

A break in the earth's crust accompanied by a dislocation in the plane of the fracture.

## plate

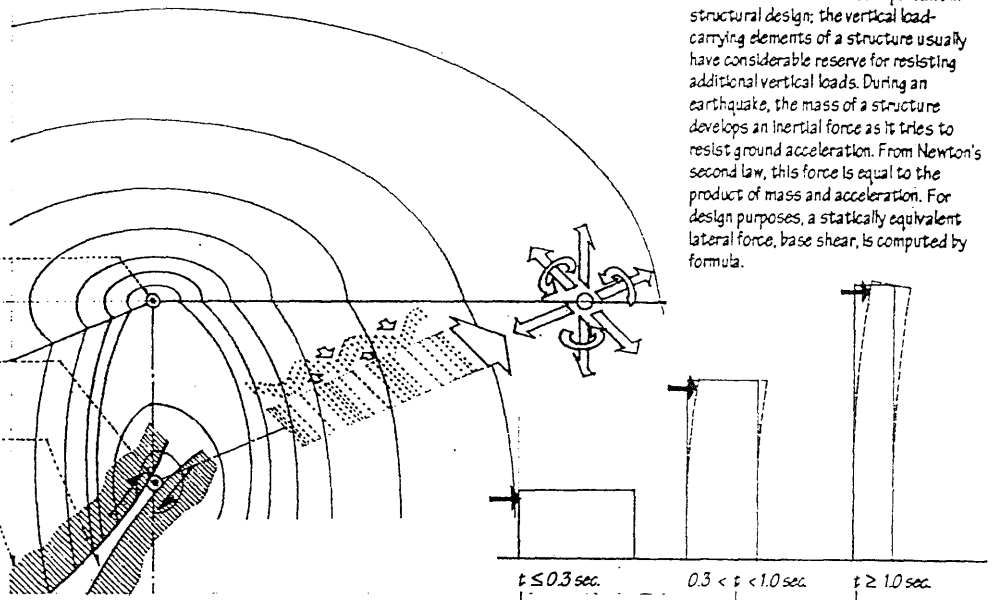
Any of the huge movable segments into which the earth's crust is divided.

## seismic

Of, pertaining to, or caused by an earthquake or vibration of the earth.

## seismic force

Any of the forces caused by the vibratory ground motions of an earthquake. While these motions are three-dimensional in nature, their horizontal components are considered to be the most important in structural design; the vertical load-carrying elements of a structure usually have considerable reserve for resisting additional vertical loads. During an earthquake, the mass of a structure develops an inertial force as it tries to resist ground acceleration. From Newton's second law, this force is equal to the product of mass and acceleration. For design purposes, a statically equivalent lateral force, base shear, is computed by formula.



## vibration

The oscillating, reciprocating, or other periodic motion of an elastic body or medium when forced from a position or state of equilibrium.

## periodic motion

Any motion that recurs in the same form at equal intervals of time.

## harmonic motion

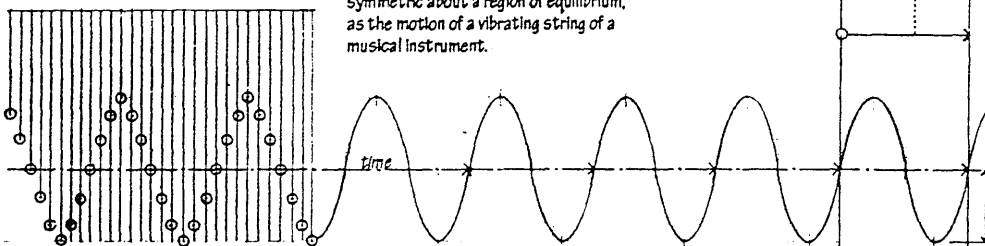
Periodic motion consisting of one or more vibratory motions that are symmetric about a region of equilibrium, as the motion of a vibrating string of a musical instrument.

## period

The time required for one complete cycle of a wave or oscillation.

## natural period of vibration

The time required for a body subject to a vibratory force to go through one oscillation in the direction under consideration. A structure's natural period of vibration varies according to its height above the base and its dimension parallel to the direction of the applied forces. A relatively stiff structure tends to oscillate rapidly and has a short period of vibration while a more flexible structure tends to oscillate slowly and has a longer period. Also called fundamental period of vibration.



## amplitude

The maximum displacement from the mean position during one period of an oscillation.

## oscillation

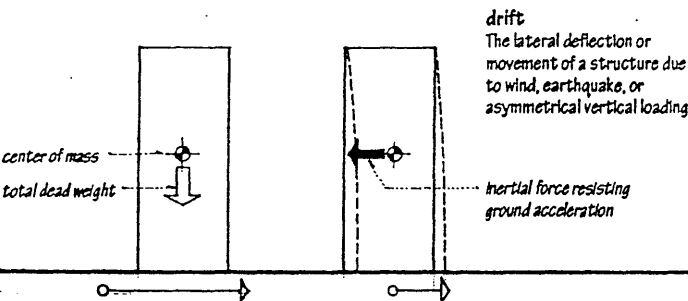
A single swing of an oscillating body from one extreme limit to another.

## oscillate

To swing back and forth like a pendulum between alternating extremes.

## resonance

An abnormally large vibration in a system caused by a relatively small vibratory force of the same or nearly the same period as the natural period of vibration of the system.



## drift

The lateral deflection or movement of a structure due to wind, earthquake, or asymmetrical vertical loading.

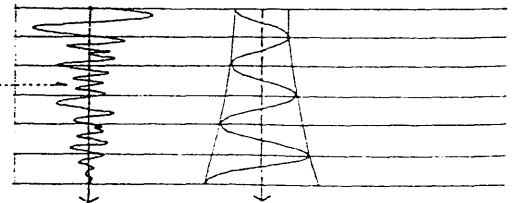
inertial force resisting ground acceleration

## ground acceleration

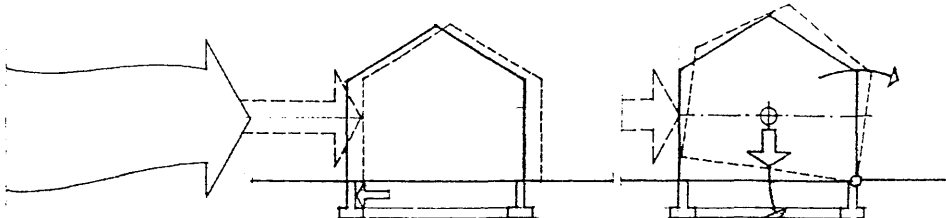
The rate of change in the velocity of ground movement with respect to time. High accelerations are the most damaging to a structure, which must try to follow the rapid changes in ground movement during an earthquake.

## damping

The absorption or dissipation of energy to progressively diminish successive oscillations or waves of a vibrating structure.







## wind load

Any of the forces exerted by the kinetic energy of a moving mass of air, resulting in pressure on certain parts of a structure and suction on others.

## sliding

The horizontal movement of a structure in response to a lateral load.

## uplift

The raising of a structure or portion of structure in response to an overturning moment or wind suction.

## flutter

The rapid oscillations of a flexible cable or membrane structure caused by the aerodynamic effects of wind. Also called aerodynamic oscillation.

## Bernoulli equation

An expression of the conservation of energy in streamline flow, stating that the sum of the ratio of pressure to mass density, the square of the velocity divided by 2, and the product of the gravitational constant and vertical height, remains constant. Also called Bernoulli's theorem.

## dynamic wind pressure

The pressure exerted by a moving mass of air, derived from Bernoulli's equation and equal to the product of the mass density of the air and the square of the velocity at a given height divided by 2.

## design wind pressure

A minimum design value for the equivalent static pressure on the exterior surfaces of a structure resulting from a critical wind velocity, equal to the wind stagnation pressure modified by a number of coefficients to account for the effects of exposure condition, building height, wind gusts, and the geometry and orientation of the structure to the impinging air flow.

## importance factor

A coefficient for increasing the design values for wind or seismic forces on a building because of its large occupancy, its potentially hazardous contents, or its essential nature in the wake of a hurricane or earthquake.

## wind stagnation pressure

The static equivalent to dynamic wind pressure used as a reference in calculating design wind pressure, specified in pounds per square foot and equal to 0.00256 times the square of the basic wind speed for the geographic location. Wind velocity approaches zero as the moving air mass parts to flow around an obstruction. Since the sum of static and dynamic pressures remains constant in streamline flow, all of the energy in the flow at this point of stagnation is in the form of static pressure.

## basic wind speed

The wind velocity used in calculating wind stagnation pressure, usually the extreme fastest-mile wind speed recorded for a geographic location at a standard height of 33 ft. (10 m) and based on a 50-year mean occurrence interval. Also called design wind velocity.

$$P = C_e C_q q_s I$$

## pressure coefficient

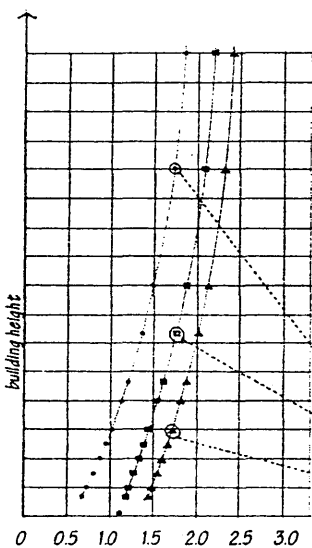
A coefficient modifying design wind pressure to reflect how the geometry and orientation of the various parts of a structure alter the effects of an impinging air flow. Inward or positive coefficients result in wind pressure while outward or negative coefficients result in wind suction.

## fastest-mile wind speed

The average speed of a one-mile-long column of air that passes over a given point, measured in miles per hour.

## wind suction

The negative pressure exerted by wind on the sides and leeward vertical surfaces of a building and normal to windward roof surfaces having a slope less than 30°.



## height factor

A coefficient increasing design wind pressure to account for the increase in wind velocity with height above the ground.

## gust factor

A coefficient increasing design wind pressure to account for the dynamic effects of wind gusts.

## exposure condition

One of four conditions modifying design wind pressure according to obstructions in the area surrounding a building site.

exposure A: urban areas with high-rise buildings, or rough, hilly terrain;

exposure B: suburban sites, wooded areas, or rolling terrain;

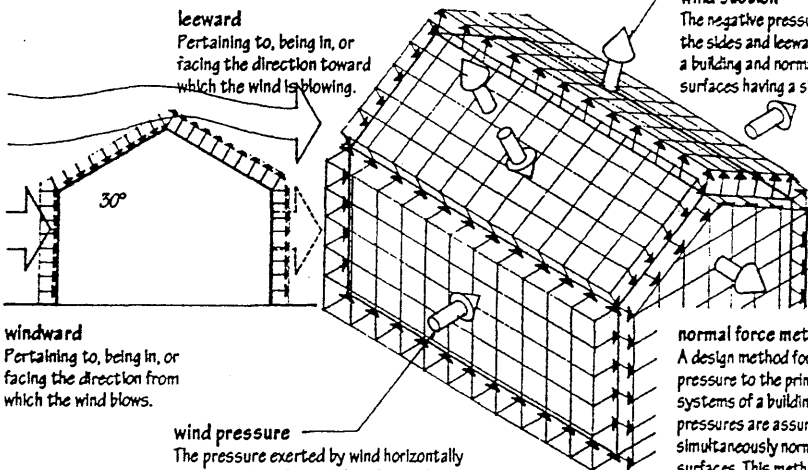
exposure C: flat, open terrain with minimal obstructions;

exposure D: flat, unobstructed terrain facing large bodies of water.

The more open a site, the greater the wind speed and the resulting design wind pressure.

## leeward

Pertaining to, being in, or facing the direction toward which the wind is blowing.



## windward

Pertaining to, being in, or facing the direction from which the wind blows.

## wind pressure

The pressure exerted by wind horizontally on the windward vertical surfaces of a building and normal to windward roof surfaces having a slope greater than 30°.

## normal force method

A design method for applying design wind pressure to the primary frame and bracing systems of a building, in which wind pressures are assumed to act simultaneously normal to all exterior surfaces. This method may be used for any structure, but is required for gabled rigid frames.

Tall, slender buildings, structures with unusual or complex shapes, and lightweight, flexible structures subject to flutter require wind tunnel testing or computer modeling to investigate how they respond to the distribution of wind pressure.

## projected area method

A design method for applying design wind pressure to the primary frame and bracing systems of a building. In which the total wind effect is considered to be a combination of a single inward or positive horizontal pressure acting on the full vertical projected area of the building and an outward or negative pressure acting on the full horizontal projected area of the building. This method may be used for any structure less than 200 ft. (61 m) high, except for gabled rigid frames.



Building with units of various natural or manufactured products, as stone, brick, or concrete block, usually with the use of mortar as a bonding agent.

**field**  
The expanse of a masonry wall between openings and corners, usually composed primarily of stretchers.

**head joint**  
The vertical joint between two masonry units, perpendicular to the face of a wall.

**shoved joint**  
A head joint formed by applying mortar to the end of a masonry unit and forcing it in position against the last masonry unit laid.

**collar joint**  
The vertical joint between two wythes of masonry.

**bed joint**  
The horizontal joint between two masonry courses.

**bed**  
The underside of a brick or other masonry unit, or the layer of mortar in which a masonry unit is laid.

**clip joint**  
A bed joint made thicker than usual in order to level the course above.

**wythe**  
A continuous vertical section of a masonry wall one unit in thickness. Also, wythe.

**course**  
A continuous, usually horizontal range of bricks, tiles, or shingles, as in a wall or roof.

**range**  
A continuous course of masonry units having the same height from end to end.

**closer**  
The last masonry unit laid in a course.

**corbel**  
A brick or stone projecting from within a wall, usually to support a weight.

**corbeling**  
An overlapping arrangement of bricks or stones in which each course steps upward and outward from the vertical face of a wall.

**tooled joint**  
A weather-resistant mortar joint compressed and shaped with any tool other than a trowel.

**concave joint**  
A curved, hollowed mortar joint formed by a rounded bar.

**V-joint**  
An angular, hollowed mortar joint formed by a V-shaped jointer.

**weathered joint**  
A mortar joint smoothed by pressing the trowel in at the upper edge of the joint, forming a sloping surface that sheds water readily.

**flush joint**  
A mortar joint struck flush with the masonry.

**struck joint**  
A mortar joint pressed in at the lower edge and sloping in the reverse direction from a weathered joint.

**raked joint**  
A mortar joint made by removing mortar to a given depth with a square-edged tool before hardening.

**point**  
To fill and finish the surface of a masonry joint with mortar after the masonry has been laid, either to finish the joint or to repair a defective joint.

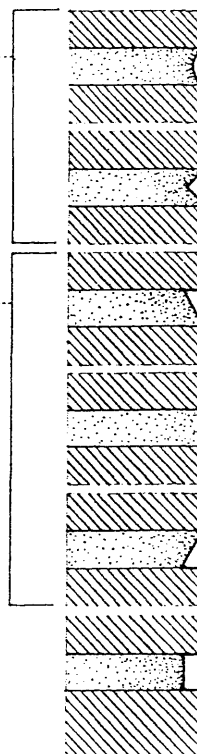
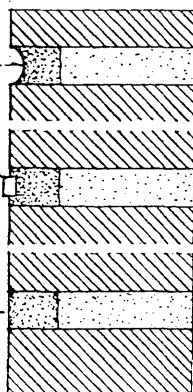
**tuck pointing**  
The process of raking out defective mortar from a masonry joint, filling with fresh mortar, and tooling the joint.

**tuck and pat pointing**  
Tuck pointing having an ornamental fillet of lime or putty projecting from the joint.

**bastard pointing**  
An imitation of tuck and pat pointing, having a fillet made from the mortar of the joint.

**flat-joint pointing**  
Pointing having flush joints of common mortar.

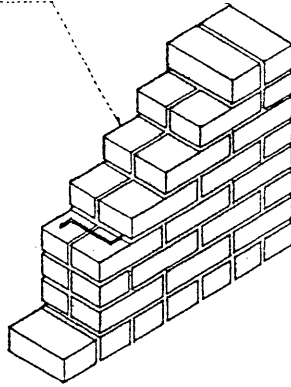
**troweled joint**  
A mortar joint finished by striking off excess mortar with a trowel.



# MASONRY

## solid masonry

A wall constructed of brick or other solid masonry units laid contiguously with all joints solidly filled with mortar and adjacent wythes bonded by masonry headers or metal ties.



## cavity wall

A masonry wall having a facing and backing completely separated except for metal ties and enclosing an inner space serving to prevent penetration by water.

## facing

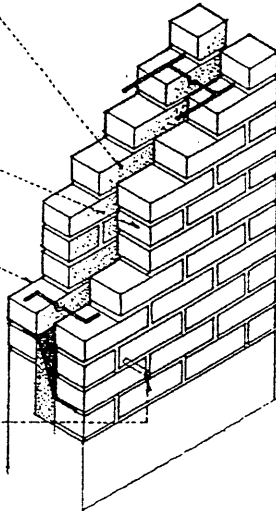
An ornamental or protective layer, as the outer wythe of a masonry wall.

## backing

Something that forms the back or provides support, strength, or protection from the back, as the inner wythe or wythes of a masonry wall.

## weep hole

A small opening in a cavity wall, retaining wall, or other construction for draining off accumulated moisture, as from condensation or leakage.



## faced wall

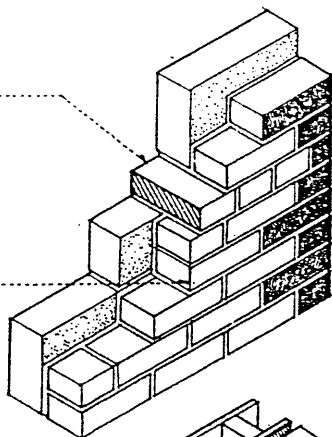
A wall having a masonry facing bonded to a backing so as to exert a common action under load.

## adhered veneer

A veneer supported by and secured to a backing by means of a bonding material.

## veneer

A nonstructural facing of brick, stone, concrete, or tile attached to a backing for the purpose of ornamentation, protection, or insulation.

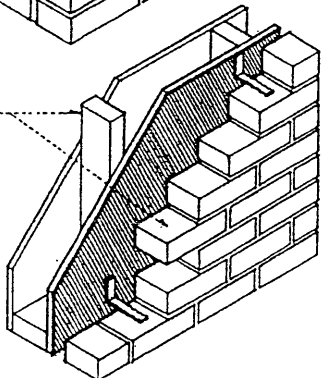


## veneered wall

A wall having a nonstructural facing attached but not bonded to a supporting structure.

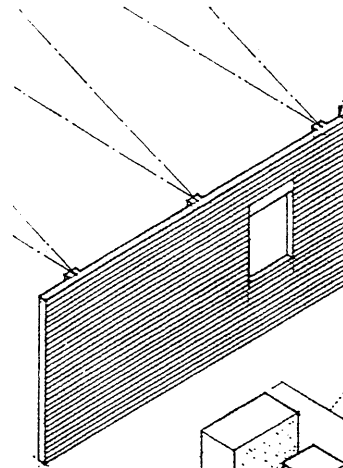
## anchored veneer

A veneer supported by and secured to a backing by means of mechanical fasteners.



## economy wall

A brick wall 4 in. (102 mm) thick, plastered and strengthened at intervals with 8-in. (203-mm) pilasters to support roof trusses.



## composite wall

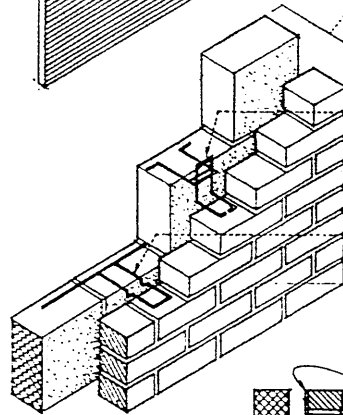
A masonry wall having at least one wythe dissimilar to the other wythe or wythes with respect to type or grade of masonry unit or mortar.

## adjustable tie

A metal tie consisting of two interlocking parts which enable it to adapt to bed joints at different elevations.

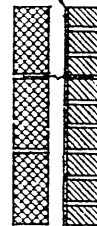
## tie

Any of various corrosion-resistant metal devices for holding two parts of a construction together, as the wythes of a masonry wall.



## back plaster

To parge a part of a wall that is not seen, as behind the outer wythe of a cavity wall in order to exclude air and moisture from the interior of the wall.

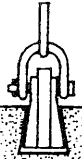


## panel wall

A non-load-bearing exterior masonry wall wholly supported at each story.

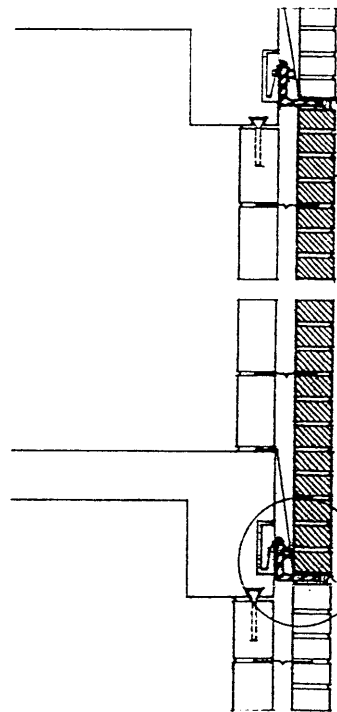
## lewis

A device for lifting a dressed stone or precast concrete panel, consisting of a number of pieces fitting together to fill a dovetailed recess cut into the stone or panel.



## soft joint

A compressible joint directly below a supporting shelf or relieving angle, allowing for the expansion and contraction of a panel wall and preventing the weight of higher courses from being transmitted to the masonry below.



# mortar

A plastic mixture of lime or cement, or a combination of both, with sand and water, used as a bonding agent in masonry construction.

# cement mortar

A mortar made by mixing portland cement, sand, and water.

# cement-lime mortar

A cement mortar to which lime is added to increase its plasticity and water-retentivity.

# masonry cement

A proprietary mix of portland cement and other ingredients, as hydrated lime, plasticizers, air-entraining agents, and gypsum, requiring only the addition of sand and water to make cement mortar.

# epoxy mortar

A mortar consisting of epoxy resin, a catalyst, and fine aggregate.

# nonstaining mortar

A mortar having a low free-alkali content to minimize efflorescence or the staining of adjacent masonry by the migration of soluble materials.

# lime mortar

A mixture of lime, sand, and water that is rarely used because of its slow rate of hardening and low compressive strength.

# lime

A white or grayish white, caustic, odorless solid obtained by heating forms of calcium carbonate, as shells or limestone, at a high temperature. Also called calcium oxide, calx, caustic lime, quicklime.

# hydrated lime

A soft, crystalline powder obtained by the action of water on lime and used in making mortar, plaster, and cement. Also called calcium hydroxide, slaked lime.

# green

Of or pertaining to concrete or mortar that is freshly set but not completely hardened.

# fat mix

A concrete or mortar mix that is easy to work or spread because of a relatively high cement or lime content. Also called rich mix.

# lean mix

A concrete or mortar mix that is difficult to work or spread because of a shortness of cement or lime.

# plasticizer

An admixture for making a concrete or mortar mix workable with little water.

# Type M mortar

A high-strength mortar recommended for use in reinforced masonry below grade or in contact with the earth, as foundation and retaining walls subject to frost action or to high lateral or compressive loads.

# Type S mortar

A medium-high-strength mortar recommended for use in masonry where bond and lateral strength are more important than compressive strength.

# Type N mortar

A medium-strength mortar recommended for general use in exposed masonry above grade where high compressive and lateral strength are not required.

# Type O mortar

A low-strength mortar suitable for use in interior non-load-bearing walls and partitions.

# Type K mortar

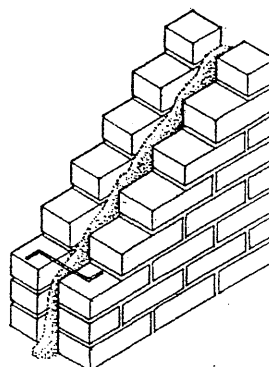
A very-low-strength mortar suitable only for use in interior non-load-bearing walls where permitted by the building code.

# grout

A fluid cement mortar that will flow easily without segregation of the ingredients, used to fill narrow cavities in masonry and consolidate the adjoining materials into a solid mass.

# bond

The adhesion between mortar or grout and the masonry units or steel reinforcement being cemented.



# grouted masonry

A wall constructed of brick or concrete brick units with all interior joints being filled with grout as the work progresses.

# high-lift grouting

A technique for grouting a masonry wall constructed a story at a time in lifts not exceeding 6 feet (1.8 m).

# low-lift grouting

A technique for grouting a masonry wall in lifts not exceeding six times the width of the grout space or a maximum of 8 inches (203 mm) as the wall is built.

# grout pour

The total height of masonry to be filled with grout before the erection of additional masonry, consisting of one or more grout lifts.

# grout lift

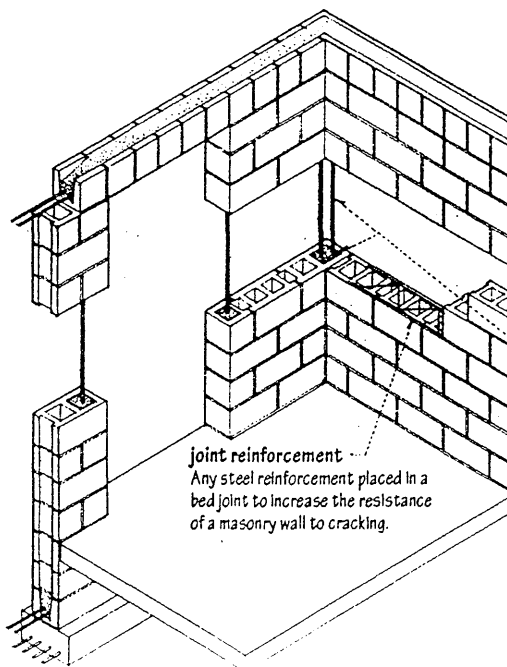
An increment of grout height within a total grout pour.

# cleanout

Any of a series of temporary openings at the bottom of a masonry wall large enough to permit the removal of debris or obstructions from a cavity or cell prior to grouting.

# reinforced grouted masonry

A masonry wall constructed with horizontal and vertical steel reinforcement fully embedded in grout for increased resistance to buckling and lateral wind and seismic loads.



# hollow unit masonry

A wall constructed of hollow masonry units laid and set with mortar, with adjacent wythes bonded by masonry headers or metal ties.

# reinforced hollow-unit masonry

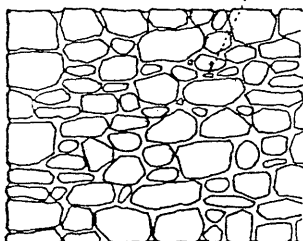
Hollow unit masonry having certain cells continuously filled with concrete or grout, in which reinforcing steel is embedded for increased resistance to buckling and lateral wind and seismic loads.

# joint reinforcement

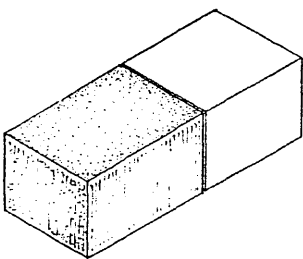
Any steel reinforcement placed in a bed joint to increase the resistance of a masonry wall to cracking.

# MASONRY

**rubble**  
Rough fragments of broken stone or the masonry built of such stones.

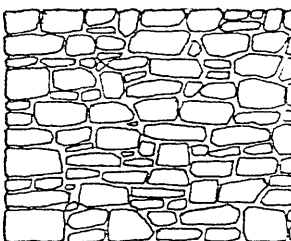


**random rubble**  
A rubble wall having discontinuous but approximately level beds or courses.

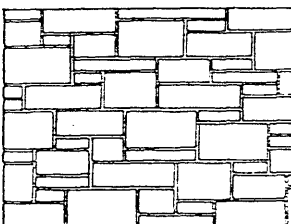


**ashlar**  
A squared building stone finely dressed on all faces adjacent to those of other stones so as to permit very thin mortar joints.

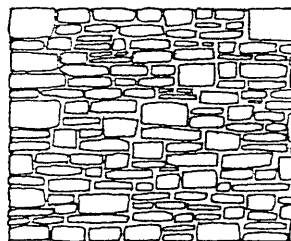
**gallet**  
To embed small stone chips in the mortar joints of rough masonry to wedge larger stones in position or add detail to the appearance. Also, garret.



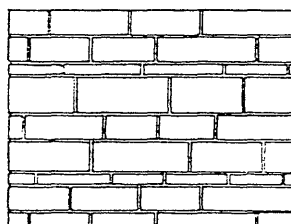
**coursed rubble**  
A rubble wall having approximately level beds and brought at intervals to continuous level courses.



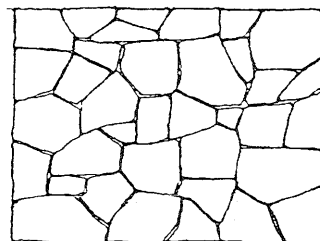
**random ashlar**  
Ashlar masonry built in discontinuous courses.



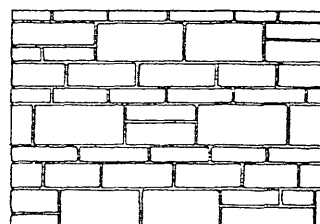
**squared rubble**  
A rubble wall built of squared stones of varying sizes and coursed at every third or fourth stone.



**coursed ashlar**  
Ashlar masonry built of stones having the same height within each course, but each course varying in height.

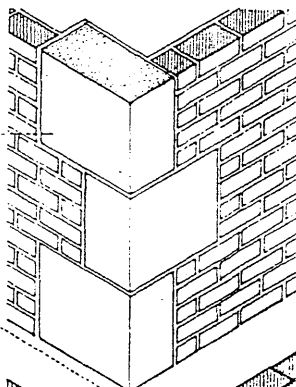


**cyclopean**  
Formed with large, irregular blocks of stones fitted closely together without the use of mortar.



**broken rangework**  
Ashlar masonry laid in horizontal courses of varying heights, any one of which may be broken at intervals into two or more courses.

**quoins**  
An exterior angle of a masonry wall, or one of the stones or bricks forming such an angle, usually differentiated from adjoining surfaces by material, texture, color, size, or projection.

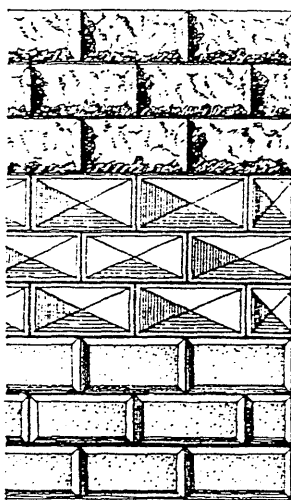
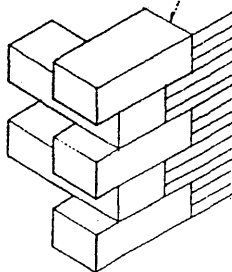


**perpend**  
A large stone passing through the entire thickness of a wall and exposed on both faces. Also called through stone.

**bondstone**  
A stone for bonding facing masonry to a masonry backing. Also called binder.

**long-and-short work**  
An arrangement of rectangular quoins or jambstones set alternately horizontally and vertically.

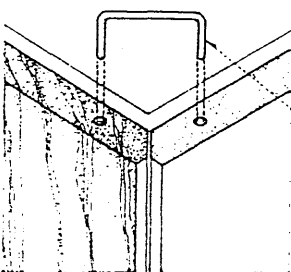
**in-and-out bond**  
A masonry bond having headers and stretchers alternating vertically.



**rustication**  
Ashlar masonry having the visible faces of the dressed stones raised or otherwise contrasted with the horizontal and usually the vertical joints, which may be rabbeted, chamfered, or beveled.

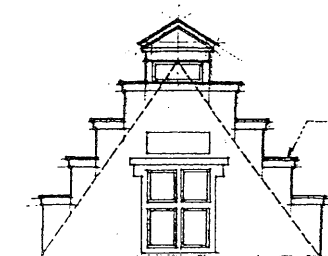
**rustic joint**  
A mortar joint between stones recessed from the adjacent faces between sunken drafts or bevells.

**rustic**  
Having rough, irregular surfaces and sunken or beveled joints.

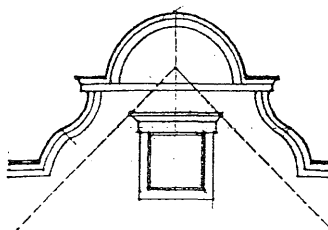


**interlocking joint**  
A joint in ashlar masonry made by fitting a projection on one stone into a routed groove on the next stone.

**cramp iron**  
An iron bar or rod with bent ends for holding together stone masonry units.



**corbie gable**  
A gable having corbiesteps.



**fractable**  
A coping on a gable wall concealing the slopes of the roof, esp. one having an ornamental silhouette.

**boss**  
A stone roughly formed and set in place for later carving.

**tail in**  
To fasten a beam or stone by one end.

**tail in**  
The part of a stone or brick projecting from a wall.

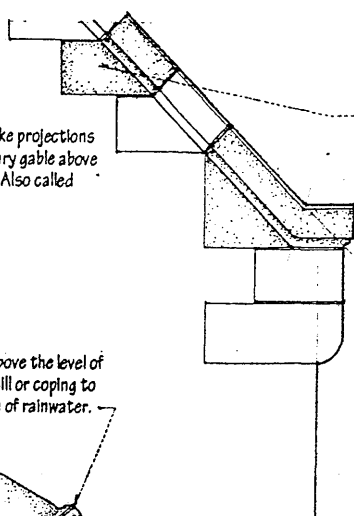
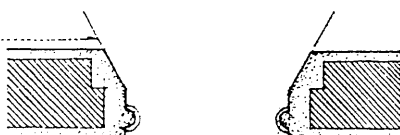
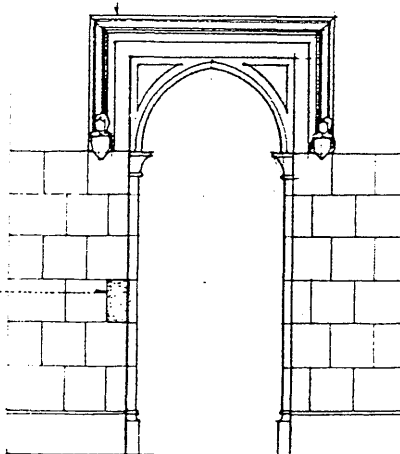
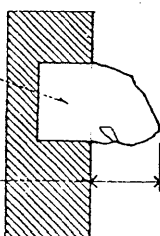
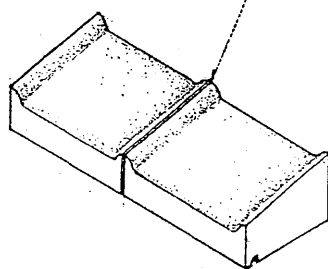
**label**  
A molding or dripstone over a door or window, esp. one that extends horizontally across the top of the opening and vertically downward for a short distance at the sides.

**jambstone**  
A stone, or one of the stones, forming the jamb of a door or window opening.

**embrasure**  
A splayed enlargement of a door or window opening toward the inner face of a wall.

**corbiestep**  
Any of a series of steplike projections that terminate a masonry gable above the surface of the roof. Also called crowstep.

**saddle joint**  
A vertical joint raised above the level of the washes on a stone sill or coping to prevent the penetration of rainwater.

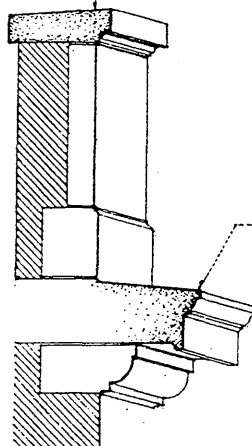


**capstone**  
A finishing stone of a structure, as a copestone.

**kneeler**  
Any of the stones having a sloping top for supporting or forming a gable coping. Also called skew.

**skew corbel**  
A stone overhanging at the foot of a gable coping, often serving as a stop for eave gutters or wall cornices.

**copestone**  
A stone forming a coping.



**dripstone**  
A stone molding used as a drip, as on a cornice over a window or doorway.

**string course**  
A horizontal course of brick or stone flush with or projecting beyond the face of a building, often molded to mark a division in the wall. Also called belt course.

**cordons**  
A stringcourse, esp. one having little or no projection.

**table**  
A course or band, esp. of masonry, having a distinctive form or position.

**water table**  
A projecting stringcourse, molding, or ledge placed so as to divert rainwater from a building.

**scarcement**  
A footing or ledge formed by a setback in the face of a wall.

**plinth**  
A continuous, usually projecting course of stones forming the base or foundation of a wall. Also called plinth course.

# MASONRY

## concrete masonry unit

A precast masonry unit of portland cement, fine aggregate, and water, molded into various shapes.

## stretcher block

A concrete masonry unit having nominal dimensions of 8 x 8 x 16 in. (203 x 203 x 406 mm).

## partition block

A concrete masonry unit used in constructing non-load-bearing walls, usually having a nominal thickness of 4 or 6 in. (102 or 152 mm).

## bullnose block

A concrete masonry unit having one or more rounded exterior corners.

## corner block

A concrete masonry unit having a solid end face and used in constructing the end or corner of a wall.

## return-corner block

A concrete masonry unit used at the corners of walls to maintain horizontal coursing with the appearance of full- and half-length units.

## double-corner block

A concrete masonry unit having solid faces at both ends and used in constructing a masonry pier.

## pilaster block

Any of various concrete masonry units used in constructing a plain or reinforced masonry pilaster.

## coping block

A solid concrete masonry unit used in constructing the top or finishing course of a masonry wall.

## sash block

A concrete masonry unit having an end slot or rabbet to receive the jamb of a door or window frame. Also called jamb block.

## sill block

A solid concrete masonry unit having a wash to shed rainwater from a sill.

## wash

An upper surface inclined to shed rain water from a building. Also called weathering.

## cap block

A concrete masonry unit having a solid top for use as a bearing surface in the finishing course of a foundation wall. Also called solid-top block.

## control-joint block

Any of various concrete masonry units used in constructing a vertical control joint.

## bond-beam block

A concrete masonry unit used in constructing a bond beam, having a depressed section in which reinforcing steel can be placed for embedment in grout.

## bond beam

A masonry course grouted and reinforced to serve as a beam, a horizontal tie, or a bearing course for structural members.

## concrete block

A hollow or solid concrete masonry unit, often incorrectly referred to as cement block.

## face shell

One of the two sidewalls of a hollow concrete masonry unit.

## web

One of the cross walls connecting the face shells of a hollow masonry unit.

## core

The molded open space in a concrete masonry unit. Also called cell.

## open-end block

A concrete masonry unit having one end open in which vertical steel reinforcement can be placed for embedment in grout.

## lintel block

A concrete masonry unit used in constructing a lintel or bond beam, having a U-shaped section in which reinforcing steel can be placed for embedment in grout.

## header block

A concrete masonry unit having a portion of one face shell removed to receive headers in a bonded masonry wall.

## sound-absorbing masonry unit

A concrete masonry unit having a solid top and a slotted face shell, and sometimes a fibrous filler, for increased sound absorption.

## slump block

A concrete masonry unit having an irregular face and surface texture caused by the settlement of a wet mix during curing.

## split-face block

A concrete masonry unit, split lengthwise by a machine after curing to produce a rough, fractured face texture.

## faced block

A concrete masonry unit having a special ceramic, glazed, or polished face.

## scored block

Any of various concrete masonry units having one or more vertical grooves which simulate raked joints.

## shadow block

Any of various concrete masonry units having a face shell with a pattern of beveled recesses.

## screen block

A concrete masonry unit used esp. in tropical architecture, having a decorative pattern of transverse openings for admitting air and excluding sunlight.

## concrete brick

A solid rectangular concrete masonry unit, usually not larger than 4 x 4 x 12 in. (102 x 102 x 305 mm).

## sand-lime brick

A hard, light-colored brick made by molding a mixture of damp sand and slaked lime under high pressure and curing in a steam oven.

## solid masonry unit

A masonry unit having a net cross-sectional area in any plane parallel to the bearing surface that is 75% or more of the gross cross-sectional area measured in the same plane.

## hollow masonry unit

A masonry unit having a net cross-sectional area in any plane parallel to the bearing surface less than 75% of the gross cross-sectional area measured in the same plane.

## gross cross-sectional area

The total cross-sectional area of a hollow masonry unit perpendicular to the direction of loading, including cellular and reentrant spaces, except when these spaces are to be occupied by portions of adjacent masonry.

## net cross-sectional area

The gross cross-sectional area of a hollow masonry unit minus the area of ungrouted cores of cellular spaces.

## equivalent thickness

The thickness that would be obtained if the amount of concrete contained in a hollow masonry unit were recast without any cellular spaces, used esp. to determine the fire resistance of a wall constructed with such units.

## absorption

The weight of water absorbed by a concrete masonry unit when immersed in water, expressed in pounds of water per cubic foot of concrete.

## Grade N

A grade of load-bearing concrete masonry unit suitable for general use, as in exterior walls above and below grade.

## Grade S

A grade of load-bearing concrete masonry unit limited to use above grade, in exterior walls with weather-protective coatings, or in walls not exposed to the weather.

## Type I

A concrete masonry unit manufactured to a specified limit of moisture content in order to minimize the drying shrinkage that can cause cracking.

## Type II

A concrete masonry unit not manufactured to a specified limit moisture content.

## normal-weight block

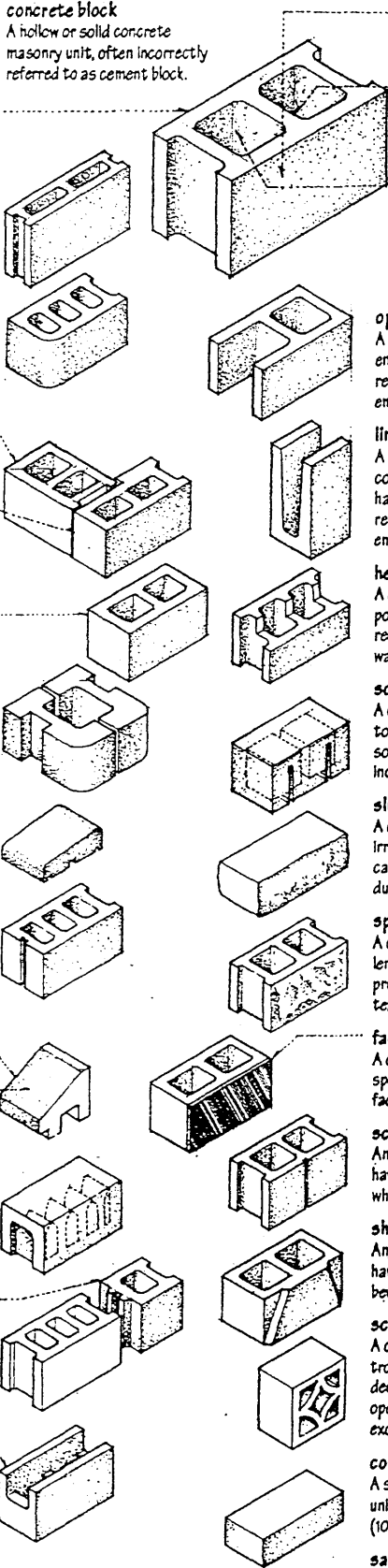
A concrete masonry unit made with sand, gravel, or other dense aggregate and weighing more than 125 pcf (2000 kg/m<sup>3</sup>).

## lightweight block

A concrete masonry unit made with lightweight aggregate, as cinder or expanded slag, and weighing less than 125 pcf (2000 kg/m<sup>3</sup>).

## surface bonding

The bonding of a concrete masonry wall by stacking the units without mortar and troweling on a stucco-like compound of white portland cement and glass fiber.



**bond**

The attractive force by which atoms, ions, or groups of atoms are bound together in a molecule or crystalline structure. Also called chemical bond.

**ionic bond**

A chemical bond characteristic of salts and ceramic materials, formed by the complete transfer of one or more electrons from one kind of ion to another. Also called electrovalent bond.

**positive ion**

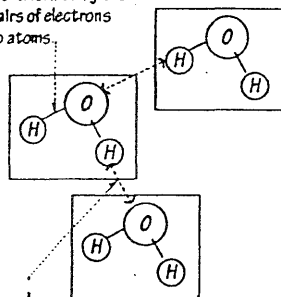
A positively charged ion created by electron loss. Also called cation.

**ion**

An electrically charged atom or group of atoms formed by the loss or gain of one or more electrons.

**covalent bond**

A chemical bond formed by the sharing of pairs of electrons between two atoms.



**hydrogen bond**

An electrostatic bond between an electronegative atom and a hydrogen atom already linked to another electronegative atom by a covalent bond.

**molecule**

The smallest particle of a substance that displays all of the characteristic physical and chemical properties of the substance, consisting of one or more like atoms in an element, or two or more different atoms in a compound.

**molecular weight**

The average weight of a molecule of an element or compound calculated as the sum of the atomic weights of the molecule's constituent atoms. Also called formula weight.

**mole**

The molecular weight of a substance expressed in grams; gram molecule. Also, mol.

**condense**

To reduce to a denser form, as a gas or vapor to a liquid or solid state.

**heat of condensation**

The heat liberated by a unit mass of gas at its boiling point as it condenses to a liquid.

**heat of vaporization**

The quantity of heat required to convert a unit mass of liquid at its boiling point into vapor at the same temperature; equal to the heat of condensation.

**liquid**

Matter distinguished from the solid or gaseous states by a characteristic readiness to flow, little or no tendency to disperse, and relatively high incompressibility.

**negative ion**

A negatively charged ion created by electron gain. Also called anion.

**valence**

A measure of the capacity of an atom or group to combine with other atoms or groups, equal to the number of chemical bonds the atom or group can form.

**valence electron**

An electron located in the outer shell of an atom that can be transferred or shared in forming a chemical bond with another atom.

**inert gas configuration**

The stable configuration of an element in which the outer shells of its atoms or ions are filled with the maximum number of electron pairs. Nature moves atoms and ions toward this configuration by capturing, surrendering, or sharing electrons with neighboring atoms or ions in an effort to achieve a relatively inert state of low energy.

**noble gas**

Any of the chemically inert gaseous elements: helium, neon, argon, krypton, xenon, and radon. Also called inert gas.

**fluid**

A substance, as a gas or liquid, that is capable of flowing, yields easily to pressure, and conforms to the shape of its container.

**matter**

That which occupies space, can be perceived by the senses, and constitutes the substance of a physical body.

**shell**

Any of up to seven spherical surfaces containing the orbits of electrons of approximately equal energy about the nucleus of an atom.

**electron**

A fundamental particle of matter having a negative charge.

**neutron**

A fundamental particle having no charge.

**proton**

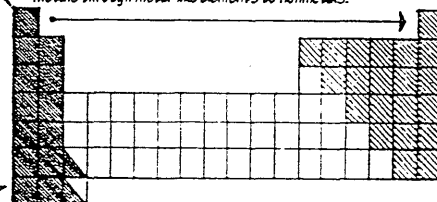
A positively charged particle that is a fundamental constituent of all atomic nuclei.

**periodic table**

A tabular arrangement of the chemical elements in related groups, formerly in the order of their atomic weights and now according to their atomic numbers.

Down a group, elements share certain characteristics and behave in a similar manner because of the way electrons are arranged in their outer shells.

Across a period, elements change gradually from metals through metal-like elements to nonmetals.



Matter having unique qualities by which it may be categorized.

**atom**

The smallest unit of an element that can exist either alone or in combination, consisting of a nucleus of neutrons and protons surrounded by one or more electrons bound to the nucleus by electrical attraction.

**atomic number**

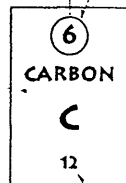
The number of protons in the nucleus of an atom of a given element, which equals the number of electrons normally surrounding the nucleus. Also called proton number.

**element**

One of a class of substances that cannot be separated into simpler substances by chemical means, composed of atoms having an identical number of protons in each nucleus.

**atomic weight**

The average weight of an atom of an element based on 1/12 the weight of the carbon-12 atom.



**gas**

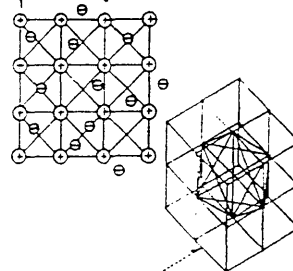
Matter having neither independent shape nor volume, possessing perfect molecular mobility and the tendency to expand indefinitely.

**solid**

Matter having relative firmness, coherence of particles, or persistence of form.

**metallic bond**

A chemical bond characteristic of metals, produced by the sharing of valence electrons which move freely through the lattice of a usually stable crystalline structure.



**lattice**

A regular pattern of isolated points in space showing the location of atoms, ions, or molecules in a crystalline solid.

**crystal**

A solid having a regularly repeating internal structure of atoms, ions, or molecules and enclosed by symmetrically arranged plane surfaces.

**amorphous**

Not crystalline in structure.

**evaporate**

To change or convert from a liquid or solid into a vapor.

**solidify**

To change or convert from a liquid or gas into a solid.

**heat of solidification**

The heat liberated by a unit mass of liquid at its freezing point as it solidifies.

**heat of fusion**

The quantity of heat required to convert a unit mass of a solid at its melting point into a liquid at the same temperature; equal to the heat of solidification.

# MATERIAL

## property

An essential or distinctive attribute or quality belonging specifically to the constitution of, or found in, the behavior of a thing.

## mechanical property

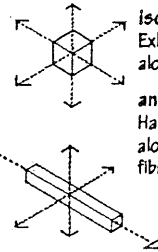
Any of the physical properties of a material that exhibit a response to applied forces.

## strength

The capability of a material to resist the forces imposed on it, esp. the ability to sustain a high stress without yielding or rupturing.

## strength of materials

The study of the relationship between applied external forces and the internal effects produced by these forces in a body.



## isotropic

Exhibiting the same physical properties along all axes.

## anisotropic

Having different physical properties along different axes, as wood and other fibrous materials.

## tension

The act of stretching or state of being pulled apart, resulting in the elongation of an elastic body.

## tensile force

An applied force producing or tending to produce tension in an elastic body.

## axial force

A tensile or compressive force acting along the longitudinal axis of a structural member and at the centroid of the cross section, producing axial stress without bending, torsion, or shear. Also called axial load.

## axial stress

The tensile or compressive stress that develops to resist an axial force, assumed to be normal to and uniformly distributed over the area of the cross section. Also called direct stress, normal stress.

## compression

The act of shortening or state of being pushed together, resulting in a reduction in size or volume of an elastic body.

## compressive force

An applied force producing or tending to produce compression in an elastic body.

## eccentric force

A force applied parallel to the longitudinal axis of a structural member but not to the centroid of the cross section, producing bending and an uneven distribution of stresses in the section. Also called eccentric load.

## stress

The internal resistance or reaction of an elastic body to external forces applied to it, equal to the ratio of force to area and expressed in units of force per unit of cross-sectional area. Also called unit stress.

## tensile stress

The axial stress that develops at the cross section of an elastic body to resist the collinear tensile forces tending to elongate it.

## tensile strain

The elongation of a unit length of material produced by a tensile stress.

## strain

The deformation of a body under the action of an applied force. Strain is a dimensionless quantity, equal to the ratio of the change in size or shape to the original size or shape of a stressed element.

## Young's modulus

A coefficient of elasticity of a material, expressing the ratio of longitudinal stress to the corresponding longitudinal strain caused by the stress.

## Poisson's ratio

The ratio of lateral strain to the corresponding longitudinal strain in an elastic body under longitudinal stress.

## tensile test

A test for determining the behavior of a material under axial tension, in which a specimen is gripped at both ends and pulled apart until rupture occurs; the most common test for structural materials.

## tensile strength

The resistance of a material to longitudinal stress, measured by the minimum amount of longitudinal stress required to rupture the material.

## elongation

A measure of the ductility of a material, expressed as the percentage increase in length of a test specimen after failure in a tensile test.

## reduction of area

A measure of the ductility of a material, expressed as the percentage decrease in cross-sectional area of a test specimen after rupturing in a tensile test.

## compression test

A test for determining the behavior of a material under axial compression, in which a specimen is crushed until fracture or disintegration occurs. The compression test is used for brittle materials since their low tensile strength is difficult to measure accurately.

## strain gauge

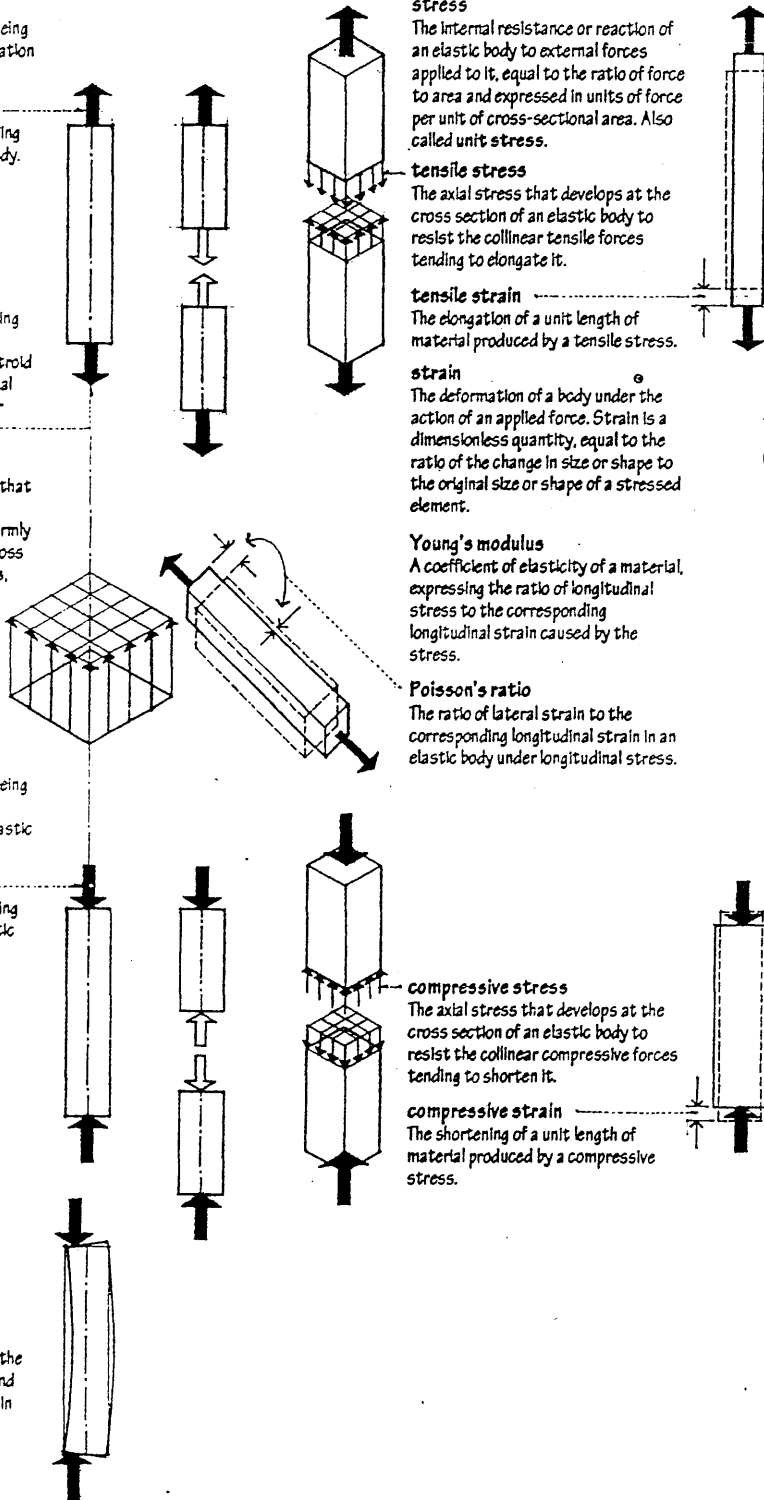
An instrument for measuring minute deformations in a test specimen caused by tension, compression, bending, or twisting. Also called extensometer.

## bulk modulus

A coefficient of elasticity of a material, expressing the ratio between a pressure and the corresponding fractional change in volume produced.

## compressibility

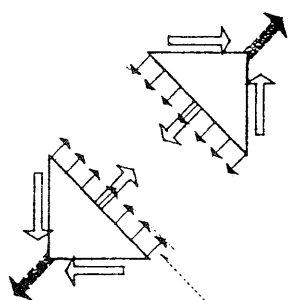
The reciprocal of bulk modulus, equal to the ratio of the fractional change in volume to the pressure applied to a substance.





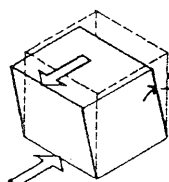
## shearing force

An internal force tangential to the surface on which it acts, developed by a body in response to a shear force. For equilibrium of a rectangular element subject to shear, shearing in a vertical plane necessarily involves shearing in a horizontal plane, and vice versa.



## shearing stress

The force per unit area developed along a section of an elastic body to resist a shear force. Also called shear stress, tangential stress.



## shearing strain

The lateral deformation developed in a body in response to shearing stresses, defined as the tangent of the skew angle of the deformation. Since this skew angle is always very small, shearing strain is a pure number very nearly equal to the skew angle in radians. Also called shear strain.

## shear modulus

A coefficient of elasticity of a material, expressing the ratio between shearing stress and the corresponding shearing strain produced by the stress. Also called modulus of rigidity, modulus of torsion.

## shear

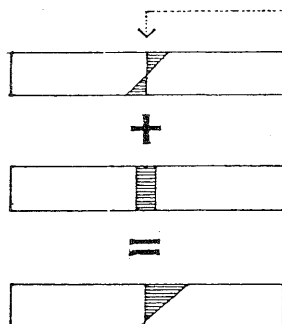
The lateral deformation produced in a body by an external force that causes one part of the body to slide relative to an adjacent part in a direction parallel to their plane of contact.

## shear force

An applied force producing or tending to produce shear in a body.

## combined stresses

A set of tensile and compressive stresses resulting from the superposition of axial and bending stresses in the cross section of a structural member, acting in the same direction and equal at any point to their algebraic sum.



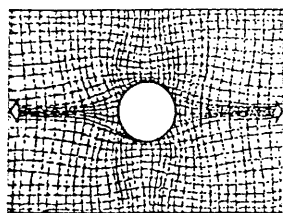
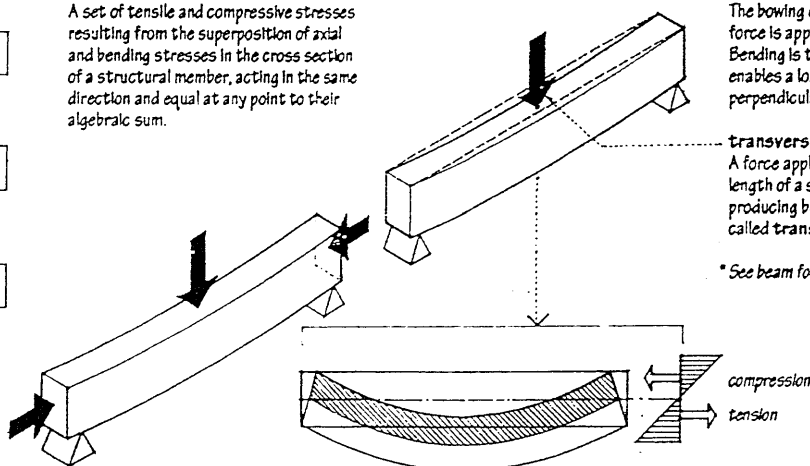
## bending

The bowing of an elastic body as an external force is applied transversely to its length. Bending is the structural mechanism that enables a load to be channeled in a direction perpendicular to its application.

## transverse force

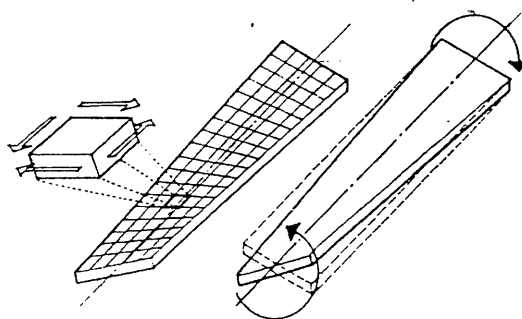
A force applied perpendicular to the length of a structural member, producing bending and shear. Also called transverse load.

\* See beam for bending stresses.



## stress concentration

An increase in stress that develops at discontinuities or flaws in a material. Stress concentrations in brittle materials develop cracks which propagate until failure. In ductile materials, stress concentrations develop local deformations which serve to redistribute and relieve the stresses.



## torque

The moment of a force system that causes or tends to cause rotation or torsion.

## torsion

The twisting of an elastic body about its longitudinal axis caused by two equal and opposite torques, producing shearing stresses in the body.

# MATERIAL

## stress-strain diagram

A graphic representation of the relationship between unit stress values and the corresponding unit strains for a specific material.

### elastic range

The range of unit stresses for which a material exhibits elastic deformation.

### deformation

A change in the shape or dimensions of a body or structure resulting from stress.

### elastic deformation

A temporary change in the dimensions or shape of a body produced by a stress less than the elastic limit of the material.

### brittleness

The property of a material that causes it to rupture suddenly under stress with little evident deformation. Since brittle materials lack the plastic behavior of ductile materials, they can give no advance warning of impending failure.

### proportional limit

The stress beyond which the ratio of stress to strain for a material no longer remains constant.

### stiffness

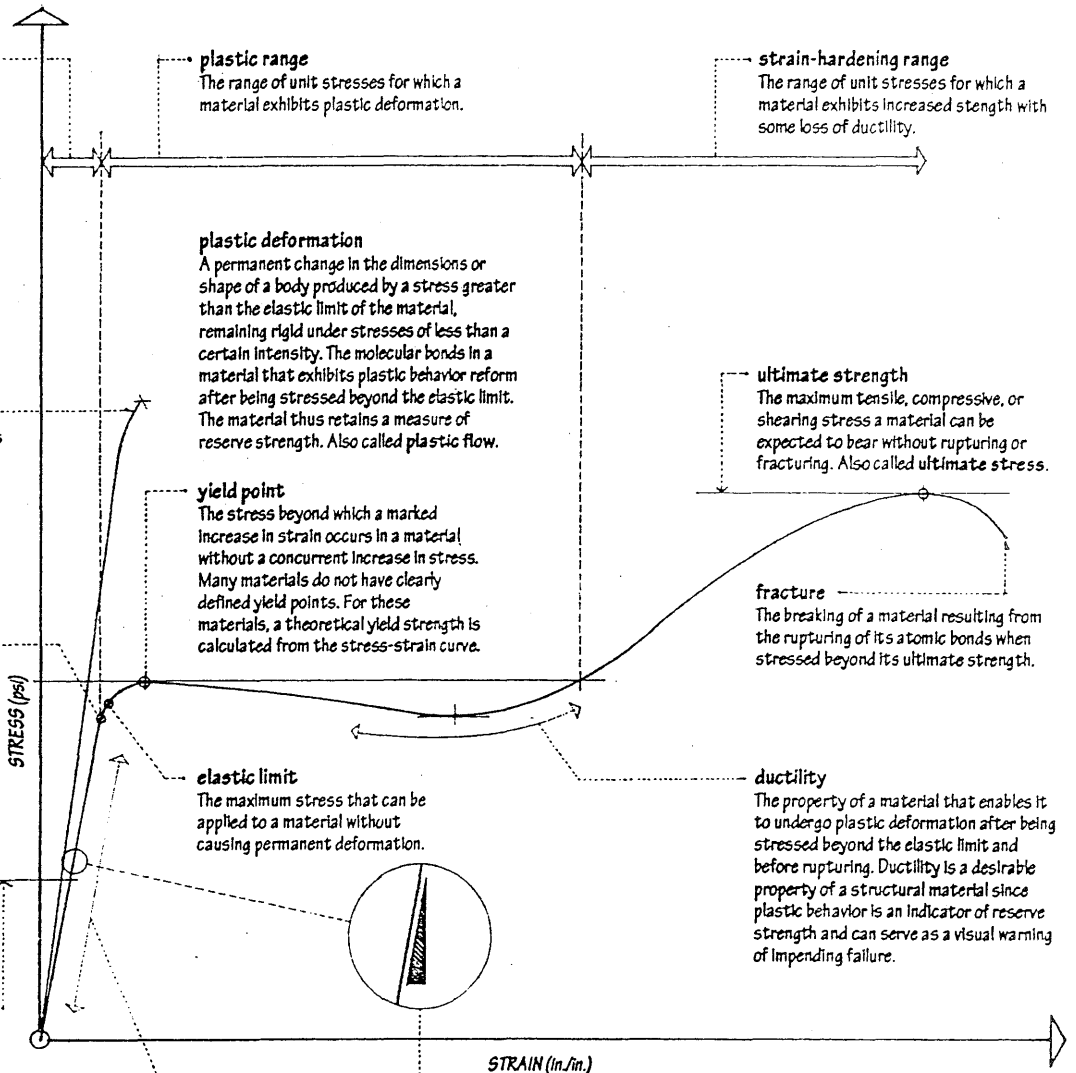
A measure of a material's resistance to deformation when stressed within its elastic range.

### allowable stress

The maximum unit stress permitted for a material in the design of a structural member, usually a fraction of the material's elastic limit, yield strength, or ultimate strength. The allowable stresses for various materials are specified by building codes, engineering societies, and trade associations, based on specifications and methods of testing established by the American Society for Testing and Materials. Also called allowable unit stress, working stress.

### yield strength

The stress necessary to produce a specified limiting permanent set in a material, usually 0.2% of its original length when tested in tension. Yield strength is used to determine the limit of usefulness of a material having a poorly defined yield point. Also called proof stress.



### plastic range

The range of unit stresses for which a material exhibits plastic deformation.

### strain-hardening range

The range of unit stresses for which a material exhibits increased strength with some loss of ductility.

### plastic deformation

A permanent change in the dimensions or shape of a body produced by a stress greater than the elastic limit of the material, remaining rigid under stresses of less than a certain intensity. The molecular bonds in a material that exhibits plastic behavior reform after being stressed beyond the elastic limit. The material thus retains a measure of reserve strength. Also called plastic flow.

### yield point

The stress beyond which a marked increase in strain occurs in a material without a concurrent increase in stress. Many materials do not have clearly defined yield points. For these materials, a theoretical yield strength is calculated from the stress-strain curve.

### ultimate strength

The maximum tensile, compressive, or shearing stress a material can be expected to bear without rupturing or fracturing. Also called ultimate stress.

### fracture

The breaking of a material resulting from the rupturing of its atomic bonds when stressed beyond its ultimate strength.

### elastic limit

The maximum stress that can be applied to a material without causing permanent deformation.

### ductility

The property of a material that enables it to undergo plastic deformation after being stressed beyond the elastic limit and before rupturing. Ductility is a desirable property of a structural material since plastic behavior is an indicator of reserve strength and can serve as a visual warning of impending failure.

### elasticity

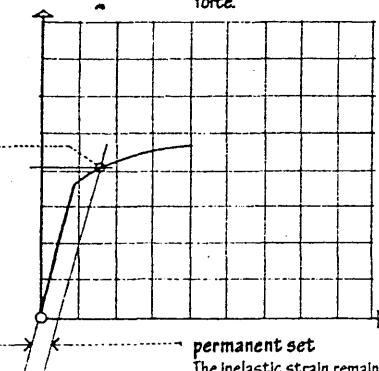
The property of a material that enables it to deform in response to an applied force and to recover its original size and shape upon removal of the force.

### modulus of elasticity

A coefficient of elasticity of a material, expressing the ratio between a unit stress and the corresponding unit strain caused by the stress, as derived from Hooke's law and represented by the slope of the straight-line portion of the stress-strain diagram. Also called coefficient of elasticity, elastic modulus.

### Hooke's law

The law stating that the stress on a body is directly proportional to the strain produced, provided the stress does not exceed the elastic limit of the material.

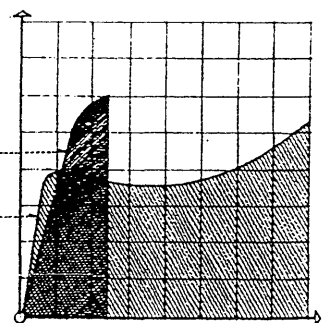


### permanent set

The inelastic strain remaining in a material after complete release of the stress producing the deformation.

### strong but brittle

### ductile and tough

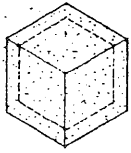


### toughness

The property of a material that enables it to absorb energy before rupturing, represented by the area under the stress-strain curve derived from a tensile test of the material. Ductile materials are tougher than brittle materials.

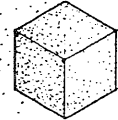
**moisture expansion**

An increase in the bulk of a material caused by the absorption of water or water vapor. Also called balking.



**absorption**

The taking in or reception of a gas or liquid by molecular or chemical action.

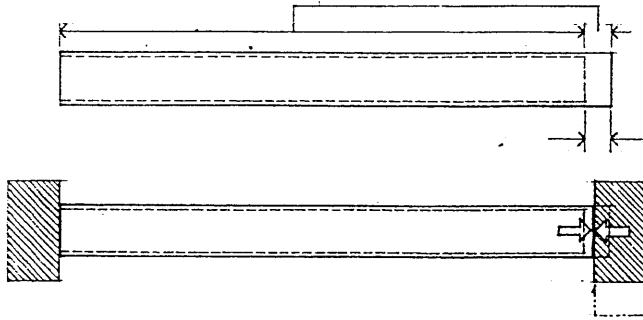


**adsorption**

The adhesion of a thin, condensed layer of gas, liquid, or dissolved substance to the surface of a solid, usually without any physical or chemical change in the material.

**coefficient of expansion**

The fractional change in length, area, or volume of a material per unit change in temperature at a given constant pressure. Also called expansivity.



**dimensional stability**

The property of a material that enables it to maintain its original shape and dimensions when subjected to changes in temperature or humidity.

**kinetic theory of heat**

The theory that the temperature of a substance increases with an increase of the average kinetic energy of its particles when heat is absorbed.

**thermal expansion**

An increase in length, area, or volume of a material caused by a rise in temperature.

**thermal contraction**

A decrease in length, area, or volume of a material caused by a drop in temperature.

**thermal stress**

The tensile or compressive stress developed in a material constrained against thermal expansion or contraction.

**thermal shock**

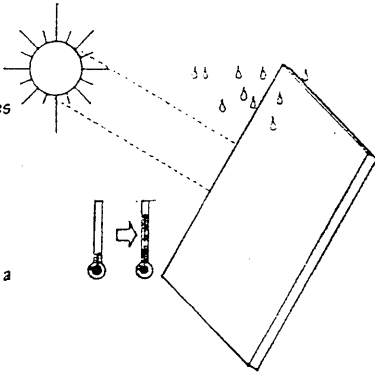
The sudden stress a rapid change in temperature can produce in a material.

**weatherability**

The property of a material that enables it to retain its appearance and integrity when exposed to the effects of sun, wind, moisture, and changes in temperature.

**weatherometer**

A device for determining the weather resistance of a material by subjecting a test specimen to accelerated weathering.



**accelerated weathering**

A process for exposing a material to ultraviolet rays, water sprays, and heating elements in order to simulate the long-term effects of sun, rain, and temperature changes. Also called accelerated aging.

**abrasion resistance**

The property of a material that enables it to resist being worn away by friction when rubbed with another object. Abrasion resistance is a measure of toughness rather than hardness and is a necessary quality of flooring materials and surface finishes.

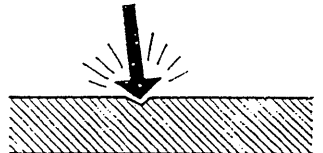


**abrasion-resistance index**

A measure of the abrasion resistance of a material, commonly expressed as the depth of penetration or material loss after testing with a weighted abrasive wheel for a specified number of cycles.

**hardness**

The property of a material that enables it to resist deformation by compression, indentation, or penetration.



**Mohs' scale**

A scale for measuring the hardness of a mineral. Its degrees, in increasing hardness, are: 1, talc; 2, gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, feldspar; 7, quartz; 8, topaz; 9, sapphire; 10, diamond.

**Brinell number**

A measure of the hardness of a material, determined by pressing a standard steel ball into a test piece using a standard force and dividing the load by the area of indentation. The higher the number, the harder the material.

**Rockwell number**

A measure of the hardness of a material, determined by indenting a test piece with a conoidal diamond indenter, or with a standard steel ball, under two successive loads and measuring the net increase in depth of the impressions: the higher the number, the harder the material.

**Vickers number**

A measure of the hardness of a material, determined by indenting a test piece with the point of a diamond using a known force and dividing the load by the surface area of indentation: the higher the number, the harder the material.

**strain-rate effect**

The brittle behavior an increased rate of load application can cause in a normally ductile material.

**temperature effect**

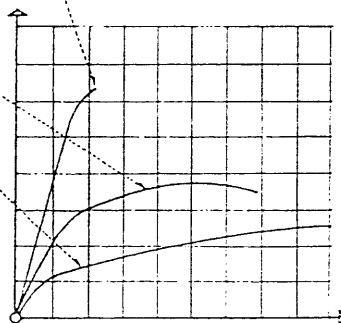
The brittle behavior low temperatures can cause in a normally ductile material.

**stress relaxation**

The time-dependent decrease in stress in a constrained material under a constant load.

**creep**

The gradual and permanent deformation of a body produced by a continued application of stress or prolonged exposure to heat. Creep deflection in a concrete structure continues over time and can be significantly greater than the initial elastic deflection.



**fatigue**

The weakening or failure of a material at a stress below the elastic limit when subjected to a repeated series of stresses.

**fatigue limit**

The maximum stress to which a material can be subjected for an indefinite number of cycles without failing.

**fatigue ratio**

The ratio between the fatigue limit and the tensile strength of a material. Also called endurance ratio.

# MEASURE

A unit or standard of measurement used to ascertain the dimensions, quantity, or capacity of something.

## metric system

A decimal system of weights and measures, adopted first in France but now widespread and universally used in science.

## International System of Units

An internationally accepted system of coherent physical units, using the meter, kilogram, second, ampere, kelvin, and candela as the basic units of the fundamental quantities of length, mass, time, electric current, temperature, and luminous intensity.

## length

The extent of anything measured along its greatest dimension.

## conversion table

A tabular arrangement of the equivalent values of the weight or measure units of different systems.

## SI unit

One of the basic units of the International System of Units.

## meter

The basic unit of length in the metric system, equivalent to 39.37 inches, originally defined as one ten-millionth of the distance from the equator to the pole measured on the meridian, later as the distance between two lines on a platinum-iridium bar preserved at the International Bureau of Weights and Measures near Paris, and now as  $1/299,972,458$  of the distance light travels in a vacuum in one second. Abbr.: m

## kilometer

A unit of length and distance equal to 1000 meters and equivalent to 3280.8 feet or 0.621 mile. Abbr.: km

## are

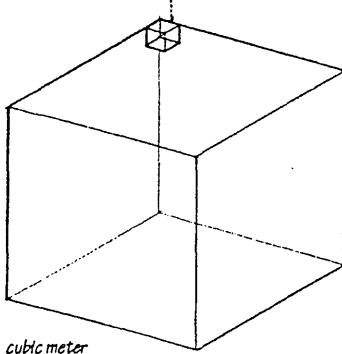
A metric unit of area equal to  $1/100$  of a hectare, 100 square meters, or 119.6 square yards. Abbr.: a

## hectare

A metric unit of area equal to 10,000 square meters or 2.47 acres. Abbr.: ha

## liter

A metric unit of capacity equal to  $1/1000$  of a cubic meter or 61.02 cubic inches. Abbr.: L



cubic meter

## scale

A system of ordered marks laid down at known intervals and used as a standard reference in measuring.

## centimeter

A metric unit of length equal to  $1/100$  of a meter or 0.3937 inch. The use of the centimeter is not recommended for use in construction. Abbr.: cm

## millimeter

A metric unit of length equal to  $1/1000$  of a meter or 0.03937 of an inch. Abbr.: mm

## micron

The millionth part of a meter. Also called micrometer. Symbol:  $\mu$ ,  $\mu$

## foot

A unit of length originally derived from the length of the human foot, divided into 12 inches and equal to 304.8 millimeters. Abbr.: ft.

## inch

A unit of length,  $1/12$ th of a foot, equivalent to 25.4 millimeters. Abbr.: in.

## mil

A unit of length equal to 0.001 of an inch or 0.0254 mm, used in measuring the diameter of wires and the thickness of very thin sheet materials.

## yard

A unit of length equal to 3 feet or 36 inches, and equivalent to 0.9144 meter. Abbr.: yd.

## rod

A unit of length equal to  $5\frac{1}{2}$  yards or  $16\frac{1}{2}$  feet, and equivalent to 5.029 meters.

## mile

A unit of distance on land equal to 5280 feet or 1760 yards, and equivalent to 1.609 km. Also called statute mile. Abbr.: mi

## nautical mile

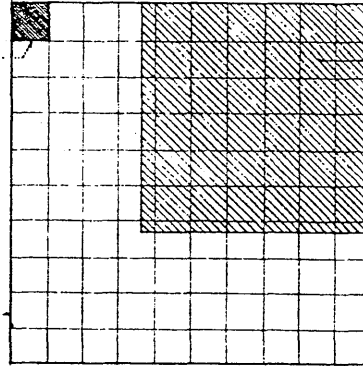
A unit of distance used in sea or air navigation, equal to 1.852 kilometers or about 6,076 feet. Also called air mile.

## square measure

A unit or system of units for measuring area, derived from units of linear measure.

## area

A quantitative measure of a plane or curved surface.



## acre

A unit of land area equal to  $1/640$  of a square mile, 4840 square yards, 43,560 square feet, or 4047 square meters.

## circular mil

A unit used principally for measuring the cross-sectional area of wire, equal to the area of a circle having a diameter of one mil.

## cubic measure

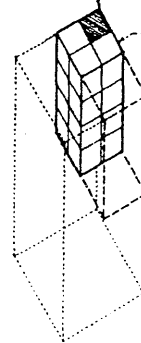
A unit or system of units for measuring volume or capacity, derived from units of linear measure.

## volume

The size or extent of a three-dimensional object or region of space, measured in cubic units.

## milliliter

A metric unit of capacity equal to  $1/1000$  of a liter or 0.0162 cubic inch. Abbr.: ml



## fluid ounce

A unit of liquid capacity equal to 1.805 cubic inches or 29.573 milliliters. Abbr.: fl oz

## pint

A unit of liquid capacity equal to 16 fluid ounces, 28.875 cubic inches, or 0.473 liter. Abbr.: pt.

## quart

A unit of liquid capacity equal to two pints, 57.75 cubic inches, or 0.946 liter. Abbr.: qt.

## gallon

A unit of liquid capacity equal to 4 quarts, 231 cubic inches, or 3.785 liters. Abbr.: gal.

**density**  
The mass of a substance per unit volume.

**specific volume**  
The reciprocal of density, equal to volume per unit mass.

**specific gravity**  
The ratio of the density of a substance to the density of another substance taken as a standard, usually distilled water for liquids and solids, and air or hydrogen for gases.

**pound**  
A unit of force equal to the weight of a one-pound mass under the acceleration of gravity. Abbr.: lb

**newton**  
The SI unit of force equal to the force required to accelerate a mass of one kilogram at the rate of one meter per second per second. Abbr.: N

**kilogram**  
A unit of force and weight equal to the weight of a kilogram mass under the acceleration of gravity. Abbr.: kg

**atmosphere**  
A unit of pressure equal to the normal pressure of the air at sea level, equal to  $1.01325 \times 10^5 \text{ N/m}^2$  or about 14.7 pounds per square inch. Abbr.: atm.

**standard atmosphere**  
A standard unit of atmospheric pressure, having a value of 29.92 in. (760 mm) of mercury.

**atmospheric pressure**  
The pressure exerted by the earth's atmosphere at any given point, usually expressed in terms of the height of a column of mercury. Also called barometric pressure.

**barometer**  
An instrument for measuring atmospheric pressure, used in weather forecasting and determining elevation.

**horsepower**  
A unit of power equal to 550 foot-pounds per second or 745.7 watts. Abbr.: hp

**mechanical equivalent of heat**  
The number of units of work or energy equal to one unit of heat, as 778.2 ft-lb, which equals one Btu, or 4.1858 joules, which equals one calorie.

**metric ton**  
A unit of mass equal to 1,000 kilograms and equivalent to 2,204.62 avoirdupois pounds. Also called tonne. Abbr.: m.t.

**gram**  
A metric unit of mass equal to  $1/1000$  of a kilogram or 0.035 ounce. Abbr.: g

**mass**  
A measure of a body's inertia, as determined by the quantity of material it contains and its weight in a field of constant gravitational acceleration. Abbr.: M

**kilogram**  
The base SI unit of mass, equal to the mass of a platinum-iridium cylinder kept at the International Bureau of Weights and Measures near Paris; equivalent to 2.205 avoirdupois pounds. Abbr.: kg

**pound**  
A unit of weight equal to 16 ounces and equivalent to 0.453 kg. Abbr.: lb.

**kip**  
A unit of weight equal to 1000 pounds or 453.6 kg.

**ton**  
A unit of weight equal to 2,000 pounds or 0.907 metric ton. Also called short ton.

**weight**  
The gravitational force exerted by the earth on a body, equal to the mass of the body times the local acceleration of gravity.

**gravity**  
The central force of attraction exerted by the mass of the earth on a body near its surface.

**acceleration of gravity**  
The acceleration of a freely falling body in the earth's gravitational field, having an approximate value at sea level of 32 ft. (9.8 m) per second per second.

**Boyle's law**  
The principle that, at relatively low pressures and a fixed temperature, the pressure of a confined ideal gas varies inversely with its volume.

**foot-pound**  
A unit of energy equal to the work done when the point of application of a force of one pound moves through a distance of one foot in the direction of the force. Abbr.: ft-lb

**inch-pound**  
One-twelfth of a foot-pound. Abbr.: in-lb

**pressure**  
The force exerted over a surface, measured as force per unit area.

**pascal**  
The SI unit of pressure equal to one newton per square meter. Abbr.: Pa

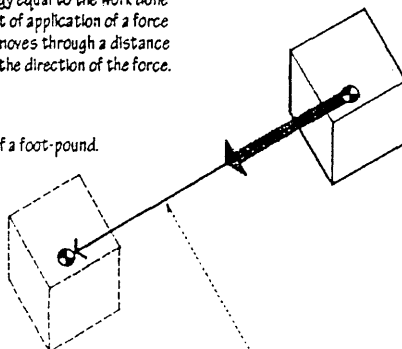
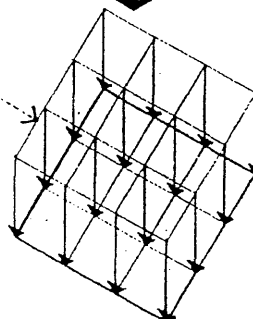
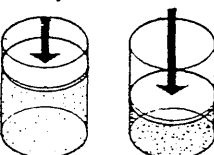
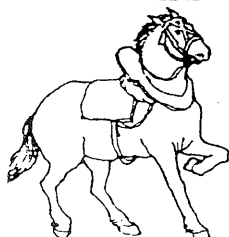
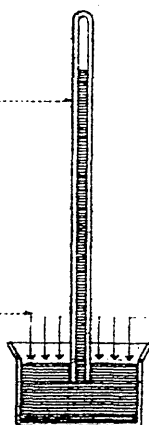
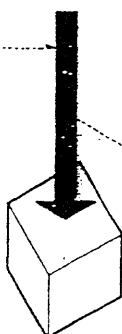
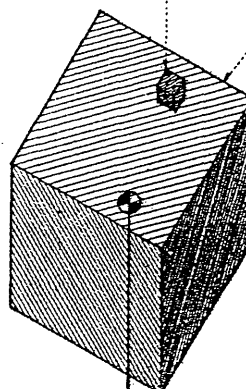
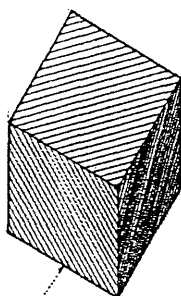
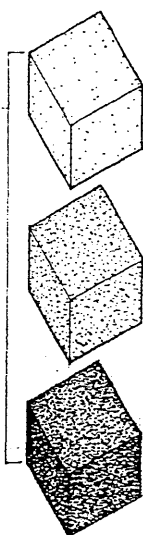
**energy**  
The work a physical system is capable of doing in changing from its actual state to a specified reference state.

**joule**  
The SI unit of work or energy equal to the work done when the point of application of a force of one newton moves through a distance of one meter in the direction of the force; approximately 0.7375 ft-lb. Also called newton-meter. Abbr.: J

**watt-hour**  
A unit of energy equal to energy of one watt operating for one hour and equivalent to 3,600 joules. Abbr.: Wh

**power**  
The amount of work done or energy transferred per unit of time, usually expressed in watts or horsepower.

**work**  
The transfer of energy produced by the motion of the point of application of a force, equal to the product of the component of the force that acts in the direction of the motion of the point of action and the distance through which the point of application moves.

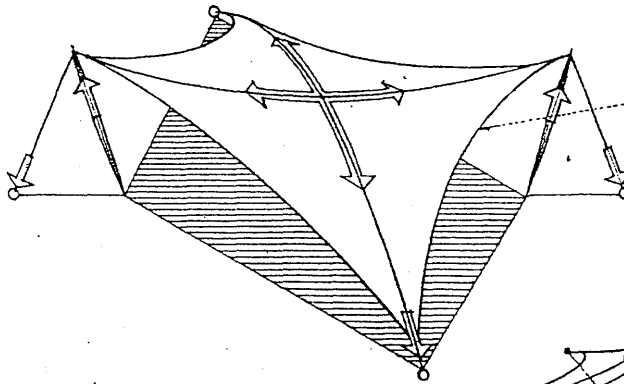


# MEMBRANE

A thin, flexible surface that carries loads primarily through the development of tensile stresses.

## tent structure

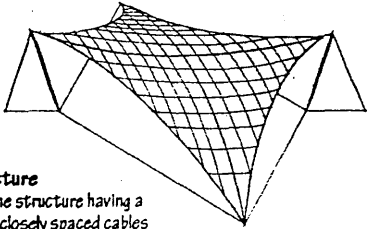
A membrane structure prestressed by externally applied forces so that it is held completely taut under all anticipated load conditions. To avoid extremely high tensile forces, a membrane structure should have relatively sharp curvatures in opposite directions.



**reinforcing edge cable**  
A cable stiffening the free edges of a prestressed membrane structure.

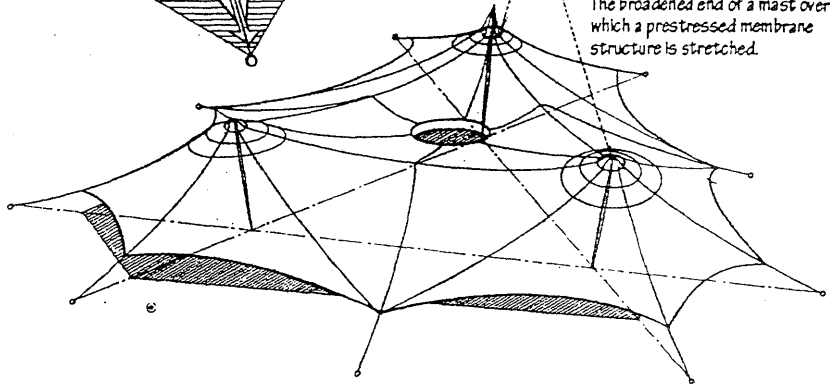
**cable loop**  
A reinforcing edge cable tied to the mast support of a membrane structure.

**distribution cap**  
The broadened end of a mast over which a prestressed membrane structure is stretched.



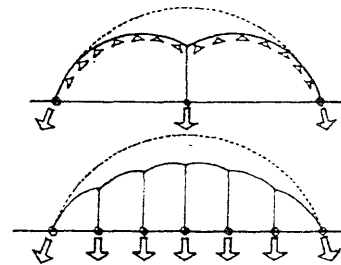
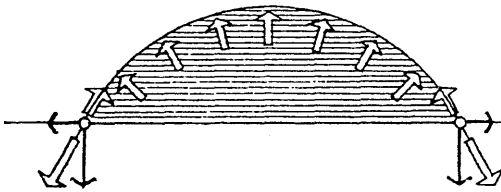
## net structure

A membrane structure having a surface of closely spaced cables instead of a fabric material.



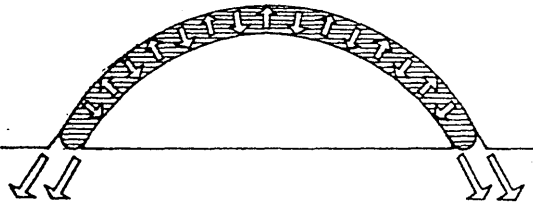
## pneumatic structure

A membrane structure that is placed in tension and stabilized by the pressure of compressed air.



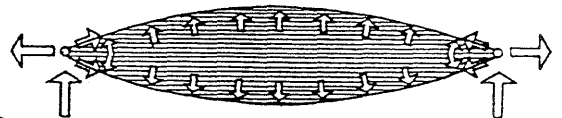
## air-supported structure

A pneumatic structure consisting of a single membrane supported by an internal air pressure slightly higher than normal atmospheric pressure, and securely anchored and sealed along the perimeter to prevent leaking. Air locks are required at entrances to maintain the internal air pressure.



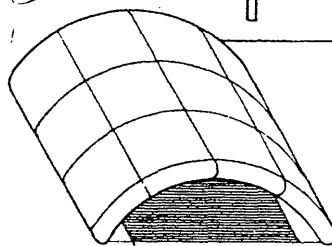
## cable-restrained pneumatic structure

An air-supported structure that uses a net of cables placed in tension by the inflating force to restrain the membrane from developing its natural inflated profile.



## air-inflated structure

A pneumatic structure supported by pressurized air within inflated building elements, which are shaped to carry loads in a traditional manner, while the enclosed volume of building air remains at normal atmospheric pressure. The tendency for a double-membrane structure to bulge in the middle is restrained by a compression ring or by internal ties or diaphragms.

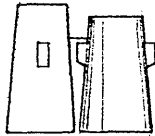


**ingot**

A mass of metal cast into a convenient shape for storage or transportation before further processing.

**blank**

A piece of metal ready to be drawn, pressed, or machined into a finished object.



**bloom**

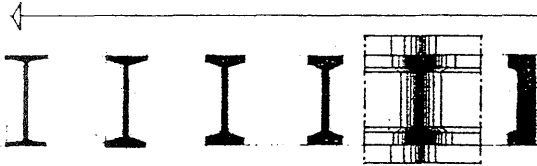
A bar of steel reduced from an ingot to dimensions suitable for further rolling.

**blooming mill**

A mill for rolling ingots into blooms.

**billet**

A narrow, generally square, bar of steel, forged or hot-rolled from an ingot or bloom.



**hot-roll**

To roll metal at a heat high enough to permit recrystallization.

**hot-rolled finish**

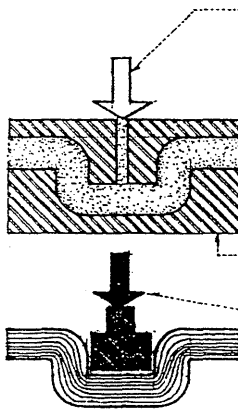
The dark, oxidized, relatively rough finish obtained by rolling metal while hot.

**scale**

An oxide occurring in a scaly form on the surface of metal when brought to a high temperature.

**mill scale**

A loose coating of iron oxide that forms on iron or steel during hot-rolling. Mill scale increases the bond between steel and concrete in reinforced concrete or in structural steelwork encased in concrete for fire protection.



**die casting**

The process or product of forcing molten metal into a metallic mold under hydraulic pressure to give it a particular shape or form.

**casting**

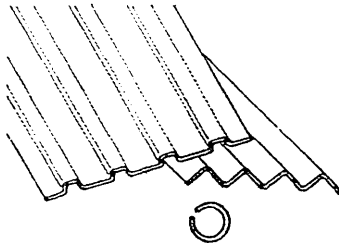
The process or product of forming a material into a particular shape by pouring it into a mold in a fluid state and letting it harden.

**mold**

A hollow form or matrix for giving a particular shape to something in a molten or plastic state.

**forge**

To form metal by heating and hammering.



**heat treatment**

The controlled heating and cooling of a metal to develop certain desirable physical or mechanical properties.

**anneal**

To remove internal stress from metal or glass by heating to a temperature below that of recrystallization and then gradually cooling in a liquid or air, esp. to make the material more ductile.

**quench**

To rapidly cool a heated metal by immersion in water, esp. to increase its hardness.

**temper**

To strengthen or toughen a metal by reheating at a lower temperature and slowly cooling the material.

**stress relieving**

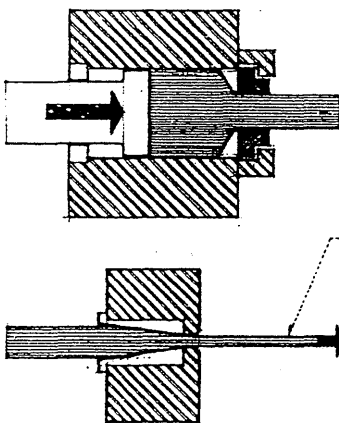
The tempering of a metal at a temperature high enough to relieve residual stresses, followed by slow, uniform cooling.

**residual stress**

Microscopic stress in a metal resulting from nonuniform thermal changes, plastic deformation, or other causes aside from external forces or applications of heat.

**case-harden**

To make the outside surface of an iron-based alloy hard by carburization and heat treatment, leaving the interior tough and ductile.



**cold-roll**

To roll metal at a temperature below that at which recrystallization occurs, so as to increase its tensile strength or improve its surface finish.

**mill finish**

The striated finish that cold rolling or extrusion imparts to a metal surface.

**extrusion**

The process or product of forming a metal or plastic with a desired cross section by forcing it through a die with a pressure ram.

**cold-draw**

To draw metal through a set of dies to reduce its cross-sectional area without preheating, as in the fabrication of wire or tubing.

**drawn finish**

A smooth, bright finish produced by drawing metal through a die.

**die**

A steel block or plate having small conical holes through which metal or plastic is extruded or drawn for shaping.

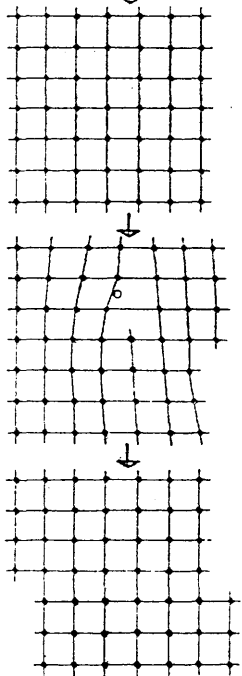
Any of a class of elementary substances, as gold, silver, or copper, all of which are crystalline when solid and many of which are characterized by opacity, ductility, conductivity, and a unique luster when freshly fractured.

**hot-working**

The working of a metal at a temperature high enough to permit recrystallization.

**recrystallize**

To acquire a new granular structure with new crystals because of plastic deformation, as when worked after being heated.



**cold-working**

The working of metal below the temperature at which recrystallization occurs, as in drawing, pressing, or stamping.

# METAL

## ferrous metal

A metal containing iron as a principal element.

## iron

A malleable, ductile, magnetic, silver-white metallic element from which pig iron and steel are made. Symbol: Fe

## pig iron

Crude iron that is drawn from a blast furnace and cast into pigs in preparation for conversion into cast iron, wrought iron, or steel.

## cast iron

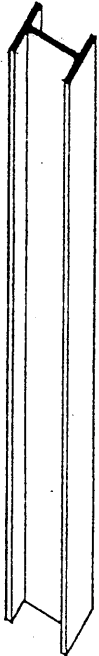
A hard, brittle, nonmalleable iron-based alloy containing 2.0% to 4.5% carbon and 0.5% to 3% silicon, cast in a sand mold and machined to make many building products.

## wrought iron

A tough, malleable, relatively soft iron that is readily forged and welded, having a fibrous structure containing approximately 0.2% carbon and a small amount of uniformly distributed slag.

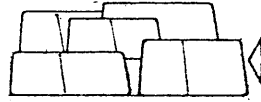
## steel

Any of various iron-based alloys having a carbon content less than that of cast iron and more than that of wrought iron, and having qualities of strength, hardness, and elasticity varying according to composition and heat treatment.



## smelt

To melt or fuse ore in order to separate the metal constituents.



## pig

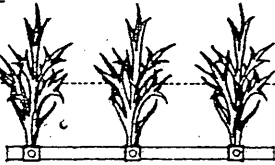
An oblong mass of metal that has been poured while still molten into a mold of sand, esp. such a mass of iron from a blast furnace.

## malleable cast iron

Cast iron that has been annealed by transforming the carbon content into graphite or removing it completely.

## malleable

Capable of being shaped or formed by hammering or by pressure from rollers.



## carbon steel

Ordinary, unalloyed steel in which the residual elements, as carbon, manganese, phosphorus, sulfur, and silicon, are controlled. Any increase in carbon content increases the strength and hardness of the steel but reduces its ductility and weldability.

## carbon

A nonmetallic element occurring in a pure state as diamond and graphite, or as a constituent of coal and petroleum. Symbol: C

## alloy steel

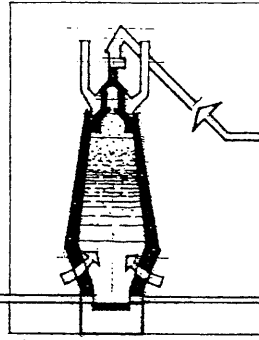
Carbon steel to which various elements, as chromium, cobalt, copper, manganese, molybdenum, nickel, tungsten, or vanadium, have been added in a sufficient amount to obtain particular physical or chemical properties.

## alloy

A substance composed of two or more metals, or of a metal and a nonmetal, intimately mixed, as by fusing or electrodeposition.

## base metal

The principal metal of an alloy or a piece underlying a coating of another metal.



A mixture of iron ore, limestone, and coke

## coke

The solid residue of coal left after destructive distillation, used as a fuel.

## blast furnace

A large vertical furnace for smelting iron from ore, in which combustion is intensified by a continuous blast of air through the fuel.

## blast-furnace slag

Slag left as a residue by the smelting of iron ore in a blast furnace.

## slag

The vitrified matter left as a residue from the smelting of a metallic ore. Also called cinder.



## mild steel

A low-carbon steel containing from 0.15% to 0.25% carbon. Also called soft steel.

## medium steel

A carbon steel containing from 0.25% to 0.45% carbon.

## hard steel

A high-carbon steel containing from 0.45% to 0.85% carbon.

## spring steel

A high-carbon steel containing 0.85% to 1.80% carbon.

## stainless steel

An alloy steel containing a minimum of 12% chromium, sometimes with nickel, manganese, or molybdenum as additional alloying elements, so as to be highly resistant to corrosion.

## high-strength low-alloy steel

Any of a group of low-carbon steels containing less than 2% alloys in a chemical composition specifically developed for increased strength, ductility, and resistance to corrosion.

## weathering steel

A high-strength, low-alloy steel that forms an oxide coating when exposed to rain or moisture in the atmosphere, which adheres firmly to the base metal and protects it from further corrosion. Structures using weathering steel should be detailed to prevent the small amounts of oxide carried off by rainwater from staining adjoining materials.





**rust**

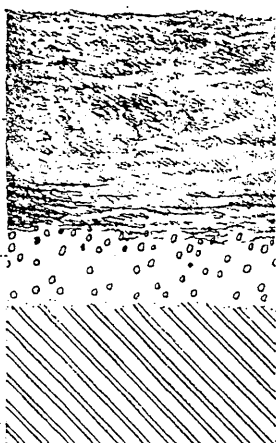
The reddish brittle coating formed on the surface of iron esp. when exposed to moisture and air, consisting essentially of hydrated ferric oxide formed by oxidation.

**oxidation**

The process or result of combining with oxygen to form an oxide.

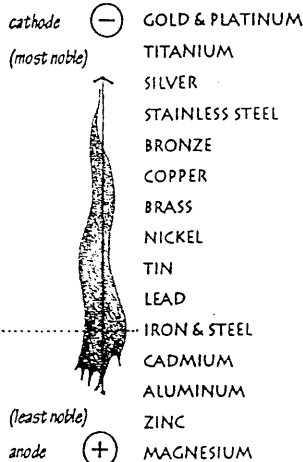
**oxide**

A binary compound of oxygen with another element.



**noble metal**

A metal, as gold, silver, and mercury, that resists oxidation when heated in air, and solution by inorganic acids.



**corrosion**

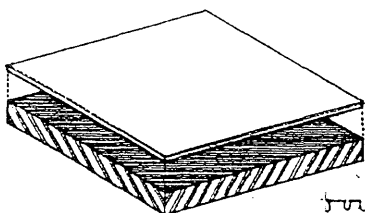
The gradual deterioration of metal by chemical action, as when exposed to weather, moisture, or other corroding agents.

**galvanic corrosion**

An accelerated corrosive action that takes place when dissimilar metals are in contact in the presence of an electrolyte.

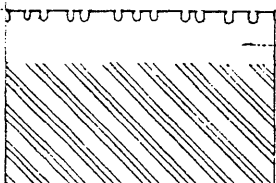
**galvanic series**

A list of metals arranged in order from least noble to most noble. The farther apart two metals are on the list, the more susceptible the least noble one is to corrosive deterioration.



**cladding**

The process or product of bonding one metal to another, usually to protect the inner metal from corrosion.



**sacrificial anode**

An anode that is attached to a metal object subject to electrolysis and is decomposed instead of the object.

**cathodic protection**

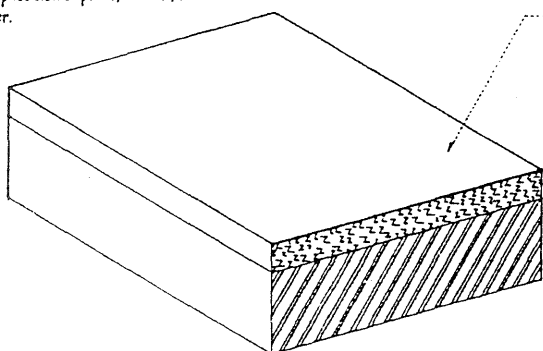
The protection of ferrous metals against electrolysis by the attachment of sacrificial anodes. Also called electrolytic protection.

**pickle**

An acid or other chemical solution in which a metal object is dipped to remove oxide scale or other adhering substances.

**bonderize**

To coat steel with an anticorrosive phosphate solution in preparation for the application of paint, enamel, or lacquer.



**anodize**

To coat a metal, esp. aluminum or magnesium, with a hard, noncorrosive film by electrolytic or chemical action.

**chrome**

To coat or plate a metal surface with a compound of chromium. Also called chromeplate.

**chromium**

A lustrous, hard, brittle metallic element used in alloy steels for hardness and corrosion resistance, and for electroplating other metals.

**galvanize**

To coat metal, esp. iron or steel, with zinc, esp. to immerse in molten zinc to produce a coating of zinc-iron alloy.

**hot-dip galvanizing**

The protective coating of ferrous metal by dipping in a bath of molten zinc.

**galvanized iron**

Iron coated with zinc to prevent rust.

**zinc**

A ductile, crystalline, bluish-white metallic element, used for galvanizing iron and steel and in making other alloys. Symbol: Zn

**tinplate**

Thin iron or steel sheet plated with tin for protection against oxidation.

**tin**

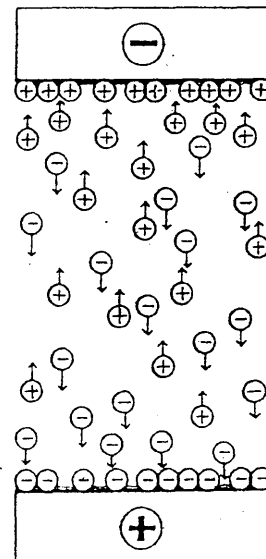
A lustrous, low-melting, bluish-white metallic element that is malleable and ductile at ordinary temperatures and used in plating and in making alloys and soft solders. Symbol: Sn

**electroplate**

To plate with an adherent metallic coating by electrolysis, usually to increase the hardness, improve the durability, or enhance the appearance of the base metal.

**electrolysis**

The producing of chemical changes by the passage of an electric current through an electrolyte, with subsequent migration of positively and negatively charged ions to the negative and positive electrodes.



# METAL

## W-shape

A hot-rolled structural steel section having an H-shape with wide parallel flanges, designated by the prefix W followed by the size and weight of the member. Also called wide flange.

## M-shape

A hot-rolled structural steel shape similar to but not classified as a W-shape, designated by the prefix M followed by the size and weight of the member.

## HP-shape

A hot-rolled structural steel section similar to a W-shape but having flanges and web of equal thickness and typically used as a load-bearing pile, designated by the prefix HP followed by the size and weight of the member.

## S-shape

A hot-rolled structural steel section having an I-shape with sloped inner flange surfaces, designated by the prefix S followed by the size and weight of the member. Also called American standard beam.

## American standard channel

A hot-rolled structural steel section having a rectangular C-shape with sloped inner flange surfaces, designated by the prefix C followed by the size and weight of the member.

## Miscellaneous channel

A hot-rolled structural steel section similar to a C-shape but designated by the prefix MC followed by the size and weight of the member.

## angle

A hot-rolled structural steel section having an L-shape, designated by the prefix L followed by the length of each leg and their thickness. Also called angle iron.

## equal leg angle

An angle iron having legs of equal length.

## unequal leg angle

An angle iron having legs of unequal length.

## double angle

A structural member consisting of a pair of angles joined back to back. The parallel legs may be in contact or slightly separated.

## structural tee

A structural steel section cut from a W-, S-, or M-shape and having a T-shape. It is designated by the prefix WT, ST, or MT, depending on the section from which it is cut, followed by the size and weight of the member.

## tee

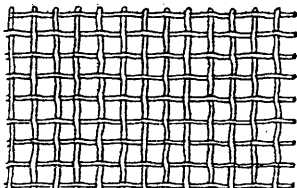
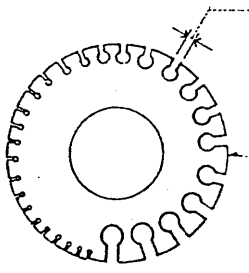
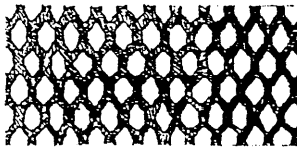
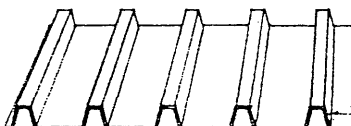
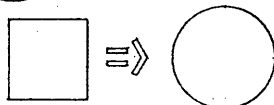
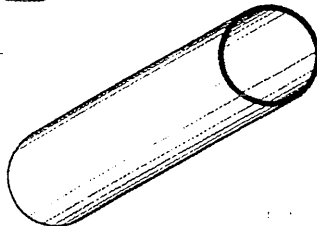
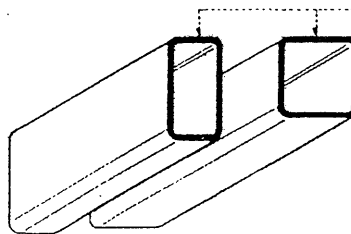
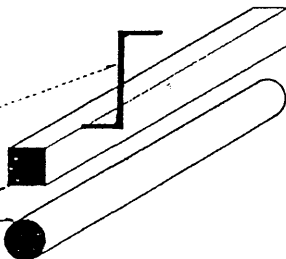
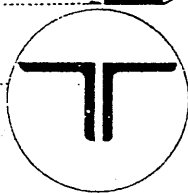
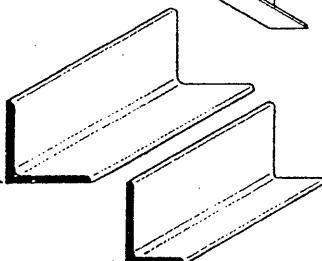
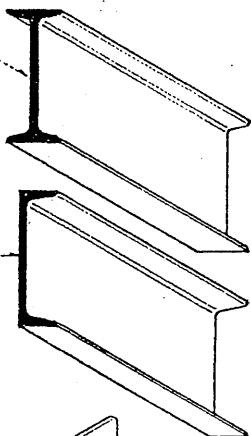
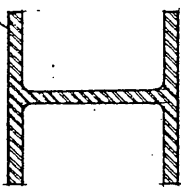
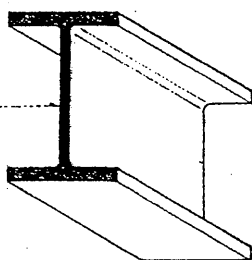
A rolled metal bar having a T-shaped cross section. Also called T-bar.

## zee

A rolled metal bar having a Z-shaped cross section with internal right angles. Also called Z-bar.

## bar

A long, solid piece of metal, esp. one having a square, rectangular, or other simple cross-sectional shape.



## structural tubing

A hollow structural steel shape of square, rectangular, or circular cross section. It is designated by the prefix TS followed by the side dimensions or diameter and the wall thickness.

## standard pipe

A structural steel pipe of standard weight and wall thickness, designated as Pipe (nominal inside diameter) Std.

## extra-strong pipe

A structural steel pipe having increased wall thickness for greater strength, designated as Pipe (nominal inside diameter) X-Strong.

## double-extra-strong pipe

A structural steel pipe having a wall thickness greater than that of extra-strong pipe, designated as Pipe (nominal inside diameter) XX-Strong.

## equivalent round

The diameter of a circle having a circumference equal to the perimeter of a noncircular tube.

## plate

A thin, flat sheet or piece of metal, esp. one of uniform thickness.

## checkered plate

A steel or cast-iron plate having a wafflelike pattern.

## sheet metal

Metal in thin sheets or plates, used in the manufacture of ductwork, flashing, and roofing.

## corrugated metal

Sheet metal drawn or rolled into parallel ridges and furrows for additional mechanical strength.

## expanded metal

Sheet metal slotted and stretched into a stiff, open mesh or lattice, used esp. as lath.

## blackplate

Cold-rolled sheet steel before pickling or cleaning, used for coating with zinc, tin, or terne metal.

## gauge

Any of various standards for designating the thickness or diameter of a thin object, as the thickness of sheet metal or the diameter of a wire or screw. Also, gage.

## wire gauge

A gauge calibrated for determining the diameter of wire or thickness of sheet metal, consisting of a steel plate with a series of standard-sized notches around the edge.

## wire cloth

A fabric of woven metallic wire, used in screens, sieves, or the like.

## hardware cloth

A galvanized steel wire cloth with a mesh between 0.25 and 0.50 in. (6.4 to 12.7 mm).

## mesh

The number of openings per inch in wire cloth.

## wire rope

A heavy rope made of or containing wire strands twisted around a central core.

**flange**

A broad ridge or pair of ridges projecting at a right angle from the edge of a structural shape in order to strengthen or stiffen it.

**web**

An integral part of a beam that forms a flat, rigid connection between two broader, parallel parts, as the flanges of a structural shape.

**I-beam**

A rolled or extruded metal beam having a cross section resembling the capital letter I.

**structural steel**

Steel that is hot-rolled or cold-formed in a variety of standard shapes and fabricated for use as load-bearing members or elements.

**steel beam**

A beam consisting of a single or built-up structural steel section.

**open-web steel joist**

A lightweight, fabricated steel joist having an open web. A K-Series joist has a web consisting of a single bent bar, running in a zigzag pattern between the upper and lower chords. LH- and DLH-Series joists have heavier web and chord members for increased loads and spans. Also called *bar joist*.

**joist girder**

A trussed girder for supporting open-web steel joists.

**cover plate**

A plate fastened to the flanges of a plate girder to increase its section modulus in areas subject to high-bending stresses.

**flange angle**

One of the angles forming the top or bottom flange of a plate girder.

**web plate**

A steel plate forming the web of a plate girder.

**shear plate**

A plate fastened to the web of a plate girder to increase its resistance to shearing stresses.

**plate girder**

A steel girder built up from plates or shapes that are welded or riveted together.

**stiffener**

One of a pair of vertical angles fastened to each side of a web plate to stiffen it against buckling.

**bearing stiffener**

A stiffener angle for the web of a plate girder, placed at a point of support or under a concentrated load.

**intermediate stiffener**

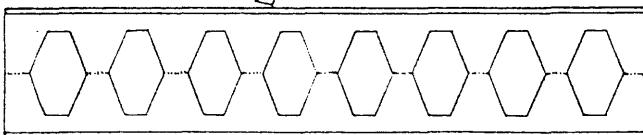
A stiffener angle for the web of a plate girder, placed between bearing stiffeners for increased resistance to diagonal compressive stresses.

**box girder**

A steel beam built up from shapes and having a hollow, rectangular cross section.

**castellated beam**

A steel beam fabricated by dividing the web of a wide-flange section with a lengthwise zigzag cut, then welding both halves together at the peaks, thus increasing its depth without increasing its weight.



# MOISTURE PROTECTION

## joint sealant

Any of various viscous substances injected into a building joint, curing to form a flexible material that adheres to the surrounding surfaces and seals the joint against the passage of air and water.

## joint movement

The change in width of a building joint resulting from a change in temperature.

## extensibility

The capacity of a sealant to be extended in tension.

## high-range sealant

A joint sealant of polysulfide, polyurethane, or silicone capable of elongations up to 25%, used for sealing joints in curtain-wall systems.

## medium-range sealant

A joint sealant of butyl rubber or acrylic capable of elongations up to 10%, used for sealing nonworking or mechanically fastened joints.

## caulk

A low-range joint sealant used for filling or closing a seam, crevice or crack in order to make it watertight and airtight. Also, caulking.

## bead

A narrow deposit of sealant applied to a building joint.

## bond face

The surface of a building component or joint that serves as a substrate for a sealant and to which the sealant is bonded.

## substrate

Any material that underlies and serves as a base or foundation.

## primer

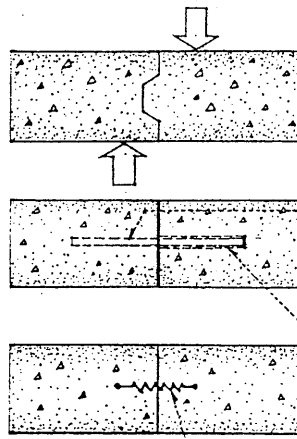
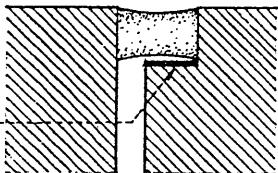
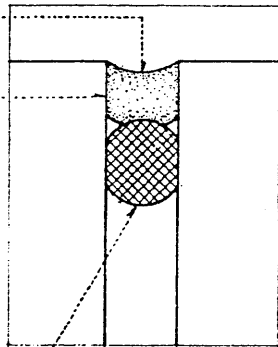
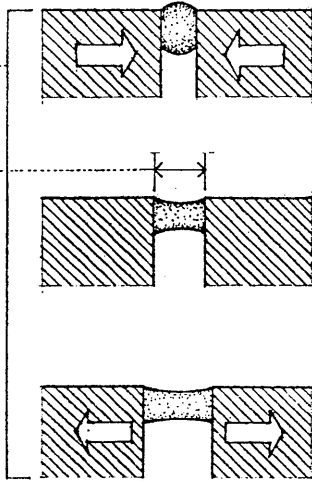
A liquid for improving the adhesion of a sealant to a substrate.

## joint filler

A compressible strip, rod, or tube of resilient material, as neoprene or butyl, used for filling a joint and controlling the depth of a sealant. Also called backup rod.

## bond breaker

Any of various materials, as polyethylene tape, used for preventing the adhesion of a sealant to the bottom of a joint.



## construction joint

A joint between two successive placements of concrete, often keyed or doweled to provide lateral stability across the joint.

## dowel

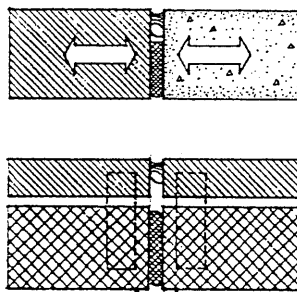
A short reinforcing bar extending equally into two abutting sections of concrete to prevent differential movement.

## expansion sleeve

A pipe sleeve that allows the housed element to move freely in a longitudinal direction.

## waterstop

A flexible strip of rubber or plastic inserted across a concrete or masonry joint to prevent the passage of water.

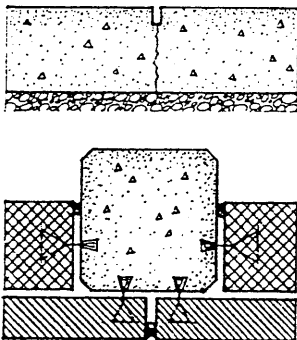


## expansion joint

A joint between two parts of a building or structure permitting thermal or moisture expansion to occur without damage to either part. Expansion joints also serve as isolation joints and control joints.

## expansion joint cover

A prefabricated cover for protecting an expansion joint while allowing relative movement between the two parts being connected.

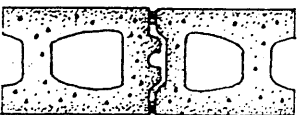


## control joint

A continuous groove or separation formed, sawed, or tooled in a concrete or masonry structure to form a plane of weakness and thus regulate the location and amount of cracking resulting from drying shrinkage or thermal stresses.

## contraction joint

A joint between two parts of a structure, designed to compensate for the contraction of either part.



## isolation joint

A joint separating two sections of a structure so that differential movement or settlement can occur between the parts.

**cymatium**  
The crowning member of a classical cornice, usually a cyma recta.

**corona**  
The projecting, slablike member of a classical cornice, supported by the bed molding and crowned by the cymatium.

**bed molding**  
The molding or group of moldings immediately beneath the corona of a cornice.

**columniation**  
The use or arrangement of columns in a structure.

**distyle**  
Having two columns on one or each front.

**tristyle**  
Having three columns on one or each front.

**tetrastyle**  
Having four columns on one or each front.

**pentastyle**  
Having five columns on one or each front.

**hexastyle**  
Having six columns on one or each front.

**heptastyle**  
Having seven columns on one or each front.

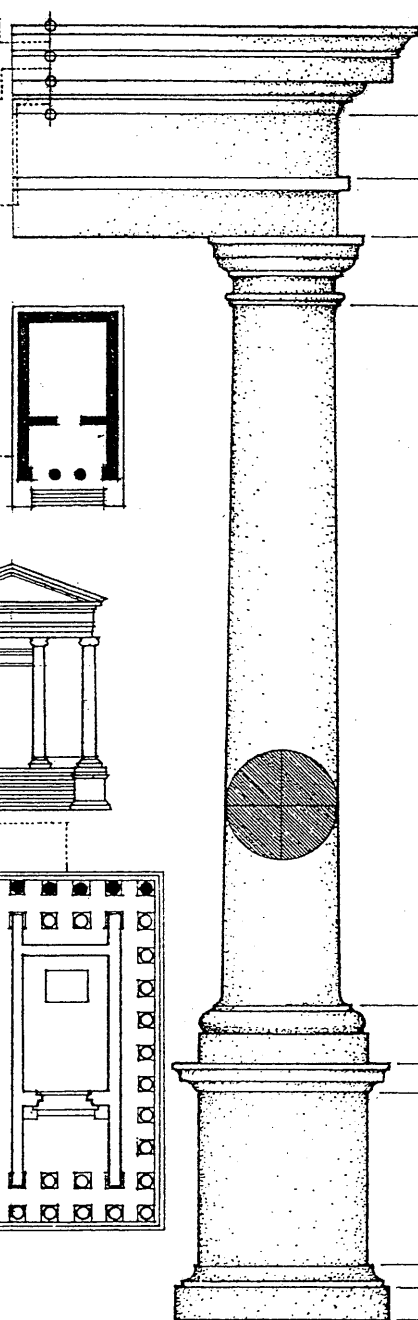
**octastyle**  
Having eight columns on one or either front.

**enneastyle**  
Having nine columns on one or on each front. Also, *enneastylar*.

**decastyle**  
Having 10 columns on one or on each front.

**dodecastyle**  
Having 12 columns on one or either front. Also, *dodecastylar*, *duodecastyle*.

**intercolumniation**  
The space between two adjacent columns, usually the clear space between the lower parts of the shafts, measured in diameters. Also, a system for spacing columns in a colonnade based on this measurement.



**cornice**  
The uppermost member of a classical entablature, consisting typically of a cymatium, corona, and bed molding.

**frieze**  
The horizontal part of a classical entablature between the cornice and architrave, often decorated with sculpture in low relief.

**architrave**  
The lowermost division of a classical entablature, resting directly on the column capitals and supporting the frieze.

**capital**  
The distinctively treated upper end of a column, pillar, or pier, crowning the shaft and taking the weight of the entablature or architrave.

**shaft**  
The central part of a column or pier between the capital and the base.

**base**  
The lowermost portion of a wall, column, pier, or other structure, usually distinctively treated and considered as an architectural unit.

**cornice or cap**  
**dado**  
The part of a pedestal between the base and the cornice or cap. Also called *die*.

**base molding**  
**plinth**  
The usually square slab beneath the base of a column, pier, or pedestal.

Any of five styles of classical architecture characterized by the type and arrangement of columns and entablatures employed, as the Doric, Ionic, Corinthian, Tuscan, and Composite orders.

**entablature**  
The horizontal section of a classical order that rests on the columns, usually composed of a cornice, frieze, and architrave.

**column**  
A cylindrical support in classical architecture, consisting of a capital, shaft, and usually a base, either monolithic or built up of drums the full diameter of the shaft.

**pedestal**  
A construction upon which a column, statue, memorial shaft, or the like, is elevated, usually consisting of a cornice or cap, a dado, and a base.

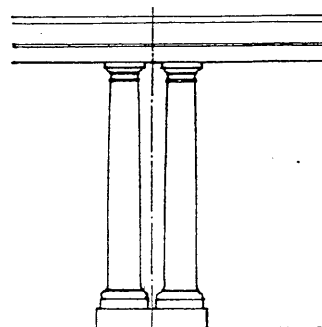
**pycnostyle**  
Having an intercolumniation of  $1\frac{1}{2}$  diameters.

**systyle**  
Having an intercolumniation of two diameters.

**eustyle**  
Having an intercolumniation of  $2\frac{1}{4}$  diameters.

**diastyle**  
Having an intercolumniation of three diameters.

**araeostyle**  
Having an intercolumniation of four diameters. Also, *araeostyle*.



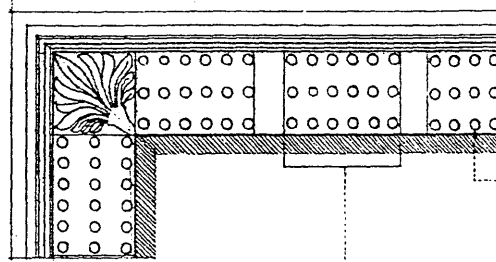
**accouplement**  
The placement of two columns or pilasters very close together.

preda  
 $\frac{1}{2}$  2  $\frac{2}{3}$  4

## ORDER

### Doric order

The oldest and simplest of the five classical orders, developed in Greece in the 7th century B.C. and later imitated by the Romans, characterized by a fluted column having no base, a plain cushion-shaped capital supporting a square abacus, and an entablature consisting of a plain architrave, a frieze of triglyphs and metopes, and a cornice, the corona of which has mutules on its soffit. In the Roman Doric order, the columns are more slender and usually have bases, the channeling is sometimes altered or omitted, and the capital consists of a bandlike necking, an echinus, and a molded abacus.



#### soffit

The underside of an architectural element, as an arch, beam, cornice, or staircase.

#### gutta

One of a series of small, droplike ornaments, attached to the undersides of the mutules and regulae of a Doric entablature. Also called drop.

#### mutule

A projecting flat block under the corona of a Doric cornice, corresponding to the modillion of other orders.

#### triglyph

One of the vertical blocks separating the metopes in a Doric frieze, typically having two vertical grooves or glyphs on its face, and two chamfers or hemiglyphs at the sides.

#### metope

Any of the panels, either plain or decorated, between triglyphs in the Doric frieze. Also called intertriglyph.

#### taenia

A raised band or fillet separating the frieze from the architrave on a Doric entablature. Also, tenia.

#### regula

A fillet beneath the taenia in a Doric entablature, corresponding to a triglyph above and from which guttae are suspended. Also called guttae band.

#### abacus

The flat slab forming the top of a column capital, plain in the Doric style, but molded or otherwise enriched in other styles.

#### echinus

The prominent circular molding supporting the abacus of a Doric or Tuscan capital.

#### necking

The upper part of a column, just above the shaft and below the projecting part of the capital, when differentiated by a molding, groove, or the omission of fluting.

#### annulet

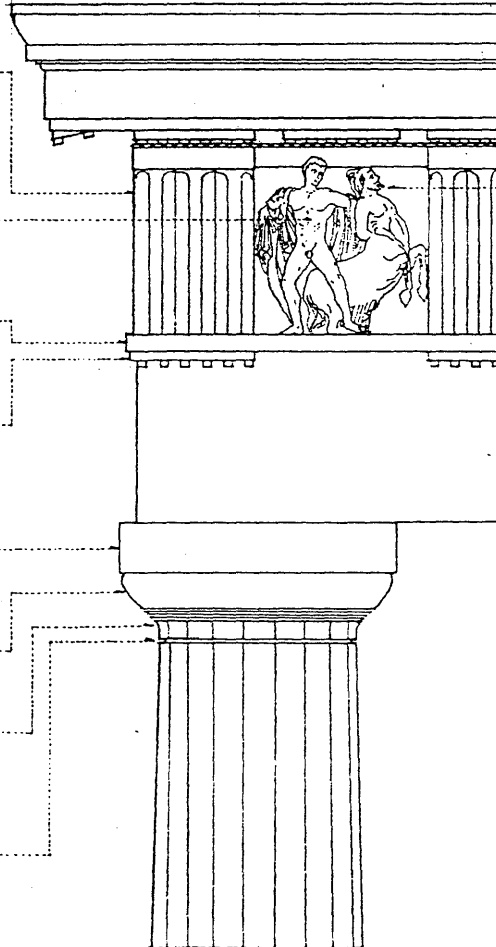
An encircling band, molding, or fillet, on a capital or shaft of a column.

#### fluting

A decorative motif consisting of a series of long, rounded, parallel grooves, as on the shaft of a classical column.

#### flute

A rounded channel or groove. Also called stria.



#### zoophorus

A frieze bearing carved figures of people or animals. Also, zoophorus.

#### trachelium

That part of the necking between the hypotrachelium and the capital of a classical column.

#### hypotrachelium

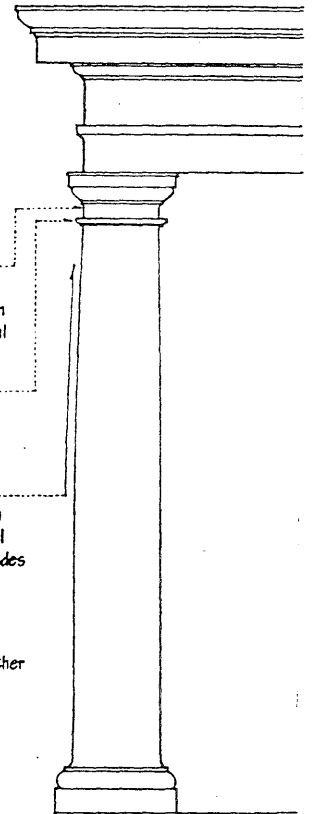
Any member between the capital and the shaft of a classical column.

#### entasis

A slight convexity given to a column to correct an optical illusion of concavity if the sides were straight.

#### drum

Any of several cylindrical stones laid one above the other to form a column or pier.



### Tuscan order

A classical order of Roman origin, basically a simplified Roman Doric characterized by an unfluted column and a plain base, capital, and entablature having no decoration other than moldings.

**egg and dart**

An ornamental motif for enriching an ovolo or echinus, consisting of a closely set, alternating series of oval and pointed forms. Also called *egg and tongue*.

**dentil**

Any of a series of closely spaced, small, rectangular blocks forming a molding or projecting beneath the coronas of Ionic, Corinthian, and Composite cornices.

**fascia**

One of the three horizontal bands making up the architrave in the Ionic order.

**Attic base**

A base to a classical column, consisting of an upper and a lower torus separated by a scotia between two fillets.

**scotia**

A deep concave molding between two fillets. Also called *trochilus*.

**torus**

A large convex, semicircular molding, commonly found directly above the plinth of the base of a classical column.

**Ionic order**

A classical order that developed in the Greek colonies of Asia Minor in the 6th century B.C., characterized esp. by the spiral volutes of its capital. The fluted columns typically had molded bases and supported an entablature consisting of an architrave of three fascias, a richly ornamented frieze, and a cornice corbeled out on egg-and-dart and dentil moldings. Roman and Renaissance examples are often more elaborate, and usually set the volutes of the capitals 45° to the architrave.

**volute**

A spiral, scroll-like ornament, as on the capitals of the Ionic, Corinthian, and Composite orders.

**cathetus**

The vertical guideline through the eye of a volute in an Ionic capital, from which the spiral form is determined.

**echinus**

The circular molding under the cushion of an Ionic capital between the volutes, usually carved with an egg-and-dart pattern. Also called *cymatium*.

**fillet**

A narrow part of the surface of a column left between adjoining flutes.

**apophyge**

A small, concave curve joining the shaft of a classical column to its base. Also called *apophysis*.

**modillion**

An ornamental bracket, usually in the form of a scroll with acanthus, used in series beneath the corona of a Corinthian, Composite, or Roman Ionic cornice.

**helix**

A spiral ornament, as any of the volutes issuing from a cauliculus in a Corinthian capital.

**cauliculus**

Any of the ornamental stalks rising between the acanthus leaves of a Corinthian capital, from which the volutes spring. Also called *caulcole*.

**bell**

The underlying part of a foliated capital, between the abacus and neck molding.

**acanthus**

An ornament, as on the Corinthian capital, patterned after the large, toothed leaves of a Mediterranean plant of the same name.

**Composite order**

One of the five classical orders, popular esp. since the beginning of the Renaissance but invented by the ancient Romans, in which the Corinthian order is modified by superimposing four diagonally set Ionic volutes on a bell of Corinthian acanthus leaves.

**Corinthian order**

The most ornate of the five classical orders, developed by the Greeks in the 4th century B.C. but used more extensively in Roman architecture, similar in most respects to the Ionic but usually of slenderer proportions and characterized esp. by a deep bell-shaped capital decorated with acanthus leaves and an abacus with concave sides.

## ORNAMENT

An accessory, article, or detail that lends grace or beauty to something to which it is added or of which it is an integral part.

### pictograph

A pictorial sign or symbol.

### graffito

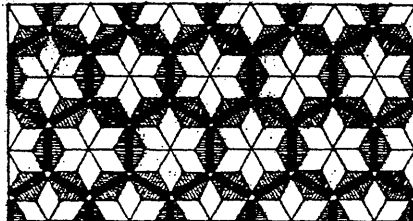
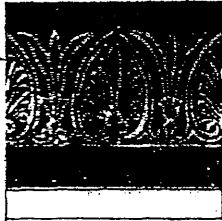
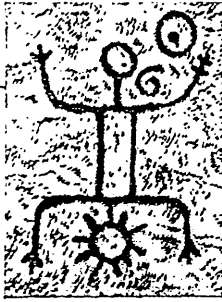
An ancient drawing or writing scratched on stone, plaster, or other hard surface.

### graffiti

Inscriptions or drawings spray-painted or sketched on a public surface, as a sidewalk or wall of a building.

### sgraffito

Decoration produced by cutting or scratching through a surface layer of paint or plaster to reveal a ground of contrasting color.



### mosaic

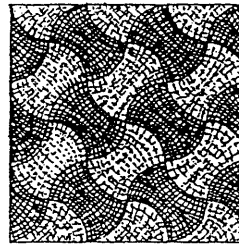
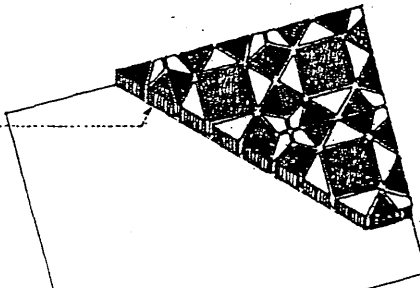
A picture or decorative pattern made by inlaying small, usually colored pieces of tile, enamel, or glass in mortar.

### tessera

One of the small pieces of colored marble, glass, or tile used in mosaic work.

### smalto

Colored glass or enamel, esp. in the form of minute squares, used in mosaic work.



### mural

A large picture painted on or applied directly to a wall or ceiling surface.

### fresco

The art or technique of painting on a freshly spread, moist plaster surface with pigments ground up in water or a limewater mixture. Also, a picture or design so painted.

### opus sectile

Any mosaic of regularly cut material.

### opus Alexandrinum

A form of opus sectile having a geometric pattern formed with few colors, as black and white, or dark green and red.

### opus vermiculatum

A mosaic of tessera arranged in waving lines resembling the form or tracks of a worm.

### Florentine mosaic

A mosaic made by inlaying fine, delicately colored stones into a white or black marble surface.

### relief

The projection of a figure or form from the flat background on which it is formed.

### cavo-relievo

Sculptural relief in which the highest points of the modeled forms are below or level with the original surface. Also called sunk relief.

### alto-relievo

Sculptural relief in which the modeled forms project from the background by at least half their depth. Also called high relief.

### mezzo-relievo

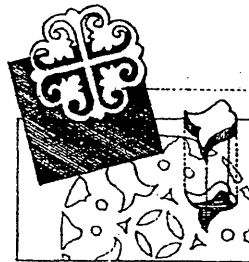
Sculptural relief intermediate between high relief and bas-relief. Also called demirelief, half relief.

### bas-relief

Sculptural relief that projects very slightly from the background. Also called basso-relievo, low relief.

### anaglyph

An ornament carved or embossed in low relief.



### appliqué

A decoration or ornament made by cutting out a design and fastening it to a larger piece of material.

### inlay

To decorate by setting pieces of wood, ivory, or the like into a surface, usually at the same level.

### emboss

To raise, mold, or carve a surface design in relief.

### engrave

To carve, cut, or etch designs on a hard surface, as of metal, stone, or the end grain of wood.

### intaglio

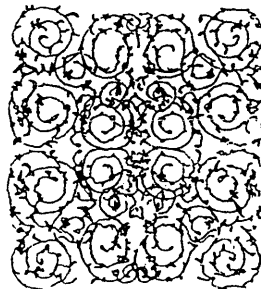
A figure or design incised into the surface of a stone or metal plate so that an impression yields a figure in relief.

### openwork

Ornamental or structural work having a latticelike nature or showing openings through its substance.

### filigree

Ornamental openwork of delicate or intricate design. Also, filagree.





## pastiche

An artistic composition consisting of forms or motifs borrowed from different sources.

## postiche

Artificial counterfeit, or false, as an architectural ornament that is added superfluously or inappropriately.

## star

A conventional figure usually having five or more points radiating from a center, often used as an ornament and symbol.

## Star of David

A hexagram used as a symbol of Judaism. Also called Magen David, Mogen David.

## hexagram

A six-pointed starlike figure, formed by extending each of the sides of a regular hexagon into equilateral triangles.

## glory

A ring, circle, or surrounding radiance of light, as a halo, nimbus, or aureole.

## halo

A disk or ring of radiant light around or above the head, traditionally symbolizing the sanctity of a divine or sacred personage in religious paintings and sculptures. Also called nimbus.

## aureole

A circle of light or radiance surrounding the head or body in the representation of a sacred personage.

## vesica piscis

An elliptical, pointed figure used esp. in early Christian art as an emblem of Christ. Also called mandorla.

## Chi-Rho

A Christian monogram and symbol formed by superimposing the first two letters of the Greek word for Christ. Also called christmon.

## table

A raised or sunken rectangular panel on a wall, distinctively treated or ornamented with inscriptions, painting, or sculpture.

## tablet

A flat slab or plaque having a surface suitable for or bearing an inscription, carving, or the like.

## medallion

A usually oval or circular tablet, often bearing a figure or ornament in relief.

## cartouche

An oval or oblong, slightly convex surface, usually surrounded with ornamental scrollwork, for receiving a painted or low-relief decoration. Also, cartouch.

## grotesque

A decorative style characterized by the fantastic shaping and combining of incongruous human and animal forms with foliage or similar figures, often distorting the natural into caricature or absurdity.

## antic

A grotesque sculpture of animal, human, or foliated forms, as a gargoyle.

## mask

An often grotesque representation of a head or face, used as an architectural ornament. Also called mascarón.

## griffin

A mythological animal typically having the head and wings of an eagle and the body and tail of a lion. Also, griffon, gryphon.

## griffe

An ornament projecting from the round base of a column toward a corner of a square or polygonal plinth. Also called spur.

## ballflower

A medieval English ornament suggesting a flower of three or four petals enclosing and partially concealing a ball.

## cross

An object or figure consisting essentially of an upright and a transverse piece at right angles to each other, often used as a symbol of Christianity.

## Latin cross

A cross having an upright or vertical shaft crossed near the top by a shorter horizontal bar.

## Celtic cross

A cross shaped like a Latin cross and having a ring about the intersection of the shaft and crossbar.

## Greek cross

A cross consisting of an upright crossed in the middle by a horizontal of the same length.

## Jerusalem cross

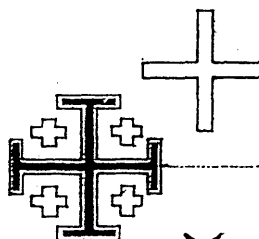
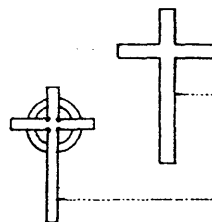
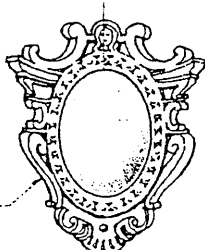
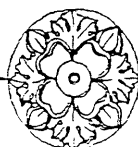
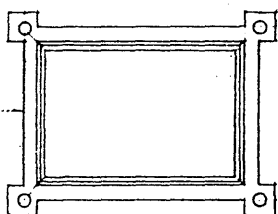
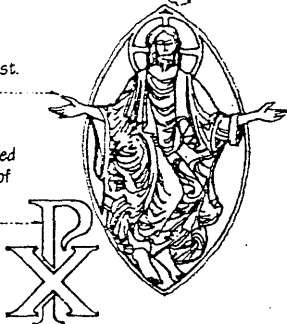
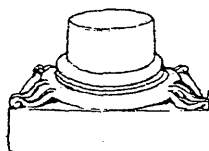
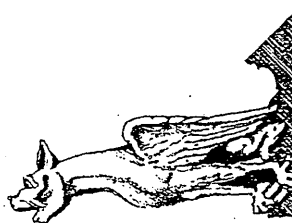
A cross whose four arms each terminate in a crossbar, often with a small Greek cross centered in each quadrant.

## Maltese cross

A cross formée having the outer face of each arm indented in a V.

## cross formée

A cross having arms of equal length, each expanding outward from the center.



# ORNAMENT

## motif

A distinctive and recurring shape, form, or color in a design.

## checker

To mark or decorate with a squared pattern.

## reticulate

Resembling or covered with a network of regularly intersecting lines.

## diaper

A pattern of small, repeated figures connecting or growing out of one another, originally used in the Middle Ages in weaving silk and gold.

## imbrication

A pattern or design resembling the regular overlapping of tiles or shingles.

## herringbone

A pattern consisting of rows of short, parallel lines which in any two adjacent rows slant in opposite directions, used in masonry, parquetry, and weaving.

## chevron

A V-shaped pattern used in heraldry and as ornamentation.

## dancette

An ornamental zigzag, as in a molding.

## fret

A decorative design contained within a band or border, consisting of repeated, often geometric figures. Also called key pattern.

## meander

A running ornament consisting of an intricate variety of fret or fretwork.

## guilloche

An ornamental border formed of two or more interlaced bands around a series of circular voids.

## dentil band

A molding occupying the position of a row of dentils, and often carved to resemble one.

## Venetian dentil

Any of a series of small rectangular blocks alternating with sloping surfaces on an archivolt or molding.

## scroll

An ornament having a spiral or convoluted form resembling a partly or loosely rolled parchment.

## Vitruvian scroll

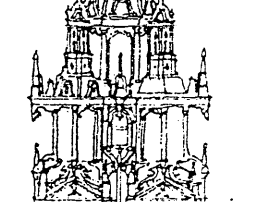
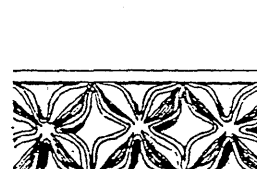
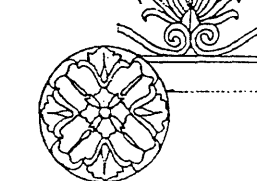
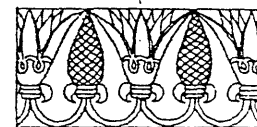
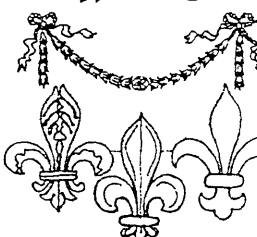
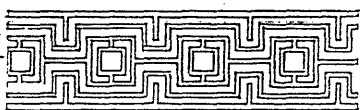
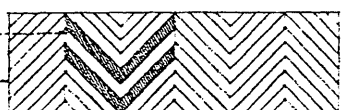
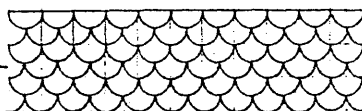
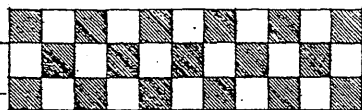
A series of scrolls forming a stylized wave pattern. Also called Vitruvian wave, wave scroll.

## banderole

A sculptured band resembling a long ribbon or scroll, adapted to receive an inscription. Also, banderol, bandrole.

## strapwork

Ornamentation composed of folded, crossed, and interlaced bands, sometimes cut with foliations.



## foliated

Ornamented with foils or representations of foliage. Also, foliate.

## wreath

A decorative band or garland of flowers, foliage, or other ornamental material.

## festoon

A decorative representation of a string or garland of flowers, foliage, ribbon, or the like, suspended in a curve between two points.

## fleur-de-lis

A stylized three-petaled iris flower tied by an encircling band, used as the heraldic bearing of the royal family of France. Also, fleur-de-lys.

## lotus

A representation of various aquatic plants in the water lily family, used as a decorative motif in ancient Egyptian and Hindu art and architecture.

## anthemion

An ornament of honeysuckle or palm leaves in a radiating cluster. Also called honeysuckle ornament.

## palmette

A stylized palm leaf shape used as a decorative element in classical art and architecture.

## rosette

An ornament having a generally circular combination of parts resembling a flower or plant. Also, rose.

## dogtooth

Any of a series of closely spaced, pyramidal ornaments, formed by sculptured leaves radiating from a raised center, used esp. in early English Gothic architecture.

## arabesque

A complex and ornate design that employs flowers, foliage, and sometimes animal and geometric figures to produce an intricate pattern of interlaced lines.

## calf's-tongue

A molding having pendant, tongue-like elements carved in relief against a flat or curved surface.

## scallop

Any of a series of curved projections forming an ornamental border.

## purfling

To decorate a shrine or tabernacle with miniature architectural forms so as to produce a lay effect.

**arris**  
A sharp edge or ridge formed by two surfaces meeting at an exterior angle. Also called *piend*.

**bullnose**  
A rounded or obtuse exterior angle. Also, bull's-nose.

**splay**  
A surface that makes an oblique angle with another.

**fillet**  
A narrow flat molding or area, raised or sunk to separate larger moldings or areas. Also called *list*.

**billet**  
Any of a series of closely spaced cylindrical forms ornamenting a hollow molding or cornice.

**cove**  
A concave surface or molding, esp. at the transition from wall to ceiling.

**cavetto**  
A concave molding having an outline that approximates a quarter circle.

**congé**  
A concave molding having the form of a quadrant curving away from a given surface and terminating perpendicular to a fillet parallel to that surface. Also, *congee*.

**ogee**  
A molding having a profile of a double curve in the shape of an elongated S. Also called *gula*.

**cyma**  
A projecting molding having the profile of a double curve formed by the union of a convex line and a concave line.

**cyma recta**  
A cyma having the concave part projecting beyond the convex part. Also called *Doric cyma*.

**cyma reversa**  
A cyma having the convex part projecting beyond the concave part. Also called *Lesbian cyma*.

**beak**  
A small pendant molding forming a drip and casting a deep shadow, as on the soffit of a cornice. Also called *bird's beak*.

**brace molding**  
A projecting molding having a profile formed by two ogees symmetrically disposed about an arris or fillet. Also called *keel*.

**profile**  
An outline of an object formed on a vertical plane passed through the object at right angles to one of its principal horizontal dimensions.

**molding**  
Any of various long, narrow, ornamental surfaces with uniform cross sections and a profile shaped to produce modulations of light, shade, and shadow. Almost all moldings derive at least in part from wood prototypes, as those in classical architecture, or stone prototypes, as those in Gothic architecture. By extension, the term now refers to a slender strip of wood or other material having such a surface and used for ornamentation and finishing. Also, *mold*, *moulding*.

**half round**  
A molding having a semicircular cross section.

**quarter round**  
A convex molding whose section is a quarter circle.

**ovolo**  
A convex molding having a profile approximating a quarter section of a circle or ellipse.

**bollet**  
A convex, rounded molding. Also, *boutel*, *bowtel*.

**gadroon**  
A convex molding elaborately carved with reeding or indented with notches. Also, *godroon*.

**Aaron's rod**  
A convex molding having pointed leaves or scrollwork emerging at regular intervals.

**cabie molding**  
A convex molding having the form of a rope.

**bead**  
A small convex molding usually having a continuous cylindrical surface.

**astragal**  
A small convex molding usually semicircular in section.

**baguette**  
A small convex molding of semicircular section, smaller than an astragal. Also, *baguet*.

**bead and reel**  
A convex molding having the form of disks alternating with spherical or elongated beads.

**pearl molding**  
A molding having the form of a row of pearls or beads. Also called *bead molding*, *Paternoster*.

**reeding**  
A parallel set of small convex moldings for ornamenting a plane or curved surface.

# ORNAMENT

## trim

The finished woodwork or the like used to decorate, border, or protect the edges of openings or surfaces.

## cornice

A continuous, molded projection that crowns a wall or other construction, or divides it horizontally for compositional purposes.

## picture mold

A horizontal molding near a ceiling from which pictures can be suspended. Also called picture rail.

## plate rail

A rail or narrow shelf fixed along a wall and grooved to hold plates, esp. for ornament or display.

## chair rail

A horizontal molding on an interior wall for preventing the backs of chairs from rubbing against and damaging the wall surface.

## base molding

An ornamental molding above the plinth of a pedestal, pillar, or wall.

## baseboard

A board or molding concealing the joint between an interior wall and the floor. Also called mopboard, skirt.

## shoe

A small molding, as a quarter round, covering the joint between a baseboard and the floor. Also called base shoe.

## broken pediment

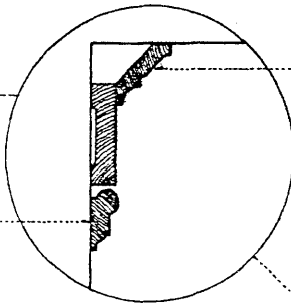
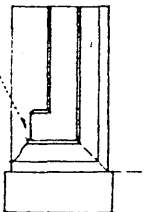
A pediment having its raking cornices interrupted at the crown or apex, the gap often being filled with an urn, a cartouche, or other ornament.

## architrave

A molded or decorative band framing a rectangular door or window opening.

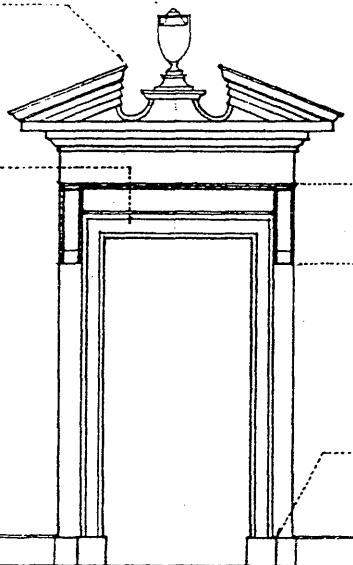
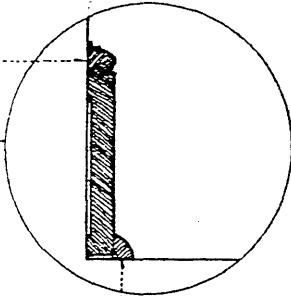
## return

The continuation of a molding, projection, or other part at an angle, usually 90°, to the main part.



## crown molding

Any ornamental molding terminating the top of a structure or decorative feature.



## tabernacle frame

A frame around a doorway or niche, having two columns or pilasters on a base supporting a pediment.

## ancon

A bracket or console used in classical architecture to support a cornice or the entablature over a doorway or window.

## console

An ornamental bracket, usually formed with scrolls and higher than its projection.

## stop

A feature terminating a molding or chamfer.

## plinth block

A plinth for stopping the architrave of a door or window above the floor.

## plinth

A flat, plain member at the bottom of an architrave, dado, or baseboard.

## plant

To attach or fasten a molding to a surface.

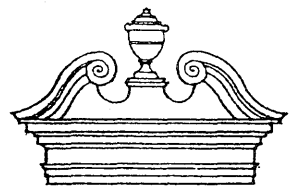
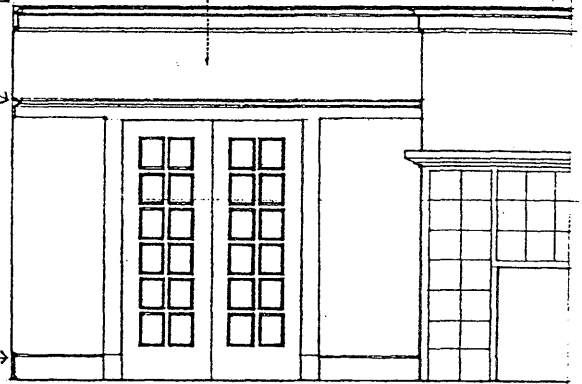
## kerfing

Making a series of parallel saw cuts partway through the thickness of a piece of wood to enable the piece to bend toward the kerfed side.



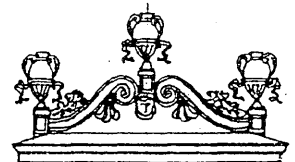
## frieze

A decorative band, as one along the top of an interior wall, immediately below the cornice, or a sculptured one in a stringcourse on an outside wall.



## swan's neck pediment

A broken pediment having an outline formed by a pair of S-curves tangent to the horizontal cornice at the ends of the pediment and rising to a pair of scrolls on either side of the center, where a finial often rises between the scrolls.



## coronet

A pedimental ornament wrought in relief over a window or door.

**gloss**  
The degree of surface luster of a dried paint film, ranging in decreasing order of gloss from high gloss, semigloss, eggshell, to flat.

**high gloss**  
Having a brilliant sheen or luster.

**enamel**  
Any paint or varnish drying to a very smooth, hard, usually glossy finish.

**semigloss**  
Having a moderate, satiny luster, producing a finish midway between high gloss and eggshell. Also called satin finish.

**eggshell**  
Having little or no gloss, producing a finish midway between semigloss and flat.

**flat**  
Without gloss or sheen.

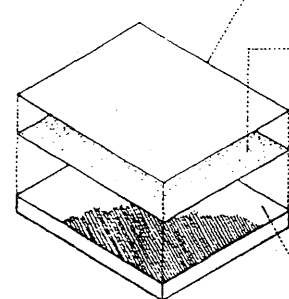
**colorfast**  
Having color that will not fade or run with washing, age, or exposure to light, esp. sunlight.

**actinic ray**  
A ray of light, as ultraviolet, that produces photochemical effects, as the yellowing, chalking, and disintegration of paint coatings.

**photochemical**  
Of or pertaining to the chemical action of radiant energy, esp. light.

**coverage**  
A measure of the area over which a gallon of paint may be spread at a given thickness, usually expressed in square feet per gallon.

**hiding power**  
The ability of a paint film to conceal any marks, pattern, or color on the surface to which it is applied. Also called covering power.



**anticorrosive paint**  
A paint or primer specially formulated with rust-inhibiting pigments to prevent or reduce the corrosion of metal surfaces. Also called rust-inhibiting paint.

**fire-retardant paint**  
A paint specially formulated with silicone, polyvinyl chloride, or other substance to reduce the flame-spread of a combustible material.

**heat-resistant paint**  
A paint specially formulated with silicone resins to withstand high temperatures.

**binder**  
The nonvolatile part of a paint vehicle that bonds particles of pigment into a cohesive film during the drying process.

**solvent**  
The volatile part of a paint vehicle that evaporates during the drying process.

**thinner**  
A volatile liquid used to dilute paint or varnish to the desired or proper consistency for ease in application.

**mineral spirits**  
A volatile distillation of petroleum, used as a solvent and thinner for paints and varnishes.

**turpentine**  
A colorless, volatile oil obtained by distilling oleoresin from various conifers and used as a thinner and solvent for paints and varnishes. Also called oil of turpentine, spirits of turpentine.

**paint system**  
A combination of one or more coatings selected for compatibility with each other and the surface to which they are applied, as well as suitability for the expected exposure and desired decorative effect.

**glaze coat**  
A thin coat of transparent color applied to enhance the color of a painted surface.

**mistcoat**  
A thin, sometimes pigmented coat applied to a finish coat to improve its luster.

**topcoat**  
The final coat of paint applied to a surface. Also called finish coat.

**undercoat**  
A primer or intermediate coat applied to hide the color of the substrate and improve adhesion of the topcoat.

**ground coat**  
A primer or basecoat of paint intended to show through a topcoat. Also called ground color.

**basecoat**  
A first coat of paint or other liquid finish applied to a surface.

**primer**  
A basecoat applied to a surface to improve the adhesion of subsequent coats of paint or varnish. Also called prime coat.

**sealer**  
A basecoat applied to a surface to reduce the absorption of subsequent coats of paint or varnish, or to prevent bleeding through the finish coat.

**pigment**  
A finely ground, insoluble substance suspended in a liquid vehicle to impart color and opacity to a paint.

**vehicle**  
A liquid in which pigment is dispersed before being applied to a surface, to control consistency, adhesion, gloss, and durability.

**drying oil**  
Any of various oil, organic liquids, as linseed oil, that oxidizes and hardens to form a tough elastic film when exposed in a thin layer to air.

**alkyd resin**  
Any of a group of synthetic resins derived from a polyvalent alcohol in reaction with an organic acid, used chiefly in adhesives and paints.

**latex**  
A water emulsion of synthetic rubber or plastic globules obtained by polymerization and used in paints and adhesives.

**dye**  
A soluble coloring material that imparts color by absorption.

**water stain**  
A penetrating stain made by dissolving dye in a water vehicle.

**spirit stain**  
A penetrating stain made by dissolving dye in an alcohol or spirit vehicle.

**oil stain**  
A stain made by dissolving dye or suspending pigment in a drying oil or oil varnish vehicle.

**copal**  
A hard, lustrous resin obtained from various tropical trees, used chiefly in making varnishes.

**spar varnish**  
A durable, weather-resistant varnish made from durable resins and linseed or tung oil. Also called marine varnish.

**polyurethane varnish**  
An exceptionally hard, abrasion-resistant, and chemical-resistant varnish made from a plastic resin of the same name.

**lac**  
A resinous secretion of the female of the lac insect, used in making shellac.

**Chinese lacquer**  
A natural varnish obtained from an Asian sumac, used to produce a highly polished, lustrous surface on wood. Also called Japanese lacquer.

A mixture of a solid pigment suspended in a liquid vehicle, applied as a thin, usually opaque coating to a surface for protection and decoration.

**oil paint**  
A paint in which the vehicle is a drying oil.

**alkyd paint**  
A paint in which the vehicle is an alkyd resin.

**epoxy paint**  
A paint having an epoxy resin as a binder for increased resistance to abrasion, corrosion, and chemicals.

**latex paint**  
A paint having a latex binder that coalesces as water evaporates from the emulsion. Also called rubber-base paint, water-base paint.

**stain**  
A solution of dye or suspension of pigment in a vehicle, applied to penetrate and color a wood surface without obscuring the grain.

**penetrating stain**  
A stain that penetrates a wood surface, leaving a very thin film on the surface.

**pigmented stain**  
An oil stain containing pigments capable of obscuring the grain and texture of a wood surface. Also called opaque stain.

**varnish**  
A liquid preparation consisting of a resin dissolved in an oil (oil varnish) or in alcohol (spirit varnish), that when spread and allowed to dry forms a hard, lustrous, usually transparent coating.

**shellac**  
A spirit varnish made by dissolving purified lac flakes in denatured alcohol. Also called shellac varnish.

**lacquer**  
Any of various clear or colored synthetic coatings consisting of nitrocellulose or other cellulose derivative dissolved in a solvent that dries by evaporation to form a high-gloss film.

# PLASTER

**A composition of gypsum or lime, water, sand, and sometimes hair or other fiber, applied in a pasty form to the surfaces of walls or ceilings in a plastic state and allowed to harden and dry.**

## gypsum plaster

A basecoat plaster made of calcined gypsum mixed with sand, water, and various additives to control its setting and working qualities.

## calcined gypsum

Gypsum heated to drive off most of its chemically combined water.

## plaster of Paris

Calcined gypsum in white, powdery form, containing no additives to control the set, used as a base for gypsum plaster, as an additive in lime plaster, and as a material for making ornamental casts.

## gypsum

A soft mineral, hydrated calcium sulfate, used as a retarder in portland cement and in the making of gypsum plaster.

## alabaster

A finely granular form of pure gypsum, often white and translucent, used for ornamental objects and work.

## lime plaster

A mixture of lime, sand, and sometimes a fiber, used as a basecoat plaster.

## cement temper

The addition of portland cement to lime plaster to improve its strength and durability.

## three-coat plaster

Plasterwork applied in three successive coats, a scratch coat followed by a brown coat and a finish coat.

## two-coat plaster

Plasterwork applied in two coats, a basecoat followed by a finish coat.

## finish coat

The final coat of plaster, serving either as a finished surface or as a base for decoration.

## skim coat

A thin leveling or finish coat of plaster.

## brown coat

A roughly finished, leveling coat of plaster, either the second coat in three-coat plaster or the base coat in two-coat plaster applied over gypsum lath or masonry. Also called floating coat.

## basecoat

Any plaster coat applied before the finish coat.

## scratch coat

The first coat in three-coat plaster, which is scratched to provide a better bond for the second or brown coat.

## gauged plaster

A finish coat in plastering, consisting of lime putty to which gauging plaster is added to control the setting time and counteract shrinkage.

## gauging plaster

A specially ground gypsum plaster for mixing with lime putty, formulated to provide either a quick-set or a slow-set for a finish coat of plaster.

## hard finish

A finish coat of lime putty and Keene's cement or gauging plaster, troweled to a smooth, dense finish.

## lime putty

Quicklime slaked with sufficient water to form a thick paste. Also called plasterer's putty.

## Keene's cement

Trademark for a brand of white anhydrous gypsum plaster that produces an exceptionally strong, dense, crack-resistant finish.

## anhydrous

Having all water of crystallization removed.

## white coat

A finish coat of lime putty and white gauging plaster, troweled to a smooth, dense finish.

## veneer plaster

A ready-mixed gypsum plaster applied as a very thin, one- or two-coat finish over a veneer base. Also called thin-coat plaster.

## acoustical plaster

A low-density plaster containing vermiculite or other porous material to enhance its ability to absorb sound.

## hardwall

A basecoat of neat gypsum plaster.

## neat plaster

A gypsum basecoat plaster having no admixture except hair or other fiber, used for on-the-job mixing with aggregates.

## wood-fibered plaster

A mill-mixed gypsum basecoat plaster containing coarse cellulose fibers for greater bulk, strength, and fire resistance, used neat or mixed with sand to obtain a basecoat of superior hardness.

## bond plaster

A gypsum basecoat plaster containing a small amount of lime and chemical additives to improve the bond of succeeding coats to dense, nonporous surfaces.

## gypsum-perlite plaster

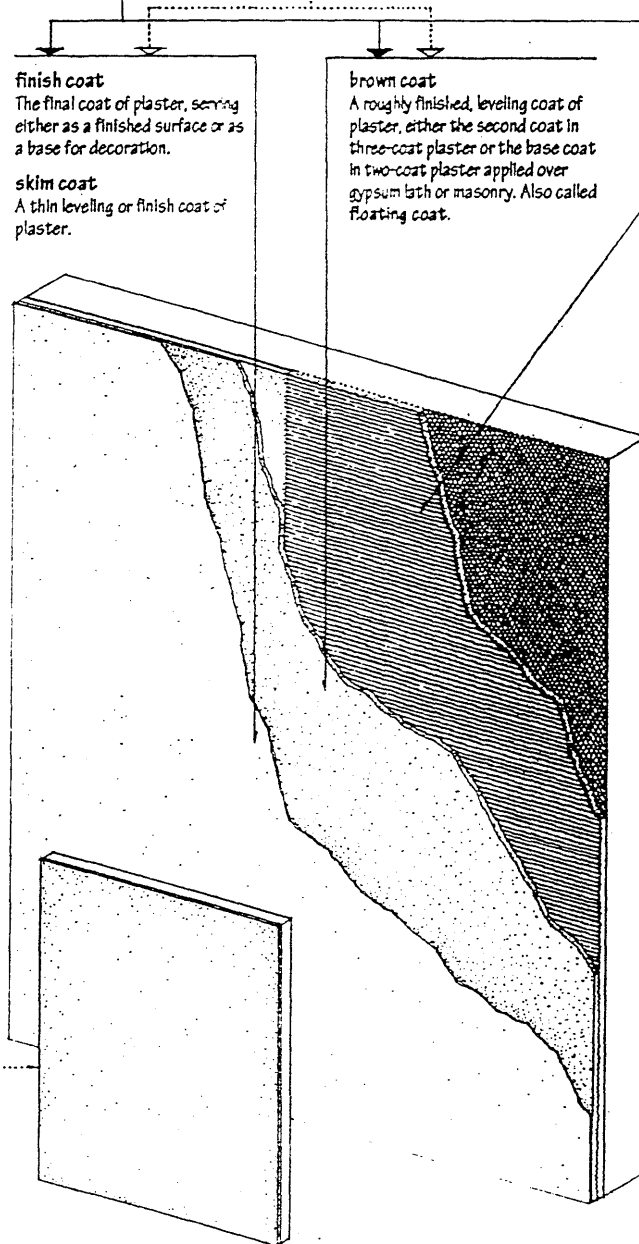
A gypsum basecoat plaster containing perlite as an aggregate to reduce its weight and increase its thermal and fire resistance.

## gypsum-vermiculite plaster

A gypsum basecoat plaster containing vermiculite as an aggregate to reduce its weight and increase its thermal and fire resistance.

## ready-mixed plaster

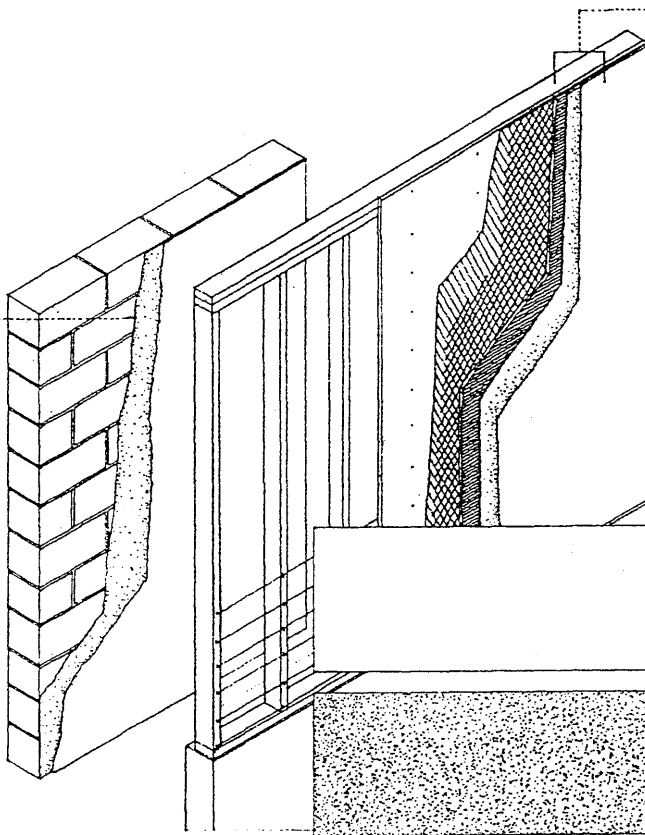
Plaster that is formulated and dry-mixed by the manufacturer, requiring only the addition of water at the job site.



**rendering coat**  
The first coat of plaster on a masonry wall. Also called rough coat.

**spatter dash**  
A wet, rich mix of portland cement and sand thrown onto a smooth brick or concrete surface and allowed to harden to provide a key for a first coat of plaster.

**key**  
A grooving or roughness applied to a surface to improve its bond with another surface.



## stucco

A coarse plaster composed of portland or masonry cement, sand, and hydrated lime, mixed with water and applied in a plastic state to form a hard covering for exterior walls.

## portland cement stucco

Stucco made with masonry cement or with portland cement mixed with less than 50% by volume of lime.

## portland cement-lime stucco

Portland cement stucco to which lime is added in an amount greater than 50% by volume to improve the plasticity of the mix.

## albarium

A stucco used in ancient times, made from powdered marble and lime mortar and often polished.

## intonaco

A finish coat of plaster made with white marble dust to receive a fresco.

## scagliola

Plasterwork imitating granite or marble.

## sand-float finish

A textured finish coat of plaster containing sand, leveled and smoothed with a float.

## float finish

A fine-textured stucco finish produced by smoothing with a carpet or rubber-faced float.

## combed finish

A stucco finish produced by dragging a serrated tool across the stucco surface before it sets. Also called dragged finish.

## dash-troweled finish

A stucco finish produced by troweling the high spots of a dashed stucco surface before it sets.

## stipple-troweled finish

A stucco finish produced by troweling the high spots of a stippled stucco surface before it sets.

## daubing

The process of giving a wall a rough finish by throwing plaster against it.

## pebble dash

An exterior wall finish produced by throwing and pressing small pebbles into unset stucco.

## roughcast

An exterior wall finish composed of a stucco mixed with fine pebbles and dashed against a wall. Also called spatter dash.

## molding plaster

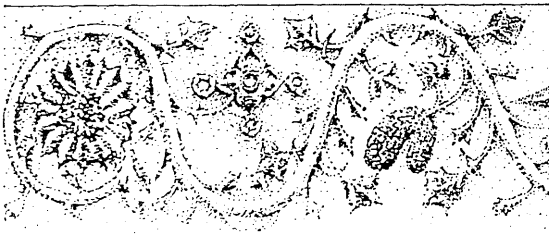
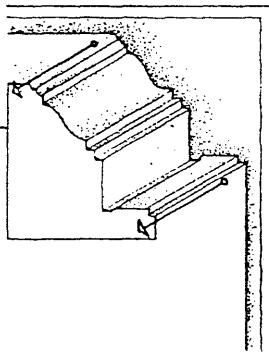
A plaster used in ornamental work, consisting of finely ground gypsum and hydrated lime.

## running mold

A sheet-metal template cut to the desired profile, backed with wood, and pushed along between temporary grounds or rules to form a plaster molding along the angle between a wall and ceiling. Also called horsed mold.

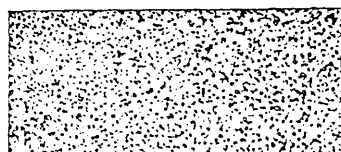
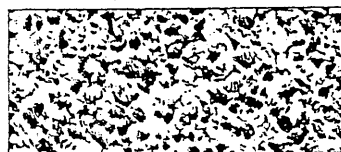
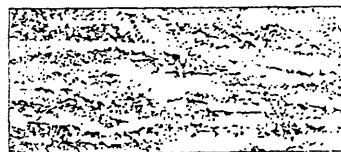
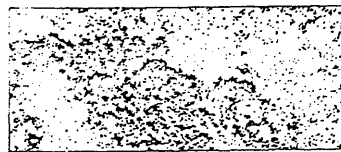
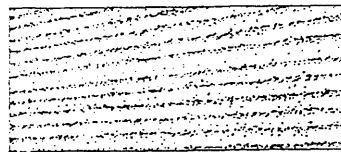
## horse

The wooden support for the sheet-metal template of a running mold.



## pargeting

Fine ornamental plasterwork, esp. exterior plasterwork bearing designs in low relief. Also, parget.



# PLASTER

## lath

Any of a number of suitable surfaces for receiving plasterwork, as gypsum lath, metal lath, wood lath, masonry, or brickwork.

## wood lath

A thin, narrow strip of wood used with other strips to form latticework, a backing for plaster or stucco, or a support for slates or other roofing material.

## furring

The attaching of wood strips or metal channels to a wall or other surface, as to provide an even base for lath or a finish material, or to provide an air space between a wall and a finish material.

## metal lath

A plaster base fabricated of expanded metal or of wire fabric, painted or galvanized for corrosion resistance.

## expanded-metal lath

Metal lath fabricated by slitting and expanding a sheet of steel alloy to form a stiff network with diamond-shaped openings.

## rib lath

An expanded-metal lath having V-shaped ribs to provide greater stiffness and permit wider spacing of the supporting framing members.

## self-centering lath

A rib lath used over steel joists as formwork for concrete slabs, or as lathing in solid plaster partitions.

## self-furring lath

Expanded-metal, welded-wire, or woven-wire lath that is dimpled to space itself from the supporting surface, creating a space for the keying of plaster or stucco.

## wire lath

Welded- or woven-wire fabric, usually with a paper backing, used as a base for plaster or stucco.

## paper-backed lath

Expanded-metal or wire lath having a backing of perforated or building paper, used as a base for plaster or stucco.

## corner lath

A strip of expanded-metal lath bent to form a 90° angle, used at an internal corner to prevent cracks in plastering. Also called corner reinforcement.

## strip lath

A narrow strip of expanded-metal lath for reinforcing joints in gypsum lath or junctures between different types of plaster bases.

## scrim

Coarse cotton, fiberglass, or metal mesh, used for bridging and reinforcing a joint or as a base for plastering or painting.

## gypsum lath

Gypsum board having an air-entrained core faced with absorbent paper, used as a base for plaster. Also called rock lath.

## perforated gypsum lath

Gypsum lath punched with small holes to provide a mechanical key for plaster.

## insulating gypsum lath

Gypsum lath having an aluminum foil backing that serves as a vapor retarder and reflective thermal insulator.

## veneer base

Gypsum lath having a special paper facing for receiving veneer plaster.

## plaster bond

The adhesion of plaster to its base produced by mechanical or chemical means.

## mechanical bond

The physical keying of a plaster coat to a plaster base or with another plaster coat roughened by scoring.

## bonding agent

A chemical substance applied to a suitable substrate to improve its bond with a succeeding layer.

## suction

The absorption of water from a finish coat of plaster by the basecoat or gypsum lath, resulting in a better bond.

## ground

A strip of wood or a metal bead used at an opening as a guide for plastering to a given thickness and as a stop for the plasterwork.

## screed

A strip of wood, plaster, or metal applied to a surface to be plastered to serve as a guide for making a true surface and plastering to a given thickness.

## base screed

A preformed metal screed for separating a plastered surface from another material along the base of a wall.

## vented screed

A perforated metal screed for venting a concealed space behind a plastered surface.

## expansion screed

A preformed metal screed applied over joints in gypsum lath to control cracking.

## control joint

A preformed metal strip installed to relieve shrinkage, temperature, or structural stresses within a large plastered or stuccoed area.

## corner bead

A preformed metal strip having two expanded or perforated flanges and variously shaped projecting noses, used as a ground and to strengthen and protect an external angle in plasterwork or a gypsum board surface. Also called angle bead.

## bullnose corner bead

A corner bead having a rounded edge.

## arch corner bead

A flexible corner bead for forming and reinforcing the curved portion of an arched opening.

## casing bead

A preformed metal strip having an expanded or perforated flange and variously shaped ends, used as a ground and to strengthen and reinforce the edges of plasterwork or a gypsum board surface.



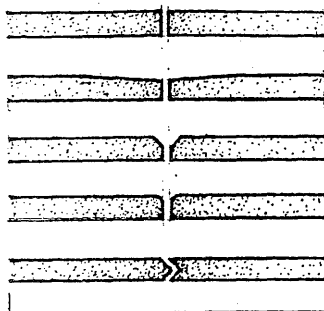
square edge

tapered edge

beveled edge

rounded edge

tongue & groove



wallboard

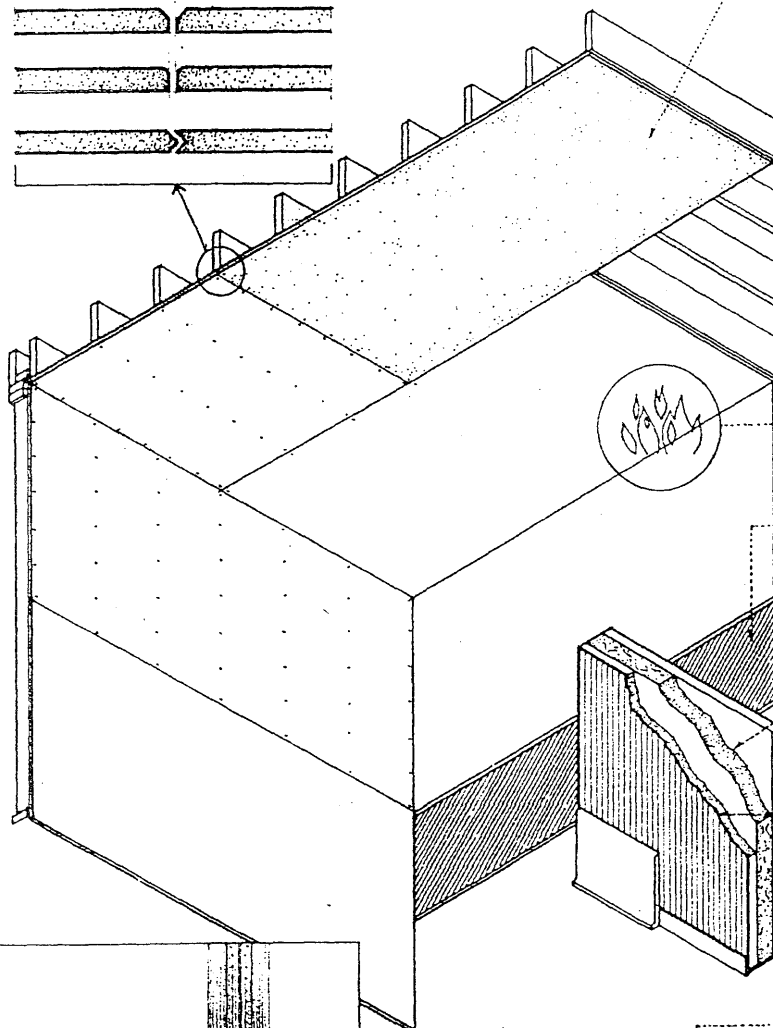
Any of various sheet materials used in covering a wall or ceiling as a substitute for plaster or paneling.

gypsum board

A sheet material having a gypsum core faced with paper on each side, used for covering walls or as lath. Also called drywall, plasterboard.

Sheetrock

Trademark for a brand of gypsum board.



type-X gypsum board

A gypsum board having a core containing additives for increased fire resistance.

backing board

An inexpensive gypsum board used as the base layer in a multilayer assembly for increased rigidity, sound insulation, and fire resistance.

coreboard

A gypsum board 1-in. (25.4 mm) thick, used as a base in solid gypsum-board partitions and for lining shafts.

prefinished gypsum board

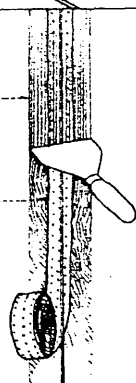
A gypsum board having a decorative vinyl or printed paper surface.

joint compound

A pasty compound for embedding joint tape, filling indentations, and finishing the joints in a gypsum-board surface.

joint tape

A strip of paper, paper-faced cotton, or plastic mesh used with joint compound to cover the joints between sheets of gypsum board.

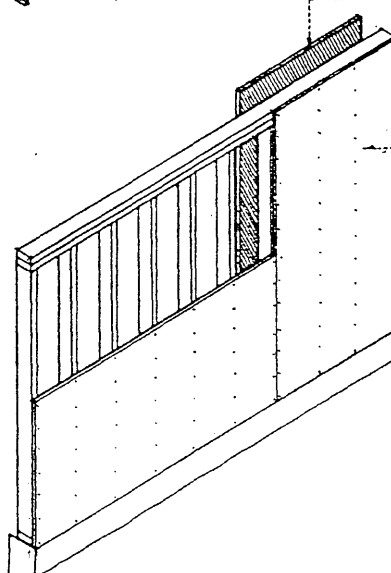


foil-backed gypsum board

Gypsum board having an aluminum foil backing that serves as a vapor retarder and as a reflective thermal insulator when the foil faces a 3/4 in. (19 mm) minimum air space.

gypsum sheathing

A gypsum board having a fire-resistant core and faced with a water-repellent paper, used as exterior sheathing.



# PLASTIC

Any of numerous synthetic or natural organic materials that are mostly thermoplastic or thermosetting polymers of high molecular weight and that can be molded, extruded, or drawn into objects, films, or filaments.

## polymerization

A chemical reaction in which the molecules of a monomer combine to form larger molecules that contain repeating structural units of the original molecules.

## monomer

A molecule of low molecular weight that can be chemically bound as a unit of a polymer.

## polymer

A compound of high molecular weight formed by polymerization and consisting essentially of repeating structural units.

## high polymer

A polymer consisting of molecules that are large multiples of monomers.

## copolymer

A compound of high molecular weight formed by polymerizing two or more different monomers together.

## casting

A method of shaping a plastic object by pouring the material into a mold and allowing it to harden without the use of pressure.

## blow molding

A method of forming hollow ware by injecting air under pressure into a molten mass, as of a thermoplastic or glass, and shaping the material within a mold.

## injection molding

A method of forming a thermoplastic, thermoset, metal, or ceramic material by rendering it fluid in a heating chamber and then forcing it under high pressure into a closed mold.

## compression molding

A method of forming thermosetting plastic by closing a mold on it, forming the material by heat and pressure.

## transfer molding

A method of forming thermosetting plastic by softening it in one chamber before it is forced into an adjacent mold where it is cured under heat and pressure.

## thermoforming

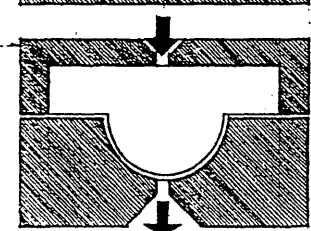
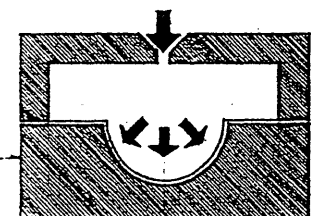
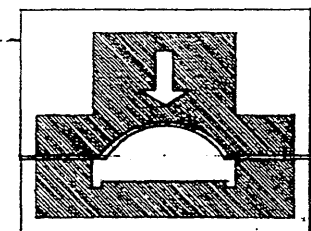
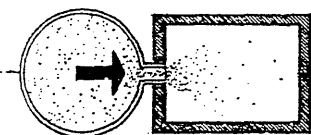
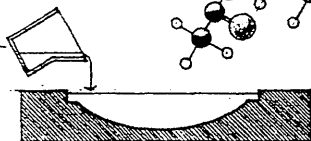
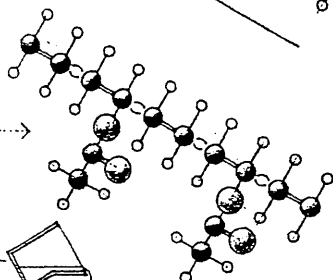
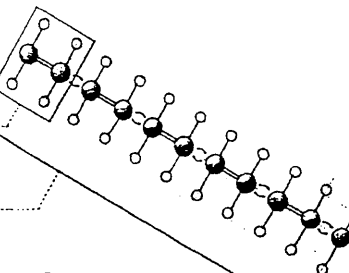
A method of shaping a thermoplastic sheet by heating and forcing it against the contours of a mold by heat and pressure.

## pressure forming

A method of thermoforming a plastic sheet by forcing it against the contours of a mold with compressed air.

## vacuum forming

A method of thermoforming a plastic sheet by evacuating the space between the sheet and the contours of a mold.



## resin

Any of numerous solid or semisolid organic substances prepared by polymerization and used with fillers, stabilizers, and other components to form plastics.

## filler

A relatively inert substance added to modify the bulk, strength, heat resistance, electrical resistance, or working properties of a resin.

## stabilizer

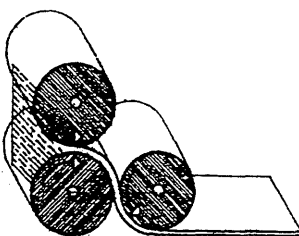
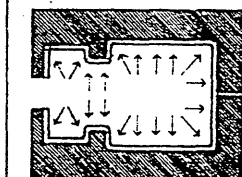
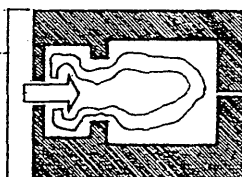
A substance added to prevent or retard the degradation of a plastic when exposed to the ultraviolet radiation or other environmental conditions.

## plasticizer

Any of various substances added to a resin to increase its workability and flexibility.

## catalyst

A substance that causes or accelerates a chemical reaction without itself undergoing a permanent change in composition.



## calendering

A method of producing plastic film or sheeting by passing the material between a series of revolving, heated rollers.

## sheeting

A thin form of plastic, having a thickness very small in proportion to its length and width.

## film

Sheeting having a nominal thickness not greater than 10 mils.

## thermoplastic

A plastic capable of softening or fusing when heated without a change in any inherent properties, and of hardening again when cooled.

## acrylic resin

Any of a class of thermoplastic resins used for casting or molding plastic parts that are exceptionally transparent, tough, and resistant to weather and chemicals, or as the main ingredient in coatings, adhesives, and caulking compounds.

## Lucite

Trademark for a brand of transparent acrylic resin.

## Plexiglas

Trademark for a brand of light, transparent, weather-resistant acrylic resin.

## polycarbonate

A tough, transparent thermoplastic characterized by its high-impact strength and used for lighting fixtures, safety glazing, and hardware.

## Lexan

Trademark for a brand of tough polycarbonate used for shatterproof windows.

## polyethylene

A tough, light, and flexible thermoplastic used esp. in the form of sheeting and film for packaging, dampproofing, and as a vapor retarder. Also called polythene.

## polypropylene

A tough, thermoplastic that is resistant to heat and chemicals and used for pipe fittings, electrical insulation, and carpeting fibers.

## polystyrene

A hard, tough, stable thermoplastic that is easily colored and molded, expanded, or rolled into sheeting.

## acrylonitrile-butadiene-styrene

A thermoplastic used for making plastic pipes and hardware products that are tough, rigid, and resistant to heat and chemicals. Abbr.: ABS

## vinyl

Any of various tough, flexible plastics made from polyvinyl resin.

## polyvinyl resin

Any of a class of thermoplastic resins formed by polymerizing or copolymerizing a vinyl compound. Also called vinyl resin.

## polyvinyl chloride

A white, water-insoluble thermoplastic widely used in the manufacture of floor coverings, insulation, and piping. Abbr.: PVC

## polyvinyl butyral

A thermoplastic resin used chiefly as the interlayer of safety glass.

## nylon

Any of a class of thermoplastics characterized by extreme toughness, strength, and elasticity and capable of being extruded into filaments, fibers, and sheets.

**thermosetting plastic**

A plastic that becomes permanently rigid when heated and cannot be softened again. Also called **thermoset**.

**polyurethane**

Any of various thermoplastic or thermosetting resins used in flexible and rigid foams, elastomers, and resins for sealants, adhesives, and coatings.

**polyester**

Any of a group of thermosetting resins used in the manufacture of plastics and textile fibers.

**fiberglass-reinforced plastic**

A polyester reinforced with glass fibers and used in translucent roofs and skylights, facings for sandwich panels, and molded plumbing fixtures.

**Dacron**

Trademark for a brand of strong, wrinkle-resistant polyester fiber.

**Mylar**

Trademark for a brand of strong, thin polyester film used in photography, recording tapes, and electrical insulation.

**epoxy resin**

Any of various thermosetting resins capable of forming tight cross-linked polymer structures characterized by toughness, strong adhesion, and high corrosion and chemical resistance, used esp. in surface coatings and adhesives.

**melamine resin**

Any of a class of thermosetting resins formed by the interaction of melamine and formaldehyde and used for molded products, adhesives, and surface coatings.

**phenolic resin**

Any of a class of hard, heat-resistant thermosetting resins formed by the condensation of phenol with formaldehyde and used for molded products, adhesives, and surface coatings. Also called **phenoplast**.

**Bakelite**

Trademark for a brand of dark phenolic resin, invented by Dr. Leo Baekeland in 1916, and used for telephone receivers, radio cabinets, electric insulators, and molded plastic hardware.

**urea-formaldehyde resin**

Any of various thermosetting synthetic resin made by condensing urea with formaldehyde and used in appliance housings, electrical devices, adhesives, and surface coatings.

**postforming**

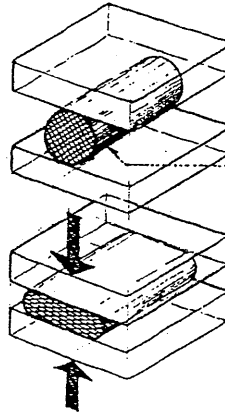
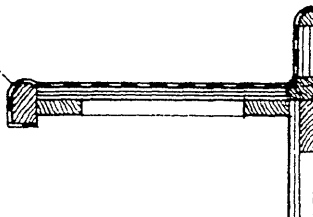
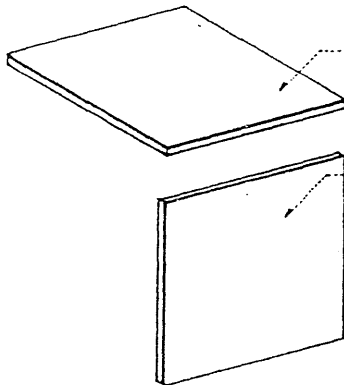
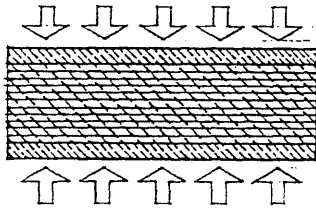
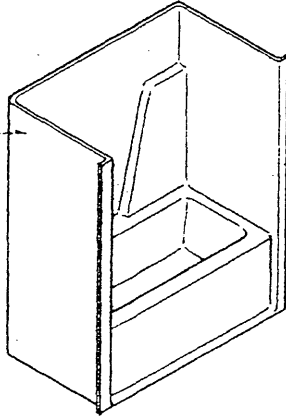
A method of shaping a fully or partially cured thermosetting laminate over a mold by heat and pressure.

**service temperature**

The maximum temperature at which a plastic can be continuously employed without a noticeable reduction in any of its inherent properties.

**softening point**

The temperature at which a plastic changes from a rigid to a soft state.



**laminate**

A product made by uniting two or more layers of material by an adhesive or other means, as plywood and plastic laminate.

**plastic laminate**

A hard surfacing material consisting of superposed layers of paper impregnated with melamine and phenolic resins, fused together under heat and pressure.

**high-pressure laminate**

A plastic laminate molded and cured in the range of pressures from 1,200 to 2,000 psi (84 to 140 kg per sq. cm), used for surfacing countertops and cabinetry.

**low-pressure laminate**

A plastic laminate molded and cured with a maximum pressure of 400 psi (28 kg per sq. m), used in vertical and low-wear applications.

**Formica**

Trademark for a brand of plastic laminate.

**rubber**

A material made by chemically treating and toughening natural rubber, valued for its elasticity, nonconduction of electricity, and resistance to shock and moisture.

**natural rubber**

A highly elastic solid substance, essentially a polymer of isoprene, obtained by coagulating the milky juice of rubber trees and plants. Also called **india rubber**.

**foam rubber**

A light, spongy, cellular rubber made by foaming latex before vulcanization.

**vulcanization**

The treatment of rubber with sulfur and heat to impart greater elasticity, strength, and durability.

**synthetic rubber**

An elastomer similar to natural rubber in properties and uses, produced by the polymerization of an unsaturated hydrocarbon, as butylene or isoprene, or by the copolymerization of hydrocarbons with styrene or butadiene.

**elastomer**

Any of various polymers having the elastic properties of natural rubber, as butyl rubber or neoprene.

**butyl rubber**

A synthetic rubber having exceptional resistance to sunlight and unusually low gaseous permeability, produced by polymerizing butylene and used in roofing membranes and waterproofing barriers.

**Butyl**

Trademark for a brand of butyl rubber.

**neoprene**

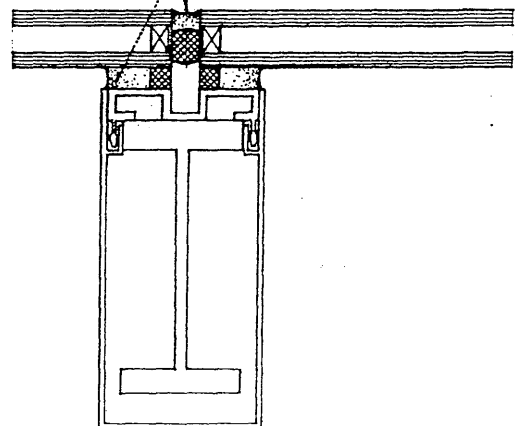
A synthetic rubber characterized by superior resistance to oils and sunlight, and used in paints, roofing membranes, flashing, gaskets, and bearings.

**silicone rubber**

A rubber made from silicone elastomers and noted for its retention of flexibility, resilience, and tensile strength over a wide temperature range.

**silicone**

Any of a group of polymers containing alternating silicon and oxygen atoms, characterized by thermal stability, chemical inertness, and extreme water repellence, and used in adhesives, lubricants, protective coatings, and synthetic rubber.



# PLATE

A rigid, planar, usually monolithic structure that disperses applied loads in a multidirectional pattern, with the loads generally following the shortest and stiffest routes to the supports.

## plate action

The manner in which an applied load is transmitted to the supports of a plate in a multidirectional pattern.

A plate can be envisioned as a series of adjacent beam strips interconnected continuously along their lengths.

As an applied load is transmitted to the supports through bending of one beam strip, the load is distributed over the entire plate by vertical shear transmitted from the deflected strip to adjacent strips.

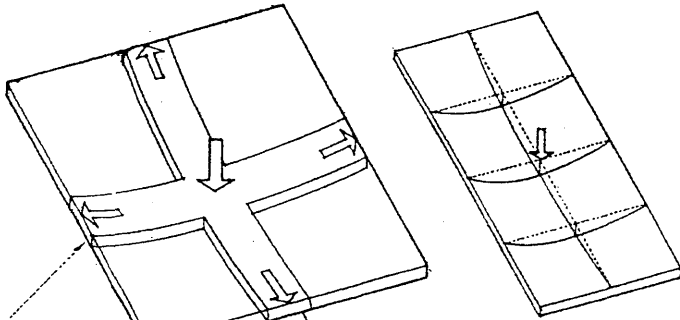
The bending of one beam strip also causes twisting of transverse strips, whose torsional resistance increases the overall stiffness of the plate. Therefore, while bending and shear transfer an applied load in the direction of the loaded beam strip, shear and twisting transfer the load at right angles to the loaded strip.

## continuous plate

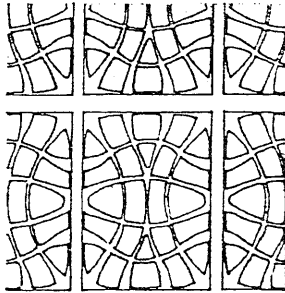
A plate extending as a structural unit over three or more supports in a given direction. A continuous plate is subject to lower bending moments than a series of discrete, simply supported plates.

## folded plate

A plate structure composed of thin, deep elements joined rigidly along their boundaries and forming sharp angles to brace each other against lateral buckling. The resulting stiffness of the cross section enables a folded plate to span relatively long distances.

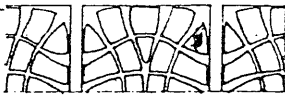


A plate should be square or nearly square to ensure that it behaves as a two-way structure. As a plate becomes more rectangular than square, the two-way action decreases and a one-way system spanning the shorter direction develops since the shorter plate strips are stiffer and can carry a greater portion of the load.



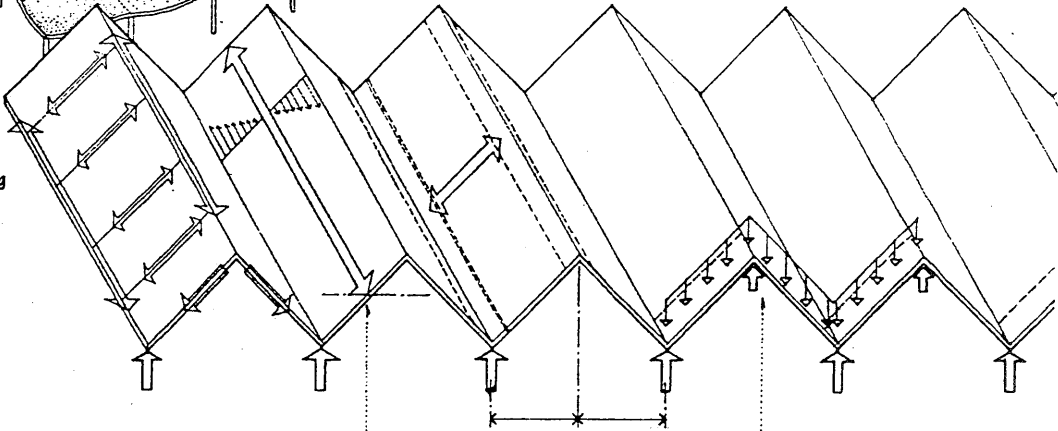
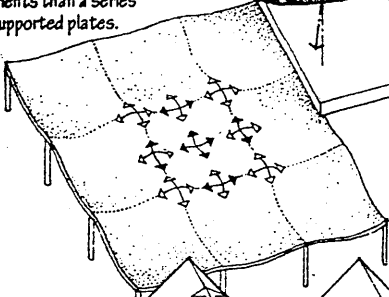
## isostatic plate

A plate reinforced by a grid of curved ribs which follow the isostatics of the structure.



## isostatics

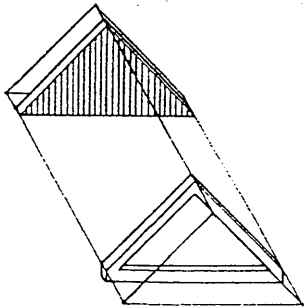
Lines of principal stress indicating the flow of bending stresses and along which torsional shear stresses are zero.



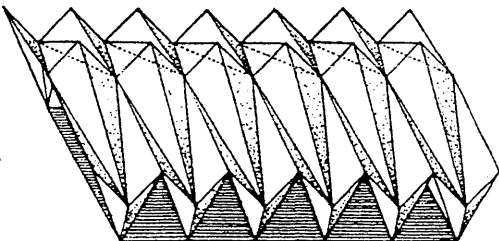
Each plane behaves as a beam in the longitudinal direction.

In the short direction, the span is reduced by each fold acting as a rigid support.

Transverse strips behave as a continuous beam supported at fold points.

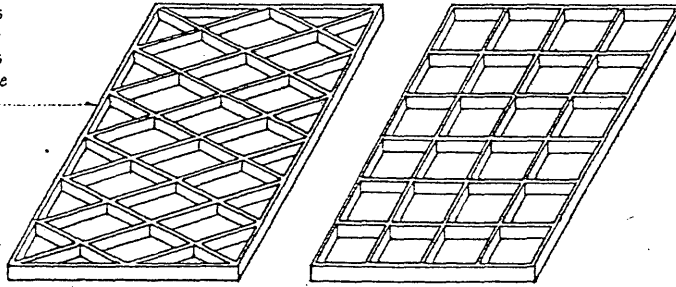


Vertical diaphragms or rigid frames stiffen a folded plate against deformation of the fold profile.



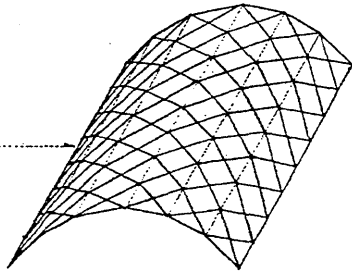
### skew grid

A grid structure of beams or flat trusses running obliquely to the sides of the base rectangle in order to equalize their spans and stiffnesses. The shorter spans at the corners result in additional stiffness.



### lamella roof

A vaulted roof composed of lamellae forming a crisscross pattern of parallel arches skewed with respect to the sides of the covered space.



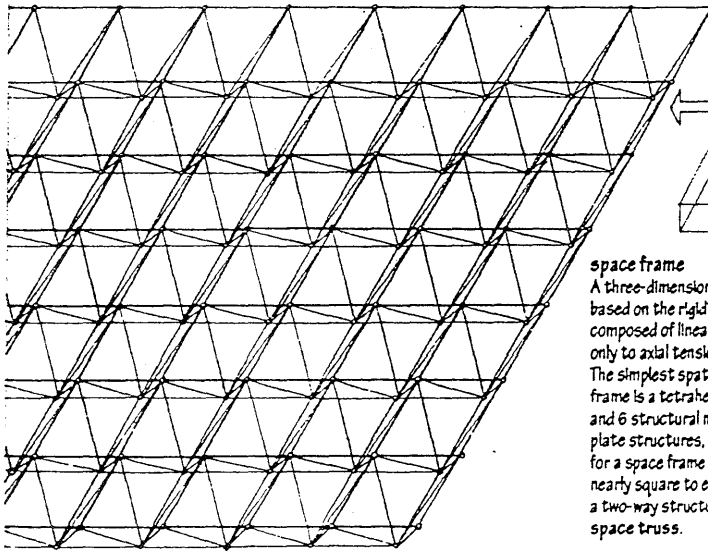
### lamella

One of the relatively short timber, metal, or reinforced-concrete elements forming a lamella roof.

### grid structure

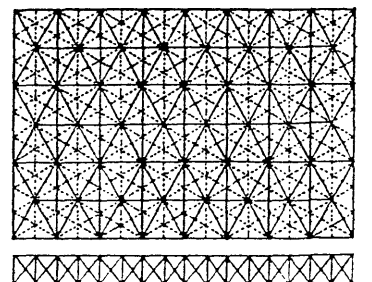
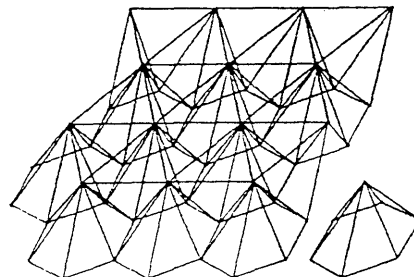
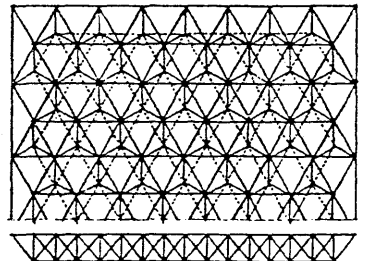
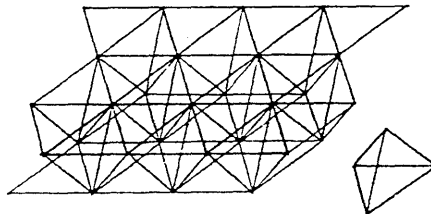
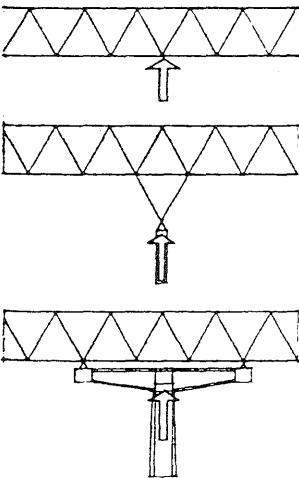
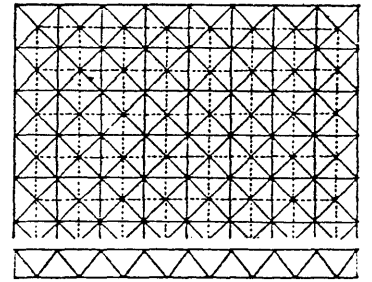
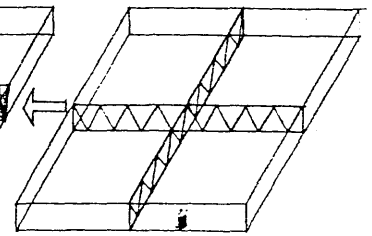
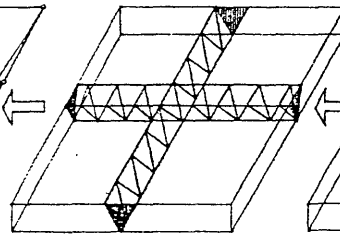
A framework of crisscrossing beams connected at their intersections by rigid joints and dispersing an applied load in two directions according to the physical properties and dimensions of the beam elements.

All beam elements participate in carrying a load through a combination of bending and twisting. If two beams at right angles to each other are identical, they share an applied load equally in bending. If the beams have different lengths, however, the shorter beam carries more of the load since the stiffness of a beam is inversely proportional to the cube of its length and a load generally follows the path of least resistance to supports. For example, if two beams have a span ratio of 1:2, their stiffnesses will have a ratio of 1:8. Consequently, the shorter beam will carry  $\frac{8}{9}$  of the load. The torsional resistance of beams against the twisting induced by the bending of a transverse beam increases the stiffness of the grid.



### space frame

A three-dimensional structural frame based on the rigidity of the triangle and composed of linear elements subject only to axial tension or compression. The simplest spatial unit of a space frame is a tetrahedron having 4 joints and 6 structural members. As with plate structures, the supporting bay for a space frame should be square or nearly square to ensure that it acts as a two-way structure. Also called space truss.



Increasing the bearing area of the supports increases the number of members into which shear is transferred and reduces the forces in the members.

# PLUMBING

The system of pipes, valves, fixtures, and other apparatus of a water supply or sewage system.

## water supply

The supply of purified water to a community, usually including facilities for storing and distributing this water, as reservoirs and pipelines.

## cistern

A reservoir or tank for storing or holding water or other liquid, as rainwater collected from a roof, for use when required.

## well

A hole drilled or bored into the earth to obtain water, petroleum, or natural gas.

## aquifer

A geological formation containing or conducting groundwater, esp. one capable of providing water in usable quantities to springs or wells.

## artesian well

A well in which water rises under pressure from a permeable stratum overlaid by impermeable rock.

## drawdown

A lowering of the water surface level, as in a well, or the distance by which the groundwater level is lowered as a result of pumping.

## reservoir

A natural or artificial place where water is collected and stored for use, esp. water for supplying a community, irrigating land, or furnishing power.

## water tower

A tower into which water is pumped to a height sufficient to maintain a desired pressure for distribution to customers, or for firefighting.

## potable water

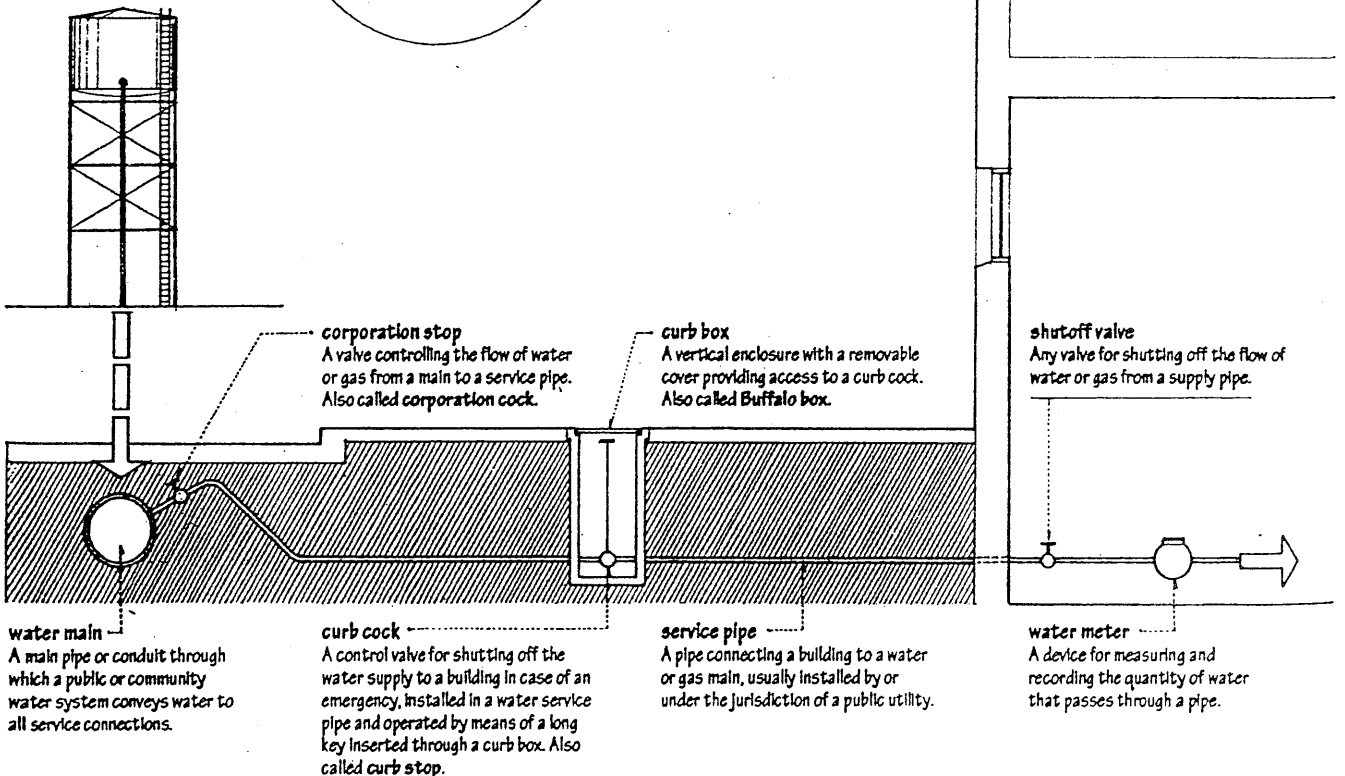
Water fit for human consumption.

## water treatment

The act or process of making water more potable or useful, as by purifying, clarifying, or softening.

## raw water

Water that requires treatment before it can be used for drinking.



## water system

A system of pipes, valves, and fixtures for distributing and using water in a building.

## gravity water system

A water supply and distribution system in which the water source is set at a height sufficient to maintain adequate supply pressure throughout the water distribution system. Also called downfeed distribution system.

## head

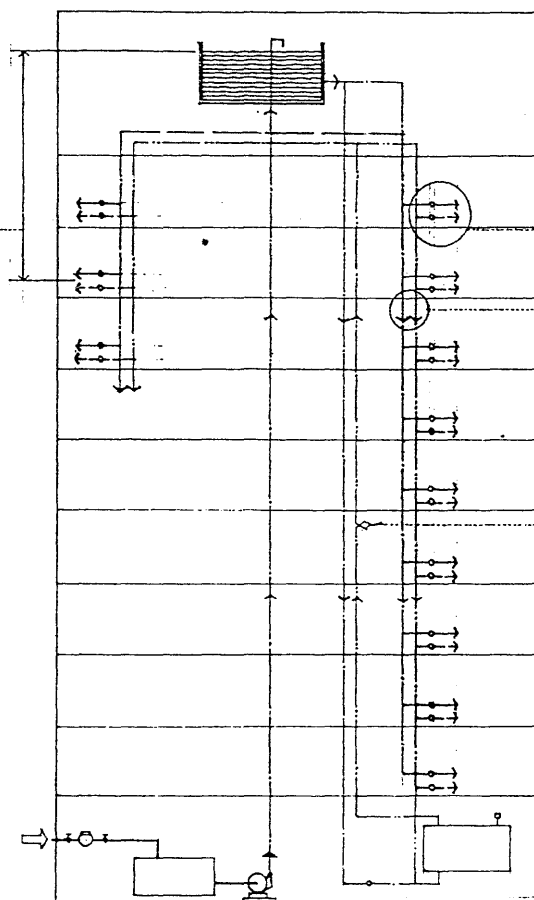
The pressure at the lower of two given points in a liquid, expressed in terms of the vertical distance between the points. Also called pressure head.

## pressure drop

A loss of head or fluid pressure between two points of a pipe or across a valve, due to hydraulic friction.

## fixture unit

A unit for measuring the probable demand for water by a plumbing fixture, or the probable discharge of liquid waste from the fixture, equivalent to 7 1/2 gallons or one cubic foot per minute.



## branch

Any member of a piping system other than a main, riser, or stack.

## riser

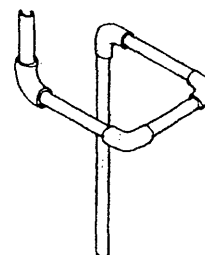
A vertical pipe, conduit, or duct in a utility system.

## main

A principal pipe, conduit, or duct in a utility system.

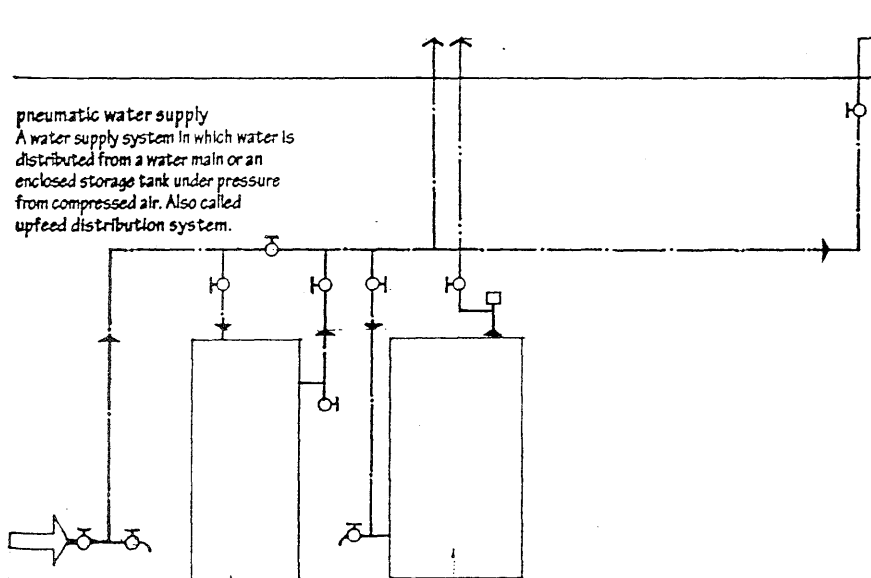
## expansion bend

An expansion joint of pipe and pipe fittings permitting thermal expansion to occur in a long run of hot-water piping. Also called expansion loop.



## pneumatic water supply

A water supply system in which water is distributed from a water main or an enclosed storage tank under pressure from compressed air. Also called upfeed distribution system.



## hose bibb

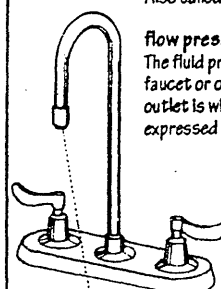
A threaded exterior faucet, as for attaching a garden hose, often attached to the side of a house at about the height of a sill. Also called hosecock, sillcock.

## faucet

A device for controlling the flow of a liquid from a pipe by opening or closing an orifice. Also called spigot, tap.

## flow pressure

The fluid pressure in a supply pipe at a faucet or other outlet while the faucet or outlet is wide open and water is flowing, expressed in psi (N/m<sup>2</sup>).



## mixing faucet

A faucet having a single outlet for water from separately controlled hot-water and cold-water taps. Also called mixer.

## aerator

A sieve-like device for mixing air with the water flowing from the end of a spigot.

## anti-scald faucet

A faucet having a thermostatically controlled valve for maintaining the desired water temperature regardless of pressure or flow.

## water softener

An apparatus that removes calcium and magnesium salts from hard water by ion exchange in order to give the water more efficient sudsing ability with soap.

## hard water

Water containing dissolved salts of calcium or magnesium and forming soap lather with difficulty.

## water heater

An electric or gas appliance for heating water to a temperature between 120°F and 140°F (50°C and 60°C) and storing it for use.

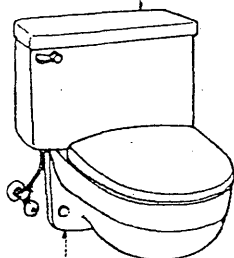
# PLUMBING

## plumbing fixture

Any of various receptacles for receiving water from a water system and discharging the liquid waste into a drainage system.

## sanitary ware

Plumbing fixtures, as sinks and toilet bowls, made of vitreous china, porcelain enamel, or enameled metal.



## water hammer

The concussion and banging noise that results when a volume of water moving in a pipe suddenly stops or loses momentum.

## air chamber

A compartment in a water system containing air that elastically compresses and expands to equalize the pressure and flow of water in the system. Also called air cushion.

## overflow

An outlet, pipe, or receptacle for excess liquid.

## backflow

A flow of a liquid opposite to the usual or desired direction.

## back-siphonage

A backflow of used or contaminated water from a plumbing fixture into a pipe supplying potable water due to negative pressure in the pipe.

## backwater valve

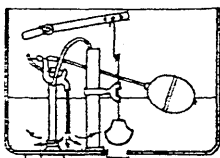
A valve for preventing flowing liquid, as sewage, from reversing its direction. Also called backflow valve.

## flow rate

The rate of discharge from a plumbing fixture, equal to the total number of gallons discharged per minute divided by 7.5 and expressed in fixture units.

## ball cock

A device for regulating the supply of water in a flush tank by means of a hollow floating ball which by its rise or fall shuts or opens a supply valve. Also called float valve.

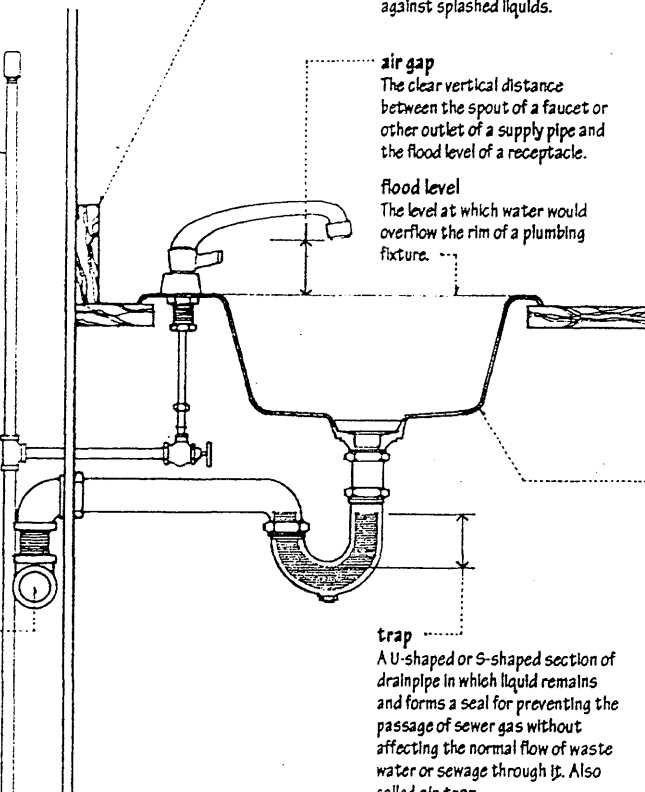


## water closet

A fixture consisting of a ceramic bowl with a detachable, hinged seat and lid and a device for flushing with water, used for defecation and urination. Also called toilet.

## flushometer valve

A valve that supplies a fixed quantity of water to fixtures for flushing purposes when actuated by direct water pressure.



## backsplash

A vertical panel of waterproof material attached to the wall behind a countertop or stovetop to protect against splashed liquids.

## air gap

The clear vertical distance between the spout of a faucet or other outlet of a supply pipe and the flood level of a receptacle.

## flood level

The level at which water would overflow the rim of a plumbing fixture.

## trap

A U-shaped or S-shaped section of drainpipe in which liquid remains and forms a seal for preventing the passage of sewer gas without affecting the normal flow of waste water or sewage through it. Also called air trap.

## drum trap

A cylindrical trap closed on the bottom and having a cover plate for access, usually installed on the drain line from a bathtub.

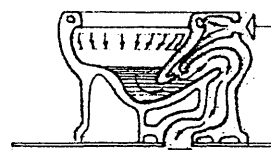
## siphon-jet

A toilet bowl in which the flushing water enters through the rim and siphonic action initiated by a waterjet draws the contents of the bowl through the trapway.



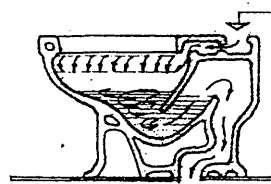
## reverse-trap

A toilet bowl similar to the siphon-jet, but having a smaller water surface and trapway.



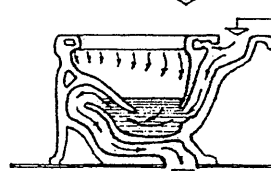
## siphon-vortex

A toilet bowl similar to the siphon-jet, but having the flushing water directed through the rim to create a vortex that scours the bowl.



## wash-down

A toilet bowl having a simple washout action and emptying through a small, irregular passage; prohibited by some health codes.



## bidet

A basinlike fixture designed to be straddled for bathing the genitals and posterior parts of the body.

## urinal

A flushable fixture used by men for urinating.

## toilet partition

A panel forming an enclosure around a water closet for privacy in a public lavatory.

## bathtub

An oblong tub to bathe in, esp. one that is a permanent fixture in a bathroom.

## shower

A bath in which water is sprayed on the body from an overhead nozzle or showerhead.

## grab bar

A bar attached to a wall near a bathtub or shower to provide a hand grip for a person who is bathing.

## receptor

The shallow base pan of a stall shower.

## lavatory

A bowl or basin with running water for washing the face and hands.

## sink

A basin, as in a kitchen or laundry, connected with a water supply and drainage system for washing.

## disposal

An electrical device in the drain of a sink, for grinding food wastes to be washed down the drain. Also called disposer.

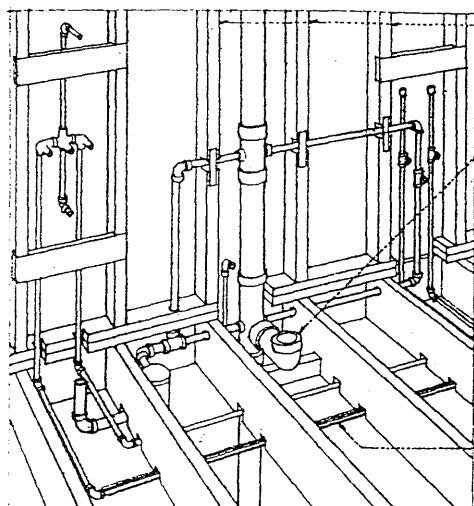
## laundry tray

A deep sink for washing clothes.

## service sink

A deep sink used in janitorial work. Also called slop sink.





### roughing-in

The act or process of installing all parts of a plumbing system that will later be concealed, usually to the fixture connections.

### valve

Any device for controlling or stopping the flow of a liquid or gas by a movable part that opens, partially obstructs, or shuts a passage, pipe, inlet, or outlet.

### bonnet

The part of a valve casing through which the stem passes and that forms a guide and seal for the stem.

### seat

The part or surface of a valve on which the stem is closed to stop flow completely.

### globe valve

A valve with a globular body, closed by a disk seating on an opening in an internal wall.

### gate valve

A shutoff valve closed by lowering a wedge-shaped gate across the passage.

### angle valve

A globe valve having an outlet at a right angle to the inlet.

### alignment valve

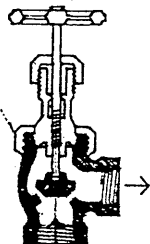
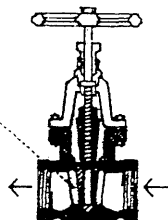
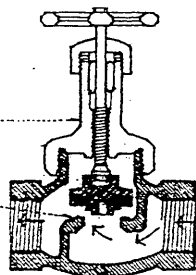
A washerless valve opened by aligning holes in a disk, cylinder, or ball.

### mixing valve

A valve for controlling the relative amount of hot and cold water admitted from separate hot-water and cold-water lines.

### check valve

A valve permitting a liquid or gas to flow in one direction only.

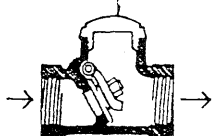


### bell-and-spigot

A pipe joint made by fitting the end (spigot) of one pipe into the enlarged end (bell) of another pipe and sealing with a caulking compound or a compressible ring.

### gasket

A rubber or metal ring inserted between two mating surfaces to make the joint watertight.



**plumbing wall**  
A wall or partition containing vertical space for a plumbing stack. Also called stack partition.

**closet bend**  
A 90° soil fitting installed directly beneath a water closet.

**developed length**  
The length of a pipeline measured along the centerline of the pipe and pipe fittings.

**molded insulation**  
Thermal insulation premolded to fit around pipes and pipe fittings.

### pipe

A hollow cylinder of metal or plastic used for the conveyance of water, steam, gas, or other fluid material.

### pipe fitting

A standard part, as an elbow, union, or tee, for connecting two or more pipes.

### elbow

A pipe fitting having an angled, usually 90° bend. Also called ell, el.

### drop elbow

An elbow having lugs for attachment to a wall or joist. Also called drop ell.

### sweep fitting

A pipe fitting having a large radius of curvature.

### return bend

A 180° bend in a pipe.

### tee

A T-shaped pipe fitting for making a three-way joint.

### drop tee

A tee having lugs for attachment to a wall or joist.

### sanitary tee

A tee having a slight curve in the 90° transition to channel the flow from a branch pipe in the direction of the main.

### wye

A Y-shaped pipe fitting for joining a branch pipe with a main, usually at a 45° angle.

### cross

A pipe fitting for making a four-way connection.

### sanitary cross

A cross having a slight curve in each of the 90° transitions to channel the flow from branch pipes in the direction of the main.

### crossover

A U-shaped pipe for bypassing another pipe.

### nipple

A short length of pipe with threads on each end, used for joining couplings or other pipe fittings.

### coupling

A short length of pipe having each end threaded on the inside, used for joining two pipes of the same diameter.

### increaser

A coupling increasing in diameter at one end.

### reducer

A coupling decreasing in diameter at one end.

### union

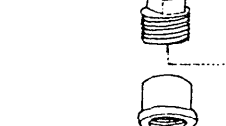
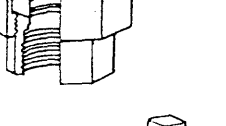
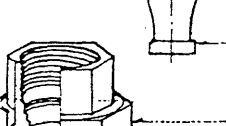
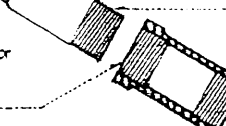
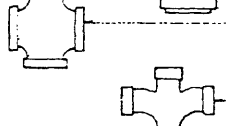
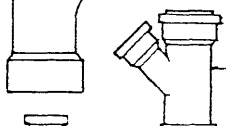
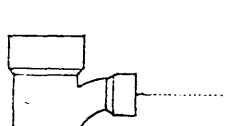
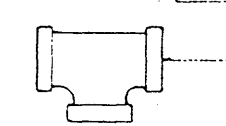
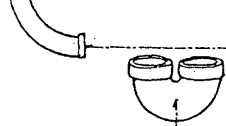
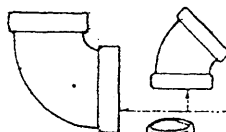
A coupling device for connecting two pipes, neither of which can be turned, consisting of two internally threaded end pieces which are tightened around the pipe ends to be joined, and an externally threaded center piece, which draws the two end pieces together as it is rotated.

### plug

An externally threaded fitting for closing the end of a pipe.

### cap

An internally threaded fitting for enclosing the end of a pipe.



## drainage system

A system of pipes, traps, and other apparatus for conveying sewage, waste water, or rainwater to a public sewer or a private treatment facility.

## drain

Any pipe or channel by which a liquid is drawn off.

## fixture drain

A drain extending from the trap of a plumbing fixture to a junction with a waste or soil stack.

## branch drain

A drain connecting one or more fixtures to a soil or waste stack.

## stack

A vertical waste pipe or vent pipe serving a number of floors.

## soil stack

A vertical soil pipe.

## soil pipe

Any pipe carrying the discharge from water closets or urinals to the building drain or building sewer.

## waste stack

A vertical waste pipe.

## waste pipe

Any pipe carrying the discharge from plumbing fixtures other than water closets or urinals.

## indirect waste pipe

A waste pipe that is not connected directly with a drainage system, but discharges into it through a properly trapped plumbing fixture.

## branch interval

A length of soil or waste stack corresponding to a story height but never less than 8 ft. (2.4 m), within which the horizontal branch drains from one floor are connected.

## fall

The downward slope of a pipe, conduit, or channel, expressed either as a percentage or in inches per foot.

## wet vent

An oversized pipe functioning both as a soil or waste pipe and a vent.

## cleanout

A pipe fitting with a removable plug giving access to a soil or waste pipe for inspection or cleaning.

## sump pump

A pump for removing the accumulations of liquid from a sump.

## sump

A pit or reservoir serving as a drain or receptacle for water or other liquids.

## invert

The lowest point on the interior of a drain pipe or sewer where the liquid is deepest.

## vent system

A system of pipes supplying a flow of air to or from a drainage system or providing a circulation of air within the system to protect trap seals from siphonage and back pressure.

## stack vent

The extension of a soil or waste stack above the highest horizontal drain connected to the stack. Also called soil vent, waste vent.

## battery

A group of two or more similar plumbing fixtures discharging into a common waste or soil branch.

## vent

A pipe connecting a drain near one or more traps to a vent stack or stack vent.

## relief vent

A vent that provides circulation of air between a drainage and a venting system by connecting a vent stack to a horizontal drain between the first fixture and the soil or waste stack.

## loop vent

A circuit vent that loops back and connects with a stack vent instead of a vent stack.

## common vent

A single vent serving two fixture drains connected at the same level. Also called dual vent.

## vent stack

A vertical vent installed primarily to provide circulation of air to or from any part of a drainage system.

## branch vent

A vent connecting one or more individual vents with a vent stack or stack vent.

## individual vent

A vent connecting a fixture drain to a main or branch vent. Also called revent.

## circuit vent

A vent serving two or more traps and extending from in front of the last fixture connection of a horizontal branch to the vent stack.

## back vent

A vent installed on the sewer side of a trap.

## continuous vent

A vertical vent formed by a continuation of the drain line to which it connects.

## fresh-air inlet

A vent pipe admitting fresh air into the drainage system of a building, connected to the building drain at or before the building trap.

## building sewer

A drain connecting a building drain to a public sewer or private treatment facility. Also called house sewer.

## sewer

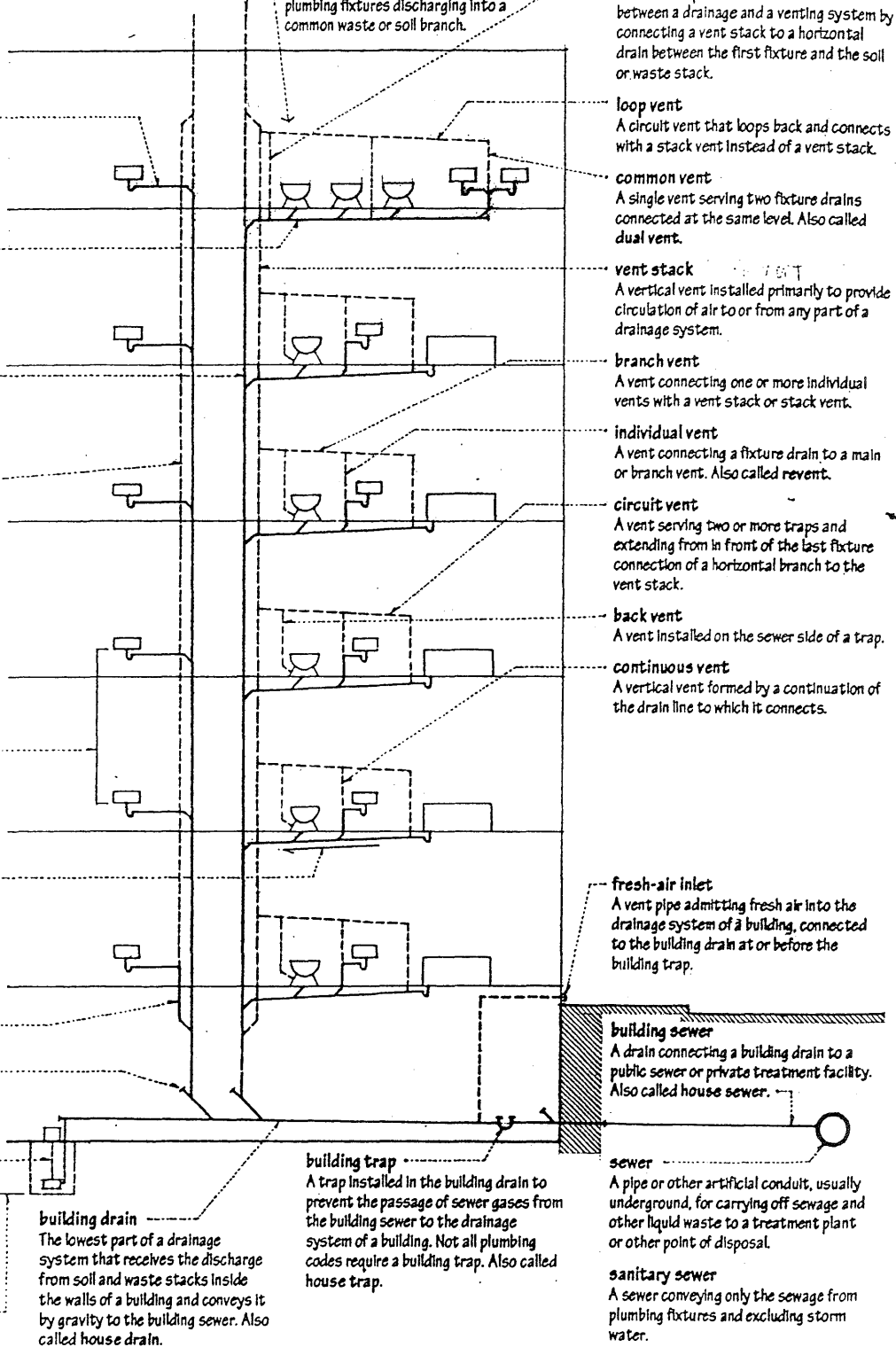
A pipe or other artificial conduit, usually underground, for carrying off sewage and other liquid waste to a treatment plant or other point of disposal.

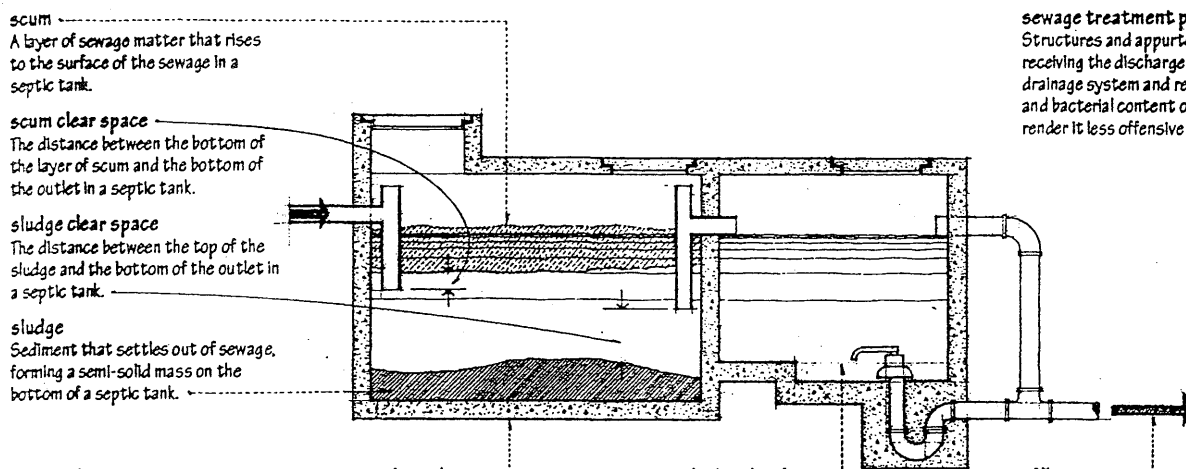
## sanitary sewer

A sewer conveying only the sewage from plumbing fixtures and excluding storm water.

## sewage

The liquid waste containing animal or vegetable matter in suspension or solution that passes through a sewer.





**sewage treatment plant**  
Structures and appurtenances for receiving the discharge of a sanitary drainage system and reducing the organic and bacterial content of the waste so as to render it less offensive or dangerous.

**scum**  
A layer of sewage matter that rises to the surface of the sewage in a septic tank.

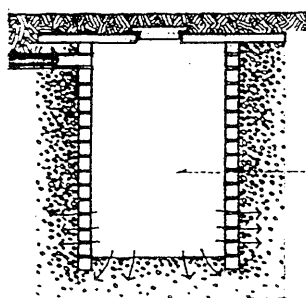
**scum clear space**  
The distance between the bottom of the layer of scum and the bottom of the outlet in a septic tank.

**sludge clear space**  
The distance between the top of the sludge and the bottom of the outlet in a septic tank.

**sludge**  
Sediment that settles out of sewage, forming a semi-solid mass on the bottom of a septic tank.

**cesspool**  
A covered pit for receiving the sewage from a house, having a perforated lining to allow the liquid portion of the sewage to leach into the ground while the sludge is retained in the pit to undergo decomposition. Cesspools are no longer acceptable as a means of sewage disposal.

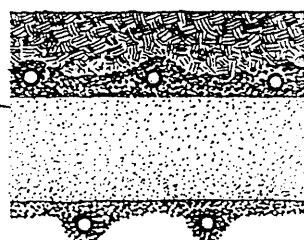
**seepage pit**  
A pit that is lined with a perforated masonry or concrete wall to allow effluent collected from a septic tank to seep or leach into the surrounding soil, sometimes used as a substitute for a drainfield.



**sand filter**  
A filter for cleansing water or purifying effluent, consisting of layers of coarse stone, coarse gravel, and sand becoming finer toward the top.

**subsurface sand filter**  
A sewage filtering system consisting of a number of distribution pipes surrounded by graded gravel, an intermediate layer of clean, coarse sand, and a system of underdrains to carry off the filtered effluent.

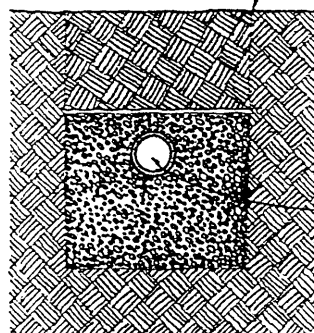
**septic tank**  
A covered watertight tank for receiving the discharge from a building sewer, separating out the solid organic matter which is decomposed and purified by anaerobic bacteria, and allowing the clarified liquid to discharge for final disposal.



**serial distribution**  
A sequence of absorption trenches, absorption beds, or seepage pits so arranged that the total effective absorption area of one is utilized before effluent flows into the next.

**percolation test**  
A test for determining the rate at which a soil will absorb effluent, made by measuring the rate at which the water level drops after a hole is dug in the soil and filled with water.

**dosing chamber**  
A chamber of a large septic tank employing siphonic action to automatically discharge a large volume of effluent when a predetermined quantity has accumulated.



**grease trap**  
A tank installed between a kitchen sink and a house sewer for retaining and removing grease from waste water. Also called grease interceptor.

**distribution box**  
A box through which the flow of effluent from a septic tank is distributed to the drainage tiles of a drainfield. Also called diversion box.

**drainfield**  
An open area containing an arrangement of absorption trenches through which septic-tank effluent from a septic tank may seep or leach into the surrounding soil. Also called absorption field, disposal field.

**absorption trench**  
A narrow trench 12 to 36 in. (305 to 914 mm) wide containing coarse aggregate and a distribution pipe through which the effluent from a septic tank is allowed to seep into the soil.

**absorption bed**  
A trench wider than 36 in. (914 mm), containing coarse aggregate and two or more distribution pipes through which the effluent from a septic tank may seep into the surrounding soil. Also called seepage bed.

**distribution pipe**  
Drain tiles laid with open joints or perforated pipe having sufficient openings for the distribution of the effluent from a septic tank. Also called distribution line.

**drain tile**  
A hollow tile laid end to end with open joints to disperse effluent in a drainfield, or to drain water-saturated soil. Also, drainage tile.

**leach**  
To cause water or other liquid to percolate through something, so as to dissolve out soluble constituents.

# REINFORCED CONCRETE

**Concrete in which steel reinforcement is embedded in such a manner that the two materials act together in resisting forces. Also called *béton armé*, *ferroconcrete*.**

## reinforcement

A system of steel bars, strands, or wires for absorbing tensile, shearing, and sometimes the compressive stresses in a concrete member or structure.

## reinforcing bar

A steel bar for reinforcing concrete, usually specified by a number equivalent to its diameter in eighths of an inch. Also called *rebar*.

## deformed bar

A reinforcing bar hot-rolled with surface deformations to develop a greater bond with concrete.

## tension reinforcement

Reinforcement designed to absorb tensile stresses.

## compression reinforcement

Reinforcement designed to absorb compressive stresses.

## plain concrete

Concrete having no reinforcement, or reinforced only for drying shrinkage or thermal stresses.

## ferrocement

Constructed of cement-sand mortar over a wire mesh that has been preshaped over a mold.

## fiber-reinforced concrete

Concrete reinforced with dispersed, randomly oriented fibers of glass or plastic.

## gfrc

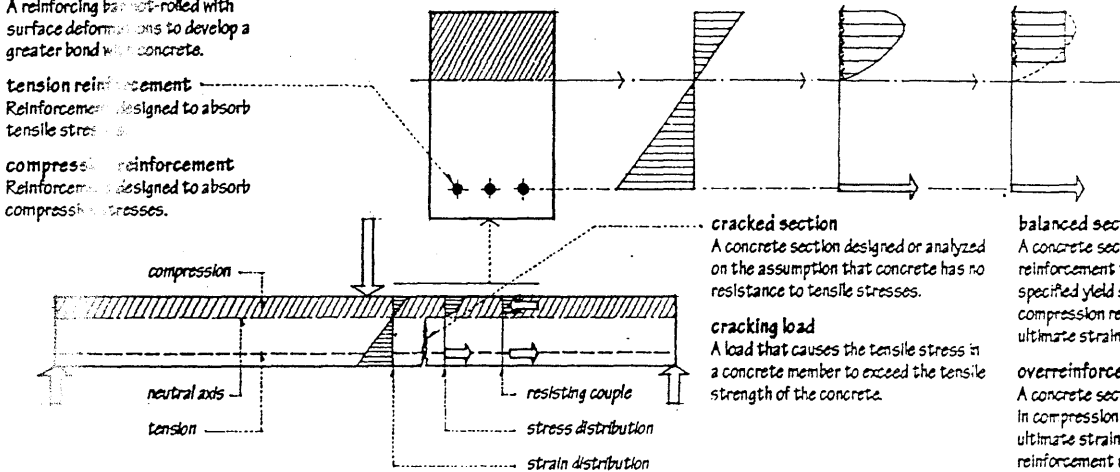
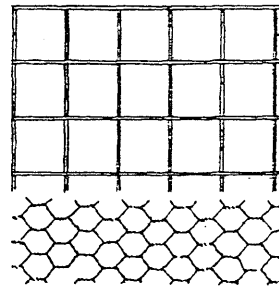
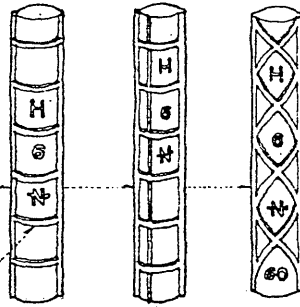
Abbreviation for glass-fiber-reinforced concrete.

## welded-wire fabric

A grid of longitudinal and transverse steel wires or bars welded together at all points of intersection, usually specified by the size of the grid in inches and the wire gauge. Also called *welded-wire mesh*.

## woven-wire fabric

A mesh of cold-drawn steel wires mechanically twisted together to form hexagonally shaped openings.



## cracked section

A concrete section designed or analyzed on the assumption that concrete has no resistance to tensile stresses.

## cracking load

A load that causes the tensile stress in a concrete member to exceed the tensile strength of the concrete.

## balanced section

A concrete section in which the tension reinforcement theoretically reaches its specified yield strength as the concrete in compression reaches its assumed ultimate strain.

## overreinforced section

A concrete section in which the concrete in compression reaches its assumed ultimate strain before the tension reinforcement reaches its specified yield strength. This is a dangerous condition since failure of the section could occur instantaneously without warning.

## underreinforced section

A concrete section in which the tension reinforcement reaches its specified yield strength before the concrete in compression reaches its assumed ultimate strain. This is a desirable condition since failure of the section would be preceded by large deformations, giving prior warning of impending collapse.

## effective depth

The depth of a concrete section measured from the compression face to the centroid of the tension reinforcement.

## bar spacing

The center-to-center spacing of parallel reinforcing bars, the resulting bar distance between the bars being regulated by bar diameter, maximum size of coarse aggregate, and thickness of the concrete section.

## cover

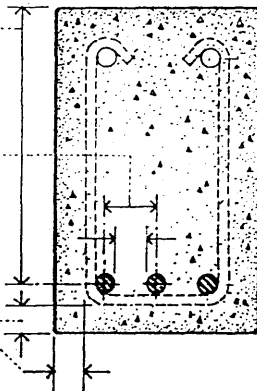
The amount of concrete required to protect steel reinforcement from fire and corrosion, measured from the surface of the reinforcement to the outer surface of the concrete section.

## bond

The adhesion between two substances, concrete and reinforcing bars.

## bond stress

The adhesive force per unit area of contact between a reinforcing bar and the surrounding concrete developed at any section of a flexural member.



## effective area of concrete

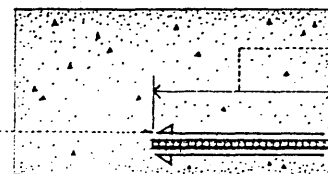
The area of a concrete section between the compression face and the centroid of the tension reinforcement.

## effective area of reinforcement

The product of the right cross-sectional area of reinforcement and the cosine of the angle between its direction and the direction for which its effectiveness is considered.

## percentage reinforcement

The ratio of effective area of reinforcement to effective area of concrete at any section of a reinforced concrete member, expressed as a percentage.



## embedment length

The length of embedded reinforcement provided beyond a critical section for anchorage.

## hook

A bend or curve given to the end of a tension bar to develop an equivalent embedment length, used where there is insufficient room to develop an adequate embedment length.

## standard hook

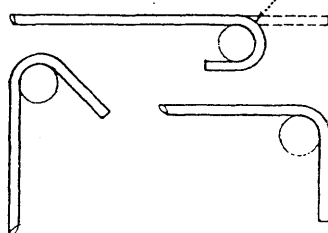
A 90°, 135°, or 180° bend made at the end of a reinforcing bar according to industry standards with a radius based on the bar diameter.

## anchorage

Any of various means, as embedment length or hooked bars, for developing tension or compression in a reinforcing bar on each side of a critical section in order to prevent bond failure or splitting.

## critical section

The section of a flexural concrete member at a point of maximum stress, a point of inflection, or a point within the span where tension bars are no longer needed to resist stress.



## truss bar

A longitudinal bar bent up or down at points of moment reversal in a reinforced concrete beam.

## top bar

Any of the longitudinal bars serving as tension reinforcement in the section of a concrete beam or slab subject to a negative moment.

## reinforced concrete beam

A concrete beam designed to act together with longitudinal and web reinforcement in resisting applied forces.

## longitudinal reinforcement

Reinforcement essentially parallel to the horizontal surface of a slab or to the long axis of a concrete beam or column.

## deep beam

A reinforced concrete beam having a depth-to-span ratio greater than 2.5 for continuous spans, or 4.5 for simple spans, subject to nonlinear distribution of stress and lateral buckling.

## T-beam

A monolithic reinforced concrete construction in which a portion of the slab on each side of a beam acts as a flange in resisting compressive stresses, and the portion of the beam projecting below the slab serves as a web or stem in resisting bending and shear stresses.

## web reinforcement

Reinforcement consisting of bent bars or stirrups, placed in a concrete beam to resist diagonal tension.

## bent bar

A longitudinal bar bent to an angle of 30° or more with the axis of a concrete beam, perpendicular to and intersecting the cracking that could occur from diagonal tension.

## bottom bar

Any of the longitudinal bars serving as tension reinforcement in the section of a concrete beam or slab subject to a positive moment.

## stirrup

Any of the U-shaped or closed-loop bars placed perpendicular to the longitudinal reinforcement of a concrete beam to resist the vertical component of diagonal tension.

## diagonal tension

The principle tensile stresses acting at an angle to the longitudinal axis of a beam.

## vertical reinforcement

Longitudinal reinforcement placed in a concrete column to absorb compressive stresses, resist bending stresses, and reduce the effects of creep and shrinkage in the column. The effective cross-sectional area of vertical reinforcement should not be less than 0.01 nor more than 0.08 times the gross cross-sectional area of the column, with a minimum of four #5 bars for tied columns and a minimum of six #5 bars for spiral columns.

## lap splice

A splice for transferring tensile or compressive stresses from one longitudinal bar to another, made by lapping their ends for a length specified in bar diameters.

## butt splice

A splice for transferring tensile or compressive stresses from one longitudinal bar to another, made by butting their ends together and connecting them in a positive fashion.

## welded splice

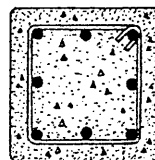
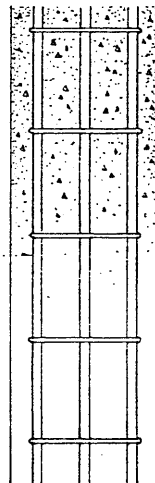
A butt splice made by arc-welding the butted ends of two reinforcing bars.

## compression splice

A butt splice made by connecting the butted ends of two reinforcing bars with a mechanical fastener, as a sleeve clamp.

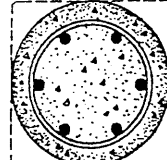
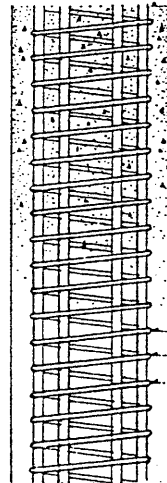
## offset bend

A bend displacing a section of longitudinal bar to a position parallel to the original bar, used esp. in the vertical reinforcement of concrete columns.



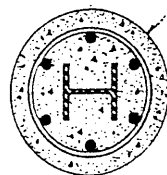
## tied column

A concrete column reinforced with vertical bars and individual lateral ties. Lateral ties should have a diameter of at least 3/8 in. (9.5 mm), spaced apart not over 48 tie diameters, 16 bar diameters, or the least dimension of the column section. Each corner and alternate longitudinal bar should be laterally supported by the bend of a tie having an included angle of not more than 135°, with no bar being more than 6 in. (152 mm) clear from such a supported bar.



## spiral column

A concrete column with spiral reinforcement enclosing a circular core reinforced with vertical bars.



## reinforced concrete column

A concrete column designed to act together with vertical and lateral reinforcement in resisting applied forces. Reinforced concrete columns constituting the principal supports for a floor or roof should have a minimum diameter of 10 in. (254 mm), or if rectangular in section, a minimum thickness of 8 in. (203 mm), and a minimum gross area of 96 sq. in. (61935 sq. mm).

## lateral reinforcement

Spiral reinforcement or lateral ties placed in a concrete column to laterally restrain the vertical reinforcement and prevent buckling.

## spiral reinforcement

Lateral reinforcement consisting of an evenly spaced continuous spiral held firmly in place by vertical spacers. Spiral reinforcement should have a diameter of at least 3/8 in. (9.5 mm), with a maximum center-to-center spacing between spirals of 1/6 of the core diameter, and a clear spacing between spirals not to exceed 3 in. (76 mm) nor be less than 1 1/8 in. (35 mm) or 1/2 times the size of the coarse aggregate.

## compound column

A structural steel column encased in concrete at least 2 1/2 in. (64 mm) thick, reinforced with wire mesh.

## composite column

A structural steel column thoroughly encased in concrete reinforced with both vertical and spiral reinforcement.

## REINFORCED CONCRETE

### reinforced concrete slab

A rigid planar structure of concrete designed to act together with principal and secondary reinforcement in resisting applied forces.

### principal reinforcement

Reinforcement designed to absorb the stresses from applied loads and moments.

### shrinkage reinforcement

Reinforcement placed perpendicular to the principal reinforcement in a one-way slab to absorb the stresses resulting from shrinkage or changes in temperature. Also called temperature reinforcement.

### topping

A thin layer of high-quality concrete placed over a concrete base to form a floor surface.

### bonding layer

A thin layer of mortar spread on a moistened and prepared existing concrete surface prior to laying a new concrete slab.

### one-way slab

A concrete slab of uniform thickness reinforced in one direction and cast integrally with parallel supporting beams. One-way slabs are suitable only for relatively short spans.

### beam-and-girder slab

A one-way slab supported by secondary beams which in turn are supported by primary beams or girders.

### ribbed slab

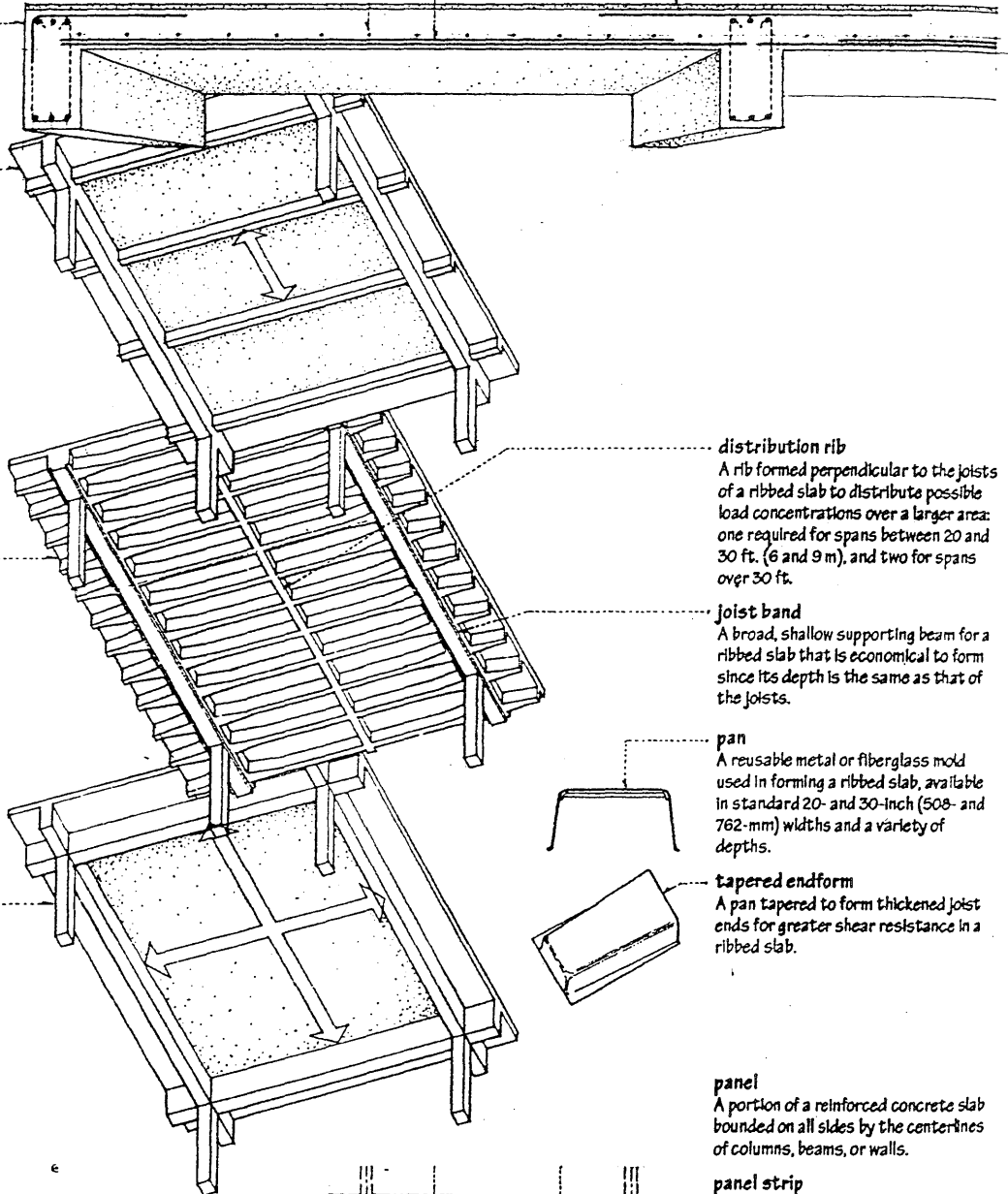
A reinforced concrete slab cast integrally with a series of closely spaced joists which in turn are supported by a parallel set of beams. Ribbed slabs are designed as a series of parallel T-beams and economical for medium spans with light to medium live loads. Also called joist slab.

### two-way slab

A concrete slab of uniform thickness reinforced in two directions and cast integrally with supporting edge beams or bearing walls on four sides. Two-way slabs are economical for medium spans with intermediate to heavy loads.

### continuous slab

A reinforced concrete slab extending as a structural unit over three or more supports in a given direction. A continuous slab is subject to lower bending moments than a series of discrete, simply supported slabs.



### distribution rib

A rib formed perpendicular to the joists of a ribbed slab to distribute possible load concentrations over a larger area: one required for spans between 20 and 30 ft. (6 and 9 m), and two for spans over 30 ft.

### joist band

A broad, shallow supporting beam for a ribbed slab that is economical to form since its depth is the same as that of the joists.

### pan

A reusable metal or fiberglass mold used in forming a ribbed slab, available in standard 20- and 30-inch (508- and 762-mm) widths and a variety of depths.

### tapered endform

A pan tapered to form thickened joist ends for greater shear resistance in a ribbed slab.

### panel

A portion of a reinforced concrete slab bounded on all sides by the centerlines of columns, beams, or walls.

### panel strip

A strip running in each direction of a two-way slab, within which moments per foot are assumed to be constant.

### middle strip

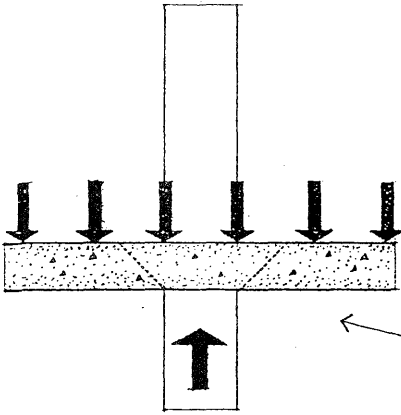
A panel strip, one-half panel in width and symmetrical about the panel centerline.

### column strip

A panel strip occupying the adjacent quarter panels on both sides of a column centerline.

## flat plate

A concrete slab of uniform thickness reinforced in two or more directions and supported directly by columns without beams or girders. Flat plates are suitable for short to medium spans with relatively light live loads. Since there are no column capitals or drop panels, shear governs the thickness of a flat plate.

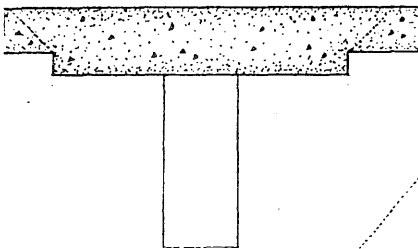


### punching shear

The potentially high-shearing stress developed by the reactive force of a column on a reinforced concrete slab.

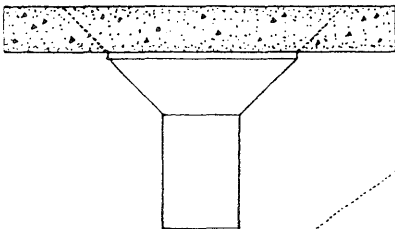
### shear head

The overstressed region of a reinforced concrete slab at a column support.



### drop panel

The portion of a flat slab thickened around a column or column capital to increase its resistance to shear.

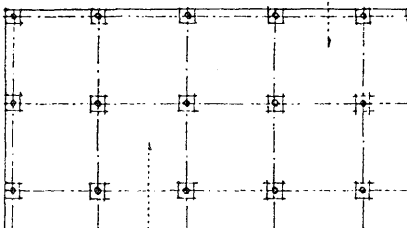


### column capital

The head of a column support for a flat slab enlarged to increase the plate area in shear.

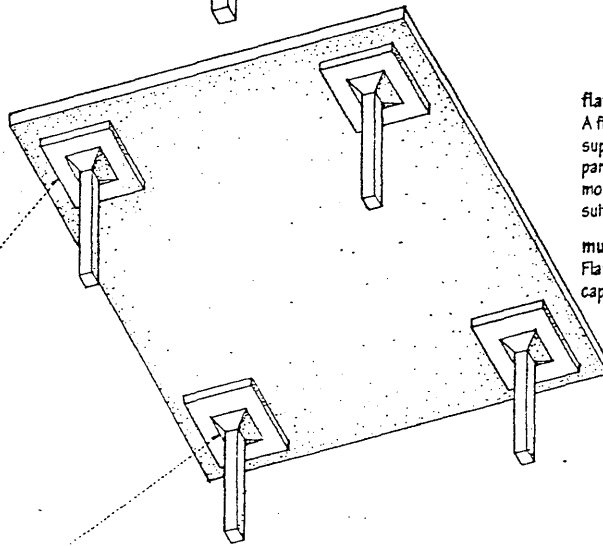
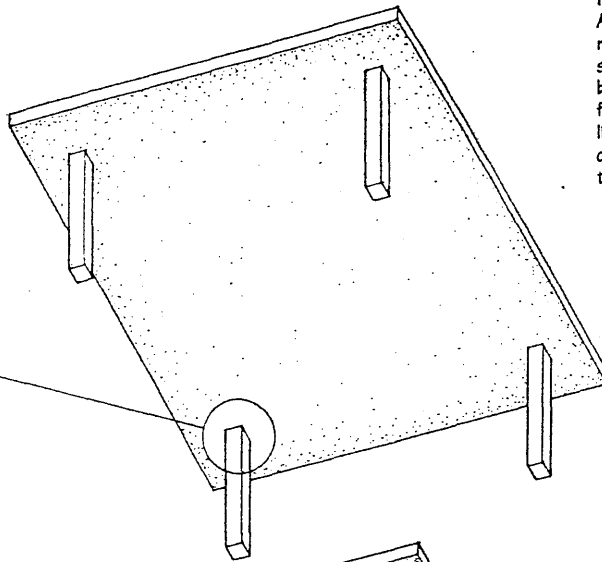
### exterior panel

A panel of a flat slab having at least one edge which does not adjoin another panel.



### interior panel

Any panel of a flat slab that adjoins other panels along all four edges.



## flat slab

A flat plate thickened at its column supports with column capitals and drop panels to increase its shear strength and moment-resisting capacity. Flat slabs are suitable for heavily loaded spans.

### mushroom construction

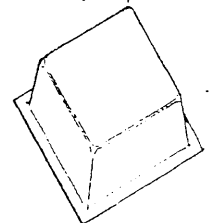
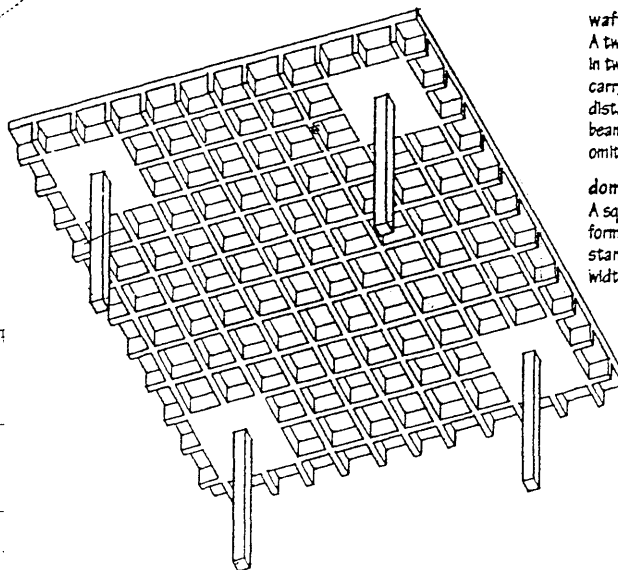
Flat slab construction utilizing column capitals and drop panels.

## waffle slab

A two-way concrete slab reinforced by ribs in two directions. Waffle slabs are able to carry heavier loads and span longer distances than flat slabs. Supporting beams and drop panels can be formed by omitting dome forms in selected areas.

### dome

A square metal or fiberglass pan used in forming the ribs of a waffle slab, available in standard 19- and 30-in. (483- and 762-mm) widths and a variety of depths.



# REINFORCED CONCRETE

## precast concrete

A concrete member or product that is cast and cured in a place other than where it is to be installed in a structure.

## solid flat slab

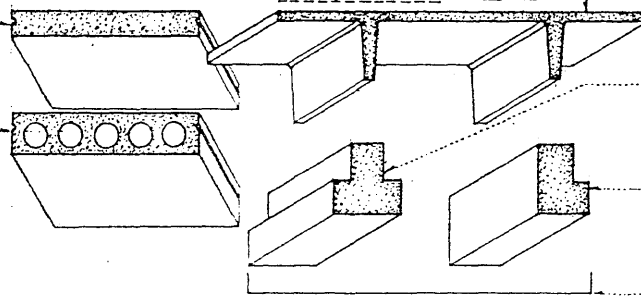
A precast, prestressed concrete plank suitable for short spans and uniformly distributed floor and roof loads.

## hollow-core slab

A precast, prestressed concrete plank internally cored to reduce dead weight. Hollow-core slabs are suitable for medium to long spans and uniformly distributed floor and roof loads.

## topping

A layer of reinforced concrete cast to form a composite structural unit with a precast concrete floor or roof deck.



## single tee

A precast, prestressed concrete slab having a broad, T-shaped cross section.

## double tee

A precast, prestressed concrete slab having two stems and a broad cross section resembling the capital letters TT.

## inverted tee

A precast, prestressed ledger beam having a cross section resembling an inverted capital T.

## L-beam

A precast, prestressed ledger beam having a cross section resembling the capital letter L.

## ledger beam

A reinforced concrete beam having projecting ledges for receiving the ends of joists or slabs.

## prestressed concrete

Concrete reinforced by pretensioning or posttensioning high-strength steel tendons within their elastic limit to actively resist a service load. The tensile stresses in the tendons are transferred to the concrete, placing the entire cross section of a flexural member in compression. The resulting compressive stresses counteract the tensile-bending stresses from the applied load, enabling the prestressed member to deflect less, carry a greater load, or span a greater distance than a conventionally reinforced member of the same size, proportion, and weight.

## prestress

To introduce internal stresses to a concrete member in order to counteract the stresses that will result from an applied load.

## pretension

To prestress a concrete member by tensioning the reinforcing tendons before the concrete is cast. The tendons are first stretched between two abutments until a predetermined tensile force is developed. Concrete is then cast in formwork around the tendons and fully cured. Finally, the tendons are cut, and the tensile stress in the tendons is transferred to the concrete through bond stresses.

## tendon

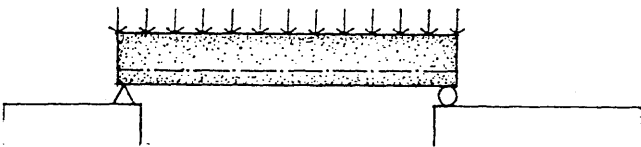
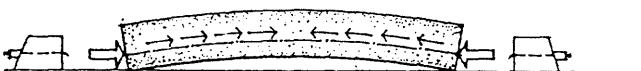
A high-strength steel strand or bar for prestressing concrete.

## strand

A cable composed of high-strength steel wires twisted about a core.

## casting bed

A long horizontal slab on which a number of pretensioned concrete members may be prestressed, formed, and cast simultaneously.



## abutment

A structure for anchoring the reinforcing tendons in the pretensioning of a concrete member.

## anchor

A mechanical device for locking a stressed tendon in position and delivering the prestressing force to the concrete, either permanently in a posttensioned member or temporarily during hardening of a pretensioned concrete member. Also called anchorage.

## jacking force

The tensile force exerted temporarily by a jack in the prestressing of a concrete member.

## jack

A hydraulic device for stretching and stressing tendons in the prestressing of a concrete member.

## initial prestress

The tensile force in the reinforcing tendons transferred to a concrete member at the time of stressing.

## loss of prestress

A reduction in initial prestress resulting from the combined effects of creep, shrinkage, or elastic shortening of the concrete, relaxation of the reinforcing steel, friction losses resulting from the curvature of draped tendons, and slippage at the anchorages.

## final prestress

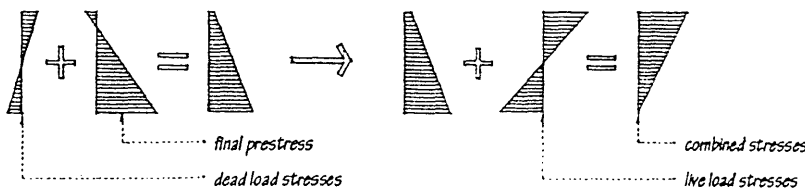
The internal stress that exists in a prestressed concrete member after all losses in prestress have occurred.

## effective prestress

The final prestress in a prestressed concrete member, including the effect of the weight of the member but excluding the effect of any superimposed load.

## partial prestressing

The prestressing of a concrete member to a level of stress such that nominal tensile stresses exist at design or service loads.







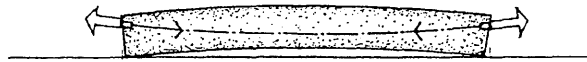
## posttension

To prestress a concrete member by tensioning the reinforcing tendons after the concrete has set. Unstressed tendons are placed in sheaths before concrete is cast in formwork around the tubes. After the concrete has cured, the tendons are clamped on one end and jacked against the concrete on the other end until the required force is developed. The tendons are then anchored on the jacking end and the jack removed.



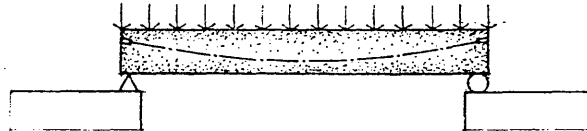
## bonded posttensioning

Posttensioning in which the reinforcing tendons are bonded to the surrounding concrete by injecting grout into the annular spaces around the strands.



## unbonded posttensioning

Posttensioning in which the annular spaces around the reinforcing tendons are not grouted, allowing the tendons to move relative to the surrounding concrete.



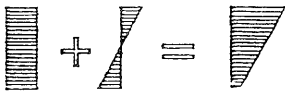
## sheath

A tube for encasing tendons in a posttensioned member to prevent their bonding to the concrete during placement.



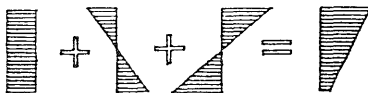
## pre-posttension

To prestress a concrete member by pretensioning some of the tendons and posttensioning others.



## concentric tendon

A tendon having a straight trajectory coincident with the centroidal axis of a prestressed concrete member. When tensioned, the tendon produces a uniformly distributed compressive stress across the section that counteracts the tensile stress from bending.

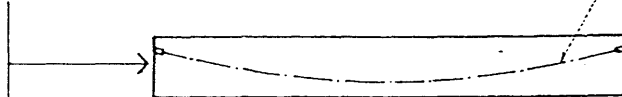


## eccentric tendon

A tendon having a straight trajectory not coincident with the centroidal axis of a prestressed concrete member. When tensioned, the tendon produces an eccentric prestressing force that reduces the compressive stress across the section to that produced by bending alone.

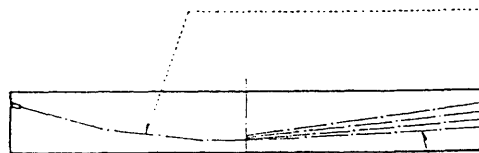
## load balancing

The concept of prestressing a concrete member with draped tendons, theoretically resulting in a state of zero deflection under a given loading condition.



## draped tendon

A posttensioning tendon having a parabolic trajectory that mirrors the moment diagram of a uniformly distributed gravity load. When tensioned, the tendon produces a variable eccentricity that responds to the variation in applied bending moment along the length of the member.



## depressed tendon

A pretensioning tendon that approximates the curve of a draped tendon with straightline segments, used in the pretensioning process since the prestressing force does not allow for draping the tendon.

## harped tendon

One of a series of depressed tendons having varying slopes.

# ROOF

The external upper covering of a building, including the frame for supporting the roofing.

## flat roof

A roof having no slope, or one with only a slight pitch so as to drain rainwater.

## pitched roof

A roof having one or more slopes.

## gable roof

A roof sloping downward in two parts from a central ridge, so as to form a gable at each end.

## gable

The triangular portion of wall enclosing the end of a pitched roof from cornice or eaves to ridge.

## hip roof

A roof having sloping ends and sides meeting at an inclined projecting angle. Also, hipped roof.

## curb roof

A roof divided on each side of the ridge into two or more slopes, as a gambrel or mansard.

## mansard

A roof having on each side a steeper lower part and a shallower upper part. Also called mansard roof.

## butterfly roof

A roof having two slopes, each descending inward from the eaves.

## shed roof

A roof having a single slope.

## lean-to

A shed roof with the higher end abutting a wall or larger building.

## penthouse

A shed roof projecting from a wall or the side of a building, as to shelter a door. Also called apprentice, pent, pentice.

## pitch

The slope of a roof, commonly expressed in inches of vertical rise per foot of horizontal run.

## rise

The measured height of a sloping roof from the eaves to the ridge.

## run

The horizontal distance from the eaves to the ridge of a sloping roof.

## pavilion roof

A pyramidal hip roof.

## hipped gable

A roof having a hipped end truncating a gable. Also called Jerkinhead, shreadhead.

## gambrel roof

A ridged roof divided on each side into a shallower slope above a steeper one.

## curb

The arris between an upper and a lower slope on a gambrel or mansard roof.

## rainbow roof

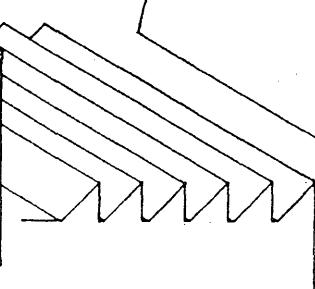
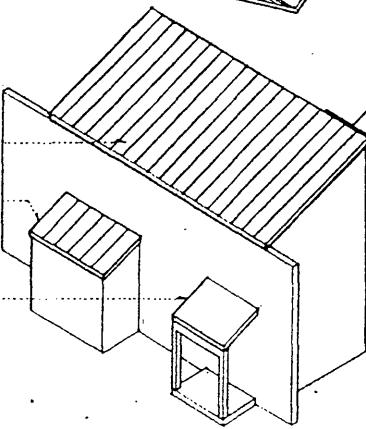
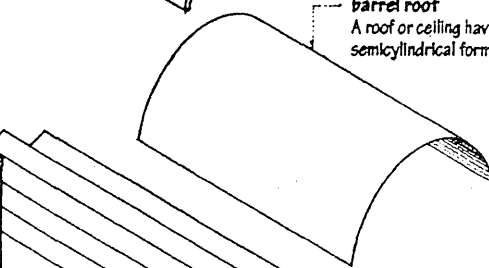
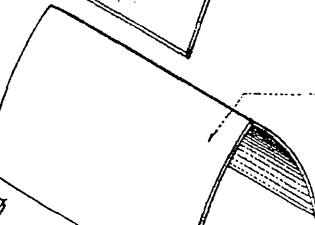
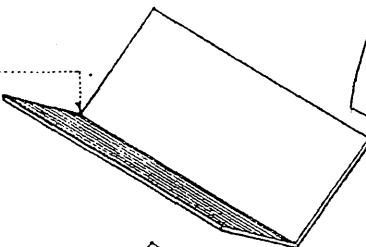
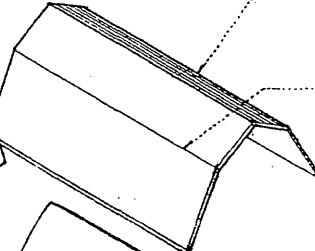
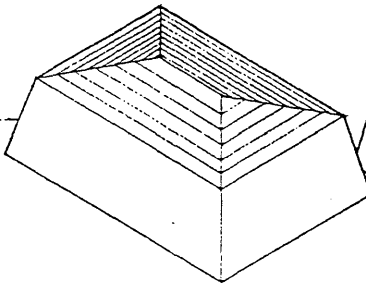
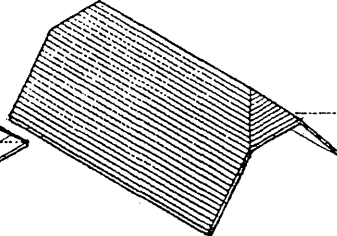
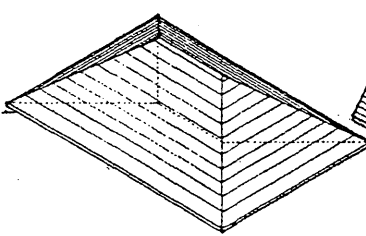
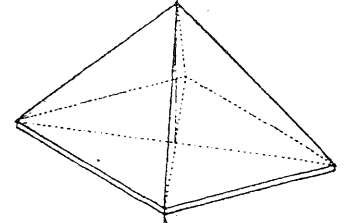
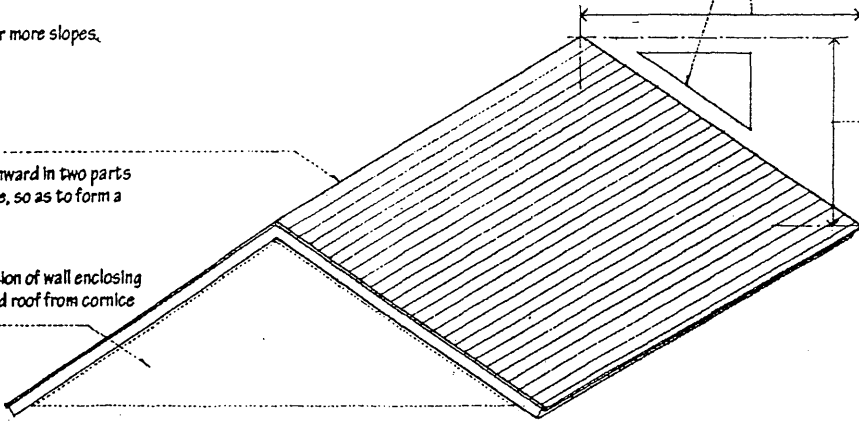
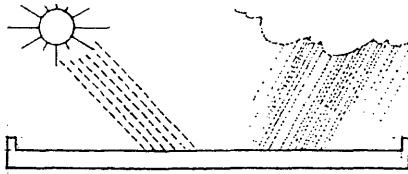
A gable roof in the form of a broad Gothic arch, with gently sloping convex surfaces.

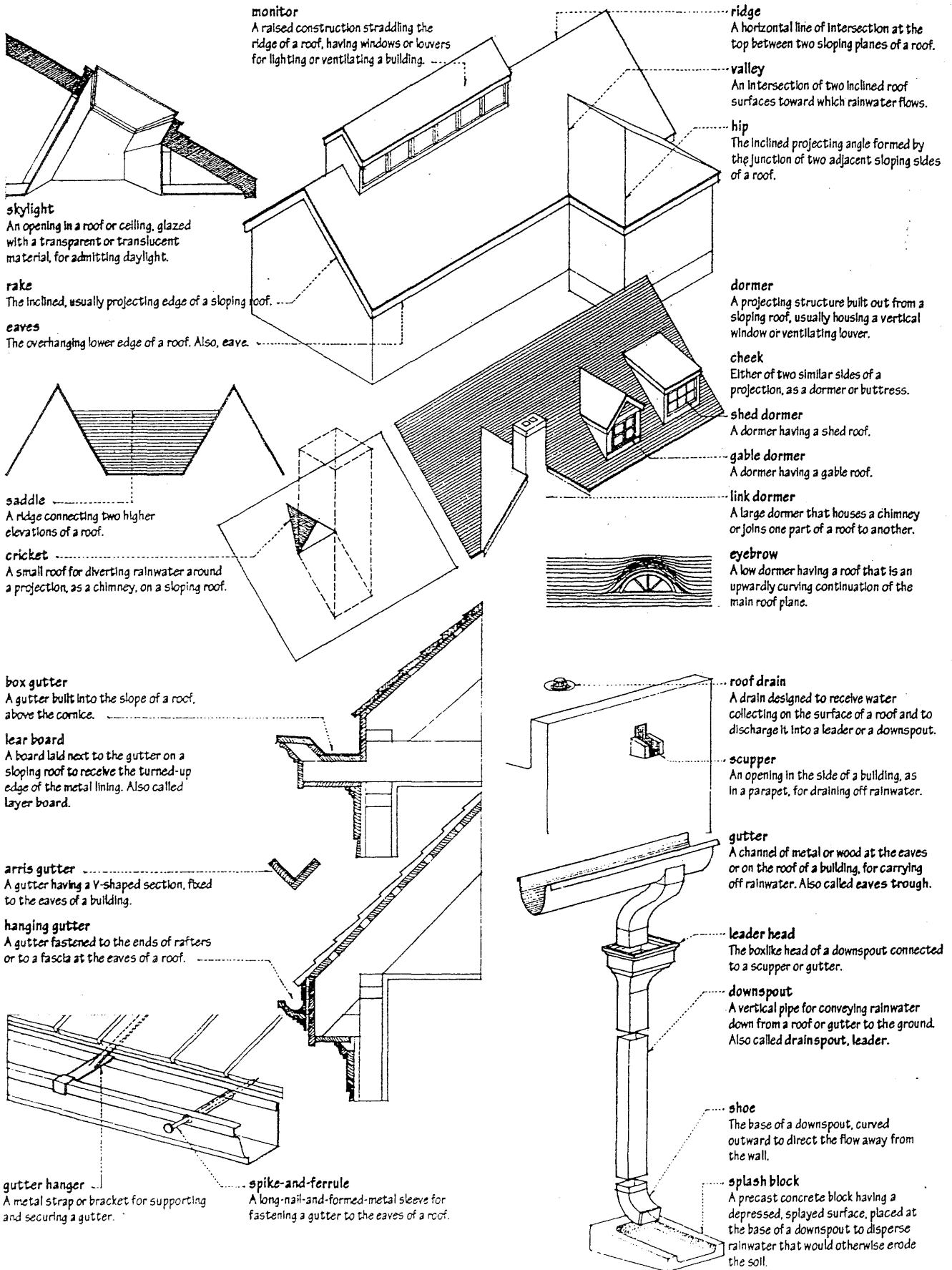
## barrel roof

A roof or ceiling having a semicylindrical form.

## sawtooth roof

A roof composed of a series of small parallel roofs of triangular cross section, usually asymmetrical with the shorter slope glazed.





# ROOF

## double roof

A roof in which longitudinal members, as a ridge beam and purlins, are used as intermediate supports for common rafters. Also called double-framed roof.

## king post

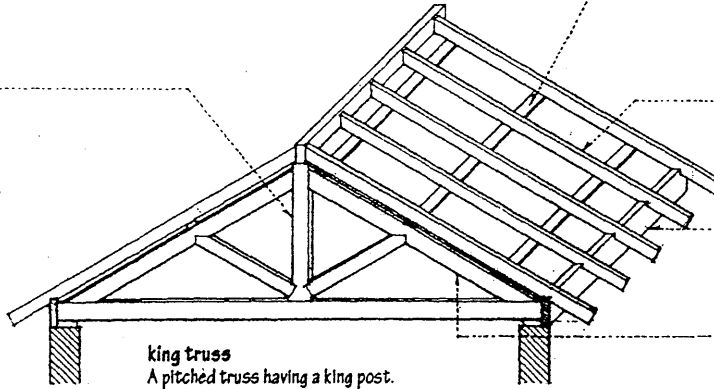
A vertical member from the apex to the bottom chord of a pitched truss.

## joggle post

A king post having notches or raised areas for receiving and supporting the feet of inclined struts. Also called joggle piece.

## joggle

An enlarged area of a post for supporting the foot of a strut or brace.



**king truss**  
A pitched truss having a king post.

## purlin

A longitudinal member of a roof frame for supporting common rafters between the ridge and the eaves. Also, purline. Also called binding rafter.

## subpurlin

A light structural member for carrying roofing materials, supported by and running at right angles to purlins.

## common rafter

A rafter extending from a wallplate to a ridgeboard or ridgebeam and having no function other than to support sheathing and covering of a roof.

## pole plate

A beam perpendicular to the ends of tie beams in a trussed roof and supporting common rafters near their lower ends.

## principal rafter

A diagonal member of a roof principal, usually forming part of a truss and supporting the purlins on which common rafters rest.

## principal

A member in a frame structure upon which adjacent or similar members depend for support or reinforcement.

## straining piece

A horizontal tie beam uniting the tops of two queen posts. Also called straining beam.

## queen post

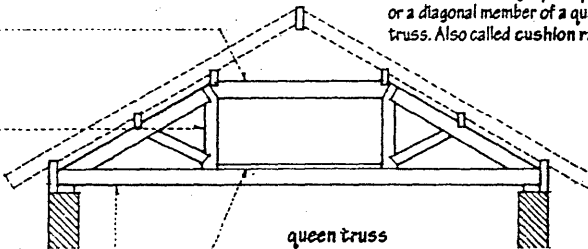
Either of the two vertical web members set at equal distances from the apex of a pitched truss.

## tie beam

A horizontal timber for connecting two structural members to keep them from spreading apart, as a beam connecting the feet of two principal rafters in a roof truss.

## straining sill

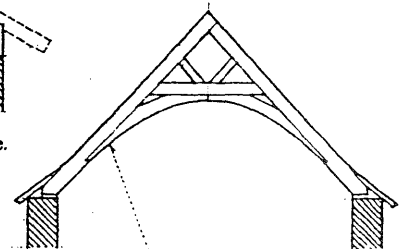
A compression member lying along and dogged to the tie beam of a queen truss and separating the feet of the queen posts.



**queen truss**  
A pitched truss having two queen posts connected by a straining piece.

## auxiliary rafter

A rafter reinforcing a principal rafter or a diagonal member of a queen truss. Also called cushion rafter.



## arch brace

A curved brace, usually used in pairs to support a roof frame and give the effect of an arch.

## hammer post

A vertical timber set on the inner end of a hammer beam and braced to a collar beam above to support a purlin.

## hammer beam

One of pair of short horizontal members attached to the foot of a principal rafter at the level of the wall plate, used in place of a tie beam.

## hammer brace

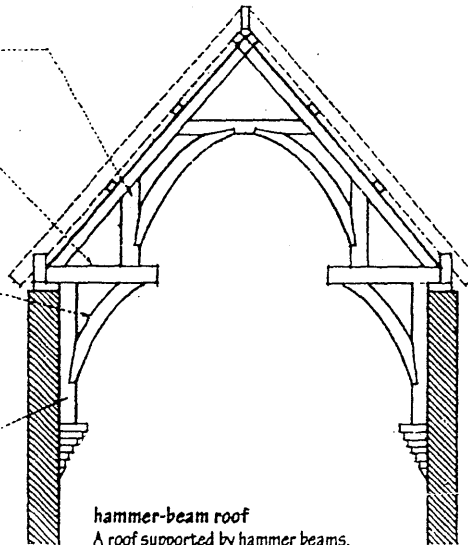
A bracket for supporting a hammer beam.

## bracket

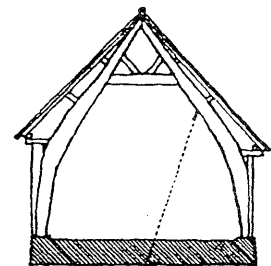
A support projecting horizontally from a wall to bear the weight of a cantilever or to strengthen an angle.

## pendant post

A vertical timber supported at its lower end by a corbel and carrying at its upper end a hammer beam or tie beam.



**hammer-beam roof**  
A roof supported by hammer beams.



## cruck

One of a pair of naturally curved timbers, forming one of several arched frames supporting the roof of an old English cottage or farm building.

**ridge beam**

A beam for supporting the upper ends of rafters at the ridge of a roof.

**ridge board**

A horizontal timber at the ridge of a roof, to which the upper ends of the rafters are fastened. Also called *ridgepole*, *ridgepiece*.

**roof framing**

The act, process, or manner of constructing the structural frame of a roof.

**couple**

A pair of rafters connected by a collar beam or tie beam. Also called *couple-close*.

**collar beam**

A horizontal timber uniting two opposing common rafters at a point below the ridge, usually in the upper half of the rafter length. Also called *collar tie*.

**rafter**

Any of a series of small, parallel beams for supporting the sheathing and covering of a pitched roof.

**ceiling joist**

A joist for carrying the finish ceiling of a room.

**knee wall**

A short wall supporting rafters at some intermediate position along their length.

**bird's mouth**

A right-angled notch cut on the underside of a rafter to fit over a longitudinal member, as a wall plate.

**seat cut**

A horizontal cut at the lower end of a rafter that allows it to rest on and be connected to a wall plate. Also called *foot cut*, *plate cut*.

**top cut**

A plumb cut at the upper end of a rafter where it butts against a ridgeboard.

**plumb**

Vertical or perpendicular in direction.

**stepping off**

A method of determining the length of a rafter with a framing square, by marking an increment of angular length for each foot of horizontal run.

**lookout**

A relatively short bracket or cantilever for supporting the overhang of a roof. Also called *tailpiece*.

**fly rafter**

Either of the end rafters in the part of a gable roof that projects beyond the gable wall.

**jack**

Having a length or height less than that of most of the others in a framed structure, as a *jack rafter* or *jack truss*.

**jack rafter**

Any rafter that is shorter than the full length of the roof slope, as one meeting a hip or a valley.

**valley jack**

A jack rafter extending from a valley rafter to a ridge.

**valley rafter**

A rafter connecting the ridge to the wall plate along a valley.

**cripple jack**

A rafter joining a hip to a valley. Also called *double jack rafter*.

**hip jack**

A jack rafter extending from a wall plate to a hip rafter.

**hip rafter**

A rafter forming the junction of the sloping sides of a hip roof.

**dragon beam**

A short beam receiving and holding the foot of a hip rafter to counteract its thrust. Also called *dragon piece*.

**dragon tie**

An angle brace for supporting one end of a dragon beam.

**barge couple**

A pair of rafters supporting the part of a gable roof that projects beyond the gable wall.

**bargeboard**

A board, often carved, attached to the projecting end of a gable roof. Also called *vergeboard*.

**outrigger**

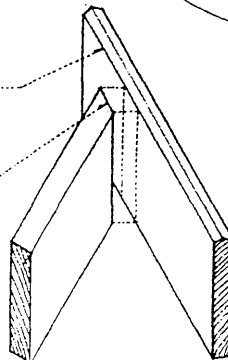
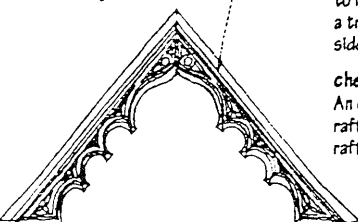
A beam extending outward from a main structure to support the projection of a floor or roof.

**backing**

A bevel given to the outer and upper edge of a hip rafter in order to allow sheathing to fit the top of the rafter without leaving a triangular space between it and the lower side of the roof covering.

**cheek cut**

An oblique angular cut at the end of a jack rafter enabling it to fit tightly against a hip rafter or valley rafter. Also called *side cut*.



# ROOF

## roofing

Any of various water-resistant materials, as shingles, slates, or tiles, laid on a roof to shed or drain rainwater.

## shingle

A thin, usually oblong piece of wood, asphaltic material, slate, metal, or concrete, laid in overlapping rows to cover the roof and walls of buildings.

## imbrication

The overlapping of shingles or roofing tiles with break joints to form a weathertight covering.

## break joints

The arranging of building units, as masonry, shingles, or siding, to ensure that vertical joints are not continuous in adjacent courses. Also called **staggered joints**.

## common lap

A method of laying shingles by offsetting alternate courses one-half the width of a shingle.

## toplap

The distance by which a shingle, slate, or roofing tile overlaps another in the course immediately below it.

## exposure

The portion of the length of a shingle, slate, or roofing tile left exposed to the weather when laid in place. Also called **gauge**, **margin**.

## headlap

The distance by which a shingle, slate, or roofing tile overlaps another in the second course below it.

## ridgecap

A course or layer of roofing material covering the ridge of a roof.

## ridge course

The top course of shingles, slates, or roofing tiles next to a ridge, cut to the required length.

## ribbon course

One of the alternate courses of shingles or slate laid with shorter or longer exposure.

## staggered course

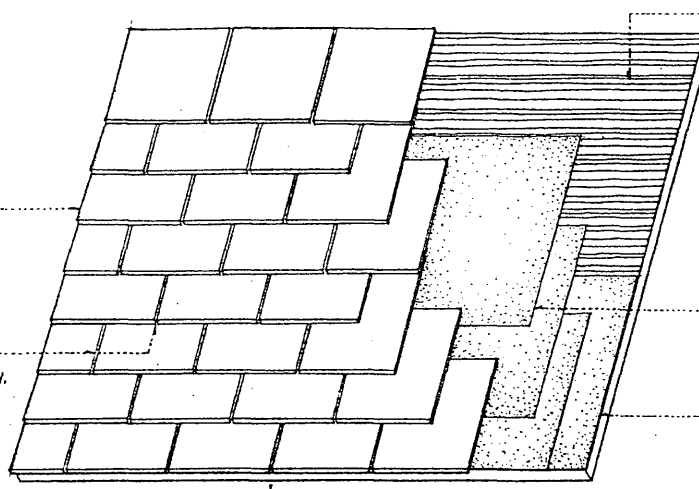
A course of shingles laid with the butts slightly above or below the one adjacent.

## doubling course

A double layer of shingles or tiles laid at the foot of a roof slope or a vertical section of shingling.

## starting course

The first course of shingles, slates, or tiles along the eaves of a roof before the first regular course is laid.



## sheathing

Boards or structural panels, as plywood, fastened to the frame of a wall or roof as a base for cladding or roofing.

## panel clip

An H-shaped metal device for joining sheets of plywood roof sheathing at unsupported joints.



## underlayment

A weather-resistant material, as roofing felt, for covering and protecting a roof deck before shingles are applied.

## eaves flashing

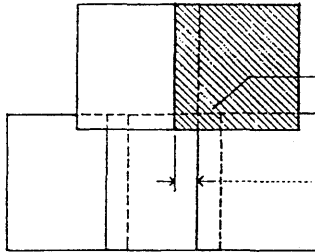
An additional layer of underlayment cemented to a roof deck to prevent melting ice and snow from backing up under the roofing along the eaves.

## ice dam

A buildup of snow and ice along the eave of a sloping roof.

## Dutch lap

A method of laying shingles or slates by lapping each shingle over one to the side and one below.



## sidelap

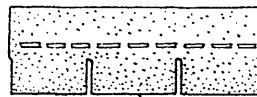
The distance by which a shingle, slate, or roofing tile overlaps an adjacent one along its side edge. Also called **endlap**.

## coverage

The amount of weather protection provided by the overlapping of shingles or slates.

## square

A unit for measuring roofing materials, equal to 100 sq. ft. (9.3 sq. m) of coverage.



## asphalt shingle

A composition shingle having an asphalt-impregnated felt base, surfaced on the weather side with colored mineral granules embedded in a hot asphaltic coating.

## fiberglass shingle

A composition shingle having an inorganic fiberglass base, saturated with asphalt and surfaced on the weather side with colored ceramic granules.

## closed valley

A valley formed by overlapping successive courses of shingles in alternate directions. Also called **laced valley**, **woven valley**.

## open valley

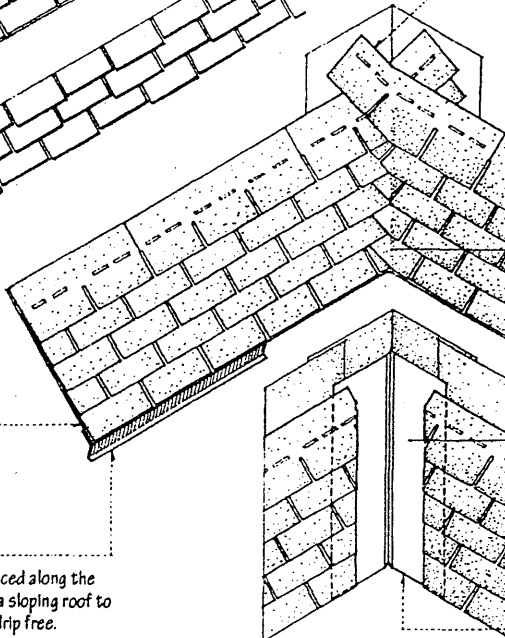
A valley at which shingles or slates are not laid to the intersection, exposing a lining of sheet metal or roll roofing.

## valley flashing

A wide strip of sheet metal or roofing felt for lining the valley of a roof.

## drip edge

A metal molding placed along the eaves and rakes of a sloping roof to allow rainwater to drip free.



**blue label**  
A premium grade of red cedar shingle of clear, edge-grained heartwood.

**red label**  
An intermediate grade of red cedar shingle having a limited amount of flat grain and sapwood.

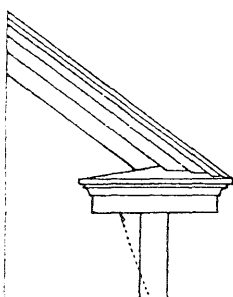
**black label**  
A utility grade of red cedar shingle.

**undercourse**  
A row of wood shingles laid along the rake of a sloping roof with the butts projecting outward to give an inward slope to the surface shingles. Also called undercloak.

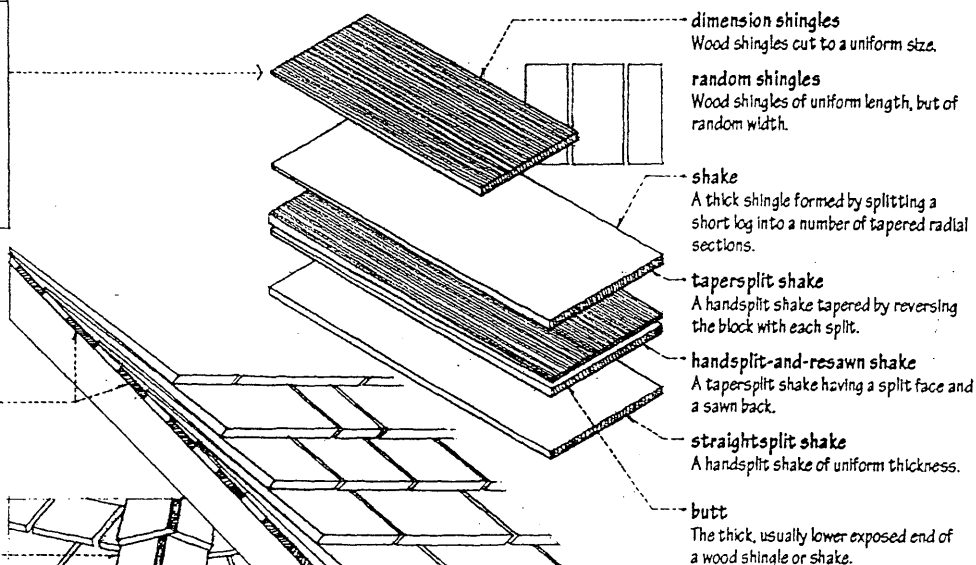
**spaced sheathing**  
Roofing boards laid some distance apart to provide ventilation for wood shingles and shakes. Also called open boarding, skip sheathing.

**Boston hip**  
The weaving of shingles at the hip or ridge of a roof. Also called Boston ridge.

**weaving**  
A method of laying shingles on adjoining surfaces of a roof or wall so that shingles on each face lap each other alternately.



**cornice return**  
The continuation of a cornice around the gable end of a house.



**dimension shingles**  
Wood shingles cut to a uniform size.

**random shingles**  
Wood shingles of uniform length, but of random width.

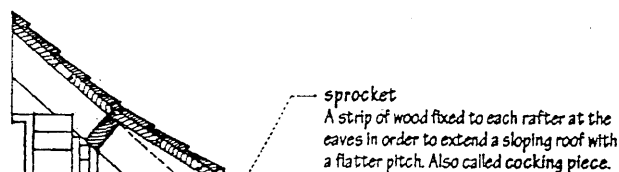
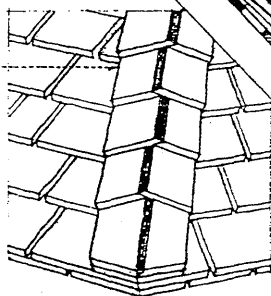
**shake**  
A thick shingle formed by splitting a short log into a number of tapered radial sections.

**tapersplit shake**  
A handsplit shake tapered by reversing the block with each split.

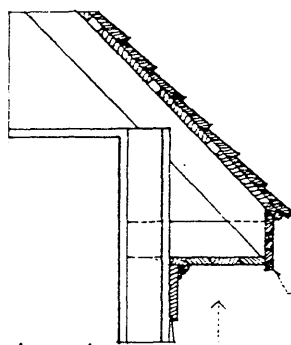
**handsplit-and-resawn shake**  
A tapersplit shake having a split face and a sawn back.

**straight split shake**  
A handsplit shake of uniform thickness.

**butt**  
The thick, usually lower exposed end of a wood shingle or shake.



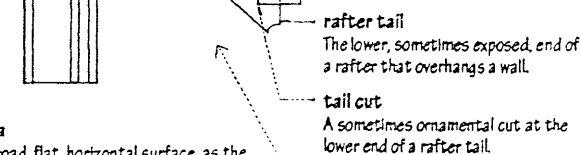
**sprocket**  
A strip of wood fixed to each rafter at the eaves in order to extend a sloping roof with a flatter pitch. Also called cocking piece.



**fascia**  
Any broad, flat, horizontal surface, as the outer edge of a cornice or roof.

**fascia board**  
A wide board set vertically to cover the lower ends of rafters or the joint between the top of a wall and the projecting eaves.

**box cornice**  
A slightly projecting, hollow cornice of boards and moldings, nailed to rafters and lockouts. Also called closed cornice.



**rafter tail**  
The lower, sometimes exposed, end of a rafter that overhangs a wall.

**tail cut**  
A sometimes ornamental cut at the lower end of a rafter tail.

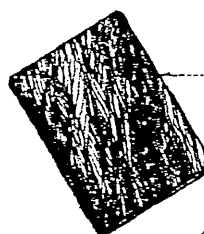
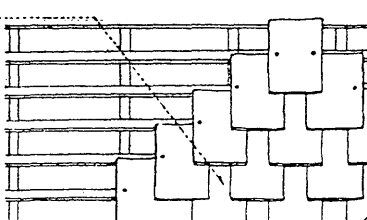
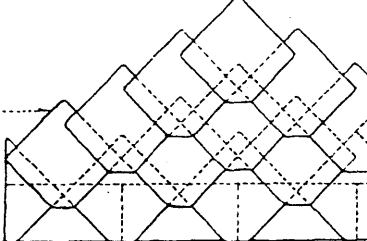
**open cornice**  
An eaves overhang exposing the ends of rafters and the underside of the roof sheathing. Also called open eaves.

**diagonal slating**  
A method of laying roofing slates with the diagonal of each tile running horizontally. Also called drop-point slating.

**honeycomb slating**  
Diagonal slating in which the tails are cut from the roofing slates.

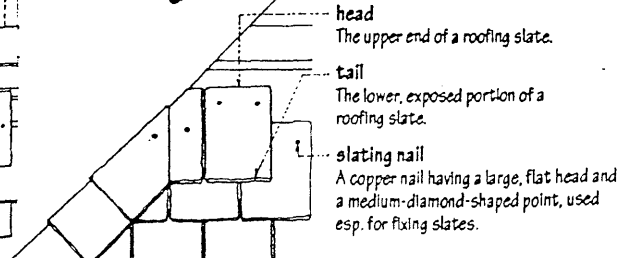
**open slating**  
A method of laying roofing slates with spaces between adjacent tiles in a course. Also called spaced slating.

**diminishing course**  
One of a number of courses of roofing slates that diminish in exposure, and sometimes width, from the eaves to the ridge.



**sized slates**  
Roofing slates of uniform width.

**random slates**  
Roofing slates of varying width, often laid in diminishing courses. Also called rustic slates.



**head**  
The upper end of a roofing slate.

**tail**  
The lower, exposed portion of a roofing slate.

**slating nail**  
A copper nail having a large, flat head and a medium-diamond-shaped point, used esp. for fixing slates.

# ROOF

## roofing tile

Any of various clay or concrete tiles for covering a roof.

## field tile

One of the roofing tiles covering the main expanse of a roof.

## hip tile

A convex roofing tile for covering the hip of a roof. Also called bonnet tile.

## ridge tile

A convex, sometimes decorated roofing tile for covering the ridge of a roof. Also called crown tile.

## tile tie

A twisted wire tie extending from the eaves to the ridge of a roof, to which roofing tiles are secured.

## mission tile

A tapered, semicylindrical roofing tile laid convex side up to overlap flanking, similar tiles laid concave side up. Also called Spanish tile.

## imbrex

A tapered, semicylindrical roofing tile laid convex side up.

## tegula

A tapered, semicylindrical roofing tile laid concave side up.

## pantile

A roofing tile having an S-shaped cross section, laid so the downturn of one overlaps the upturn of the next in the same course.

## pan-and-roll tiling

A system of roofing tiles consisting of tapered, semicylindrical tiles overlapping the flanges of flat undertiles in the same course.

## interlocking tile

A flat, rectangular roofing tile having a groove along one edge that fits over a flange in the next tile in the same course.

## shingle tile

A flat, rectangular roofing tile laid in an overlapping pattern.

## batten

A horizontal wood strip on which roofing tiles or slates are hung.

## starter tile

A roofing tile, usually shorter or plainer than the field tiles, placed under the eaves course to give it a proper slope.

## tilting fillet

A wooden strip of triangular section used to raise the edge of a double eaves course and ensure that the tails of the lowest tiles bed tightly on each other. Also called arris fillet.

## eaves course

A first course of shingles, slates, or tiles on a roof.

## barge course

A row of slates or tiles placed on and projecting over the raking edges of a gable.

## rake tile

A roofing tile formed to cover the rake of a sloping roof.

## arris tile

An L-shaped roofing tile for covering the ridge, hip, or rake of a roof. Also called angle tile.

## oil-canning

The slight waviness of a sheet metal surface.

## ridge roll

A rounded cap for covering the ridge of a roof.

## lock seam

A joint between two pieces of sheet metal, made by folding up the adjoining edges against each other, folding them over, and flattening the interlock.

## standing seam

A joint between two pieces of sheet metal, made by folding up the adjoining edges against each other, then folding their upper portion over in the same direction a number of times.

## batten seam

A joint between two pieces of sheet metal, made by turning up the adjoining edges against a batten and locking them in place with a metal strip placed over the batten.

## roll seam

A joint between two pieces of sheet metal in the direction of fall of a curved or sloping roof, made by turning up the adjoining edges against each other, then bending them around to form a cylindrical roll.

## bead

An edge of sheet metal stiffened by bending and flattening a narrow strip or rolling the edge into a tube shape.

## corrugated roofing

A roof covering of corrugated sheets of galvanized iron, coated steel, aluminum, fiberglass, or reinforced plastic.

## copper roofing

A roof covering of copper sheets, joined by standing seams.

## tin roofing

A roof covering of flexible tinplate or terneplate.

## Monel metal

Trademark for a brand of an alloy consisting mainly of nickel and copper.

## hold-down clip

A metal clip for securing lengths of sheet metal.

## overcloak

The part of a sheet of metal roofing that laps over a sheet beneath it at a drip or seam.

## undercloak

The lower sheet of metal roofing at a drip or seam.

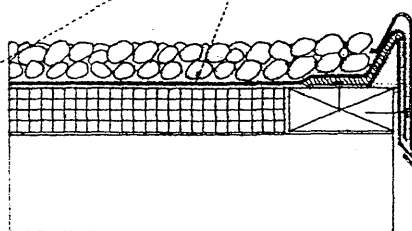
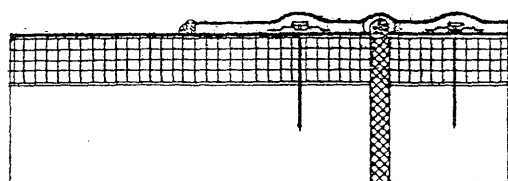
## cleat

A strip of metal or wood attached to a surface to restrain or support an element or member.



**Hypalon**  
Trademark for a brand of chlorinated polyethylene.

**EPDM**  
Ethylene propylene diene monomer, a synthetic rubber manufactured in sheets and used as a roofing membrane.

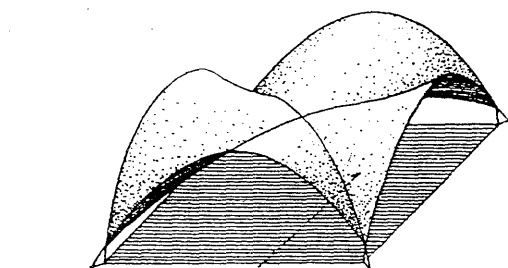


**single-ply roofing**  
A sheet of elastomeric material, as neoprene, EPDM, or PVC, having seams fused by heat or a solvent, fixed to a roof deck with adhesive, mechanical fasteners, or by the weight of a gravel ballast. Also called elastomeric roofing.

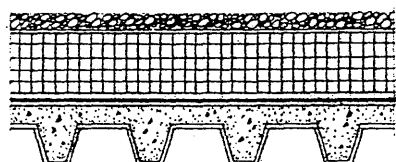
**elastomeric**  
Having the elastic qualities of natural rubber.

**gravel stop**  
A metal strip with a vertical flange for retaining surfacing aggregate and preventing leaks around the edge of a built-up roof.

**protected membrane roof**  
A single-ply roofing membrane protected from sunlight and extremes of temperature by a layer of rigid board insulation and an additional layer of gravel ballast.

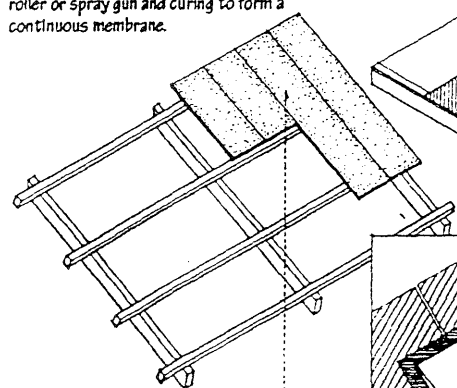


**fluid-applied roofing**  
A continuous covering for roofs of complex geometry, consisting of an elastomeric material, as neoprene, Hypalon, or butyl rubber, applied in multiple coats with a roller or spray gun and curing to form a continuous membrane.

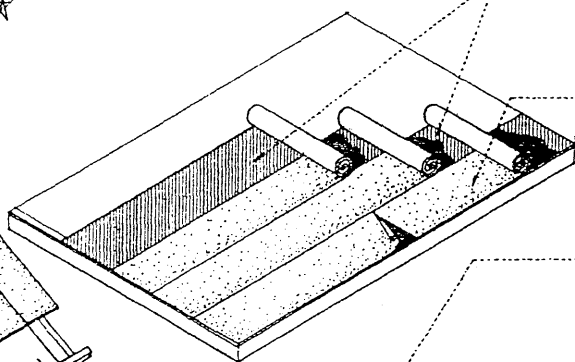


**selvage**  
The edge of a sheet of roll roofing that is free of granules and most of the asphalt coating so as to provide a better bond with the lap of the next sheet.

**roll roofing**  
A roofing material consisting of felt saturated with asphalt and surfaced on the weather side with a harder asphalt mixed with mineral or glass fibers, and a covering of mineral granules.



**structural insulating roof deck**  
A cementitious insulating board of lightweight aggregate or wood fibers bonded under pressure with portland cement, having a factory-finished underside for use on roofs with exposed beams.



**bitumen**  
Any of various mixtures of hydrocarbons occurring naturally or distilled from coal or petroleum, as asphalt or coal tar, used for surfacing roads, waterproofing, and roofing. Before application, the semisolid matter must be dissolved in a solvent, emulsified, or heated to a liquid state.

**asphalt**  
A brownish-black mixture of bitumens obtained from native deposits or as a petroleum by-product, used for paving, waterproofing, and roofing.

**coal tar**  
A viscous, black liquid formed during the distillation of coal, used for paints, waterproofing, and roofing.

**wear course**  
A layer of gravel serving to protect a roofing membrane from mechanical abrasion and uplifting wind forces.

**cap sheet**  
A sheet of coated, mineral-surfaced felt, used as the top ply in a built-up roof.

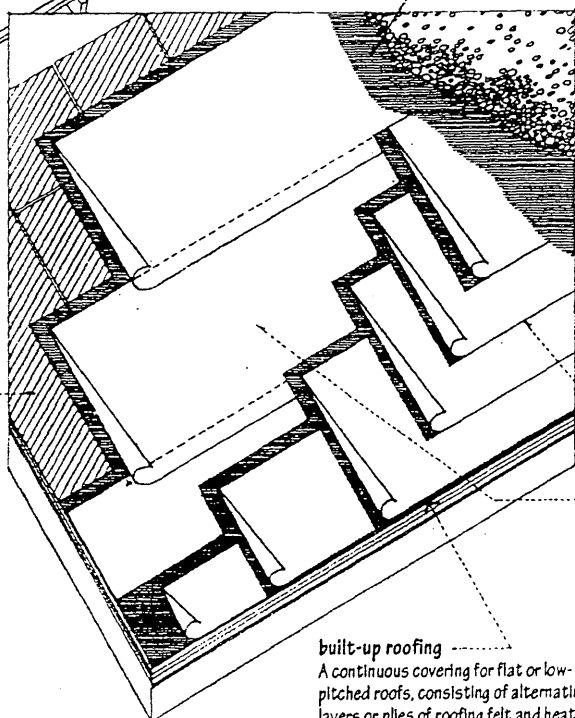
**base sheet**  
A felt impregnated with asphalt or coal tar for use as the first ply in the laying of a built-up roof.

**roofing felt**  
A matted, fibrous material impregnated with a bituminous material for increased toughness and resistance to weather. Also called roofing paper.

**rigid board insulation**

**cold-process roofing**  
A roof covering consisting of layers of roofing felt or synthetic fabric bonded and sealed with a cold application of an asphalt mastic or cement.

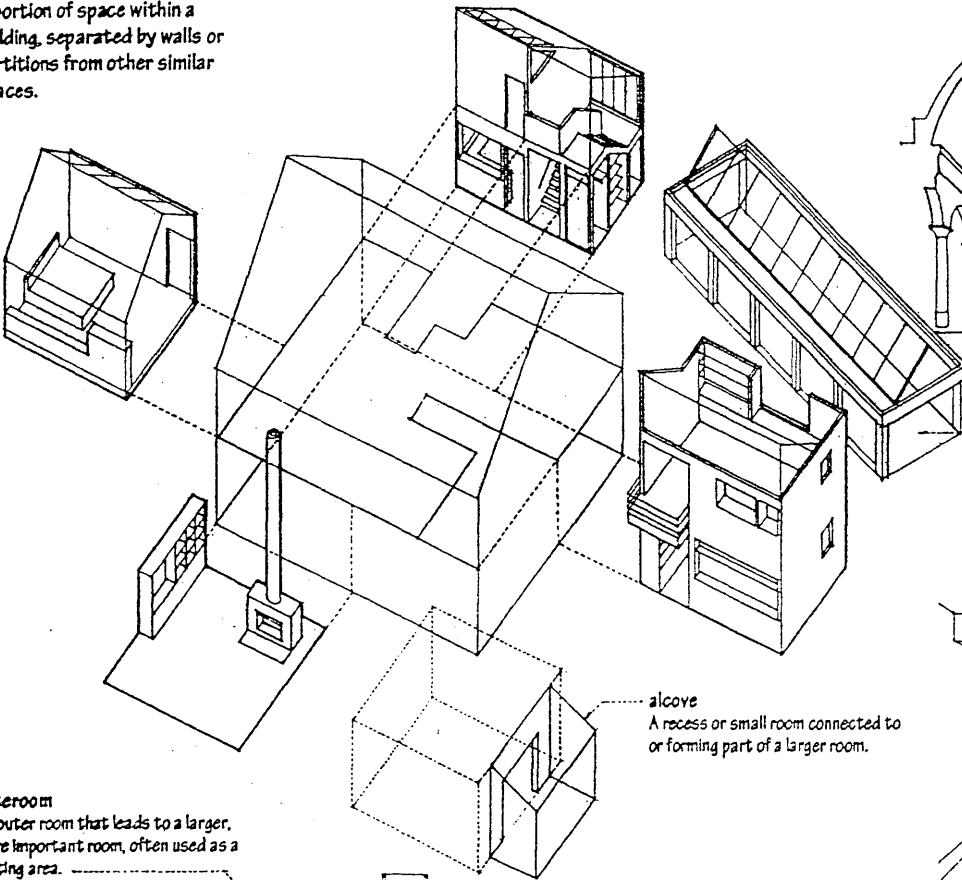
**roofing bond**  
A guarantee by a surety company that a roofing manufacturer will repair a roof membrane or covering under the conditions listed in the bonding contract.



**built-up roofing**  
A continuous covering for flat or low-pitched roofs, consisting of alternating layers or plies of roofing felt and heated bitumen, surfaced with a cap sheet or a layer of gravel or slag in a heavy coat embedded in bitumen.

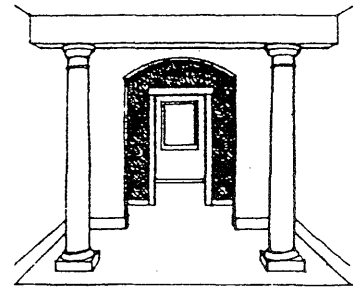
# ROOM

A portion of space within a building, separated by walls or partitions from other similar spaces.



**hall**  
A large room or building for public gatherings or entertainment.

**gallery**  
A long, relatively narrow room or hall, esp. one for public use and having architectural importance through its scale or decorative treatment.



**enfilade**  
An axial arrangement of doorways connecting a series of rooms so as to provide a vista down the entire length of the suite.

**anteroom**  
An outer room that leads to a larger, more important room, often used as a waiting area.

**hallway**  
A corridor or passageway in a house, hotel, or other building. Also called hall.

**corridor**  
A narrow passageway or gallery connecting parts of a building, esp. one into which several rooms or apartments open.

**suite**  
A connected series or group of rooms arranged to be used together.

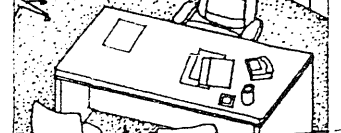
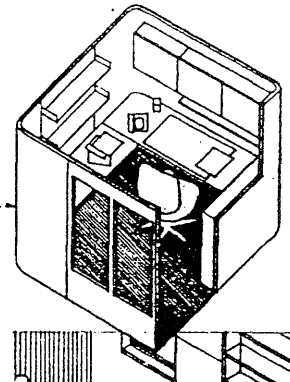
**closed plan**  
A floor plan consisting of fully enclosed spaces or distinct rooms linked by doorways.

**alcove**  
A recess or small room connected to or forming part of a larger room.

**vestibule**  
A small entrance hall between the outer door and the interior of a house or building.

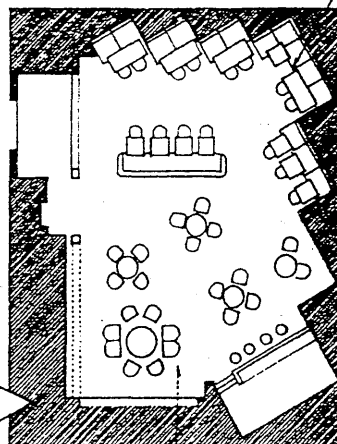
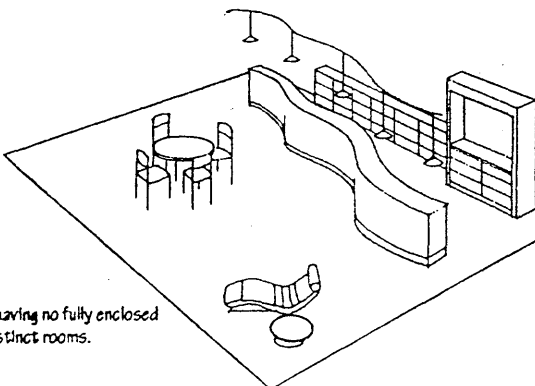
**functional grouping**  
A set of furniture pieces arranged according to function and use.

**tight fit**  
A close, often compact correspondence between functional groupings and the form or structure of the enclosing space.



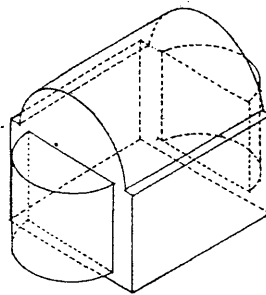
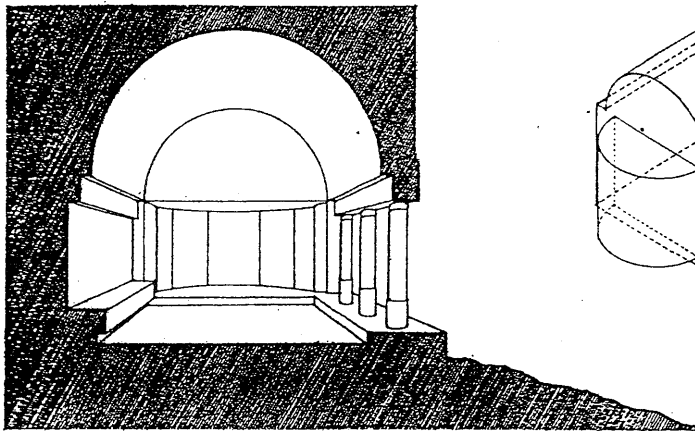
**loose fit**  
A free and unrestrained arrangement of furniture groupings that does not necessarily correspond to the form or structure of the surrounding space.

**open plan**  
A floor plan having no fully enclosed spaces or distinct rooms.



**mass**

The physical volume or bulk of a solid body.

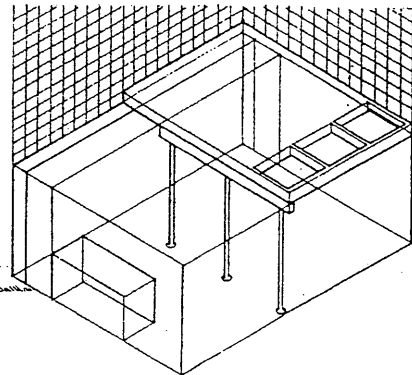


**space**

The three-dimensional field in which objects and events occur and have relative position and direction, esp. a portion of that field set apart in a given instance or for a particular purpose.

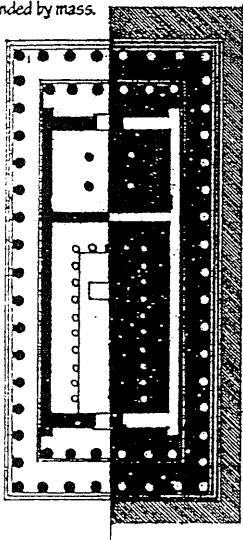
**Euclidean space**

Ordinary two- or three-dimensional space in which Euclid's definitions and axioms apply. Also called Cartesian space.



**void**

An empty space contained within or bounded by mass.



**place**

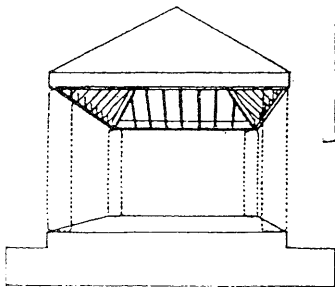
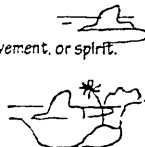
A physical environment having particular characteristics or used for a particular purpose.

**ambiance**

The mood, character, or atmosphere of an environment or milieu. Also, *ambiance*.

**animated**

Full of life, activity, movement, or spirit.

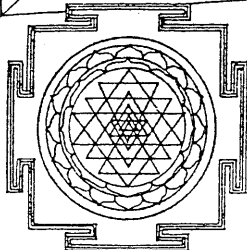


**refuge**

A place affording shelter, protection, or safety from danger or distress.

**repose**

A place of rest and tranquility.



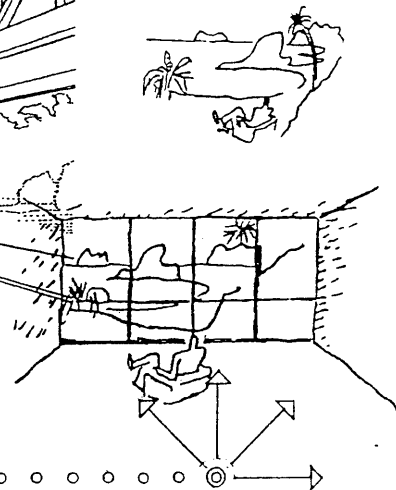
**center**

A point or place upon which interest, activity, or emotion focuses.



**focus**

A central point of attraction, attention, or activity.



**outlook**

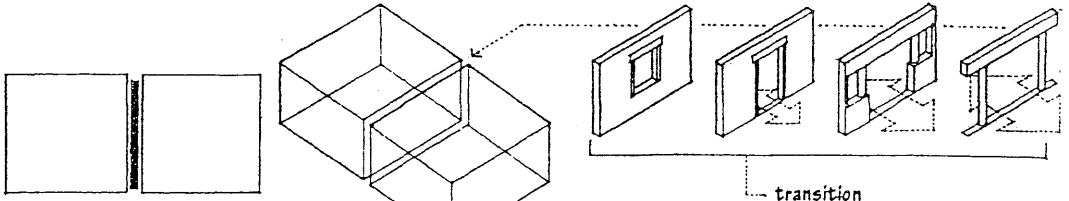
A view from a particular place, or the place offering a view.

**prospect**

An outlook over a region or in a particular direction, or the place that commands such a view.

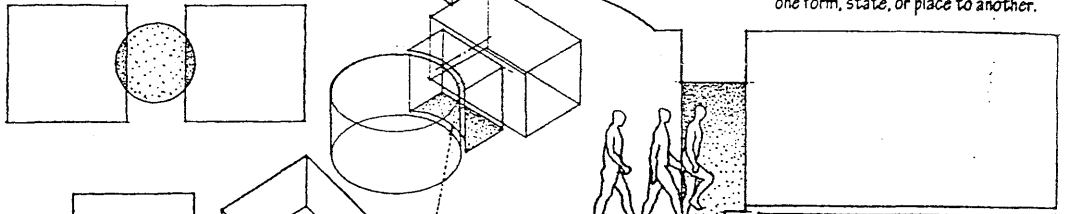
## adjacent spaces

Two spaces abutting or contiguous with each other, esp. when having a common boundary or border.



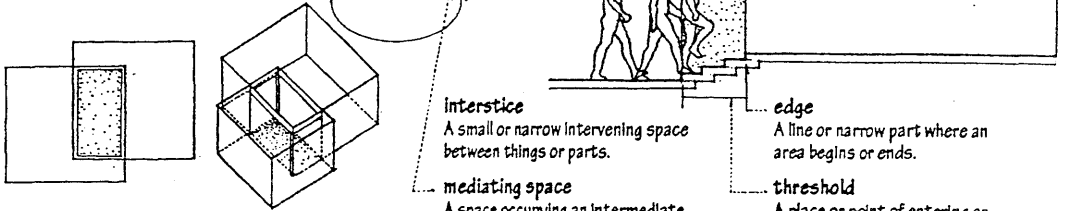
## linked spaces

Two spaces joined or connected by a third intervening space.



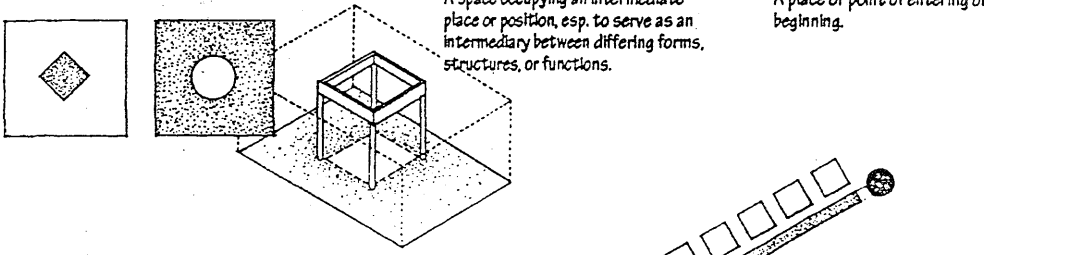
## interlocking spaces

Two spaces interwoven or fit into each other so as to form a zone or field of shared space.



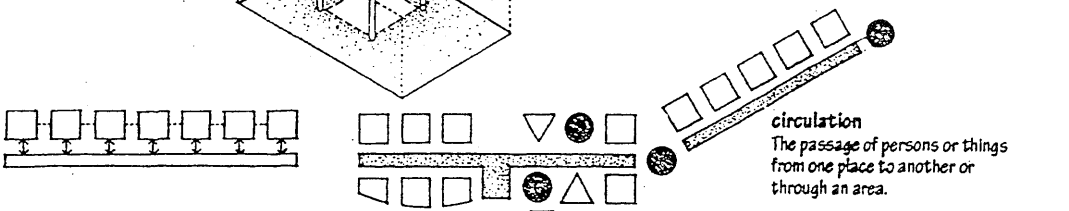
## embedded space

A space enveloped or incorporated as an essential part of a larger space.



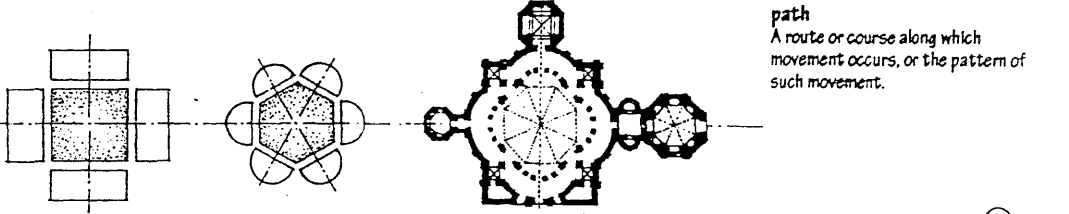
## linear organization

Spaces extended, arranged, or linked along a line, path, or gallery.



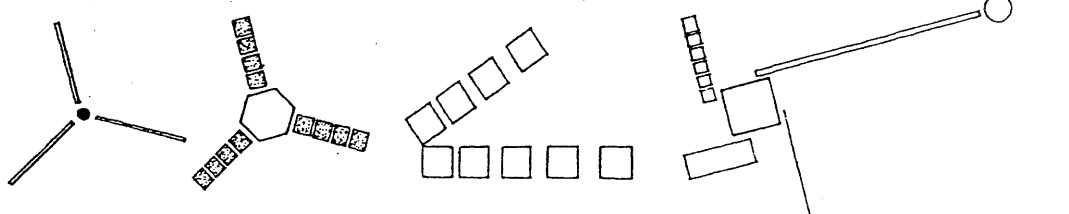
## centralized organization

Spaces gathered about or coming together at a large or dominant central space.



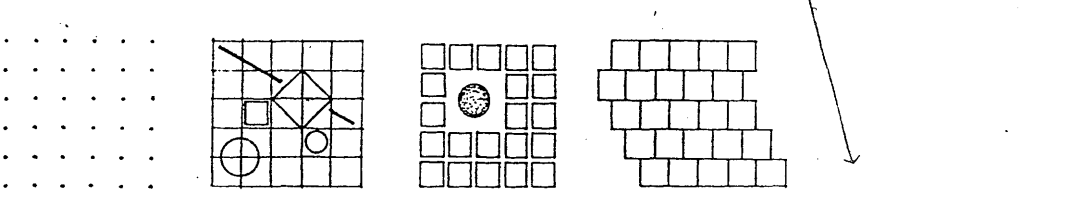
## radial organization

Spaces arranged like radii or rays from a central space or core.



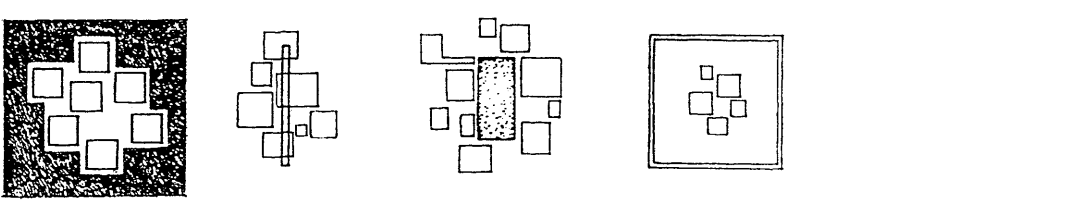
## grid organization

Spaces organized with reference to a rectangular system of lines and coordinates.



## clustered organization

Spaces grouped, collected, or gathered closely together and related by proximity rather than geometry.



## transition

Movement, passage, or change from one form, state, or place to another.

## edge

A line or narrow part where an area begins or ends.

## threshold

A place or point of entering or beginning.

## interstice

A small or narrow intervening space between things or parts.

## mediating space

A space occupying an intermediate place or position, esp. to serve as an intermediary between differing forms, structures, or functions.

## circulation

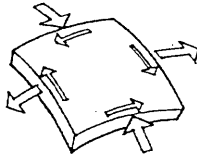
The passage of persons or things from one place to another or through an area.

## path

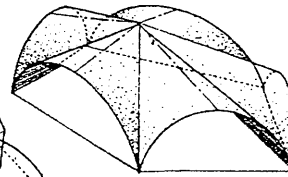
A route or course along which movement occurs, or the pattern of such movement.

**membrane stresses**

The compressive, tensile, and shear stresses acting in the plane of the surface of a shell structure. A shell can sustain relatively large forces if uniformly applied. Because of its thinness, however, a shell has little bending resistance and is unsuitable for concentrated loads.

**thin shell**

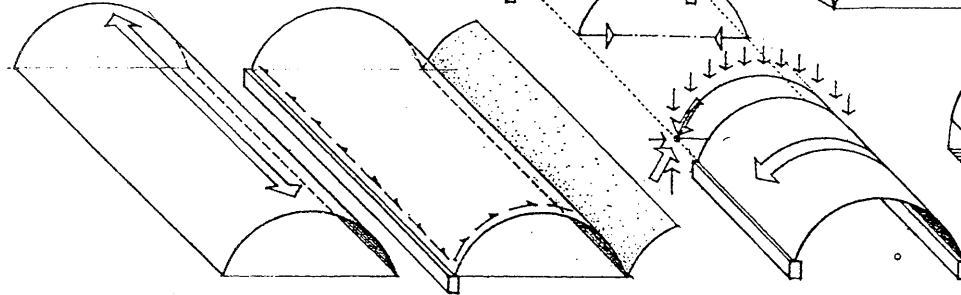
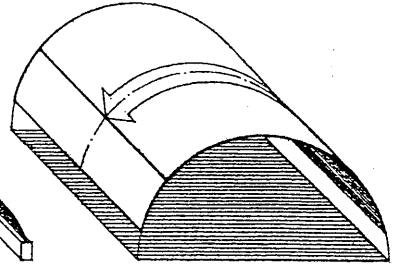
A shell structure constructed of reinforced concrete.



A thin, curved plate structure, shaped to transmit applied forces by compressive, tensile, and shear stresses acting in the plane of the surface.

**translational surface**

A surface generated by sliding a plane curve along a straight line or over another plane curve.

**barrel shell**

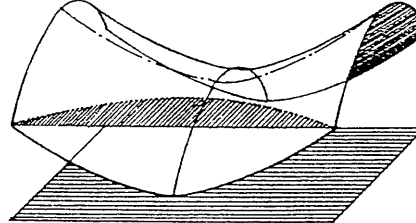
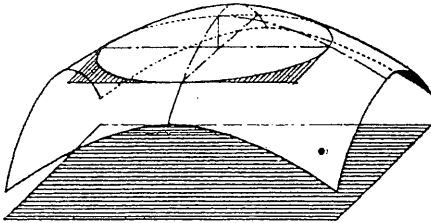
A rigid cylindrical shell structure.

If the length of a barrel shell is three or more times its transverse span, it behaves as a deep beam with a curved section spanning in the longitudinal direction. Edges are stiffened with beams or adjoining shells.

If it is relatively short, it exhibits archlike action. Tie rods, transverse rigid frames, or the like are required to counteract the outward thrusts of the arching action.

**cylindrical surface**

A surface generated by sliding a straight line along a plane curve, or vice versa. Depending on the curve, a cylindrical surface may be circular, elliptic, or parabolic. Because of its straight line geometry, a cylindrical surface can be regarded as being either a translational or a ruled surface.

**elliptic paraboloid**

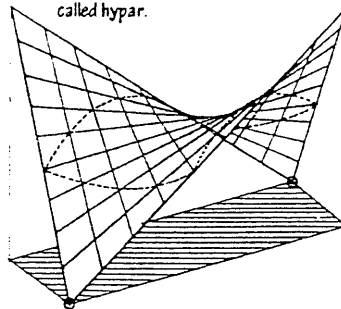
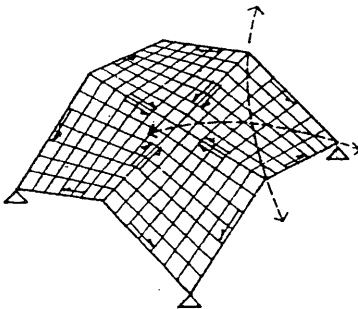
A surface generated by sliding a vertical parabola with downward curvature along a perpendicular parabola with downward curvature. Its horizontal sections are ellipses while its vertical sections are parabolas.

**hyperbolic paraboloid**

A surface generated by sliding a parabola with downward curvature along a parabola with upward curvature, or by sliding a straight line segment with its ends on two skew lines. It can be considered to be both a translational and a ruled surface. Also called hyper.

**paraboloid**

A surface all of whose intersections by planes are either parabolas and ellipses or parabolas and hyperbolas.

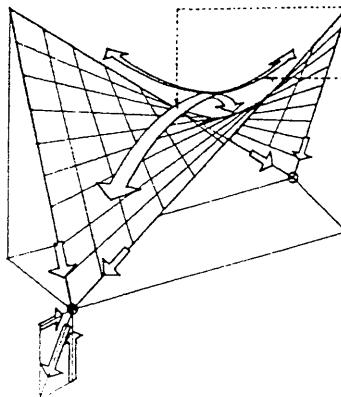
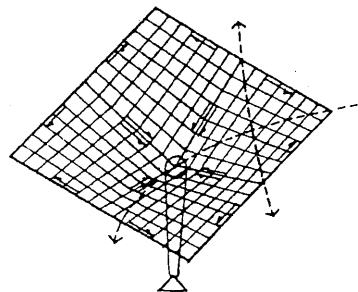
**saddle surface**

A surface having an upward curvature in one direction and a downward curvature in the perpendicular direction.

In a saddle-surfaced shell structure, regions of downward curvature exhibit archlike action, while regions of upward curvature behave as a cable structure. If the edges of the surface are not supported, beam behavior may also be present.

**anticlastic**

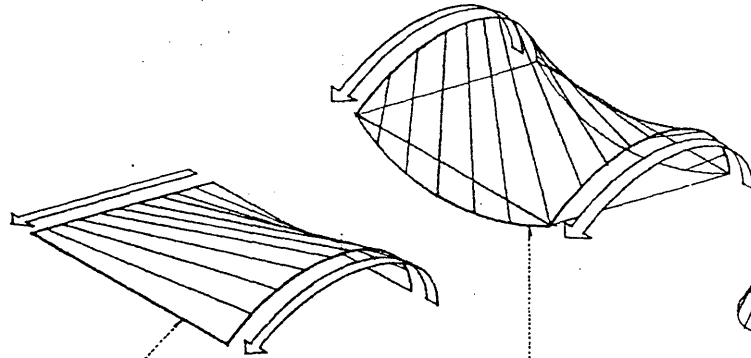
Having opposite curvatures at a given point.



# SHELL

## ruled surface

A surface generated by the motion of a straight line. Because of its straight line geometry, a ruled surface is generally easier to form and construct than a rotational or translational surface.

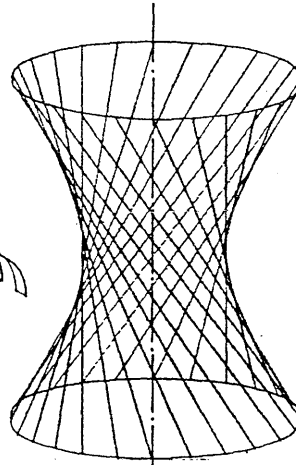


## conoid

A ruled surface generated by sliding a straight line with one end on a straight line segment and the other on a plane curve. Depending on the curve, a conoid may be circular, elliptic, or parabolic.

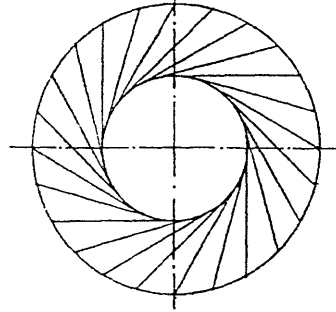
## hyperboloid

A surface having a finite center with certain plane sections that are hyperbolas and others that are circles or ellipses.



## one-sheet hyperboloid

A ruled surface generated by sliding an inclined line segment on two horizontal circles. Its vertical sections are hyperbolas.



## rotational surface

A surface generated by rotating a plane curve about an axis.

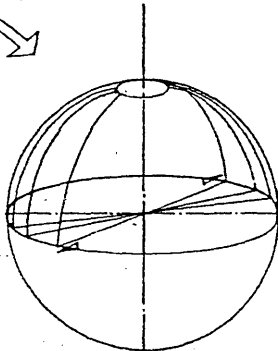
## synclastic

Having similar curvatures at a given point.



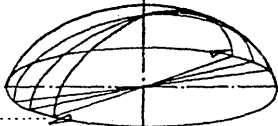
## spherical surface

A rotational surface generated by the revolution of a circular arc about a vertical axis.



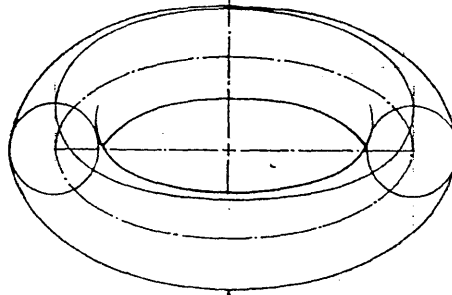
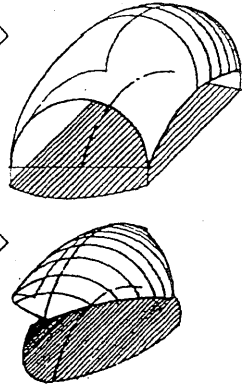
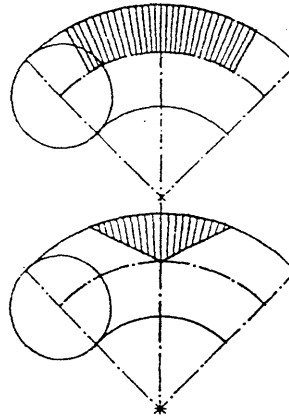
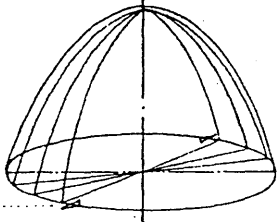
## elliptical surface

A rotational surface generated by the revolution of a half ellipse about a vertical axis.



## parabolic surface

A rotational surface generated by the revolution of a parabola about a vertical axis.



## torus

A doughnut-shaped surface generated by the revolution of a circle about an exterior line lying in its plane.

## encroachment

The unauthorized extension of a building, or part thereof, on the property or domain of another.

## setback

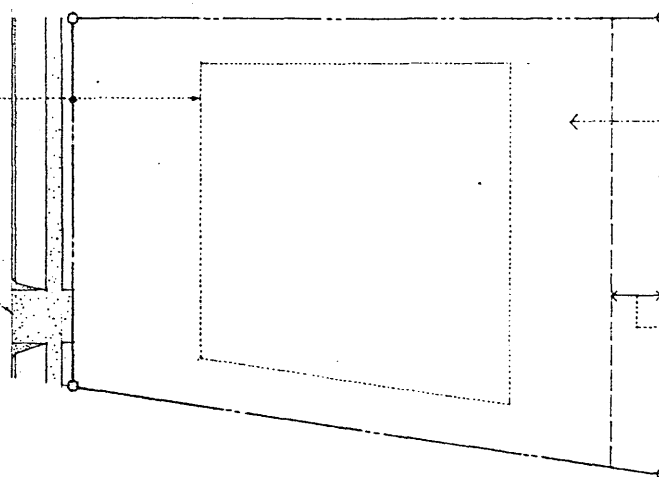
The minimum required distance from every structure to the property lines of a lot, established by a zoning ordinance to provide for air, light, solar access, and privacy.

## curb cut

A depression in a curb providing vehicular access from a street to a driveway on private property.

## contract limit

A perimeter line established on the drawings or elsewhere in the contract documents defining the boundaries of the site available to the contractor for construction purposes.



Work done at a site in preparation for a construction project, as excavation, sheeting, shoring, and grading.

## site

The geographic location of a construction project, usually defined by legal boundaries.

## property line

One of the legally defined and recorded boundaries of a parcel of land. Also called lot line.

## easement

A legal right held by specified persons or the public to make limited use of the land of another, as a right-of-way.

## overburden

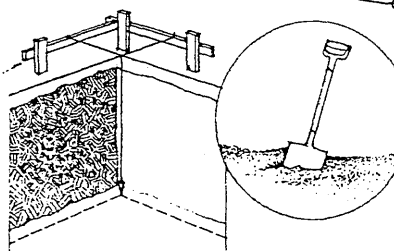
Waste earth and rock overlying a useful mineral deposit, bedrock, or a deposit of sand, gravel, or rock needed for construction. Also called burden.

## test pit

A small pit dug to examine the existing soil conditions and determine the depth of the water table at a proposed building site.

## batter board

One of a number of boards set horizontally with vertical stakes to support the strings outlining the foundation plan of a proposed building.



## groundbreaking

The act or ceremony of breaking ground for a new construction project.

## earthwork

The excavation and embankment of earth in connection with an engineering operation.

## shoring

A system of shores for bracing or supporting a wall or other structure.

## shore

A temporary supporting strut, esp. one placed obliquely against the side of an excavation, formwork, or structure.

## raker

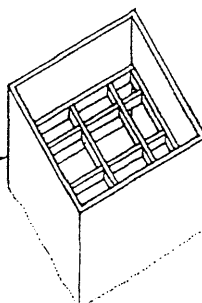
An inclined shore for supporting a wall. Also called raking shore.

## flying shore

A horizontal strut fixed between and supporting two walls above ground level.

## cofferdam

A watertight enclosure constructed underwater or in water-bearing soil and pumped dry to allow access for construction or repairs.

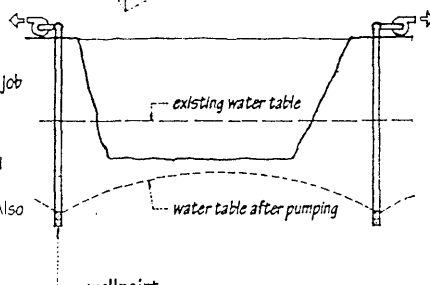


## dewater

To remove water from an excavated job site, usually by draining or pumping.

## boil

An unwanted flow of water and solid matter into an excavation, due to excessive outside water pressure. Also called blow.



## Abyssinian well

A perforated pipe driven into the ground for pumping out collected ground water.

## wellpoint

A perforated tube driven into the ground to collect water from the surrounding area so it can be pumped away, as to lower a water table or to prevent an excavation from filling with groundwater.

## excavation

The digging and removal of earth from its natural position, or the cavity resulting from such removal.

## tieback

A steel rod or tendon attached to a deadman or a rock or soil anchor to prevent lateral movement of a retaining wall or formwork.

## sheet pile

Any of a number of timber, steel, or precast concrete planks driven vertically side by side to retain earth or prevent water from seeping into an excavation. Also called sheath pile.

## lagging

A number of boards joined together side by side to retain the face of an excavation.

## soldier pile

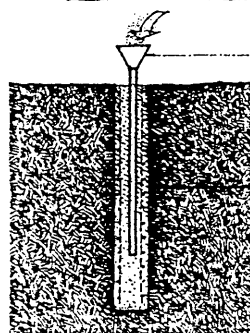
A steel H-section driven vertically into the ground to support horizontal sheeting or lagging. Also called soldier beam.

## tremie

A funnellike device with a pipe or tube for depositing concrete underwater.

## slurry wall

A concrete wall cast in a trench to serve as sheeting and often as a permanent foundation wall, constructed by excavating a trench in short lengths, filling it with a slurry of bentonite and water to prevent the sidewalls from collapsing, setting reinforcement, and placing concrete in the trench with a tremie to displace the slurry.



## SITWORK

### fill

To raise an existing grade with earth, stone, or other material, or the quantity of material used in building up the level of an area.

### made ground

Ground that has been raised to a higher level by filling with hard rubble, as stone or broken brick. Also called made-up ground.

### borrow pit

A pit from which sand, gravel, or other construction material is taken for use as fill in another location.

### cut and fill

An excavating operation in which the excavated material is moved to another location and used as fill.

### rough grading

The cutting, filling, and shaping of earth in preparation for finish grading.

### fine grading

The precise grading of an area after rough grading to prepare for paving, seeding, or planting.

### grade stake

A stake marking the amount of cut or fill required to bring the ground to a specified level.

### controlled fill

Fill material that is placed in layers, compacted, and tested after each compaction for moisture content, depth of lift, and bearing capacity before additional layers are placed.

### vertical curve

A smooth parabolic curve in the vertical plane for connecting two grades of different slope in order to avoid an abrupt transition.

### bench terrace

An embankment constructed across sloping ground with a steep drop on the downside.

### grade

The ground elevation at any specific point on a construction site, esp. where the ground meets the foundation of a building. Also called grade line.

### existing grade

The elevation of the original ground surface before excavation or grading begins. Also called natural grade.

### finish grade

The elevation of drives, walks, lawns, or other improved surfaces after completion of construction or grading operations. Also, finished grade.

### below grade

Occurring or situated below the surface of the ground.

### backfill

To refill an excavation with earth, stone, or other material, esp. the space around exterior foundation walls.

### subgrade

The prepared earth surface upon which a pavement, concrete slab, or foundation is built. A subgrade should be stable, drain well, and be relatively free of frost action.

### needle

A short beam passed through a wall as a temporary support while the foundation or part beneath is repaired, altered, or strengthened. Also called needle beam.

### dead shore

An upright timber for supporting a dead load during the structural alteration of a building, esp. one of two supports for a needle.

### underpinning

A system of supports that enables an existing foundation to be rebuilt, strengthened, or deepened, esp. the additional support required when a new excavation in adjoining property is deeper than the existing foundation.



**swale**  
A shallow depression formed by the intersection of two ground slopes, often designed to direct or divert the runoff of surface water.

**runoff**  
Something that drains or flows off, as rain that flows off the land in streams.

**groundwater**  
The water beneath the surface of the ground that supplies wells and springs, consisting largely of surface water that has seeped down.

**recharge**  
The process by which groundwater is absorbed into the water table.

**water table**  
The underground surface beneath which the earth is saturated with water.

**perched water table**  
A water table of limited area, held above the normal water table by an impervious layer.

**culvert**  
A drain or channel passing under a road or sidewalk.

**box culvert**  
A reinforced concrete culvert having a rectangular cross section.

**headwall**  
A concrete or masonry retaining wall at the inlet of a drain or culvert.

**endwall**  
A concrete or masonry retaining wall at the outlet of a drain or culvert.

**site drainage**  
The surface and subsurface drainage of a site in order to prevent the collection of excess surface water or groundwater.

**surface drainage**  
The grading and surfacing of a site in order to divert rain and other surface water into natural drainage patterns or a storm sewer system.

**cutoff**  
A wall or other structure intended to eliminate or reduce percolation through porous strata.

**curtain drain**  
A drain placed between the source of water and the area to be protected. Also called *intercepting drain*.

**underdrain**  
A perforated pipe installed in porous fill to draw off groundwater.

**French drain**  
A drainage trench filled to ground level with loose stones or rock fragments.

**subsurface drainage**  
An underground network of piping for conveying groundwater to a point of disposal, as a storm sewer system. Excess groundwater reduces the load-carrying capacity of a foundation soil and increases the hydrostatic pressure on a building foundation.

**area drain**  
A drain for collecting surface water or rainwater from a basement floor or paved area.

**dry well**  
A drainage pit lined with gravel or rubble to receive surface water and allow it to percolate away to absorbent earth underground. Also called *absorbing well*.

**manhole**  
A covered hole through which a person may enter a sewer or drain.

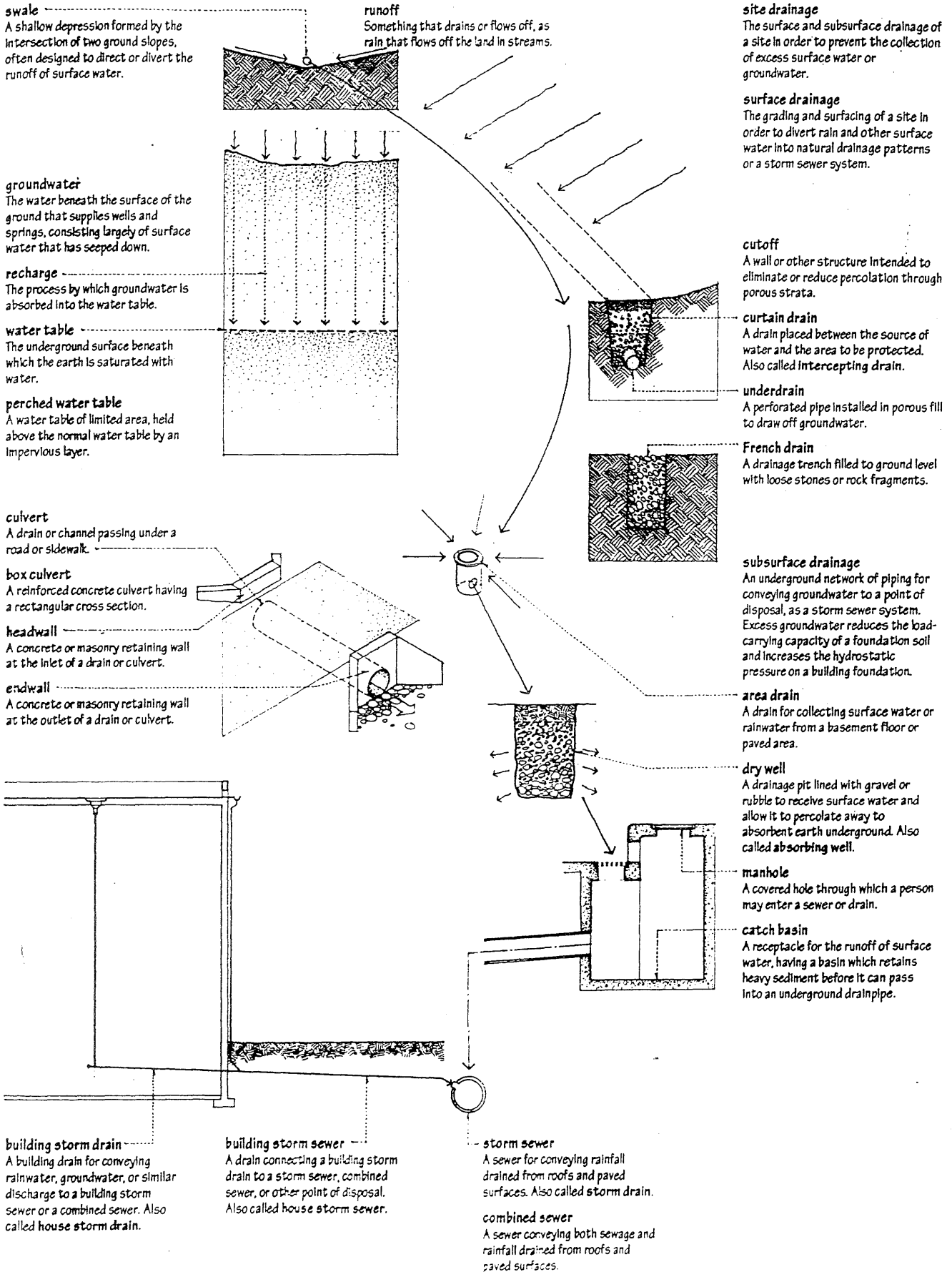
**catch basin**  
A receptacle for the runoff of surface water, having a basin which retains heavy sediment before it can pass into an underground drainpipe.

**building storm drain**  
A building drain for conveying rainwater, groundwater, or similar discharge to a building storm sewer or a combined sewer. Also called *house storm drain*.

**building storm sewer**  
A drain connecting a building storm drain to a storm sewer, combined sewer, or other point of disposal. Also called *house storm sewer*.

**storm sewer**  
A sewer for conveying rainfall drained from roofs and paved surfaces. Also called *storm drain*.

**combined sewer**  
A sewer conveying both sewage and rainfall drained from roofs and paved surfaces.



# SOIL

The top layer of the earth's surface, consisting of disintegrated rock and decayed organic matter suitable for the growth of plant life.

**topsoil**  
The fertile surface layer of soil, as distinct from the subsoil.

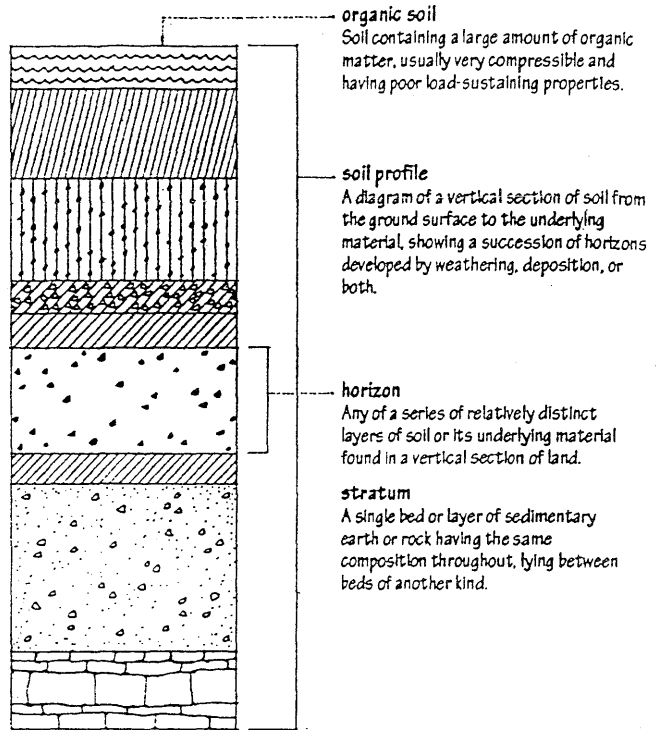
**subsoil**  
The bed or layer of earth immediately beneath the surface soil.

**permafrost**  
Perennially frozen subsoil in arctic or subarctic regions. Also called *pergellisol*.

**bedrock**  
The unbroken, solid rock that underlies all unconsolidated material on the earth's surface, as soil, clay, sand, or rock fragments.

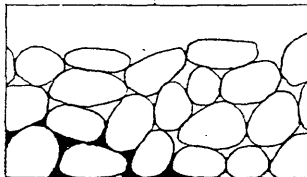
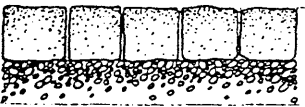
**soil analysis**  
A process for determining the particle-size distribution in an aggregate, soil, or sediment.

**soil class**  
A numerical classification of soil by texture, used by the U.S. Department of Agriculture: (1) gravel, (2) sand, (3) clay, (4) loam, (5) loam with some sand, (6) silt-loam, and (7) clay-loam.



**boulder**  
A large, naturally rounded rock, lying on the surface of the ground or partially embedded in it.

**cobble**  
A naturally rounded stone, smaller than a boulder and larger than a pebble, used for rough paving, walls, and foundations. Also called *cobblestone*.



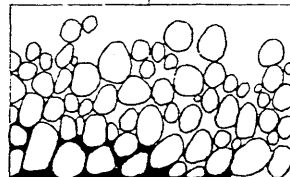
**gravel**  
Small pebbles and stones, or a mixture of these with sand, formed either naturally or by crushing rock, esp. such material that will pass a 3-in. (76 mm) sieve and be retained on a No. 4 (4.8 mm) sieve.

**crushed gravel**  
Gravel having one or more fractured faces produced by mechanical crushing.

**crushed stone**  
Stone having well-defined edges produced by the mechanical crushing of rocks or boulders. Also called *crushed rock*.

**pea gravel**  
A small-diameter, natural gravel, usually 1/4 to 3/8 in. (6.4 to 9.5 mm) in size, screened to specification.

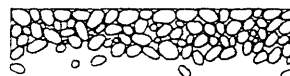
**pebble**  
A small, rounded stone, especially one worn smooth by the action of water.



**sand**  
A loose, granular material resulting from the disintegration of rocks, consisting of grains smaller than gravel but coarser than silt.

**sand clay**  
A well-graded, naturally occurring sand often used as a base or subbase material, having about 10% clay or just enough to make the mixture bind tightly when compacted.

**silt**  
Loose sedimentary material consisting of fine mineral particles between 0.002 mm and 0.05 mm in diameter.



**clay**  
A natural, earthy material that is plastic when moist but hard when fired and is used for making brick, tile, and pottery, composed mainly of fine particles of hydrous aluminum silicates less than 0.002 mm in diameter.

**clay loam**  
Soil containing 27% to 40% clay and 20% to 45% sand.

**bentonite**  
A clay formed by the decomposition of volcanic ash, having the ability to absorb large amounts of water and to expand to several times its natural volume.

**loam**  
A rich soil containing a relatively equal mixture of sand and silt and a smaller proportion of clay and organic matter.

**loess**  
An unstratified, cohesive, loamy deposit deposited by wind.

**Atterberg limits**

The levels of water content defining the boundaries between the different states of consistency of a plastic or cohesive soil, as determined by standard tests.

**liquid limit**

The water content, expressed as a percentage of dry weight, at which a soil passes from a plastic to a liquid state.

**plasticity index**

The numerical difference between the liquid limit and the plastic limit of a soil.

**plastic limit**

The water content, expressed as a percentage of dry weight, at which a soil loses its plasticity and begins to behave as a solid.

**plastic soil**

A soil that can be rolled into  $\frac{1}{8}$  in. (3.2-mm) diameter threads without crumbling.

**shrinkage limit**

The water content, expressed as a percentage of dry weight, at which a reduction in water content will not cause a further decrease in the volume of a soil mass.

**granular material**

Any gravel, sand, or silt that exhibits no cohesiveness or plasticity.

**permeability**

The property of a porous material that allows a gas or liquid to pass through its pore spaces.

**void ratio**

The ratio of the volume of void spaces to the volume of solid particles in a soil mass.

**critical void ratio**

The void ratio corresponding to the critical density of a soil mass.

**critical density**

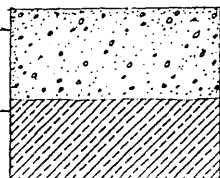
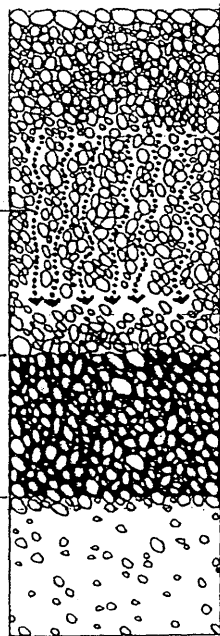
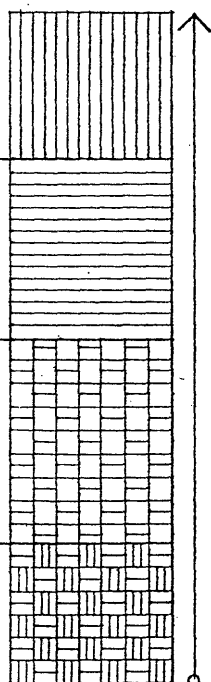
The unit weight of a saturated granular material above which it will gain strength and below which it will lose strength when subjected to rapid deformation.

**pervious soil**

Any permeable soil that allows the relatively free movement of water.

**impervious soil**

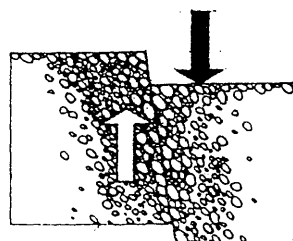
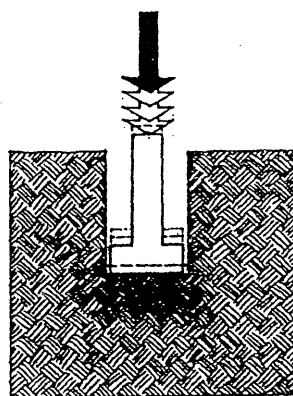
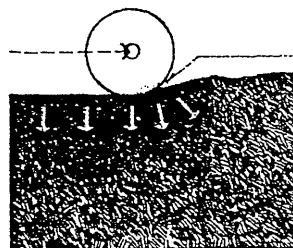
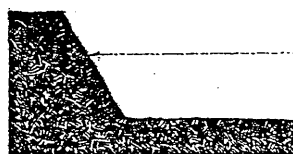
Any fine-grained soil, as clay, having pores too small to permit water to pass except by slow capillary action.

**geotechnical**

Of or pertaining to the practical applications of geological science in civil engineering.

**foundation investigation**

The investigation and classification of a foundation soil based on observation and tests of material disclosed by borings or excavations to obtain the information necessary for the design of a foundation system, including the shearing strength, compressibility, cohesion, expansiveness, permeability, and moisture content of the soil, the elevation of the water table, and the anticipated total and differential settlement. Also called subsurface investigation.

**soil mechanics**

The branch of civil engineering that deals with the mechanical behavior of soil when compressed or sheared, or when water flows through it.

**soil structure**

The arrangement and aggregation of soil particles in a soil mass.

**core**

An undisturbed, cylindrical sample of earth or rock obtained by means of a core drill and used for analysis and testing of bearing capacity. Also called boring.

**cohesive soil**

Soil that has considerable strength when unconfined and air-dried, and significant cohesion when submerged.

**cohesionless soil**

Soil that has little or no strength when unconfined and air-dried, and little or no cohesion when submerged.

**compaction**

The consolidation of sediment by the weight of overlying deposits, or a similar compression of soil, aggregate, or cementitious material by rolling, tamping, or soaking.

**optimum moisture content**

The water content of a soil at which maximum density can be attained through compaction.

**penetration test**

A test for measuring the density of granular soils and the consistency of some clays at the bottom of a borehole, recording the number of blows required by a hammer to advance a standard soil sampler.

**penetration resistance**

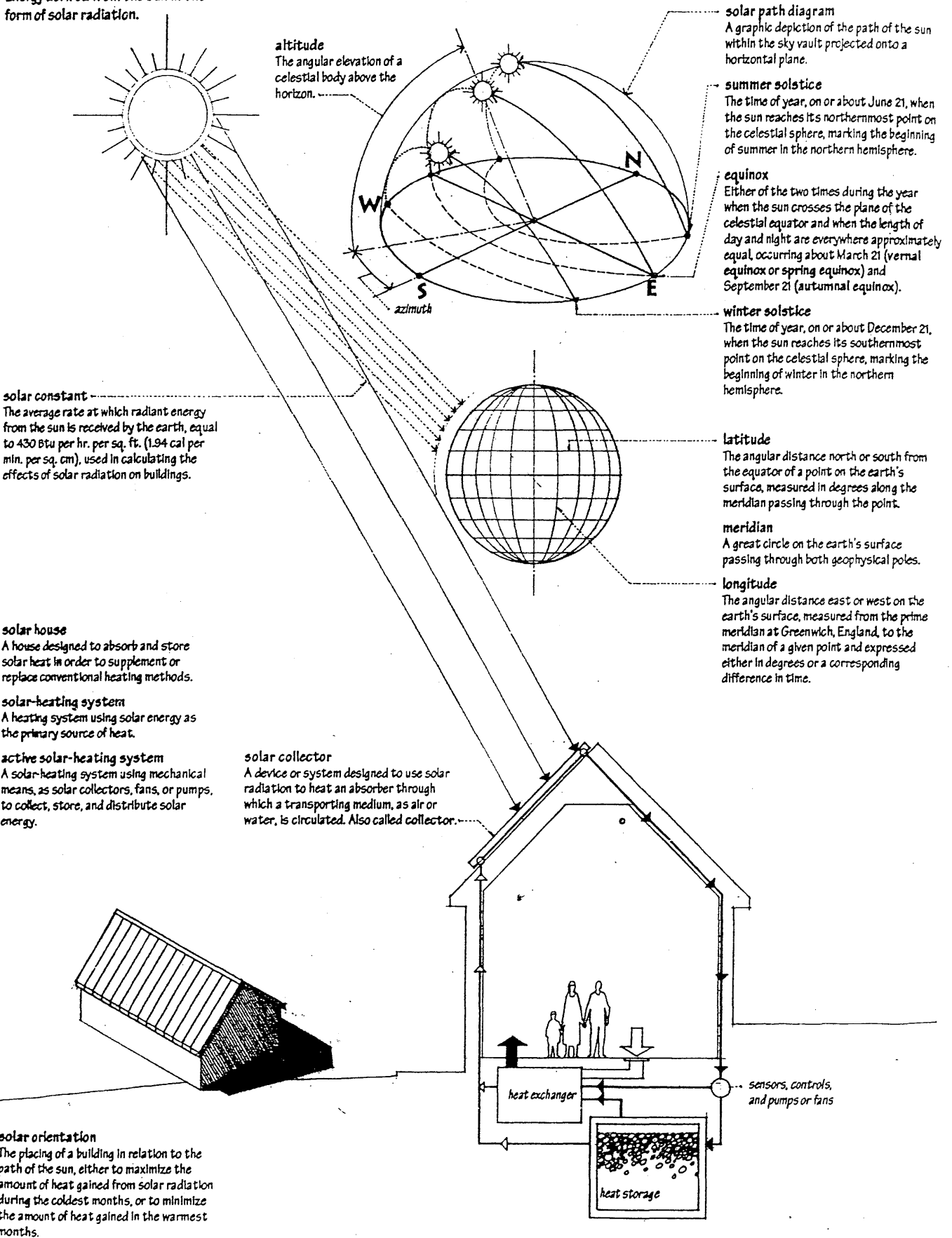
The unit load required to produce a specified penetration into a soil at a specified rate of penetration.

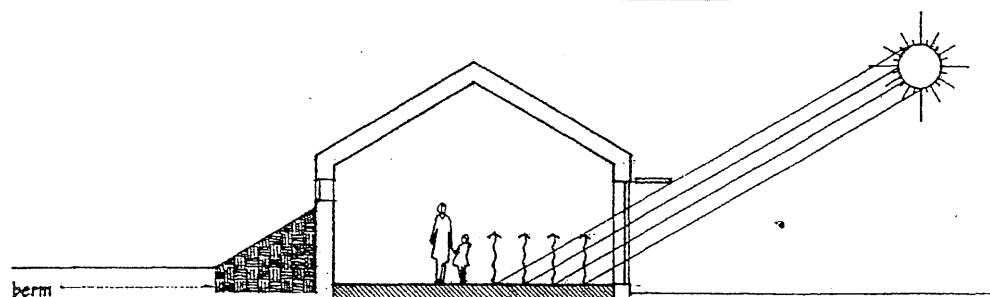
**shearing strength**

The property of a soil that enables its particles to resist displacement with respect to one another when an external force is applied, due largely to the combined effects of cohesion and internal friction. Also called shearing resistance.

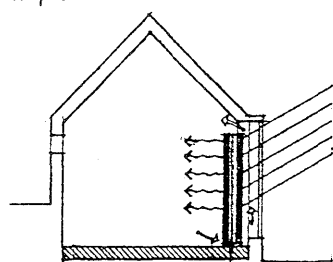
## SOLAR ENERGY

Energy derived from the sun in the form of solar radiation.

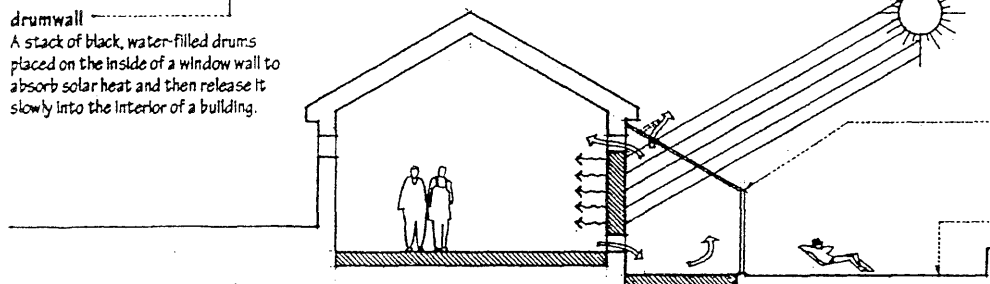




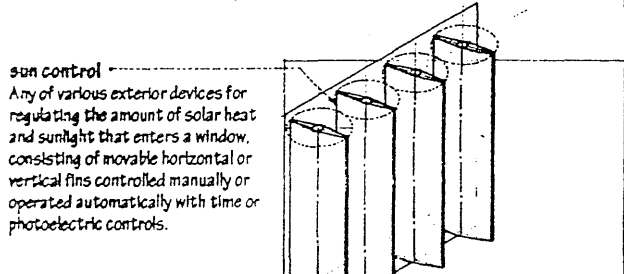
**berm**  
A bank of earth placed against one or more exterior walls of a building as protection against extremes in temperature.



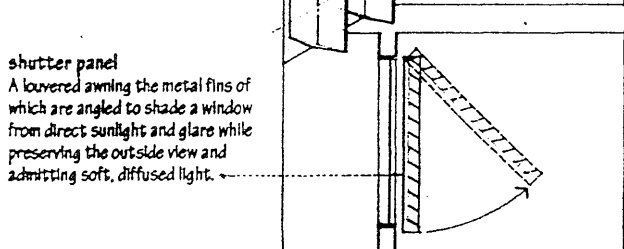
**drumwall**  
A stack of black, water-filled drums placed on the inside of a window wall to absorb solar heat and then release it slowly into the interior of a building.



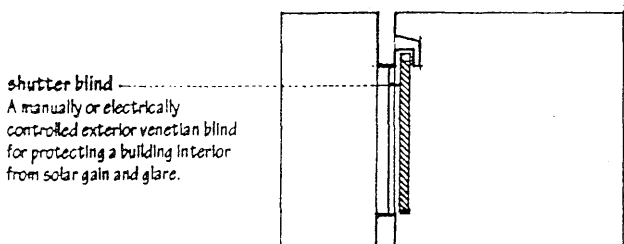
**Trombe wall**  
A glass-fronted exterior masonry wall that absorbs solar heat for radiation into the interior of a building, usually after a time-lag of several hours.



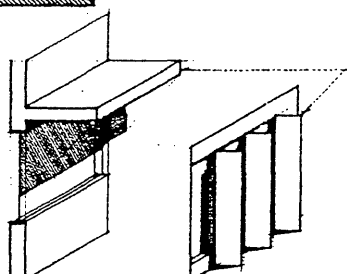
**sun control**  
Any of various exterior devices for regulating the amount of solar heat and sunlight that enters a window, consisting of movable horizontal or vertical fins controlled manually or operated automatically with time or photoelectric controls.



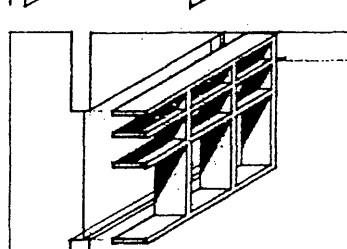
**shutter panel**  
A lowered awning the metal fins of which are angled to shade a window from direct sunlight and glare while preserving the outside view and admitting soft, diffused light.



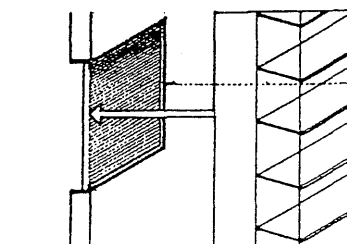
**shutter blind**  
A manually or electrically controlled exterior venetian blind for protecting a building interior from solar gain and glare.



**sunshade**  
Any of various exterior devices consisting of fixed horizontal or vertical fins angled to shield a window from direct sunlight.



**brise-soleil**  
A screen, usually of louvers, placed on the outside of a building to shield the windows from direct sunlight.



**solar screen**  
A panel of miniature external louvers for shading a window from direct sunlight and glare while allowing a high degree of visibility, daylighting, ventilation, visual daytime privacy, and insect protection.

## passive solar-heating

A solar-heating system using a building's design and construction and the natural flow of heat to collect, store, and distribute solar energy, with minimal use of fans or pumps.

# SOUND

The sensation stimulated in the organs of hearing by mechanical radiant energy transmitted as longitudinal pressure waves through the air or other medium.

## sound wave

A longitudinal pressure wave in air or an elastic medium, esp. one producing an audible sensation.

## wave

A disturbance or oscillation that transfers energy progressively from point to point in a medium or space without advance by the points themselves, as in the transmission of sound or light.

## waveform

A graphic representation of the shape of a wave, obtained by plotting deviation at a fixed point versus time.

## wavelength

The distance, measured in the direction of propagation of a wave, from any one point to the next point of corresponding phase.

## phase

A particular point or stage in a periodic cycle or process.

## amplitude

The maximum deviation of a wave or alternating current from its average value.

## frequency

The number of cycles per unit time of a wave or oscillation.

## hertz

The SI unit of frequency, equal to one cycle per second. Abbr.: Hz

## wave front

A surface of a propagating wave composed at any instant of all points having identical phase; usually perpendicular to the direction of propagation.

## fundamental

The lowest frequency at which a vibrating element or system will freely oscillate. Also called fundamental frequency.

## harmonic

A vibration having a frequency that is an integral multiple of that of the fundamental.

## band

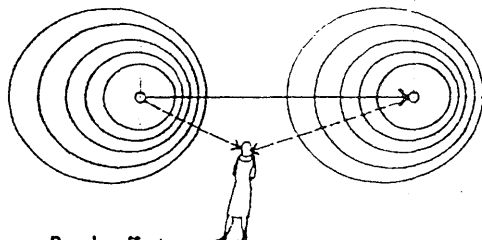
A range of wavelengths or frequencies between two defined limits.

## pitch

The predominant frequency of a sound as perceived by the human ear.

## octave

The interval between two frequencies having a ratio of 2:1.

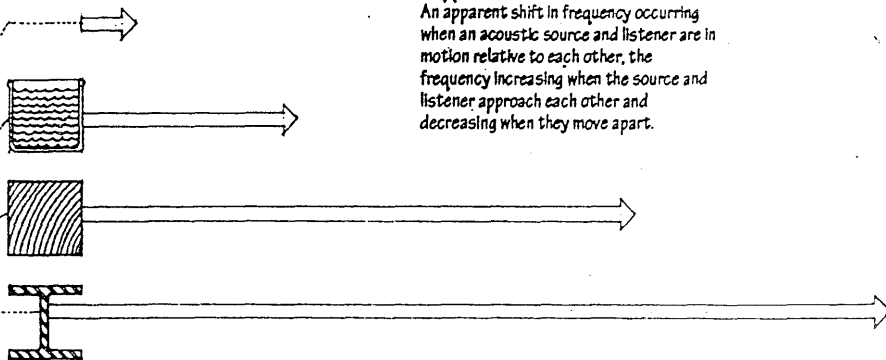


## Doppler effect

An apparent shift in frequency occurring when an acoustic source and listener are in motion relative to each other, the frequency increasing when the source and listener approach each other and decreasing when they move apart.

## speed of sound

The velocity of sound traveling through air at approximately 1087 ft. (0.3 km) per second at sea level, through water at approximately 4500 ft. (1.4 km) per second, through wood at approximately 11,700 ft. (3.6 km) per second, and through steel at approximately 18,000 ft. (5.5 km) per second.



**loudness**

A subjective response to sound indicating the magnitude of the auditory sensation produced by the amplitude of a sound wave.

**phon**

A unit for measuring the apparent loudness of a sound, equal in number to the decibels of a 1000-Hz reference sound judged by a group of listeners to be equal in loudness to the given sound.

**sone**

A unit for measuring the apparent loudness of a sound, judged by a group of listeners to be equal to the loudness of a 1000-Hz reference sound having an intensity of 40 decibels.

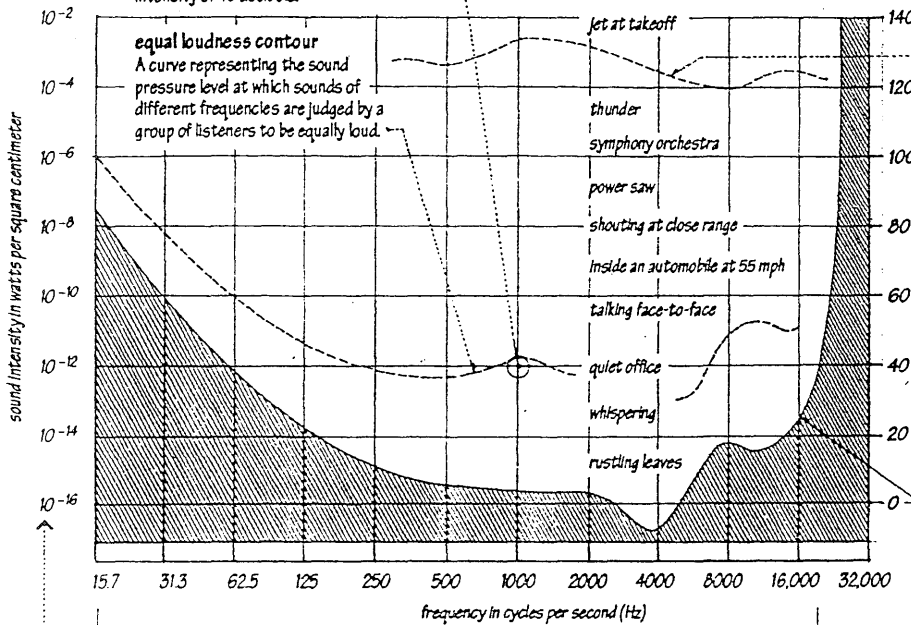
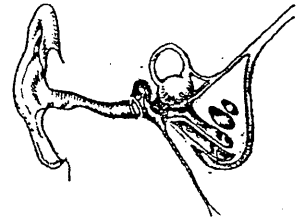
**decibel**

A unit for expressing the relative pressure or intensity of sounds on a uniform scale from 0 for the least perceptible sound to about 130 for the average threshold of pain. Abbr.: dB

Decibel measurement is based on a logarithmic scale since increments of sound pressure or intensity are perceived as equal when the ratio between successive changes in intensity remain constant. The decibel levels of two sound sources, therefore, cannot be added mathematically:  
e.g., 60 dB + 60 dB = 63 dB, not 120 dB.

**hearing**

The sense by which sound is perceived, involving the entire mechanism of the internal, middle, and external ear and including the nervous and cerebral operations that translate the physical operations into meaningful signals.



**equal loudness contour**

A curve representing the sound pressure level at which sounds of different frequencies are judged by a group of listeners to be equally loud.

**jet at takeoff**

**thunder**

**symphony orchestra**

**power saw**

**shouting at close range**

**inside an automobile at 55 mph**

**talking face-to-face**

**quiet office**

**whispering**

**rustling leaves**

**threshold of pain**

The level of sound intensity high enough to produce the sensation of pain in the human ear, usually around 130 dB.

**auditory fatigue**

Physical or mental weariness caused by prolonged exposure to loud noises.

**hearing loss**

An increase in the threshold of audibility, at specific frequencies, caused by normal aging, disease, or injury to the hearing organs.

**threshold of hearing**

The minimum sound pressure capable of stimulating an auditory sensation, usually 20 micropascals or zero dB.

**audio frequency**

A range of frequencies from 15 Hz to 20,000 Hz audible to the normal human ear.

**sound intensity**

The rate at which acoustic energy flows through a medium, expressed in watts per square meter.

**sound intensity level**

Sound intensity measured on the decibel scale, equal to 10 times the common logarithm of the ratio of the sound intensity to a reference intensity, usually  $10^{-12}$  watts per square meter ( $10^{-16}$  watts per square centimeter.)

**sound pressure**

The difference between the actual pressure at any point in the field of a sound wave and the static pressure at that point, expressed in pascals.

**sound pressure level**

Sound pressure measured on the decibel scale, equal to 10 times the common logarithm of the ratio of the sound pressure to a reference pressure, usually 20 micropascals.

**micropascal**

One-millionth ( $10^{-6}$ ) part of a pascal. Symbol  $\mu\text{Pa}$

**sound power**

The amount of acoustic energy radiated by a source per unit time, expressed in watts.

**sound power level**

The acoustic power of a source, measured on the decibel scale, equal to 10 times the common logarithm of the ratio of the acoustic power to a reference power, usually  $10^{-12}$  watts.

**logarithm**

The exponent indicating the power to which a base number must be raised to arrive at a given number.

**common logarithm**

A logarithm having a base of 10.

**sound level meter**

An electrical instrument for measuring sound pressure levels. To compensate for the way we perceive the relative loudness of different frequencies of sound, there are three networks: A, B, and C. These networks weight the recordings for different frequencies and combine the results in a single reading. The A-network scale, in dBA units, is most commonly used since it discriminates against the lower frequencies, as does the human ear at moderate sound levels.

# SOUND

## acoustics

The branch of physics that deals with the production, control, transmission, reception, and effects of sound.

## room acoustics

The qualities or characteristics of a room, auditorium, or concert hall that determine the audibility of speech or fidelity of musical sounds in it.

## sounding board

A structure over or behind and above a speaker or orchestra to reflect the sound toward the audience.

## reflecting surface

A nonabsorptive surface from which incident sound is reflected, used esp. to redirect sound in a space. To be effective, a reflecting surface should have a least dimension equal to or greater than the wavelength of the lowest frequency of the sound being reflected.

## acoustical cloud

One of a number of acoustic panels installed near the ceiling of a concert hall to reflect sound for improving the acoustic quality of music.

## acoustical analysis

A detailed study of the use of a building, the location and orientation of its spaces, possible sources of noise, and the desirable acoustical environment in each usable area.

## acoustical design

The planning, shaping, finishing, and furnishing of an enclosed space to establish the acoustical environment necessary for distinct hearing.

## acoustical treatment

The application of absorbent or reflecting materials to the walls, ceiling, and floor of an enclosed space to alter or improve its acoustic properties.

## diffracted sound

Airborne sound waves bent by diffraction around an obstacle in their path.

## reflected sound

The return of unabsorbed airborne sound after striking a surface, at an angle equal to the angle of incidence.

## airborne sound

Sound radiated directly into and transmitted through the air.

## live

Highly reverberant or resonant, as an auditorium or concert hall.

## dead

Without resonance, as a room free from echoes and reverberation.

## soundproof

Impervious to audible sound.

## resonance

The intensification and prolongation of sound produced by sympathetic vibration.

## sympathetic vibration

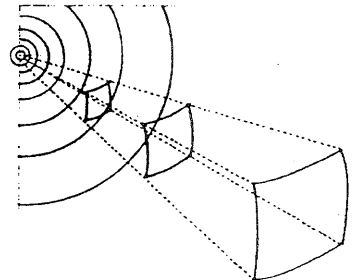
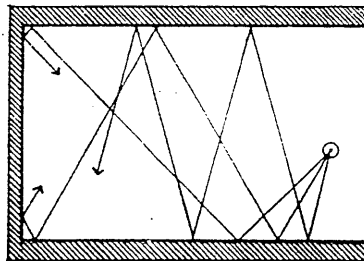
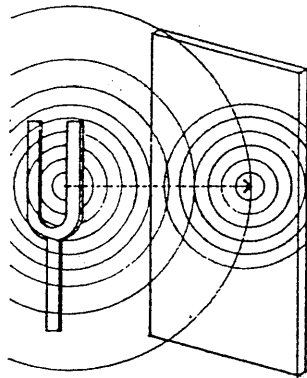
A vibration induced in one body by the vibrations of exactly the same period in a neighboring body.

## direct sound

Airborne sound traveling directly from a source to the listener. In a room, the human ear always hears direct sound before it hears reflected sound. As direct sound loses intensity, the importance of reflected sound increases.

## attenuation

A decrease in energy or pressure per unit area of a sound wave, occurring as the distance from the source increases as a result of absorption, scattering, or spreading in three dimensions.



## echo

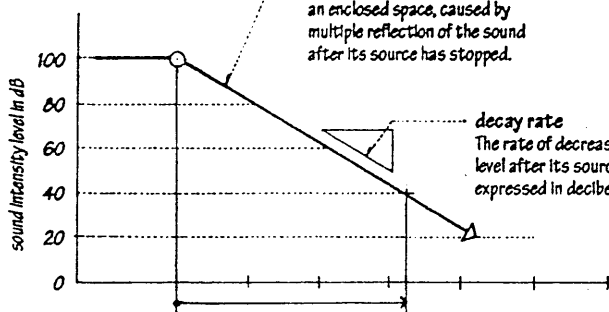
The repetition of a sound produced by the reflection of sound waves from an obstructing surface, loud enough and received late enough to be perceived as distinct from the source.

## flutter

A rapid succession of echoes caused by the reflection of sound waves back and forth between two parallel surfaces, with sufficient time between each reflection to cause the listener to be aware of separate, discrete signals.

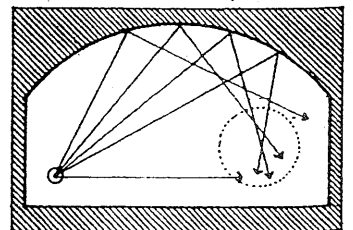
## reverberation

The persistence of a sound within an enclosed space, caused by multiple reflection of the sound after its source has stopped.



## reverberation time

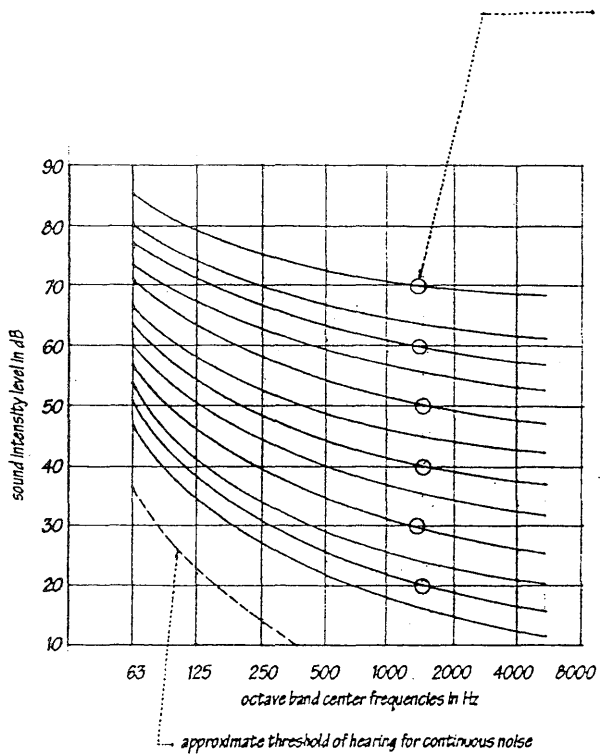
The time in seconds required for a sound made in an enclosed space to diminish by 60 decibels.



## focusing

The convergence of sound waves reflected from a concave surface.

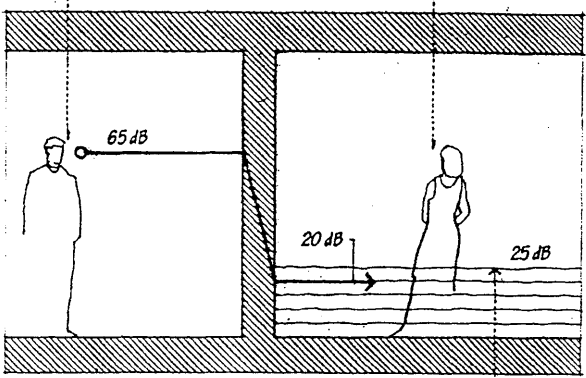




**noise criteria curve**  
One of a series of curves representing the sound pressure level across the frequency spectrum for background noise that should not be exceeded in various environments. Higher noise levels are permitted at the lower frequencies since the human ear is less sensitive to sounds in this frequency region. Also called NC curves.

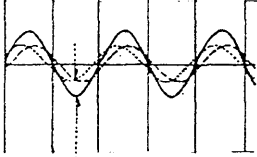
**noise**  
Any sound that is unwanted, annoying, or discordant, or that interferes with one's hearing of something.

**noise reduction**  
The perceived difference in sound pressure levels between two enclosed spaces, due to the sound-isolating qualities of the separating barrier as well as the absorption present in the receiving room: expressed in decibels.



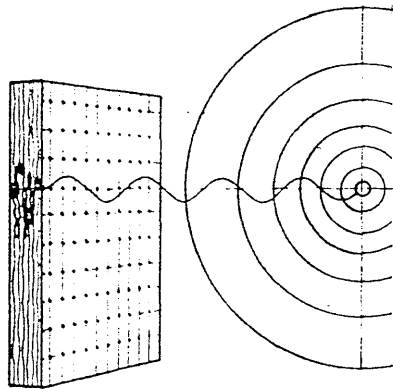
**background noise level**  
The level of ambient sound normally present in a space, above which speech, music, or other sounds must be presented to be heard.

**standing wave**  
A wave in which the amplitude of the resultant of a transmitted and a reflected wave is fixed in time and ranges from zero at the nodes to a maximum at the antinodes.



**white noise**  
An unvarying, unobtrusive sound having the same intensity for all frequencies of a given band, used to mask or obliterate unwanted sound. Also called white sound.

**interference**  
The phenomenon in which two or more light or sound waves of the same frequency combine to reinforce or cancel each other, the amplitude of the resulting wave being equal to the algebraic or vector sum of the amplitudes of the combining waves.



**background noise**  
The sound normally present in an environment, usually a composite of sounds from both exterior and interior sources, none of which are distinctly identifiable by the listener. Also called ambient sound.

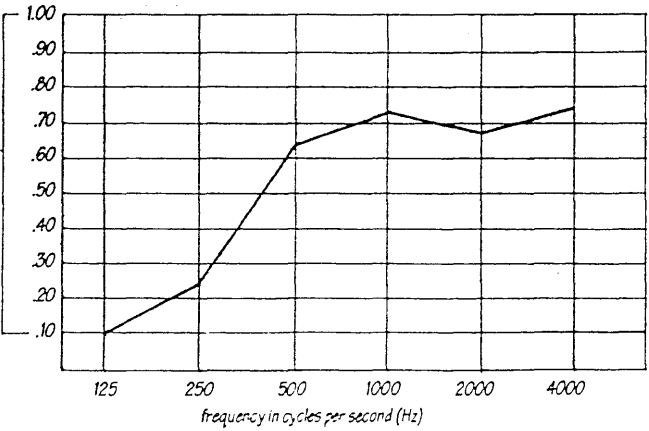
**absorption**  
The interception and conversion of sound energy into heat or other form of energy by the structure of a material, measured in sabins or absorption units.

**sabin**  
A unit of sound absorption, equal to one sq. ft. (0.09 sq. m) of a perfectly absorptive surface.

**metric sabin**  
A unit of sound absorption, equal to 1 square meter of perfectly absorptive surface. Also called absorption unit.

**absorption coefficient**  
A measure of the efficiency of a material in absorbing sound at a specified frequency, equal to the fractional part of the incident sound energy at that frequency absorbed by the material.

**noise reduction coefficient**  
A measure of the sound-absorbing efficiency of a material, equal to the average of the absorption coefficients of the material, computed to the nearest 0.05 at four frequencies: 250, 500, 1000, and 2000 Hz.



# SOUND

## sound isolation

The use of building materials and construction assemblies designed to reduce the transmission of airborne and structure-borne sound from one room to another or from the exterior to the interior of a building. Also called sound insulation.

## airborne sound transmission

Sound transmitted when a surface is set into vibration by the alternating air pressures of incident sound waves.

## structure-borne sound transmission

Sound transmitted through the solid media of a building's structure as a result of direct physical contact or impact, as by vibrating equipment or footsteps.

## transmission loss

A measure of the performance of a building material or construction assembly in preventing the transmission of airborne sound, equal to the reduction in sound intensity as it passes through the material or assembly when tested at all one-third octave band center frequencies from 125 to 4000 Hz expressed in decibels. Abbr.: TL

Three factors enhance the TL rating of a construction assembly: mass, separation into layers, and absorptive capacity.

## average transmission loss

A single-number rating of the performance of a building material or construction assembly in preventing the transmission of airborne sound, equal to the average of its TL values at nine test frequencies.

## sound transmission class

A single-number rating of the performance of a building material or construction assembly in preventing the transmission of airborne sound, derived by comparing the laboratory TL test curve for the material or assembly to a standard frequency curve. Abbr.: STC

The higher the STC rating, the greater the sound-isolating value of the material or construction. An open doorway has an STC rating of 10; normal construction has STC ratings from 30 to 60; special construction is required for STC ratings above 60.

## impact noise

Structure-borne sound generated by physical impact, as by footsteps or the moving of furniture.

## impact insulation class

A single-number rating of the performance of a floor-ceiling construction in preventing the transmission of impact noise. Abbr.: IIC

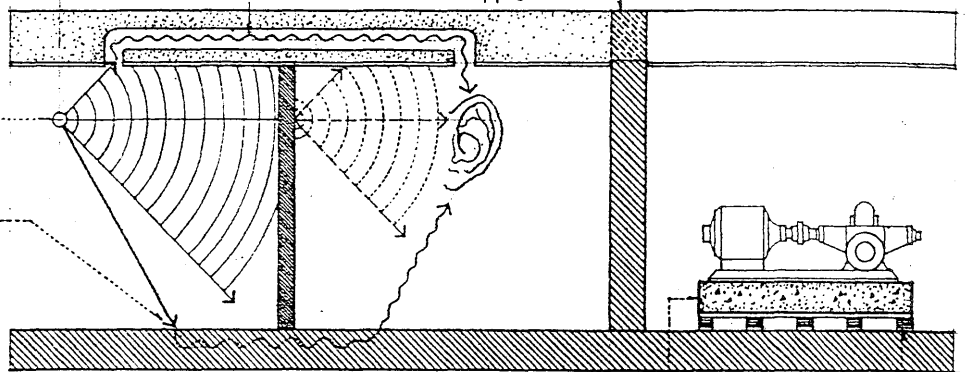
The higher the IC rating, the more effective is the construction in isolating impact noise. The IC rating replaces the previously used Impact Noise Rating (INR) and is approximately equal to the INR rating +51 dB for a given construction.

## flanking path

A path for the transmission of sound other than through a floor, wall, or ceiling assembly, as along such interconnecting structures as ductwork or piping.

## plenum barrier

An acoustic barrier erected in a plenum over a partition to reduce sound transmission between adjoining rooms.



## acoustic mass

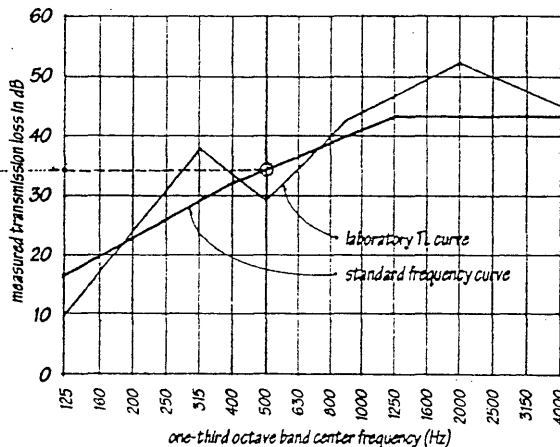
Resistance to the transmission of sound caused by the inertia and elasticity of the transmitting medium. In general, the heavier and more dense a body, the greater its resistance to sound transmission.

## vibration isolator

A resilient base for mechanical equipment, installed to reduce the transmission of vibration and noise to the supporting structure. Also called isolation mount.

## inertia block

A heavy concrete base for vibrating mechanical equipment, used in conjunction with vibration isolators to increase the mass of the equipment and decrease the potential for vibratory movement.



## discontinuous construction

Any of several construction methods, as the use of staggered studs or resilient mountings, for breaking the continuity of a path through which structure-borne sound may be transmitted from one space to another.

## staggered-stud partition

A partition for reducing sound transmission between rooms, framed with two separate rows of studs arranged in zigzag fashion and supporting opposite faces of the partition, sometimes with a fiberglass blanket between.

## resilient mounting

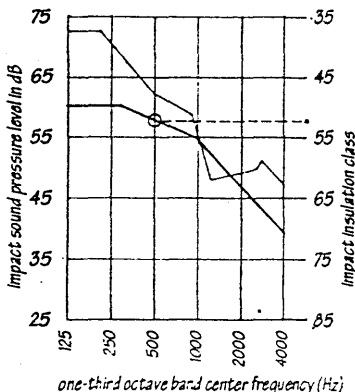
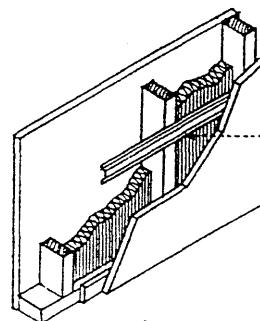
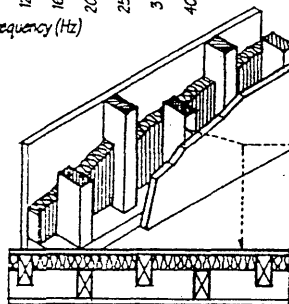
A system of flexible attachments or supports that permits room surfaces to vibrate normally without transmitting the vibratory motions and associated noise to the supporting structure.

## resilient channel

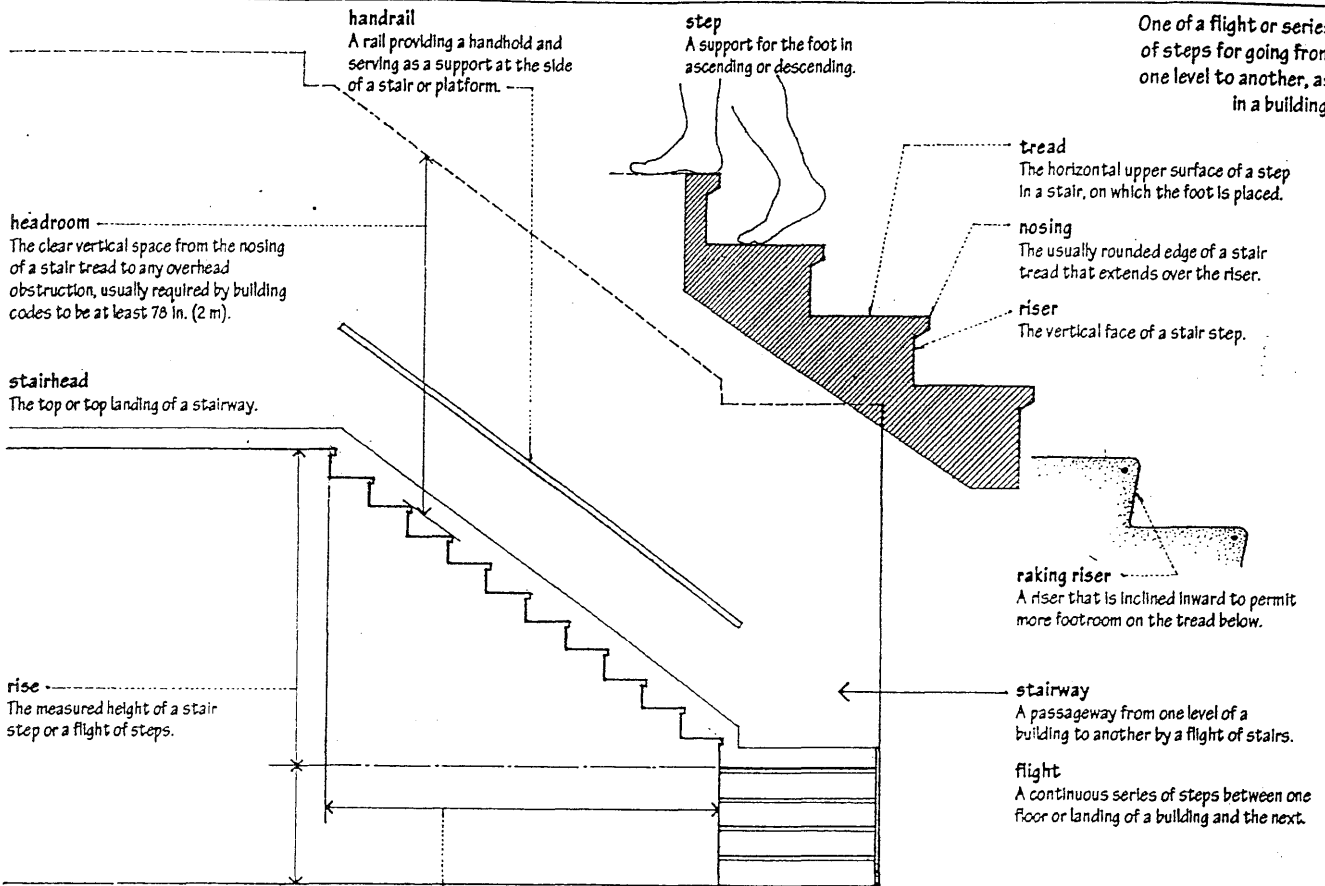
A metal channel for the resilient mounting of wallboard to studs or joists, used in sound-isolating construction to reduce the transmission of vibrations and noise.

## resilient clip

A flexible metal device for the resilient mounting of wallboard or metal lath to studs or joists, used in sound-isolating construction to reduce the transmission of vibrations and noise.



One of a flight or series of steps for going from one level to another, as in a building.



**stairwell**  
A vertical shaft or opening containing a stairway.

**ladder**  
A structure of wood, metal, or rope, usually consisting of two sidepieces joined at suitable intervals by bars or rungs, forming a means of climbing up or down at an angle of pitch between 75° and 90°.

**rung**  
One of the crosspieces, usually rounded, forming the steps of a ladder.

**ship's ladder**  
A fixed stepladder having an angle of pitch between 55° and 70°, usually equipped with handrails.

**run**  
The horizontal distance between successive risers or between the first and last risers of a flight of steps.

**critical angle**  
The angle of pitch above which a stair is considered to be uncomfortable or unsafe, usually 50°.

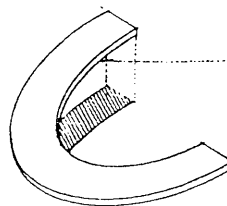
**riser:tread ratio**  
The preferred ratio between the riser and tread of a stairstep, specified by either of two formulas:  
 $R + 2T = 24 \text{ to } 25$ ;  
 $R \times T = 72 \text{ to } 75$ .

**preferred angle**  
For a flight of stairs, any angle of pitch between 28° and 36°; or, for a ramp, an angle of pitch less than 5°.

**ramp**  
A sloping floor, walk, or roadway connecting two levels.

**stepped ramp**  
A series of ramps connected by steps.

**helicline**  
A curved ramp.



# STAIR

## straight-run stair

A stair extending from one level to another without turns or winders.

## flier

One of the steps in a straight flight of stairs.

## quarter-turn stair

A stair making a right-angled turn, consisting of two straight flights connected by an intervening landing or a series of winders. Also called L stair.

## pace

A raised step or platform, esp. one serving as a landing or resting place at the end of a short flight of steps. Also called footpace.

## half-turn stair

A stair that turns 180° or through two right angles at an intervening landing.

## dog-leg stair

A half-return stair consisting of two straight flights immediately side by side and connected by an intervening landing.

## double-L stair

A half-turn stair having two intermediate landings, each offering a 90° change of direction.

## three-quarter-turn stair

A stair requiring a three-quarter turn for continued ascent or descent.

## winding stair

Any stair constructed chiefly with winders, as a geometrical or spiral stair.

## circular stair

A winding stair having a circular plan.

## spiral stair

A circular stair having wedge-shaped treads winding around and supported by a central post.

## newel

A central post from which the winders of a spiral stair radiate.

## straight flight

A flight of stairs having no turns or winders.

## landing

A platform between flights of stairs or the floor at the foot or head of a flight of stairs.

## quarterspace landing

A square landing connecting two flights of a stair. Also, quarterspace landing.

## walking line

A line 18 in. (457 mm) in from the centerline of a handrail, along which the run of a winder is the same as a flier. Also called line of travel.

## halfspace landing

A landing connecting two flights of a half-turn stair. Also, halfspace landing.

## winder

A more or less wedge-shaped stair step for changing direction.

## kite winder

The central of three stair winders making a 90° turn.

## balanced step

Any of a series of winders so arranged that they are nearly as wide at the inside of the stair as the adjacent fliers. Also called dancing step, dancing winder.

## double-return stair

A stair having one wide flight from the main floor to an intermediate landing, and two side flights from that landing to the floor above.

## elliptical stair

A winding stair having an elliptically shaped well.

## geometrical stair

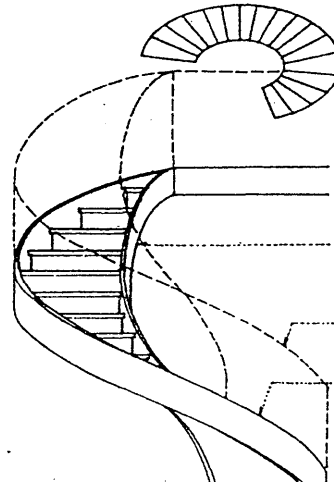
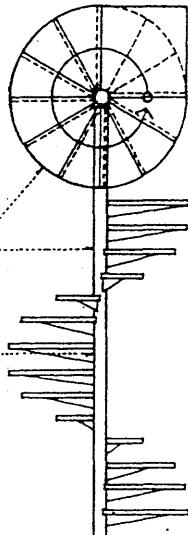
A winding stair constructed around a circular or elliptical well without the use of newels and often no landings between floors.

## wreath

A curved section of handrail.

## wreath piece

A curved section of a staircase string.



**string**  
One of the sloping boards running alongside a staircase to support or cover the ends of the treads and risers. Also called *stringboard*, *stringer*.

**wall string**  
A stair string set against a wall, usually notched or housed.

**carriage**  
An inclined beam for supporting the steps of a stair. Also called *horse*, *rough stringer*.

**box stair**  
A stair having a housed string on both sides so that it may be more or less completely finished before being set in its final location.

**housed string**  
A stair string receiving the ends of risers and treads in a series of housings. Also called *closed string*.

**apron piece**  
A header receiving the ends of stair carriages, strings, and the joists of landings. Also called *pitching piece*.

**kick plate**  
A plate for anchoring and absorbing the thrust of an inclined member, as a stair carriage.

**railing**  
A barrier composed of one or more horizontal rails supported by spaced uprights or balusters.

**stanchion**  
An upright post or support, as in a window or railing.

**balustrade**  
A railing with supporting balusters.

**baluster**  
Any of a number of closely spaced supports for a railing. Also called *banister*.

**newel drop**  
An ornamental, downward projection of a newel post, often through a soffit.

**safety nosing**  
A nosing having an abrasive, nonslip surface flush with the tread surface.

**safety tread**  
A tread having a roughened surface to prevent slipping.

**waist**  
The least thickness of a reinforced-concrete stair slab.

**hanging step**  
A step projecting from a wall with no real or apparent support at its outer end. Also called *cantilevered step*.

**landing tread**  
A board directly over the uppermost riser in a flight of stairs, having an edge matching that of the nosings on the stair treads.

**stair rod**  
A metal rod for holding a stair carpet in place against the bottom of a riser.

**staircase**  
A flight or series of flights of stairs, including its supporting framework, casing, and handrails.

**open-string stair**  
A stair having an open string on one or both sides.

**open string**  
A staircase string having its upper edge cut to the profile of the treads and risers. Also called *cut string*.

**face string**  
The outer string of a staircase, usually of better material or finish than the carriage which it covers. Also called *finish string*.

**tread return**  
A continuation of the rounded nosing of a tread beyond the face of an open string.

**bracket**  
An ornamental piece filling the angle between a riser and the overhanging edge of its tread.

**cut-and-mitered string**  
An open string having the vertical edges of the notches mitered with the ends of the stair risers.

**curtail**  
A horizontal, spiral termination to the lower end of a stair rail. Also called *volute*.

**curtail step**  
A starting step having a scroll termination to one or both ends of the tread.

**newel cap**  
The terminal feature of a newel post, often molded or turned in a decorative manner.

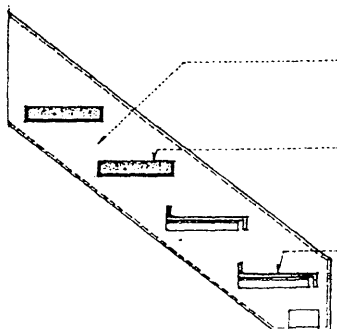
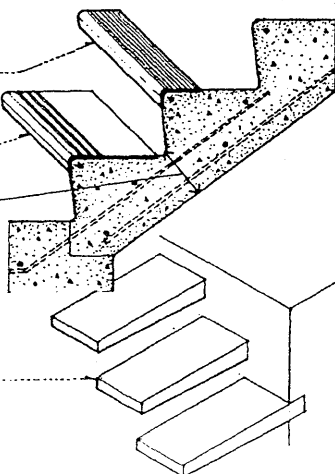
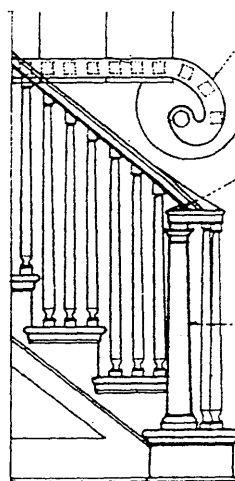
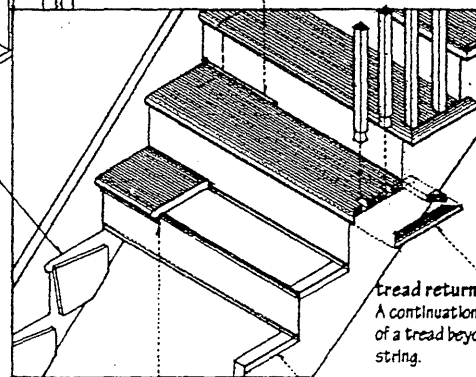
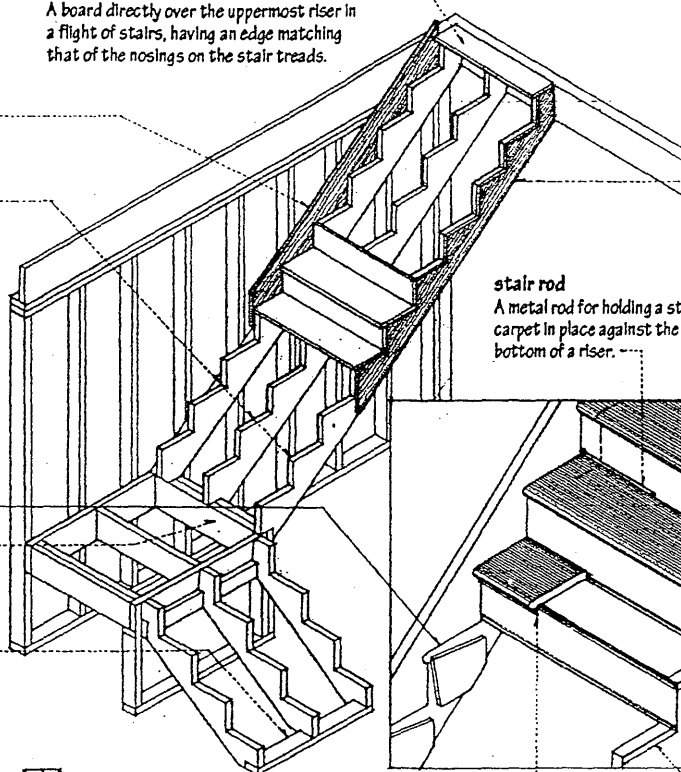
**newel**  
A post supporting one end of a handrail at the top or bottom of a flight of stairs. Also called *newel post*.

**open-riser stair**  
A stair having open spaces between successive treads, allowing light to pass from above.

**open riser**  
An open space between two successive treads.

**pan tread**  
A steel pan receiving a concrete fill and serving as a tread or as a combined tread and riser.

**plate tread**  
A tread fabricated from metal plate, usually having a raised pattern to provide a nonslip surface.

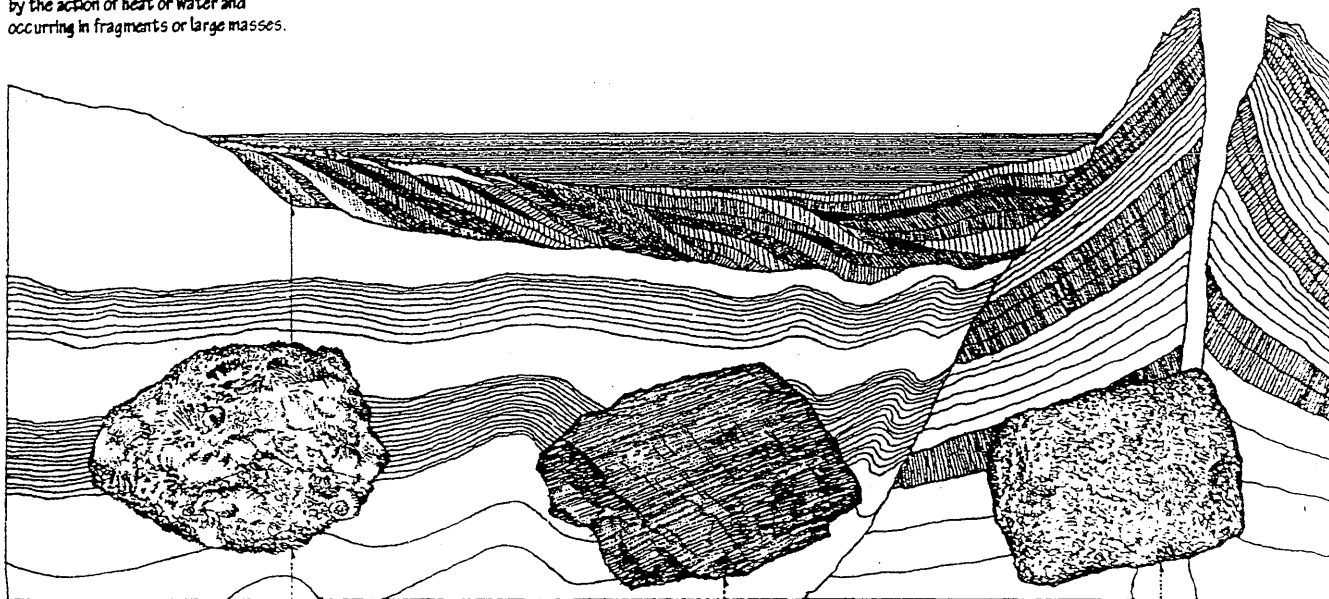


# STONE

Rock or a piece of rock quarried and worked into a specific size and shape for a particular purpose.

## rock

Solid mineral matter, naturally formed by the action of heat or water and occurring in fragments or large masses.



## sedimentary rock

A class of rock formed by the deposition of sediment, as limestone, sandstone or shale.

## limestone

A sedimentary rock formed chiefly by the accumulation of organic remains, as shells and coral, consisting mainly of calcium carbonate, and used as a building stone and in the manufacture of lime.

## travertine

A variety of limestone deposited by spring waters, esp. hot springs, sold as marble in the building trade.

## dolomite

A limestone rich in magnesium carbonate.

## oolite

A limestone composed of small, round, calcareous grains resembling fish roe. Also called egg stone.

## sandstone

A sedimentary rock consisting of sand, usually quartz, cemented together by various substances, as silica, clay, or calcium carbonate.

## bluestone

A dense, fine-grained, argillaceous sandstone that splits easily along bedding planes to form thin slabs.

## brownstone

A reddish-brown sandstone quarried and used extensively as a building material.

## soapstone

A massive, soft rock containing a high proportion of talc, used as dimension stone for hearths, table tops, and carved ornaments. Also called steatite.



## metamorphic rock

A class of rock that has undergone a change in structure, texture, or composition due to natural agencies, as heat and pressure, esp. when the rock becomes harder and more crystalline.

## marble

A metamorphic rock of crystallized limestone, consisting mainly of calcite or dolomite, capable of taking a high polish, and used esp. in architecture and sculpture. The presence and distribution of numerous minerals account for the distinctive variegated appearance that many marbles have. The commercial term includes many dense limestones and some coarse-grained dolomites.

## verd antique

A dark-green, mottled serpentine that takes a high polish and is sold as a marble. Also, verde antique.

## slate

A dense, fine-grained metamorphic rock formed by the compression of various sediments, as clay or shale, having good cleavage along parallel planes.

## quartzite

A compact, granular metamorphic rock consisting essentially of quartz, derived from sandstone.

## gneiss

A banded or foliated metamorphic rock corresponding in composition to granite, in which the minerals are arranged in layers.



## granite

A very hard, coarse-grained igneous rock composed mainly of quartz, feldspar, and mica or other colored minerals.

## obsidian

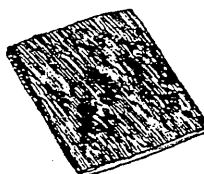
A volcanic glass similar in composition to granite, usually black with a bright luster, and transparent in thin pieces.

## malachite

A green to nearly black mineral, copper carbonate, used as a highly polished veneer and for making ornamental articles.

## serpentine

A mineral or rock consisting of hydrous magnesium silicate, usually green in color and having a mottled appearance.



**grain**  
The granular texture or appearance of a stone.

**bedding plane**  
The surface that separates one stratum or layer of stratified rock from another.

**cleavage plane**  
A relatively smooth surface along which certain rocks will tend to split.

**split-faced**  
Noting a rough stone finish produced by splitting to expose the bedding planes.

**freestone**  
Any fine-grained stone, as limestone or sandstone, that can be quarried or worked easily, esp. one that cuts well in all directions.

**carved work**  
Hand-cut ornamental features in brick or stone masonry.

**cast stone**  
A hardened mix of concrete with a fine stone aggregate, having a surface ground, polished, or molded to simulate natural stone.

**cut stone**  
Building stone cut or machined to a relatively fine finish.

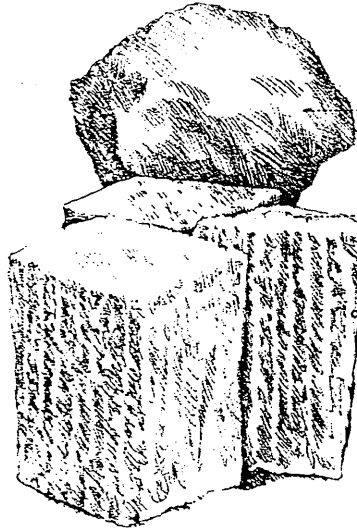
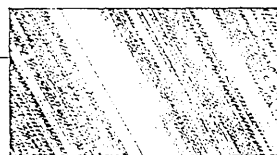
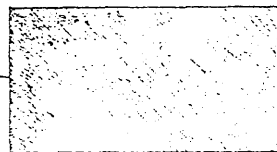
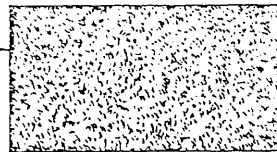
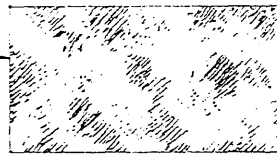
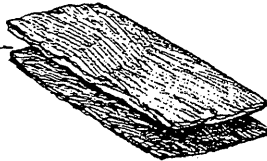
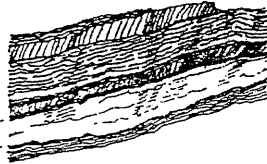
**chat-sawn**  
Noting a coarse, pebbled stone finish produced by using a slurry of a loose abrasive and water in the sawing process.

**shot-sawn**  
Noting a pebbled or rippled stone finish produced by using a slurry of water and hardened steel pellets in the sawing process.

**flame finish**  
A textured stone finish produced by superheating the surface so as to cause small chips to split off. Also called thermal finish.

**honed finish**  
A smooth stone finish having little or no gloss, obtained by rubbing with an abrasive.

**polished work**  
A stone face of crystalline texture, as of marble or granite, ground and buffed to form a glasslike surface. Also called glassed surface.



**building stone**  
Any stone suitable for use in building construction, as limestone, marble, or granite.

**fieldstone**  
Loose, unfinished stone found on the surface or in the soil, esp. when used for building, as in dry masonry.

**dimension stone**  
Quarried and squared stone 2 ft. (610 mm) or more in length and width and of specified thickness.

**dressed stone**  
Stone worked to desired shape and smoothed on the face.

**pitch-faced**  
Noting a stone having all arrises cut in the same plane and the faces roughly dressed with a pick.

**draft**  
A line or border chiseled at the edge of a stone to guide the stonecutter in leveling the surfaces.

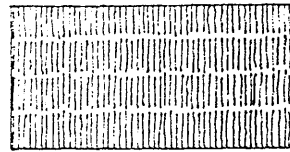
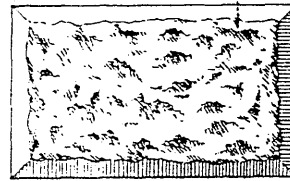
**drafted margin**  
A smooth, uniform margin worked around a stone face.

**sunk draft**  
A margin of a stone set below the rest of the face.

**quarry-faced**  
Of or pertaining to a stone or stonework the visible face of which is dressed with a hammer. Also, rock-faced.

**boasted surface**  
A stone finish obtained by chiselling roughly parallel grooves across the face.

**batted surface**  
A scored stone surface made with a mason's chisel after the surface has been rubbed smooth. Also called tooled surface.



# STRUCTURE

**A stable assembly of structural elements designed and constructed to function as a whole in supporting and transmitting applied loads safely to the ground without exceeding the allowable stresses in the members.**

## linear structure

A structural member having a length that dominates its other two dimensions.

## surface structure

A structural member having a length and width that dominates its thickness.

## rigid

Of or pertaining to a structure or structural member having a shape that does not change appreciably under the action of an applied load or changing loads.

## bulk-active structure

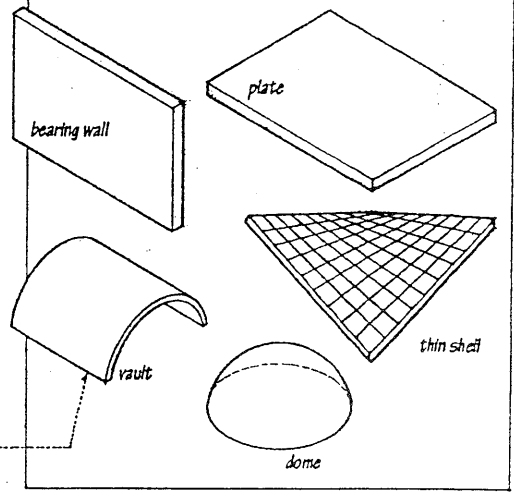
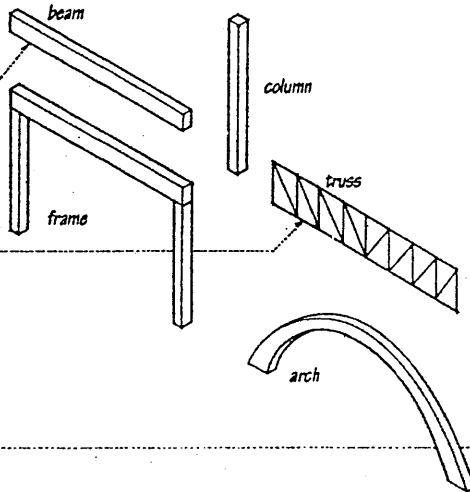
A structure or structural member that redirects external forces primarily through the bulk and continuity of its material, as a beam or column.

## vector-active structure

A structure that redirects external forces primarily through the composition of tension and compression members, as a truss.

## surface-active structure

A structure that redirects external forces primarily along the continuity of a surface, as a plate or shell.

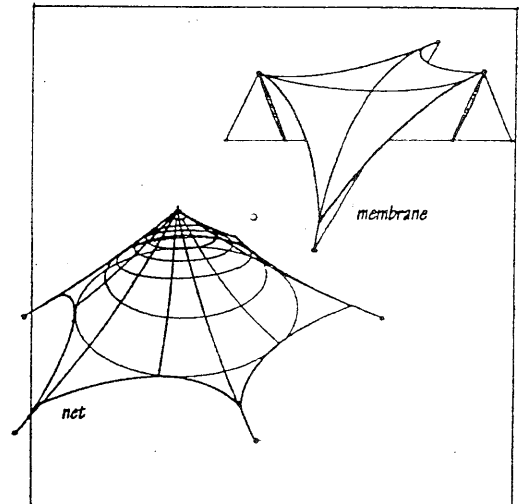
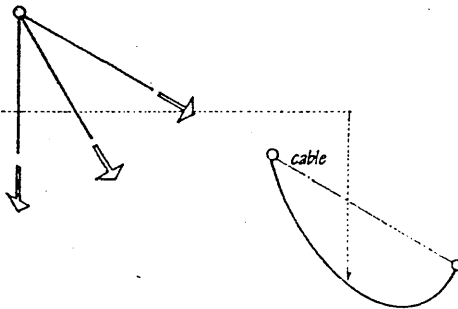


## flexible

Of or pertaining to a structure or structural member characterized by a lack of stiffness and having a shape that responds to changes in loading.

## form-active structure

A structure or structural member that redirects external forces primarily through the form of its material, as an arch or cable.

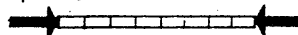


## structural member

One of the constituent parts into which a structure may be resolved by analysis, having a unitary character and exhibiting a unique behavior under an applied load.

## compression member

A structural member subject primarily to compressive forces.

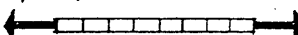


## strut

A structural member designed primarily to resist longitudinal compression.

## tension member

A structural member subject primarily to tensile forces.

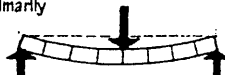


## tie

A tension member designed to keep two structural members from spreading or separating.

## bending member

A structural member subject primarily to transverse forces.

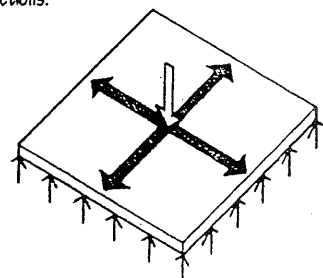
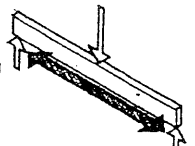


## one-way

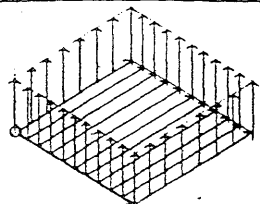
Of or pertaining to a structure or structural member having a load-carrying mechanism that acts in one direction only.

## two-way

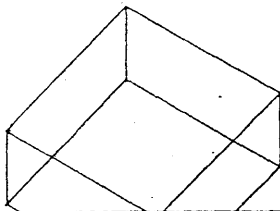
Of or pertaining to a structure or structural member having a load-carrying mechanism that acts in two or more directions.



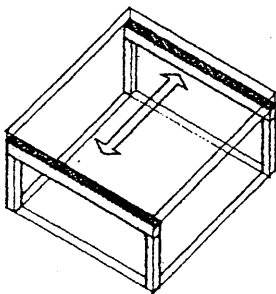




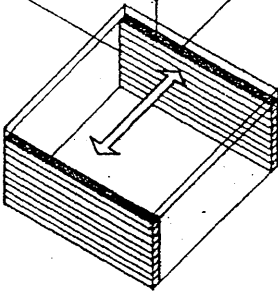
**structural unit**  
A discrete structure or assembly of structural members forming a spatial volume.



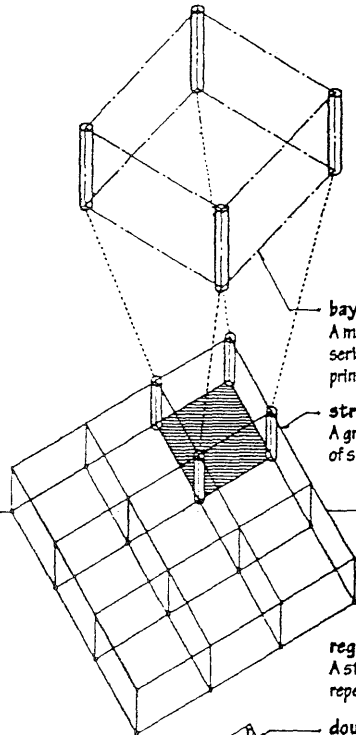
**bay**  
A major spatial division, usually one of a series, marked or partitioned off by the principal vertical supports of a structure.



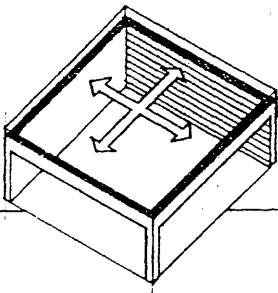
**structural grid**  
A grid defining the principal points or lines of support for a structural system.



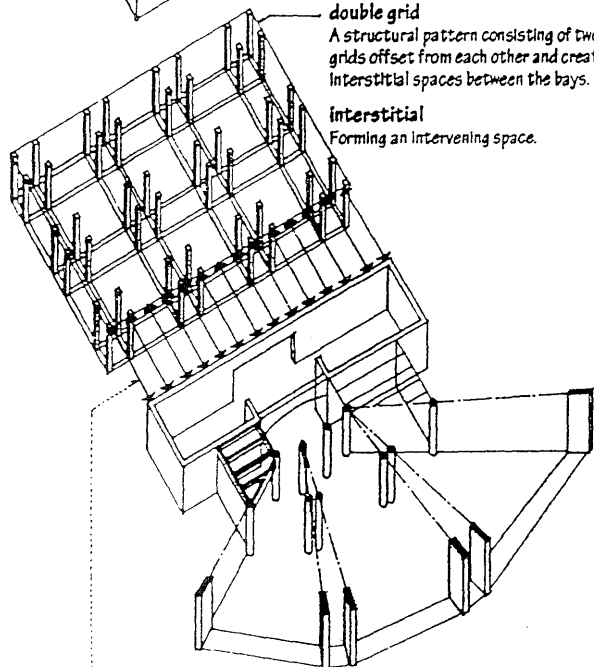
**regular grid**  
A structural grid having regularly repeating bays in two directions.



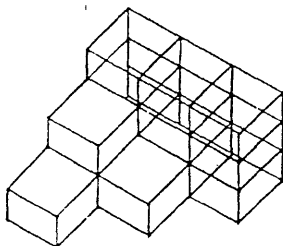
**double grid**  
A structural pattern consisting of two grids offset from each other and creating interstitial spaces between the bays.



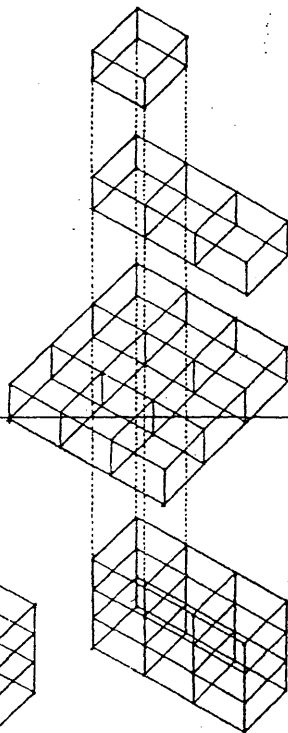
**interstitial**  
Forming an intervening space.



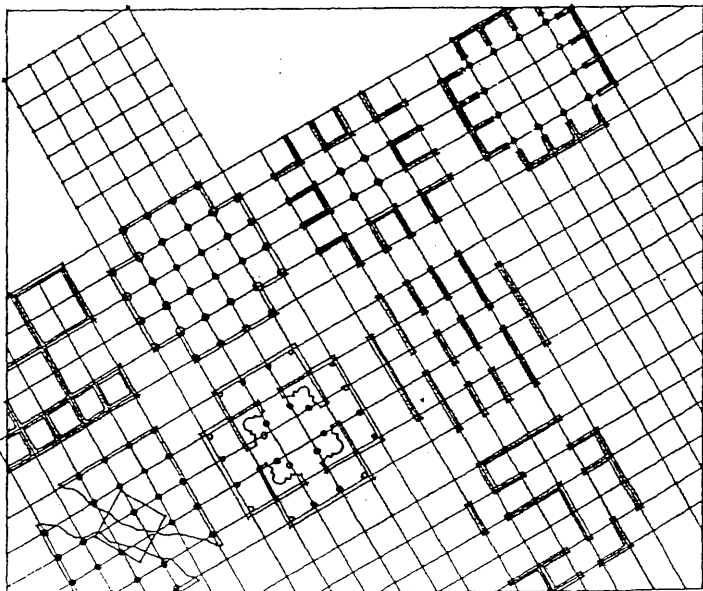
**transition structure**  
A structure mediating between two or more different structural patterns.



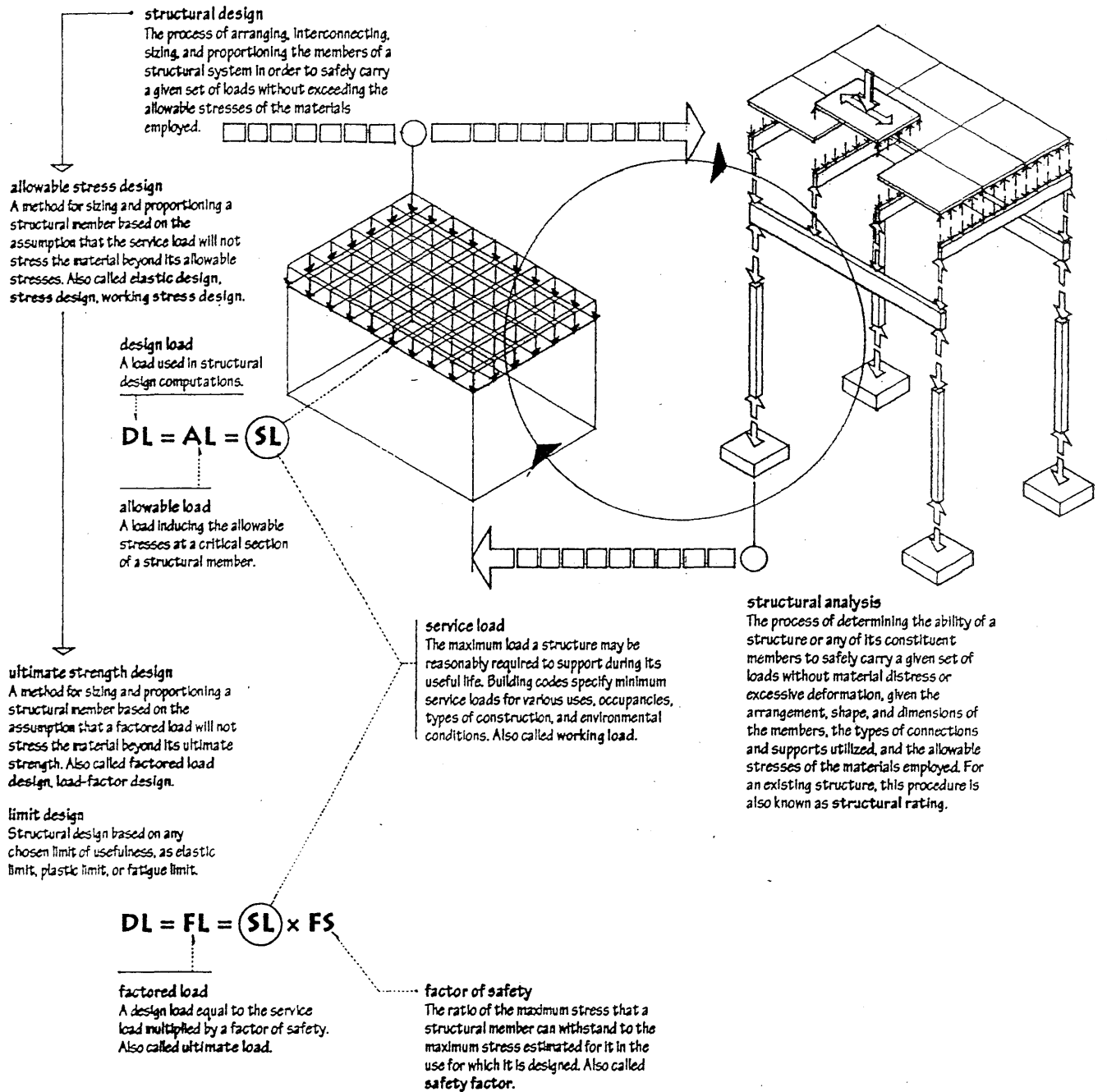
**slipped grid**  
A structural grid having points or lines of supports spaced uniformly in one direction but varying in the other.



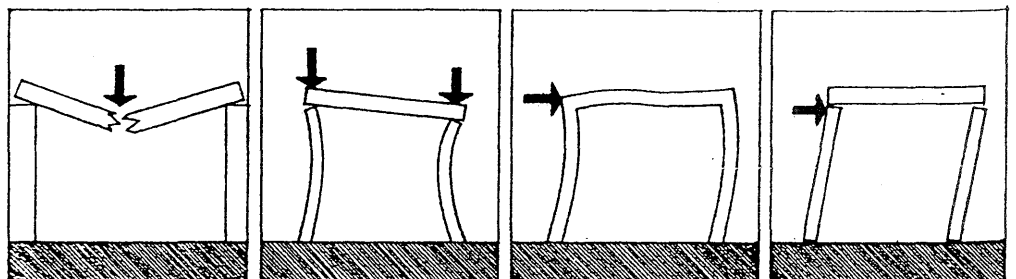
**structural pattern**  
The arrangement of principal vertical supports for a structure, which influences the selection of an appropriate spanning system and establishes the possibilities for the ordering of spaces and functions.

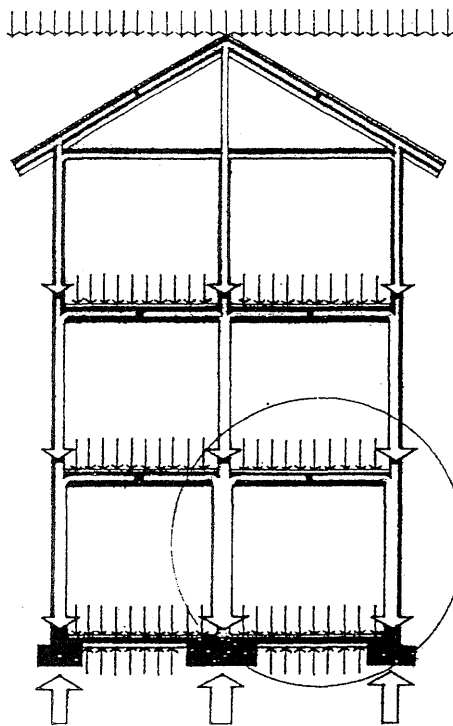


**irregular grid**  
A structural grid having irregularly shaped bays in one or more directions.



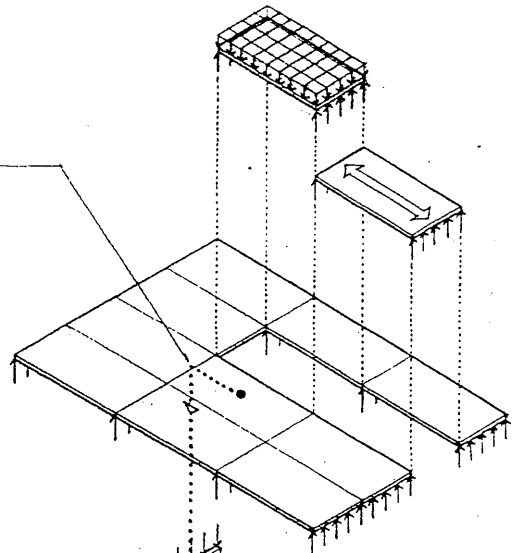
**structural failure**  
Any condition, as fracturing, buckling, or plastic deformation, that renders a structural assembly, element, or joint incapable of sustaining the load-carrying function for which it was designed.





**load trace**

The process of modeling how a structure collects, channels, and redirects the loads resulting from external forces through the hierarchy of its members to the foundation and underlying soil. The analysis usually starts at the roof level with the smallest members actually picking up the loading and proceeds by tracing the loads through each collecting member. The reactions of each member to its loading becomes forces on the members supporting it. Also called load flow.



**tributary area**

The portion of a structure contributing to the load on a structural element or member. Also called contributory area.

**tributary**

Channeling into something more inclusive.

**tributary load**

The load on a structural element or member collected from its tributary area.

**load strip**

The tributary area per unit length of a supporting structural member.



**primary member**

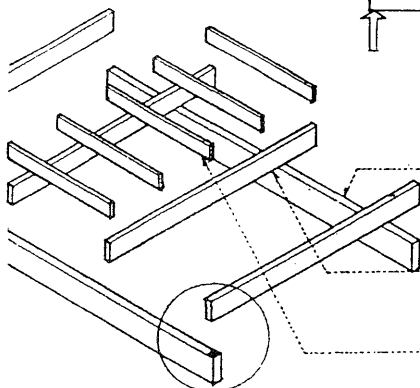
A structural member essential to the stability of a structural whole. Also called main member.

**secondary member**

Any structural member supported by a primary member.

**tertiary member**

Any structural member supported by a secondary member.

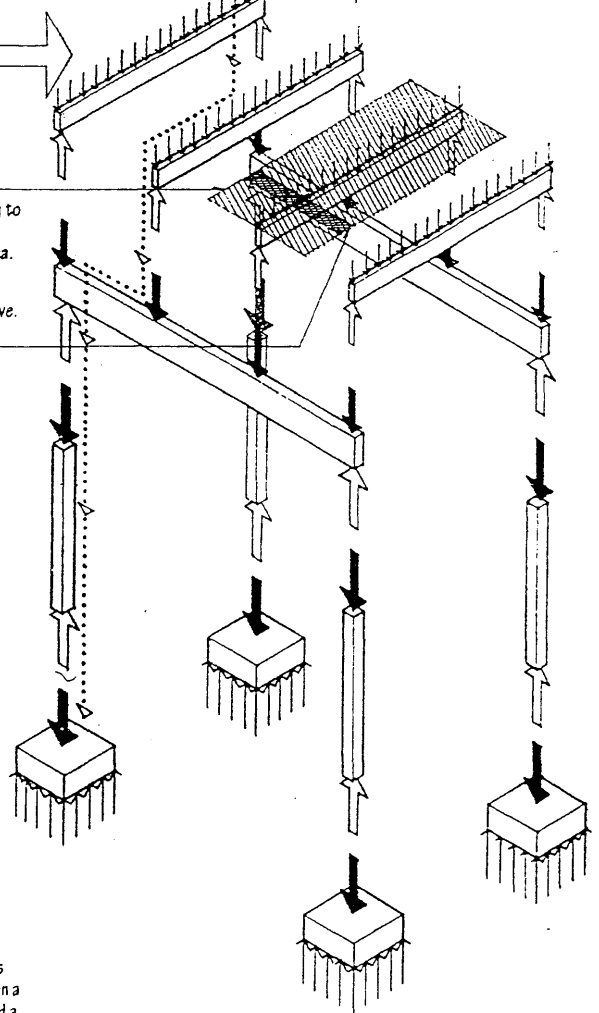
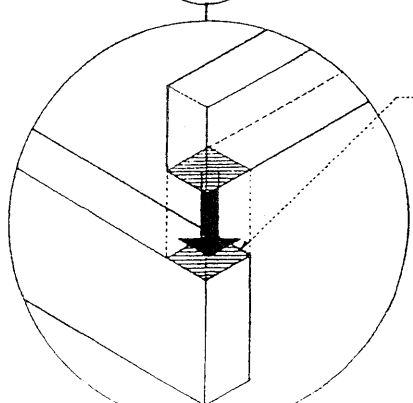


**bearing**

A point, surface, or mass that supports weight, esp. the area of contact between a bearing member, as a beam or truss, and a column, wall, or other underlying support.

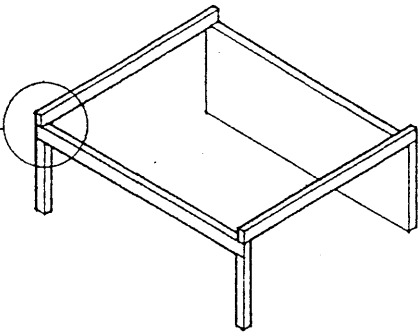
**bearing stress**

The stress developed between a bearing member and an underlying support, equal to the quotient of the magnitude of the forces transmitted and the area of contact between the two elements.

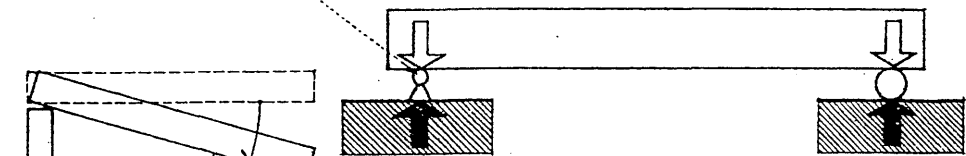


STRUCTURE

**support condition**  
The manner in which a structural member is supported and connected to other members, affecting the nature of the reactive forces developed on the loaded member.

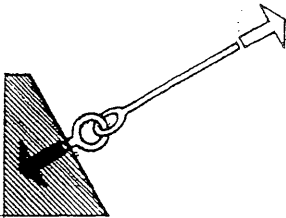


**point of support**  
A point on a structural member at which its reaction to a load is transmitted as a force to a supporting member.

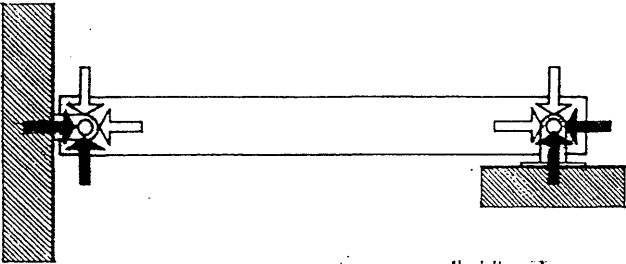
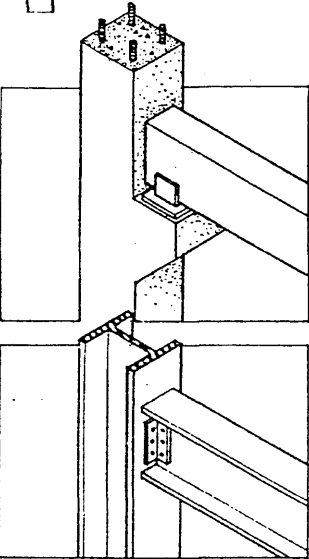


**unrestrained member**  
A structural member permitted to rotate freely about a point of support.

**roller support**  
A structural support that allows rotation but resists translation in a direction perpendicular into or away from its face. Also called roller joint.

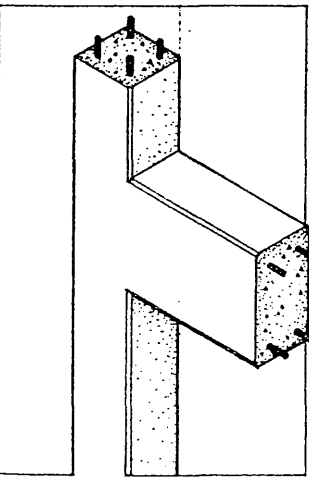
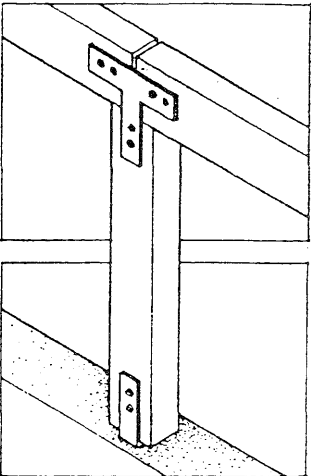
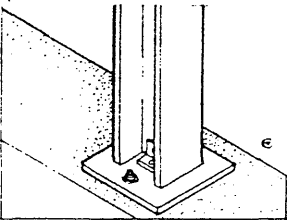


**cable support**  
A cable anchorage that allows rotation but resists translation only in the direction of the cable.

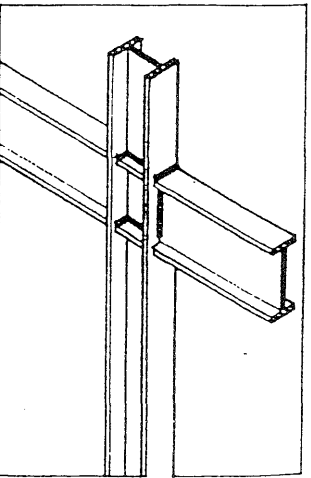
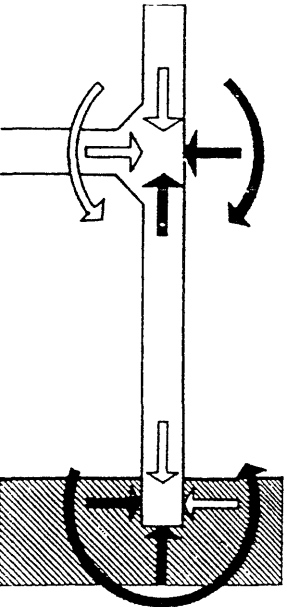


**pin joint**  
A structural connection that allows rotation but resists translation in any direction. Also called hinge joint, pinned connection.

**pin**  
A slender rod driven through holes in adjacent parts to keep the parts together or to permit them to move in one plane relative to each other.

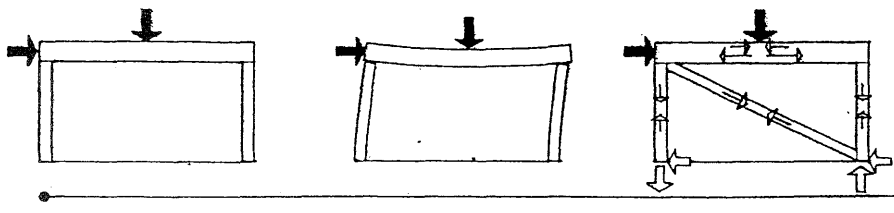


**rigid joint**  
A structural connection that maintains the angular relationship between the joined elements, restrains rotation and translation in any direction, and provides both force and moment resistance. Also called fixed connection, fixed joint, rigid connection.



**fixed-end connection**  
A rigid joint connecting the end of a structural member to a support.

**anchorage**  
A means for binding a structural member to another or to its foundation, often to resist uplifting and horizontal forces.



**stability**  
The ability of a structure, when disturbed from a condition of equilibrium by an applied load, to develop internal forces or moments that restore the original condition.

**lateral stability**  
The ability of a structure to resist lateral forces without sliding, overturning, buckling, or collapsing.

**racking**  
The straining and distortion of a structural frame by lateral forces.

**collapse mechanism**  
An unstable configuration of structural members susceptible to falling or breaking down under an applied load without a change in length of any individual member.

**lateral bracing**  
Stabilizing a structural system against lateral forces by means of diagonal or cross bracing.

**brace**  
A structural element for positioning, supporting, strengthening, or restraining the members of a structural frame.

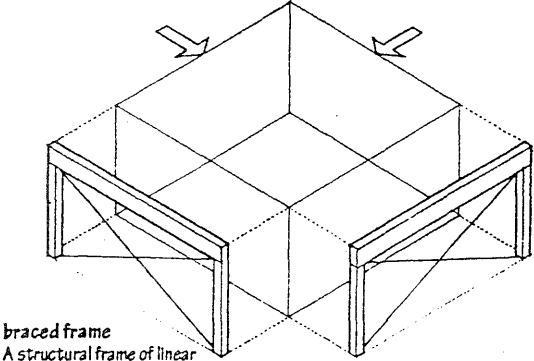
**diagonal bracing**  
A system of inclined members for bracing the angles between the members of a structural frame and ensuring the lateral stability of the whole.

**sway brace**  
A diagonal member for bracing a structure against lateral forces.

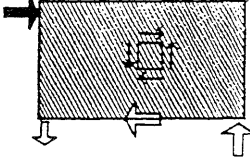
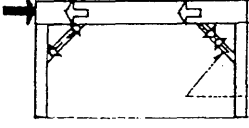
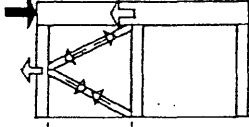
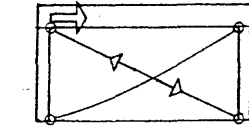
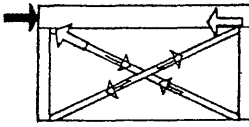
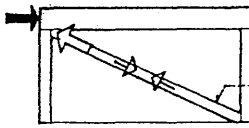
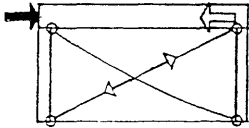
**cross bracing**  
A pair of transverse braces for stabilizing a structural frame against lateral forces. When using cables, two are necessary to stabilize the structure against lateral forces from either direction. For each direction, one cable will operate effectively in tension while the other would simply buckle. If rigid braces are used, a certain degree of redundancy is involved since a single member is capable of stabilizing the structure. Also, X-bracing.

**K-brace**  
A pair of diagonal braces for stabilizing a structural frame against lateral forces, meeting at some point along the length of a member of the frame.

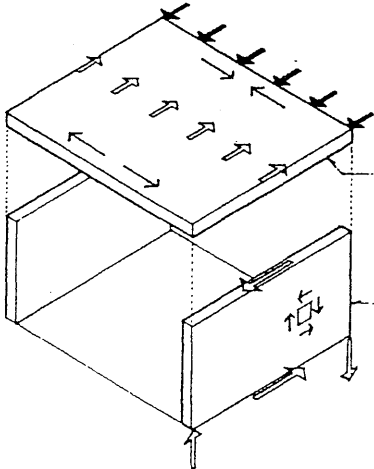
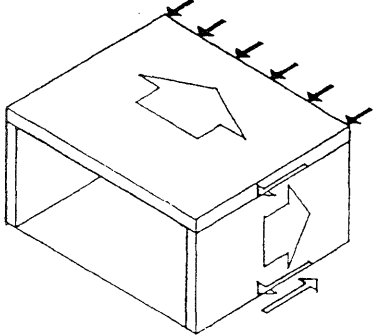
**knee brace**  
A diagonal member for bracing the angle between two joined members, being joined to each partway along its length.



**braced frame**  
A structural frame of linear members made rigid by a system of diagonal members.



**diaphragm**  
A relatively thin, rigid structural member capable of withstanding shear when loaded in a direction parallel to its plane.

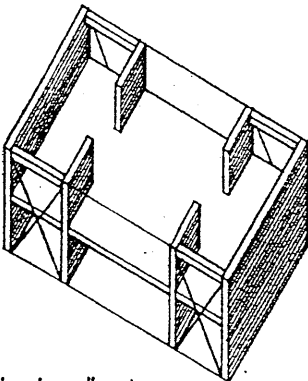
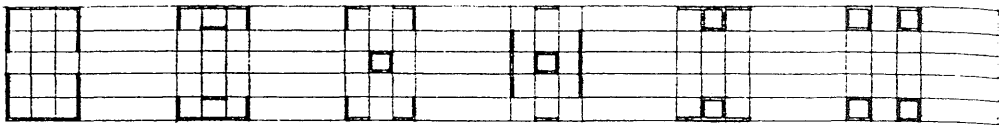


**horizontal diaphragm**  
A rigid floor or roof plane acting as a thin, deep beam in transferring lateral forces to vertical shear walls, braced frames, or rigid frames.

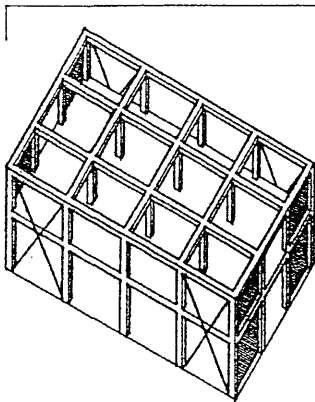
**shear wall**  
A vertical diaphragm acting as a thin, deep cantilever beam in transferring lateral loads to the ground foundation.

STRUCTURE

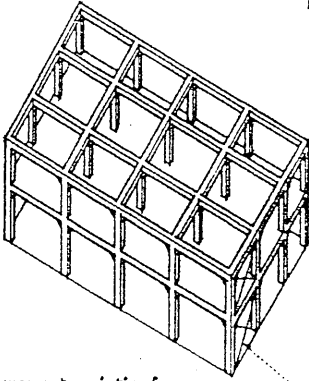
**regular structure**  
A structural system characterized by the symmetrical configuration of mass and lateral force-resisting elements and having no significant discontinuities of stiffness or strength. The effects of lateral forces on regular structures may be determined by static methods.



**bearing wall system**  
A structural system consisting of vertical planar elements for supporting gravity loads and shear walls or braced frames for resisting lateral forces.



**frame system**  
A structural system consisting of a three-dimensional array of interconnected linear members that functions as a complete, self-contained unit in supporting gravity loads and shear walls or braced frames for resisting lateral forces.



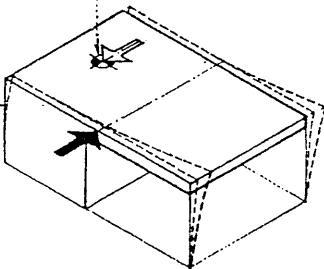
**moment-resisting frame**  
A frame system designed to resist lateral forces primarily by flexure in the members and joints.

**dual system**  
A structural system for resisting lateral forces, combining the ductility of a moment-resisting frame with the rigidity of a shear wall.

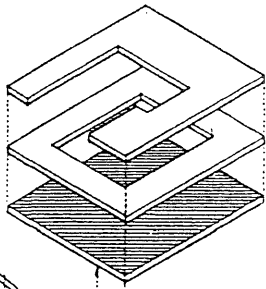
**eccentric bracing**  
A structural system for resisting lateral forces, combining the ductility of a moment-resisting frame with the rigidity of a braced frame.

**irregular structure**  
A structural system characterized by any of various plan or vertical irregularities, as a soft or weak story, a discontinuous shear wall or diaphragm, or the asymmetrical layout of mass or lateral force resisting elements. Irregular structures generally require dynamic analysis in order to determine the torsional effects of lateral forces.

**center of resistance**  
The centroid of the vertical elements of a lateral force-resisting system, through which the shear reaction to lateral forces acts. Also called center of rigidity.

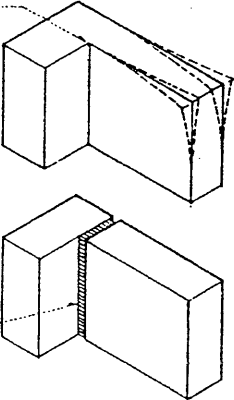


**torsional irregularity**  
The asymmetrical layout of mass or lateral force-resisting elements, resulting in noncoincident centers of mass and resistance and causing the story drift at one end of the structure to be more than the average of the story drifts at both ends.



**discontinuous diaphragm**  
A horizontal diaphragm having a large cutout or open area, or a stiffness significantly less than that of the story above or below.

**reentrant corner**  
The plan configuration of a structure and its lateral force-resisting system having projections beyond a corner significantly greater than the plan dimension in the given direction. A reentrant corner tends to produce differential motions between different portions of the structure, resulting in local stress concentrations at the corner. Solutions include providing a seismic joint to separate the building into simpler shapes, tying the building together more strongly at the corner, or splaying the corner.



**seismic joint**  
A joint that physically separates two adjacent building masses so that free vibratory movement in each can occur independently of the other.

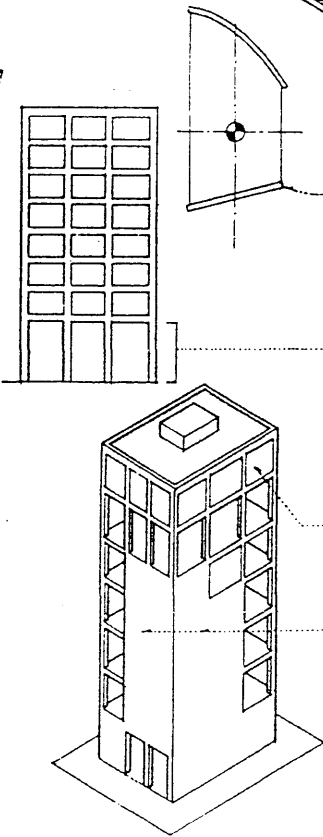
**nonparallel system**  
A structural system having lateral force-resisting elements neither parallel nor symmetrical about the major orthogonal axes of the system.

**soft story**  
A story having a lateral stiffness significantly less than that of the stories above.

**weak story**  
A story having lateral strength significantly less than that of the stories above.

**irregular mass**  
A story having an effective mass significantly greater than that of an adjacent story.

**discontinuous shear wall**  
A shear wall having a large offset or a significant change in horizontal dimension.



**perforated shell tube**

A tube structure having perimeter shear walls with less than 30% of the surface area perforated by openings.

**framed tube**

A tube structure having closely spaced perimeter columns rigidly connected by deep spandrel beams.

**braced tube**

A framed tube structure tied together by a system of diagonal braces.

**trussed tube**

A braced tube structure having trussed wall frames of widely spaced columns tied together by diagonal or cross bracing.

**latticed truss tube**

A braced tube structure having perimeter frames of closely spaced diagonals with no vertical columns.

**bundled tubes**

An assembly of narrow tubes tied directly to each other to form a modular structure that behaves like a multicellular box girder cantilevering out of the ground. More tubes are sometimes provided in the lower portion of a tall structure where greater lateral force resistance is needed.

**tube-in-tube structure**

A tube structure having an inner braced tube added to the perimeter tube to improve its shear stiffness in resisting lateral forces.

**braced core**

An interior service core braced to provide additional stiffness in resisting lateral forces.

**internal damping**

The damping that naturally occurs as a building undergoes elastic or plastic deformation, as from the internal friction of a stressed material (hysteresis damping), from the friction between two moving parts (frictional damping), or from the viscous resistance of a fluid such as air (viscous damping).

**aerodynamic damping**

The shaping of a tall building to create turbulence which generates cross-wind lift to oppose cross-wind deflections during high winds.

**turbulence**

Irregular motion of the atmosphere characterized by up-and-down currents.

**tube structure**

A high-rise structure having perimeter lateral force-resisting systems internally braced by rigid floor diaphragms. A tube structure acts as a cantilevered box beam in resisting lateral forces.

**damp**

To cause a decrease in amplitude of successive oscillations or waves.

**damping mechanism**

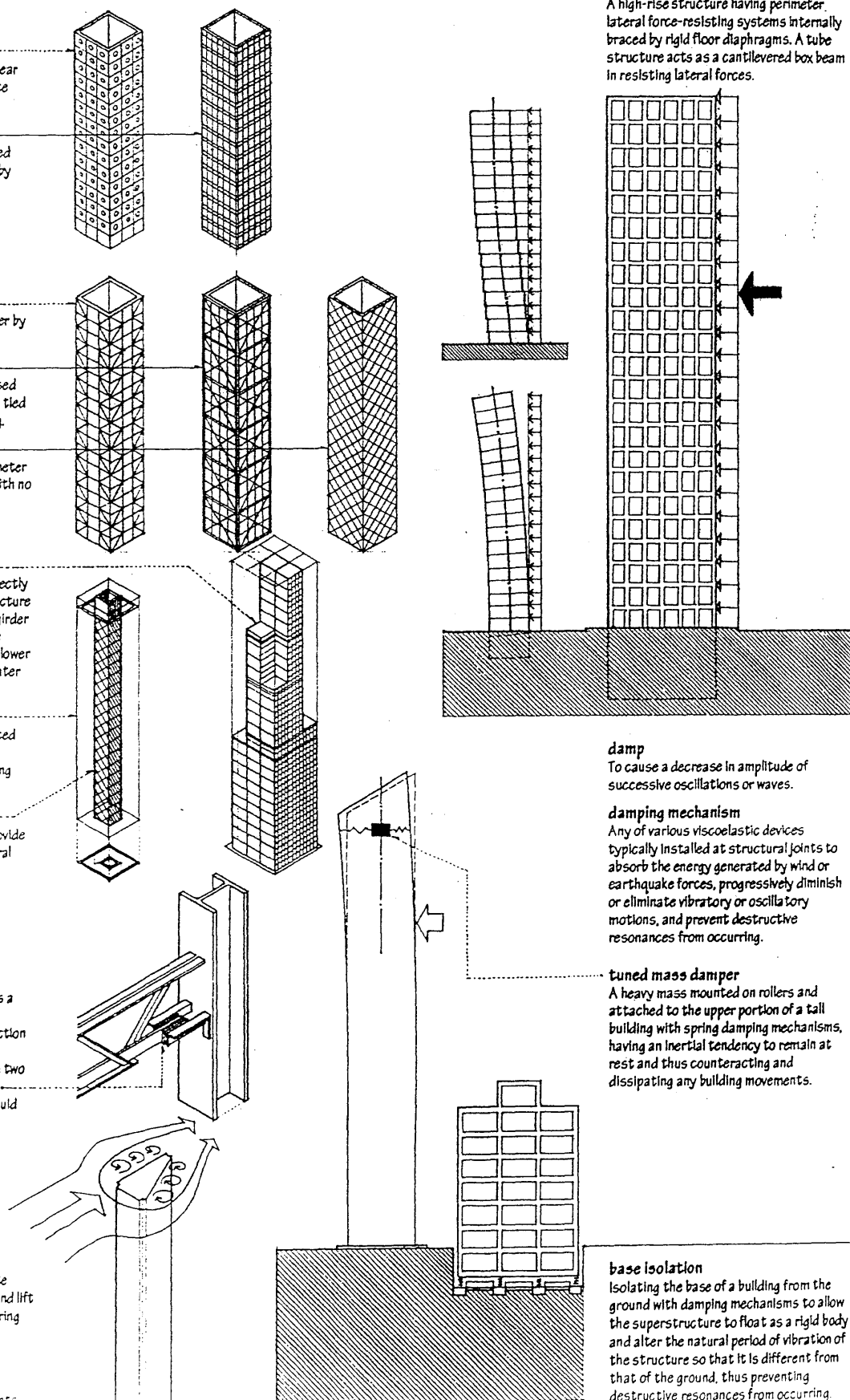
Any of various viscoelastic devices typically installed at structural joints to absorb the energy generated by wind or earthquake forces, progressively diminish or eliminate vibratory or oscillatory motions, and prevent destructive resonances from occurring.

**tuned mass damper**

A heavy mass mounted on rollers and attached to the upper portion of a tall building with spring damping mechanisms, having an inertial tendency to remain at rest and thus counteracting and dissipating any building movements.

**base isolation**

Isolating the base of a building from the ground with damping mechanisms to allow the superstructure to float as a rigid body and alter the natural period of vibration of the structure so that it is different from that of the ground, thus preventing destructive resonances from occurring.



# SURVEY

To determine the exact form, boundaries, extent, and position of a tract of land by linear and angular measurements and the application of the principles of geometry and trigonometry.

**true north**  
The direction of the north pole from a given point.

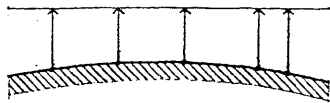
**magnetic north**  
North as indicated by the north-seeking pole of the magnetic needle in a compass.

**bearing**  
A horizontal direction expressed in degrees east or west of a true or magnetic north or south direction.

**azimuth**  
The angle of horizontal deviation, measured clockwise, of a bearing from a standard direction, as from north or south.

**traverse**  
A sequence of intersecting surveyed lines whose lengths and angles of intersection are recorded graphically on a map and as data in a table.

**place of beginning**  
The starting point for a metes-and-bounds survey.



**plane survey**  
A survey in which curvature of the earth's surface is ignored, and all distances and horizontal angles are assumed to be projected onto a horizontal plane.

**land survey**  
A survey made to establish the length and bearing of boundary lines and the area of the tract bounded by these lines.

**cadastral survey**  
A survey showing boundaries and property lines, usually made to create land units suitable for transfer of title.

**butts and bounds**  
A legal term for the boundary lines of a parcel of land as used in deeds and titles.

**plat**  
A plan or map of land in a city, town, section, or subdivision, indicating the location and boundaries of individual properties.

**survey plat**  
A legal document describing the location, boundaries, and dimensions of a tract or parcel of land, including zoning and planning commission approvals, easements and restrictions, and, for a subdivision, the dividing lines of streets, blocks, and lots, and the numbering and dimensions of each lot.

**legal description**  
A written description of the location and boundaries of a specific parcel of land, based on a metes-and-bounds survey or a rectangular system of survey, or made with reference to a recorded plat.

**metes and bounds**  
The property lines or boundaries of a parcel of line.

**metes-and-bounds survey**  
A system of land survey in which the course and length of each boundary line of a parcel of land are called out starting at a known reference point and working around the periphery of the plat until returning to the place of beginning.

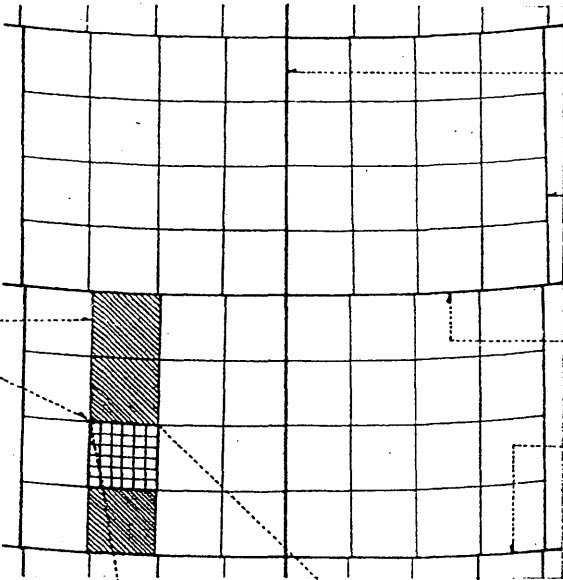
**course**  
The compass direction from one reference point to the next for each leg of a metes-and-bounds survey, stated in degrees, minutes, and seconds as an angular deviation east or west of due north or south.

**rectangular system**  
A system of land survey based on a modified grid of north-south principal meridians and east-west baselines. Also called government system.

**range**  
One of a series of divisions numbered east or west from a guide meridian in the rectangular system of survey and consisting of a row of townships that are numbered north or south from a baseline.

**township**  
A unit of land area in the rectangular system of survey, approximately 36 sq. mi. (93.2 sq. km) containing 36 sections.

**section**  
One of the 36 numbered subdivisions of a township, each approximately one square mile (2.59 sq. km or 640 acres) and further subdivided into halves, quarters, and quarter quarters.



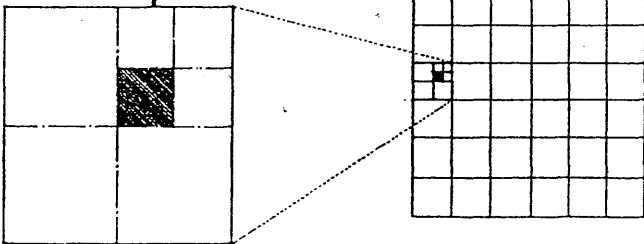
**principal meridian**  
In the rectangular system of survey, a north-south reference line established at a substantial landmark for a large area of land.

**guide meridian**  
In the rectangular system of survey, a north-south reference line located between correction lines at 24-mile intervals to the east and west of principal meridians.

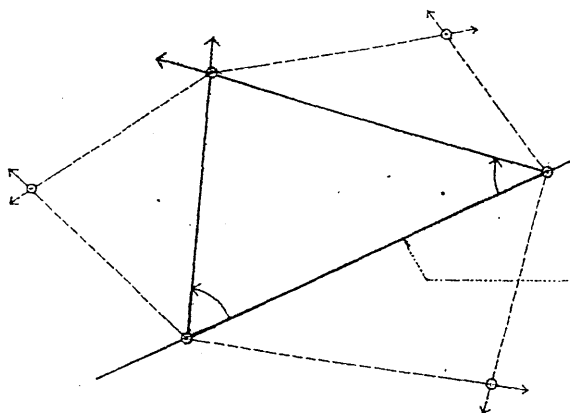
**baseline**  
The principal east-west reference line for an area in the rectangular system of survey.

**correction line**  
An east-west reference line located at 24-mile intervals to the north and south of a baseline in the rectangular system of survey, established to correct for the convergence of meridians and equalize east-west distances.

**range line**  
In the rectangular system of survey, a north-south reference line located at 6-mile intervals between guide meridians.







**trilateration**

A method for determining the relative positions of three or more points by treating these points as vertices of a triangle or triangles of which the sides and angles can be measured.

**triangulation**

A trigonometric method for determining the position of a point by taking bearings from the end points of a baseline of known or measurable length.

**baseline**

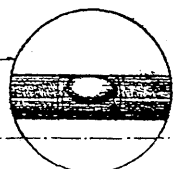
A line of known length and position from which points or other lines may be established, as a corner of a building structure or a property line.

**level**

A device for determining true horizontal or vertical directions by the centering of a bubble in a slightly bowed glass tube filled with alcohol or ether. Also called spirit level.

**artificial horizon**

A level, as a surface of mercury.



**stadia**

A method of surveying in which distances are read by noting the interval on a graduated rod intercepted by two horizontal cross hairs mounted in the telescope of a surveying instrument.

**target**

A red and white disk on a leveling rod that facilitates the sighting and reading of the rod.

**rod**

A straight pole or bar, conspicuously marked with graduations, and used in measuring the vertical distance between a point on the ground and the line of sight of a surveyor's level. Also called leveling rod, stadia rod.

**chain**

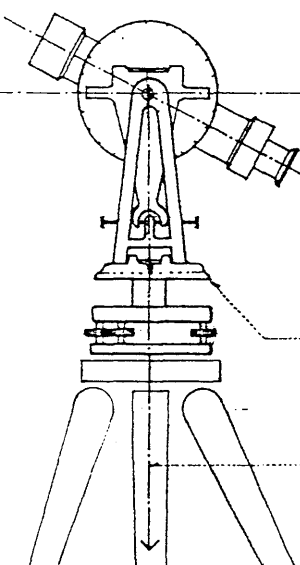
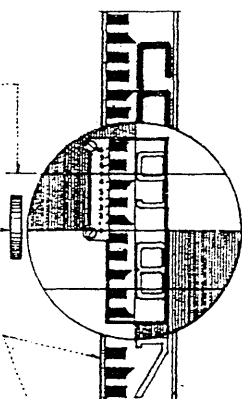
A distance-measuring device consisting of 100 metal links of equal length.

**Gunter's chain**

A distance-measuring device consisting of 100 metal links and a total length of 66 ft. (20 m). Also called surveyor's chain.

**engineer's chain**

A distance-measuring device consisting of 100 metal links and a total length of 100 ft. (30 m).



**transit**

A surveying instrument, as a theodolite, having a telescope that can be reversed by turning in a vertical plane, used for measuring horizontal and sometimes vertical angles.

**theodolite**

A precision instrument having a telescopic sight for establishing horizontal and sometimes vertical angles.

**alidade**

The entire upper part of a transit or theodolite, including the telescope, its supports, spirit level, horizontal circle, leveling devices, and the spindle.

**horizontal circle**

A circular plate, graduated in degrees, minutes, and seconds, and fixed to the base of a transit for measuring horizontal angles.

**optical plummet**

A device for centering a transit or theodolite over a reference point, used in place of a plumb bob in a strong wind.

**leveling**

A procedure for determining the difference in elevation between two points by means of a level or transit and a rod. Also called differential leveling.

**elevation**

The vertical distance above or below a datum.

**spot elevation**

The elevation of a certain point relative to a specified datum.

**profile**

A vertical section of the ground surface taken parallel to a survey line.

**datum**

Any level surface, line, or point used as a reference from which elevations are measured.

**turning point**

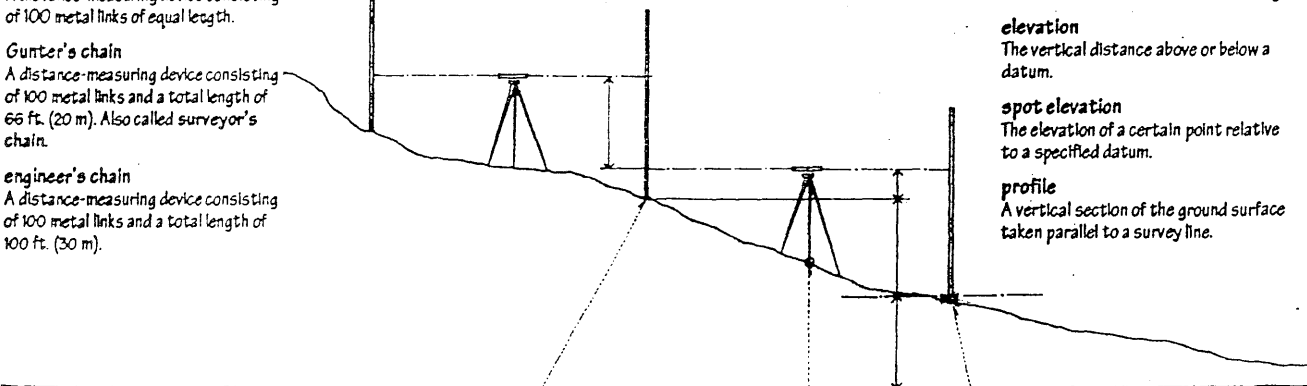
A point temporarily located and marked in order to establish the elevation or position of a surveying instrument at a new station.

**station**

A precisely located reference point over which a surveying instrument is centered. Also called instrument station, set-up.

**bench mark**

A marked point of known or assumed elevation, usually on a permanent object, from which other elevations may be established.



## TEMPLE

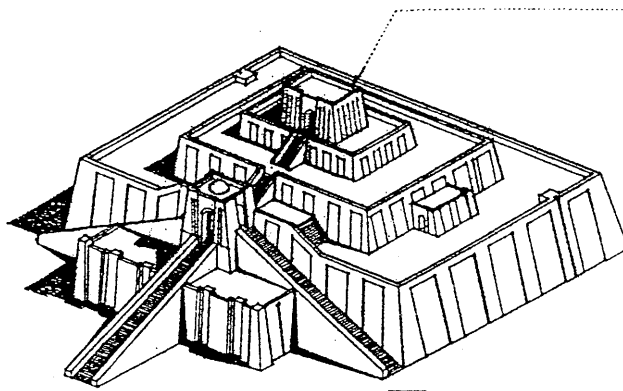
An edifice or place dedicated to the worship or presence of a deity.

### sacred

Of or pertaining to religious objects, rites, or practices, as opposed to the secular or profane.

### secular

Of or pertaining to the temporal or worldly rather than the sacred or spiritual. Also, profane.



### ziggurat

A temple-tower in Sumerian and Assyrian architecture, built in diminishing stages of mud brick with buttressed walls faced with burnt brick, culminating in a summit shrine or temple reached by a series of ramps; thought to be of Sumerian origin, dating from the end of the 3rd millennium B.C. Also, zikkurat.

### Tower of Babel

A temple-tower presumed to be the great ziggurat at Babylon, which no longer survives, though it was seen and described by the Greek historian, Herodotus, in the 5th century B.C.:

*"And they said to one another, Let us make brick, and burn it thoroughly. And they had brick for stone, and slime for mortar. And they said, Let us build a city and a tower, whose top may reach unto heaven; and let us make a name, lest we be scattered abroad upon the face of the whole earth."*  
—Genesis 11:4

### Lamassu

The monumental stone sculptures of human-headed, winged bulls or lions that guarded the entrances to Mesopotamian palaces and temples.



### menhir

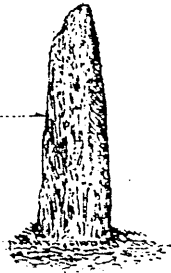
A prehistoric monument consisting of an upright megalith, usually standing alone but sometimes aligned with others.

### megalith

A very large stone used as found or roughly dressed, esp. in ancient construction work.

### monolith

A single block of stone of considerable size, often in the form of an obelisk or column.

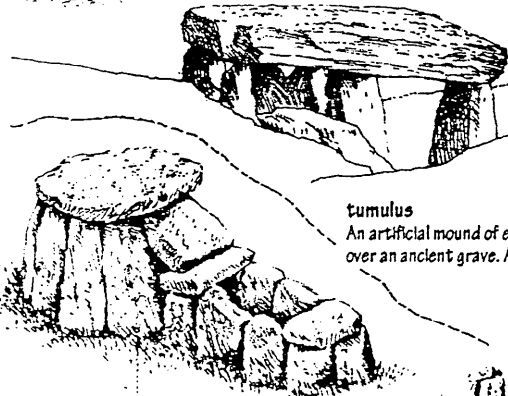


### cairn

A heap of stones piled up as a monument, tombstone, or landmark. Also, cairn.

### passage grave

A megalithic tomb of the Neolithic and early Bronze Ages found in the British Isles and Europe, consisting of a roofed burial chamber and narrow entrance passage, covered by a tumulus; believed to have been used for successive family or clan burials spanning a number of generations. Also called chamber grave.



### tumulus

An artificial mound of earth or stone, esp. over an ancient grave. Also called barrow.

### dolmen

A prehistoric monument consisting of two or more large upright stones supporting a horizontal stone slab, found esp. in Britain and France and usually regarded as a tomb.

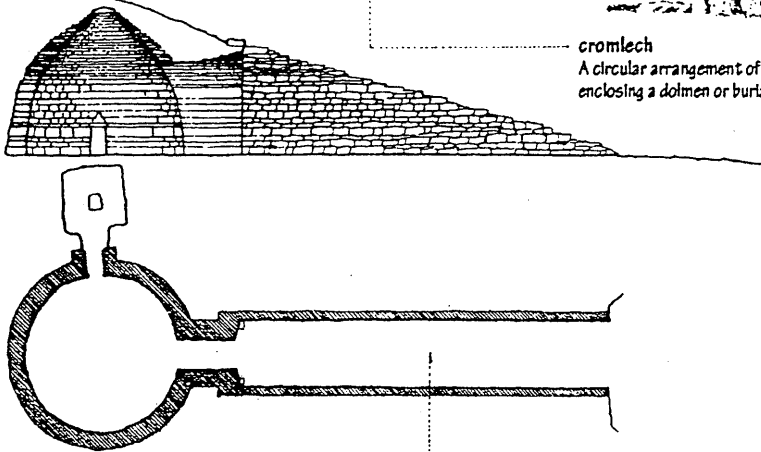
### trilithon

Two upright megaliths supporting a horizontal stone. Also called trilith.



### cromlech

A circular arrangement of megaliths enclosing a dolmen or burial mound.



### shaft grave

A tomb of the Aegean civilizations consisting of a deep rectangular cut into sloping rock and a roof of timber or stone.

### beehive tomb

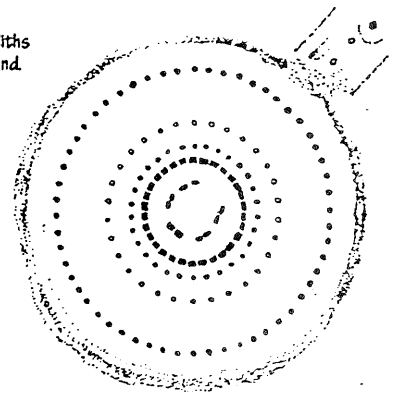
A stone-built subterranean tomb of the Mycenaean civilization consisting of a circular chamber covered by a corbeled dome and entered by a walled passage through a hillside. Also called tholos.

### dromos

A long, deep passageway into an ancient subterranean tomb.

### Stonehenge

A megalithic monument erected in the early Bronze Age c2700 B.C. on Salisbury Plain, Wiltshire, England, consisting of four concentric rings of trilithons and menhirs centered around an altar stone; believed to have been used by a sun cult or for astronomical observations.



## mastaba

An ancient Egyptian tomb made of mud brick, rectangular in plan with a flat roof and sloping sides, from which a shaft leads to underground burial and offering chambers.

## serdab

A small chamber inside a mastaba containing a statue of the deceased.

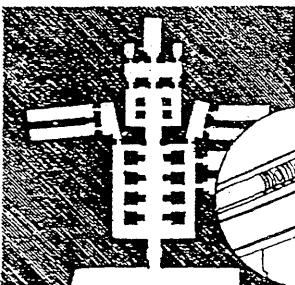
## uraeus

The figure of the sacred asp, depicted on the headdress of ancient Egyptian rulers and deities as an emblem of supreme power.



## pharaoh

Any of the rulers of ancient Egypt who were believed to be divine and had absolute power.



## rock-cut tomb

A tomb hewn out of native rock, presenting only an architectural front with dark interior chambers, of which the sections are supported by masses of stone left in the form of solid pillars.

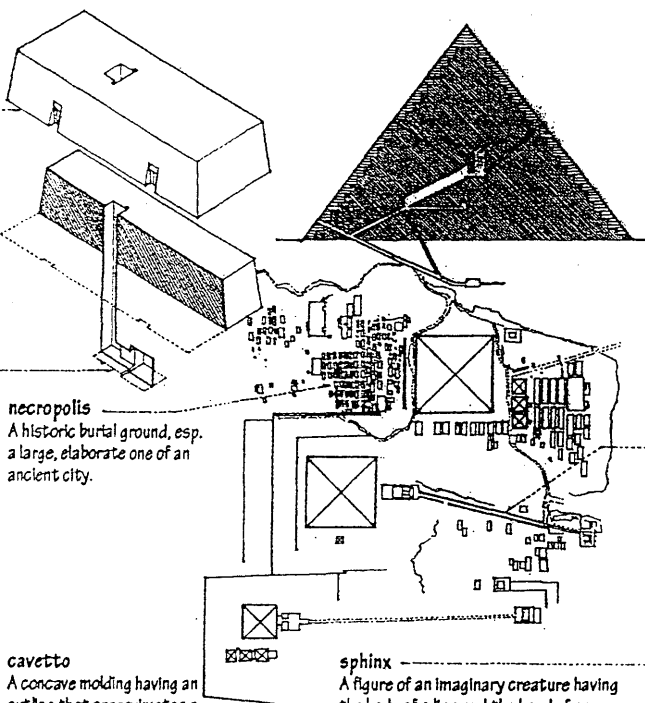
## obelisk

A tall, four-sided shaft of stone that tapers as it rises to a pyramidal point, originating in ancient Egypt as a sacred symbol of the sun-god Ra and usually standing in pairs astride temple entrances.



## Osirian column

An ancient Egyptian column incorporating the sculptured figure of Osiris, the Egyptian god of death and resurrection.



## necropolis

A historic burial ground, esp. a large, elaborate one of an ancient city.

## cavetto

A concave molding having an outline that approximates a quarter circle.

## cavetto cornice

A characteristic cornice of Egyptian buildings, consisting of a large cavetto decorated with vertical leaves and a roll molding below. Also called Egyptian gorge.

## sphinx

A figure of an imaginary creature having the body of a lion and the head of a man, ram, or hawk, commonly placed along avenues leading to ancient Egyptian temples or tombs.

## pyramid

A massive masonry structure having a rectangular base and four smooth, steeply sloping sides facing the cardinal points and meeting at an apex, used in ancient Egypt as a tomb to contain the burial chamber and the mummy of the pharaoh. The pyramid was usually part of a complex of buildings within a walled enclosure, including mastabas for members of the royal family, an offering chapel and a mortuary temple. A raised causeway led from the enclosure down to a valley temple on the Nile, where purification rites and mummification were performed.

## syrinx

A narrow rock-cut corridor in an ancient Egyptian tomb.

## causeway

A raised passageway ceremonially connecting the valley temple with an ancient Egyptian pyramid.



## cult temple

An ancient Egyptian temple for the worship of a deity, as distinguished from a mortuary temple.

## mortuary temple

An ancient Egyptian temple for offerings and worship of a deceased person, usually a deified king. In the New Kingdom, cult and funerary temples had many features in common: an avenue of sphinxes leading to a tall portal guarded by a towering pylon, an axial plan with a colonnaded forecourt and a hypostyle hall set before a dark, narrow sanctuary in which stood a statue of the deity, and walls lavishly decorated with pictographic carvings in low or sunken relief. Many of the major temples grew by accretion due to the pious ambitions of successive pharaohs, who believed in the afterlife and were determined to create an enduring reputation through their buildings.

## New Kingdom

The period in the history of ancient Egypt, c1550–1200 B.C., comprising the 18th to 20th dynasties; characterized by the dominance of its capital at Thebes.

## pylon

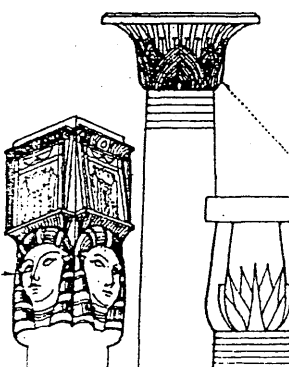
A monumental gateway to an ancient Egyptian temple, consisting either of a pair of tall truncated pyramids and a doorway between them or of one such masonry mass pierced with a doorway, often decorated with painted reliefs.

## propylon

A freestanding gateway having the form of a pylon and preceding the main gateway to an ancient Egyptian temple or sacred enclosure.

## hypostyle hall

A large hall having many columns in rows supporting a flat roof, and sometimes a clerestory; prevalent in ancient Egyptian and Achaemenid architecture.



## palm capital

An ancient Egyptian capital shaped like the crown of a palm tree.

## lotus capital

An ancient Egyptian capital having the shape of a lotus bud.

## Hathor-headed

Noting an ancient Egyptian column having as its capital the head of Hathor, the Egyptian goddess of love and happiness, often represented with the head or horns of a cow. Also, Hathoric.

# TEMPLE

## megaron

A building or semi-independent unit of a building, typically having a rectangular principal chamber with a center hearth and a porch, often of columns in antis: traditional in Greece since Mycenaean times and believed to be the ancestor of the Doric temple.

## Greek temple

A temple built as a shrine to the ancient Greek god or goddess to whom it was dedicated. Since the temple was not intended for internal worship, it was built with special regard for external effect. It stood on a stylobate of three or more steps, with a cella containing the statue of the deity and front and rear porticoes, the whole being surmounted by a low gable roof of timber, covered in terracotta or marble tiles.

## altar

An elevated place or structure upon which sacrifices are offered or incense burned in worship, or before which religious rites are performed.

## cella

The principal chamber or enclosed part of a classical temple, where the cult image was kept. Also called naos.

## pediment

A wide, low-pitched gable surmounting a colonnade or a major division of a facade.

## tympanum

The triangular space enclosed by the horizontal and raking cornices of a pediment, often recessed and decorated with sculpture.

## stylobate

A course of masonry forming the foundation for a row of columns, esp. the outermost colonnade of a classical temple.

## stereobate

A solid mass of masonry visible above ground level and serving as the foundation of a building, esp. the platform forming the floor and substructure of a classical temple. Also called crepidoma, podium.

## tabernacle

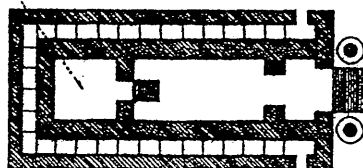
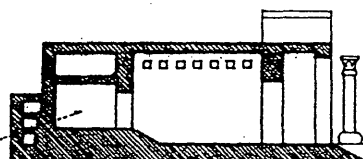
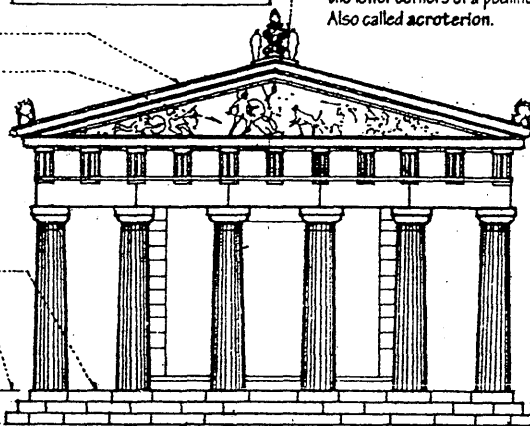
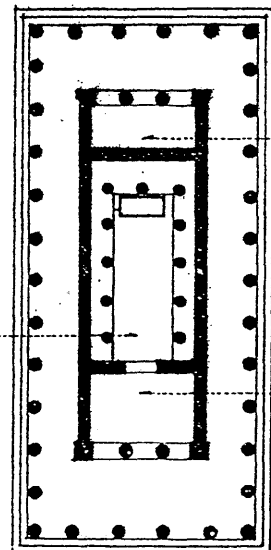
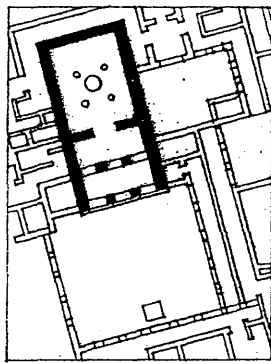
The portable sanctuary in which the Hebrews carried the ark of the covenant through the desert until the building of the Temple of Jerusalem by Solomon.

## holy of holies

The innermost chamber in the biblical Tabernacle and the Temple in Jerusalem where the ark of the covenant was kept. Also called sanctum sanctorum.

## Ark of the Covenant

The chest containing two stone tablets inscribed with the Ten Commandments, carried by the Hebrews during their desert wanderings after the Exodus.



## epinaos

The rear vestibule of a classical temple. Also called opisthodomos, posticum.



## pronaos

An open vestibule before the cella of a classical temple. Also called anticum.

## acroterium

A pedestal for a sculpture or ornament at the apex or at each of the lower corners of a pediment. Also called acroterion.



## agora

A marketplace or public square in an ancient Greek city, usually surrounded with public buildings and porticoes and commonly used as a place for popular or political assembly.

## stoa

An ancient Greek portico, usually detached and of considerable length, used as a promenade or meeting place around public places.

## temenos

In ancient Greece, a piece of ground specially reserved and enclosed as a sacred place.

## stela

An upright stone slab or pillar with a carved or inscribed surface, used as a monument or marker, or as a commemorative tablet in the face of a building. Also, stela.

## acropolis

The fortified high area or citadel of an ancient Greek city.

## antefix

An upright ornament at the eaves of a tile roof concealing the foot of a row of convex tiles that cover the joints of the flat tiles.

## atlas

A sculptured figure of a man used as a column. Also called telamon.

## caryatid

A sculptured female figure used as a column. Also called canephora.

## Temple of Solomon

The first Temple of Jerusalem, completed c950 B.C. by Phoenician artisans under the direction of King Solomon and destroyed by Nebuchadnezzar II in 586 B.C. Based on Canaanite and Phoenician prototypes, it was oblong in shape, and consisted of three main parts: an outer hall (ulam), the main sanctuary (hekhal), and the holy of holies (debir), all decorated with massive carvings in ivory, gold, and cedar.

## synagogue

A building or place of assembly for Jewish worship and religious instruction.

## bimah

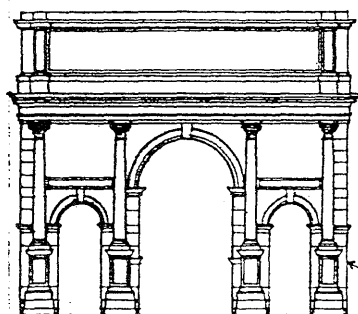
The platform in a synagogue from which services are conducted. Also called almemar, bema.

## Holy Ark

The cabinet in a synagogue in which the scrolls of the Torah are kept, set into or against the wall that faces toward Jerusalem.

**basilica**  
A large oblong building used as a hall of justice and public meeting place in ancient Rome, typically having a high central space lit by a clerestory and covered by timber trusses, and a raised dais in a semicircular apse for the tribunal. The Roman basilica served as a model for early Christian basilicas.

**tribunal**  
A raised platform in an ancient Roman basilica for the seats of magistrates. Also, tribune.



**triumphal arch**  
A monumental memorial arch erected astride the line of march of a victorious army during its triumphal procession.

**arch order**  
The engaged columns and entablature framing an arch, as in a triumphal arch.

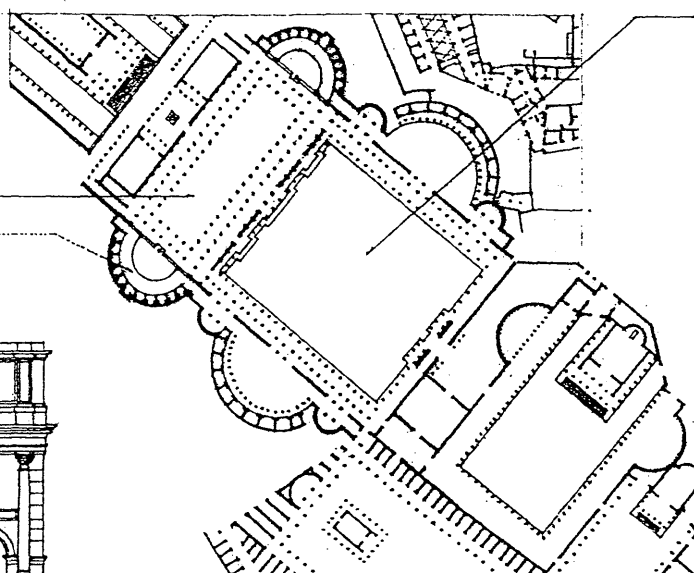
**clithral**  
Of or pertaining to a classical temple that is roofed over.

**hypethral**  
Of or pertaining to a classical temple that is wholly or partly open to the sky. Also, hypaethral.

**pseudoperipteral**  
Having engaged columns at the sides.

**dipteral**  
Having two rows of columns on all sides.

**pseudodipteral**  
Having an arrangement of columns suggesting a dipteral structure but without the inner colonnade.



**forum**  
The public square or marketplace of an ancient Roman city, the center of judicial and business affairs, and a place of assembly for the people, usually including a basilica and a temple.

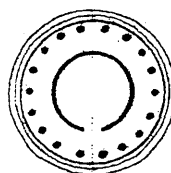
**pantheon**  
A temple dedicated to all the gods of a people.

**cenotaph**  
A monument erected in memory of a deceased person whose remains are buried elsewhere.

**cyrtostyle**  
A convex, usually semicircular portico.

**cyclostyle**  
A circular colonnade or peristyle open at the center.

**monopteron**  
A circular building having a single row of columns surrounding a central structure or a courtyard. Also, monopteros.



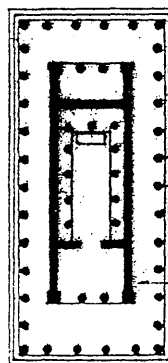
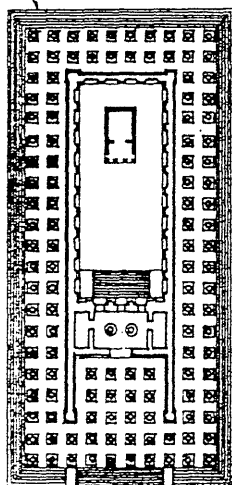
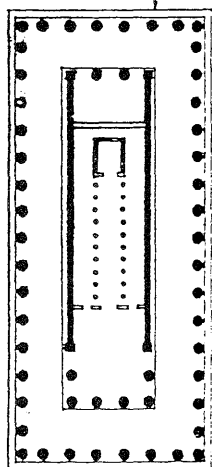
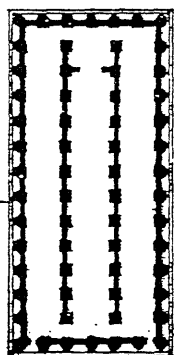
**distyle in antis**  
Having two columns in front between antae.

**anta**  
A rectangular pier or pilaster formed by thickening the end of a projecting wall.

**prostyle**  
Having a portico on the front only.

**apteral**  
Without a colonnade along the sides.

**amphiprostyle**  
Prostyle on both fronts.



**peripteral**  
Having a single row of columns on all sides.

**pteron**  
A colonnade parallel to, but apart from the cella.

**pteroia**  
The passage between the pteron and the cella.

## TEMPLE

### mosque

A Muslim building or place of public worship. Also called *masjid*, *musjid*.

### madrasah

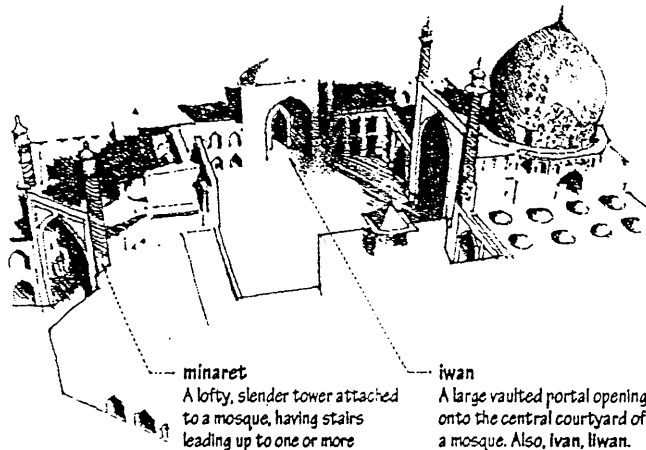
A Muslim theological school arranged around a courtyard and attached to a mosque, found from the 11th century on in Egypt, Anatolia, and Persia. Also, *madrasa*.

### maidaan

The large open square of a city, used as a marketplace or parade ground, esp. in India. Also, *meidan*, *meidan*.

### ziyada

A court or series of courts serving to shelter a mosque from immediate contact with secular buildings.



### minaret

A lofty, slender tower attached to a mosque, having stairs leading up to one or more projecting balconies from which the muezzin calls the Muslim people to prayer.

### iwan

A large vaulted portal opening onto the central courtyard of a mosque. Also, *ivan*, *liwan*.

### 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 called *Muhammadanism*.

### Muslim

Of or pertaining to the law, religion, or civilization of Islam; a believer in Islam. Also, *Moslem*, *Muslem*.

### Muhammad

Arab prophet and founder of Islam, A.D. 570–632. Also, *Mohammed*.

### Koran

The sacred text of Islam, revered as the revelations made by Allah to Muhammad through the angel Gabriel and accepted as the foundation of Islamic law, religion, culture, and politics.

### minbar

A pulpit in a mosque, recalling the three steps from which Muhammad addressed his followers.

### qibla

The wall in a mosque in which the mihrab is set, oriented to Mecca. Also, *qiblah*, *kibla*, *lilah*.

### mihrab

A niche or decorative panel in a mosque designating the qibla.

### Mecca

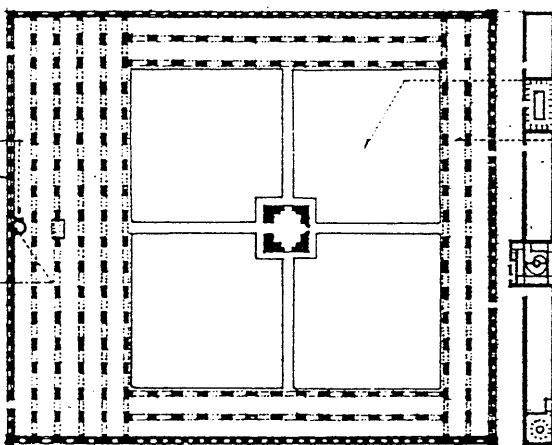
A city in Saudi Arabia, birthplace of Muhammad and spiritual center of Islam.

### Ka'ba

A small, cubical stone building in the courtyard of the Great Mosque at Mecca containing a sacred black stone and regarded by Muslims as the House of God, the objective of their pilgrimages, and the point toward which they turn in praying. Also, *Ka'aba*, *Ka'abah*.

### caravansary

An inn in the Near East for the overnight accommodation of caravans, usually having a large courtyard enclosed by a solid wall and entered through an imposing gateway. Also, *caravanserai*.

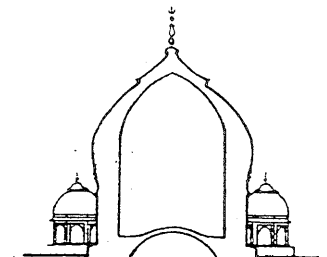


### sahn

The central courtyard of a mosque.

### riwaq

An arcaded hall of a mosque.



### melon dome

A bulbous ribbed dome, found esp. in Islamic architecture.

### stalactite work

A system of decoration in Islamic architecture, formed by the intricate corbeling of brackets, squinches, and inverted pyramids; sometimes wrought in stone but more often in plaster. Also called *honeycomb work*, *muqarna*.

### pendentive bracketing

Corbeling having the general form of a pendentive, commonly found in Moorish architecture.

### maksoorah

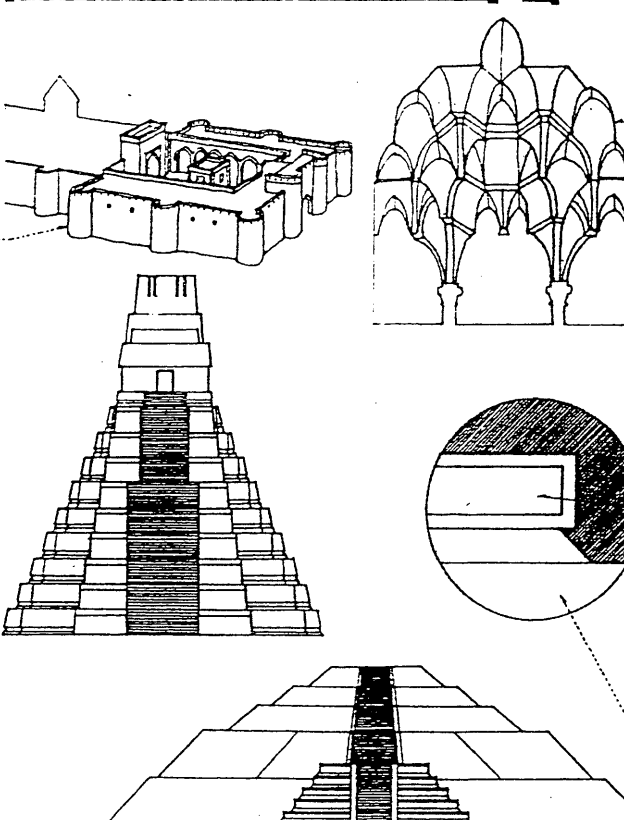
An openwork screen or partition enclosing an area for prayer or a tomb in a mosque.

### tablero

A rectangular, strongly framed panel that overhangs a talud. An original contribution of Teotihuacán architecture, this tablero-talud combination was introduced c.A.D. 150 to differentiate the stages of stepped pyramids and altar platforms. It is widely copied throughout Mesoamerica, with regional variations.

### talud

In Mesoamerican architecture, an outer wall that slopes inward as it rises. The talud first appeared c.800 B.C. at the Olmec site of La Venta, in Tabasco state, Mexico.



### pyramid

A masonry mass having a rectangular base and four stepped and sloping faces culminating in a single apex, used in ancient Egypt and pre-Columbian Central America as a tomb or a platform for a temple.

## Hinduism

The dominant religion of India, based upon the religion of the original Aryan settlers as expounded and evolved in the Vedas, having a diverse body of philosophy and cultural practices, many popular cults, and a large pantheon symbolizing a supreme being of many forms and natures. Buddhism is outside the Hindu tradition but is regarded as a related religion.

## pantheon

The officially recognized gods of a people.

## Vedas

The oldest sacred writings of Hinduism, composed between 1500 and 800 B.C., incorporating four collections hymns, prayers, and liturgical formulas: Rig-Veda, Yajur-Veda, Sama-Veda, and Atharva-Veda.

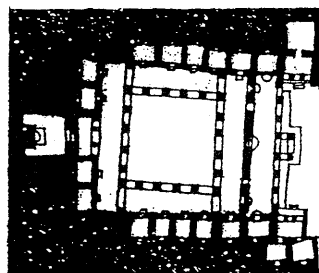


## stamba

A freestanding memorial pillar in Indian architecture, bearing carved inscriptions, religious emblems, or a statue. Also, *stambha*.

## lit

A monolithic stamba, as distinguished from one built up of stone courses.



## viihara

A Buddhist monastery in Indian architecture often excavated from solid rock, consisting of a central pillared chamber surrounded by a verandah onto which open small sleeping cells. Adjacent to this cloister was a courtyard containing the main stupa.

## chaitya

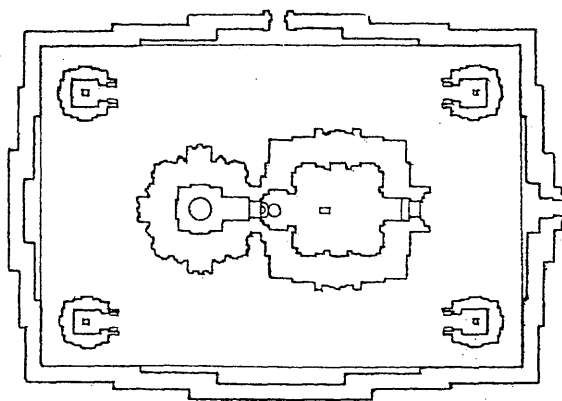
A Buddhist shrine in India, usually carved out of solid rock on a hillside, having the form of an aisled basilica with a stupa at one end.

## wat

A Buddhist monastery or temple in Thailand or Cambodia.

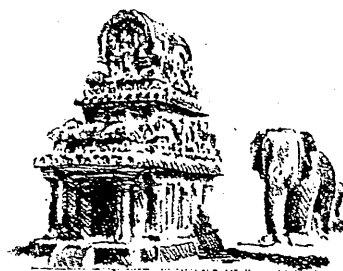
## Khmer

A people of Cambodia who established an empire in the 5th century A.D. and dominated most of Indochina from the 9th to the 12th centuries.



## mandira

A Hindu temple.



## rath

A Hindu temple cut out of solid rock to resemble a chariot. Also, *ratha*.

## vimana

The sanctuary of a Hindu temple in which a deity is enshrined.

## amalaka

The bulbous stone finial of a *sikhara*.

## sikhara

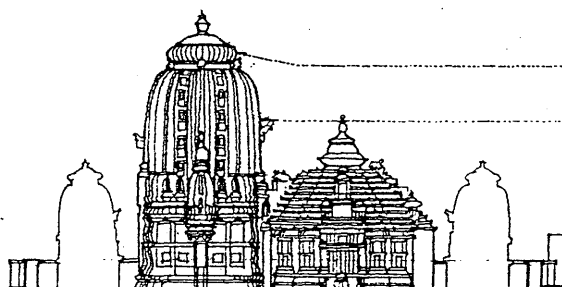
A tower of a Hindu temple, usually tapered convexly and capped by an *amalaka*. Also, *sikra*.

## mandapa

A large, porchlike hall leading to a Hindu temple and used for religious dancing and music.

## gopuram

A monumental, usually ornate gateway tower to a Hindu temple enclosure, esp. in southern India. Also, *gopura*.



## tee

A finial in the form of a conventionalized umbrella, used on stupas, totes, and pagodas.

## chattri

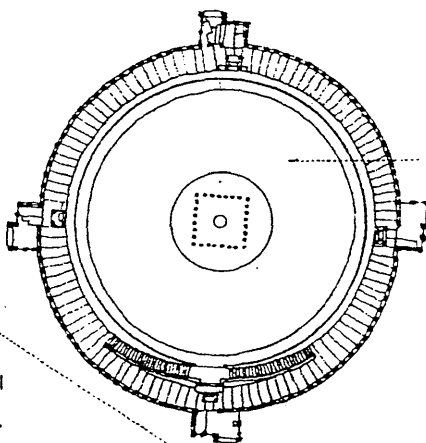
An umbrella-shaped finial symbolizing dignity, composed of a stone disk on a vertical pole.

## torana

An elaborately carved, ceremonial gateway in Indian Buddhist and Hindu architecture, having two or three lintels between two posts.

## vedika

A railing enclosing a sacred area, as a stupa.



## stupa

A Buddhist memorial mound erected to enshrine a relic of Buddha and to commemorate some event or mark a sacred spot. Modeled on a funerary tumulus, it consists of an artificial dome-shaped mound raised on a platform, surrounded by an outer ambulatory with a stone *vedika* and four *toranas*, and crowned by a *chattri*. The name for the stupa in Ceylon is *dagoba*, and in Tibet and Nepal, *chorten*. Also called *tope*.

## Buddhism

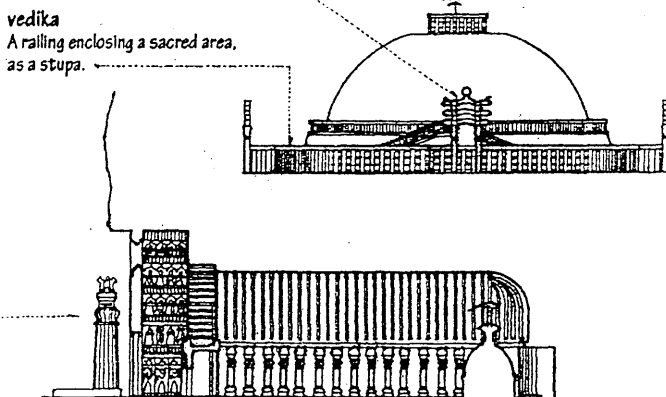
A religion based on the Four Noble Truths, originated in India by Gautama Buddha and later spreading to China, Burma, Japan, Tibet, and parts of Southeast Asia.

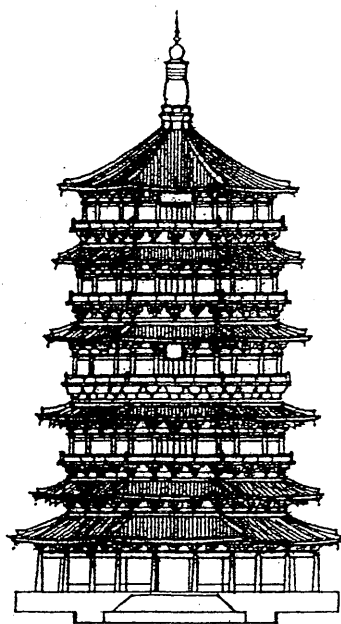
## Four Noble Truths

The doctrines of Buddha: all life is suffering; the cause of suffering is desire; cessation of suffering is possible through Nirvana – the extinction of craving; Nirvana can be reached through mental and moral self-purification.

## Buddha

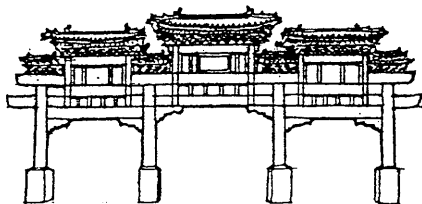
Title of Gautama Siddhartha c563–c483 B.C., Indian philosopher, religious leader, and founder of Buddhism. Also called Gautama Buddha.





**pagoda**

A Buddhist temple in the form of a square or polygonal tower with roofs projecting from each of its many stories, erected as a memorial or to hold relics. From the stupa, the Indian prototype, the pagoda gradually changed in form to resemble the traditional multistoried watch tower as it spread with Buddhism to China and Japan. Pagodas were initially of timber, but from the 6th century on, were more frequently of brick or stone, possibly due to Indian influence.



**pailou**

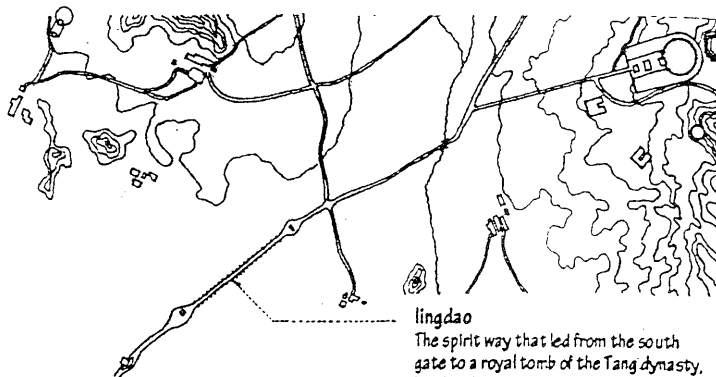
A monumental gateway in Chinese architecture, having a trabeated form of stone or wood construction with one, three, or five openings and often bold projecting roofs, erected as a memorial at the entrance to a palace, tomb, or sacred place; related to the Indian toranas and the Japanese torii. Also, pailou.

**zhonglou**

A bell tower or pavilion in Chinese architecture, located at the right side of a city gate, palace entrance, or forecourt of a temple.

**gulou**

A large drum tower or pavilion in Chinese architecture, located at the left side of a city gate, palace entrance, or forecourt of a temple.



**lingdao**

The spirit way that led from the south gate to a royal tomb of the Tang dynasty, lined with stone pillars and sculptured animal and human figures.

**Tang**

A dynasty in China, A.D. 618–907, marked by territorial expansion, the invention of printing, prosperous trade, and the development of poetry. Also, Tang.

**Yungang**

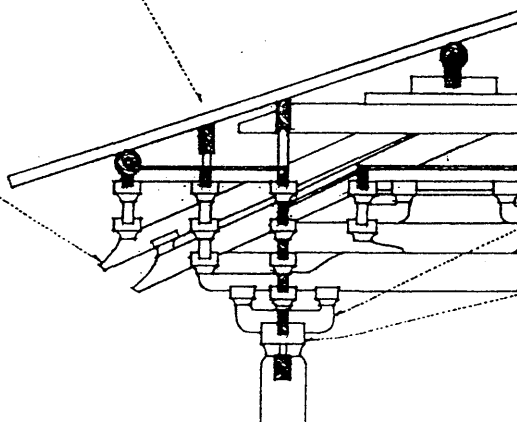
A large Buddhist monastic center in northwest China, begun in A.D. 460, where there are numerous cave temples, each having a shallow, oval-shaped interior with a massive central image of Buddha flanked by two smaller Buddhas; the concept of carving into cliffs is believed to have come to China from India. Also, Yün-kang.

**dougong**

A bracket system used in traditional Chinese construction to support roof beams, project the eaves outward, and support the interior ceiling. The absence of a triangular tied frame in Chinese architecture made it necessary to multiply the number of supports under the rafters. In order to reduce the number of pillars this would normally require, the area of support afforded by each pillar was increased by the dougong. Also, tou-kung.

**ang**

A lever arm in traditional Chinese construction, placed parallel to the rafters and raked at an angle to counterbalance the forces applied by the inner and outer purlins. The ang supports the outermost purlin by means of a bracket or cross-beam and is pinned at the inner end against a purlin.

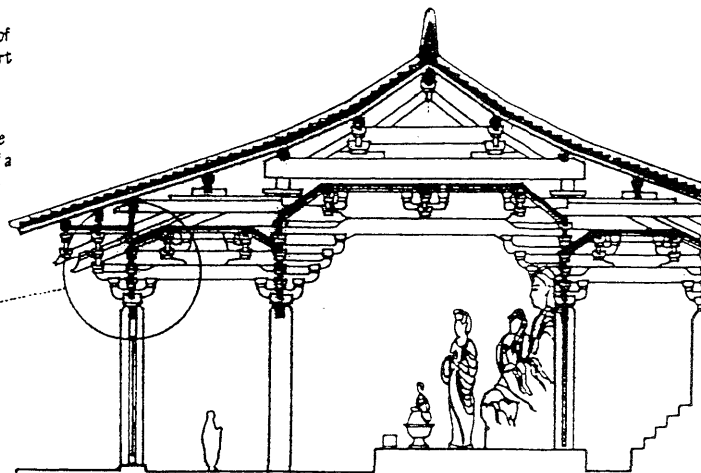


**gong**

A cantilevered bracket in traditional Chinese construction. Also, kung.

**dou**

A bearing block in traditional Chinese construction. Also, tou.





**katsuogi**  
The short wooden billets placed at right angles to the ridge of a Shinto shrine.

**chigi**  
The crossed finial formed by the projecting barge boards at each end of the ridge of a Shinto shrine.

**hashira**  
A sacred post in Shinto architecture, shaped by human hands.

**Nagare-zukuri**  
A style of Shinto shrine, based on the Ise prototype, but with the front slope of the roof extending to form a canopy over the entrance stair; this space eventually developed into a prayer room for worshippers.

**Kasuga-zukuri**  
A style of Shinto shrine, characterized by a hipped roof extending from the main roof, over a centrally placed entrance stair at one gable end.

**haiden**  
The hall of worship of a Shinto shrine, usually in front of the honden.

**honden**  
The main sanctuary of a Shinto shrine.

**bent approach**  
An approach through two gateways that are not aligned, so that it is necessary to make a sharp turn to pass from the first through the second, used for privacy in houses or temples, or for security in fortifications.

**torii**  
A monumental, freestanding gateway on the approach to a Shinto shrine, consisting of two pillars connected at the top by a horizontal crosspiece and a lintel above it, usually curving upward.

**Shinto**  
The indigenous religion of Japan, marked by a cultic devotion to deities of natural forces, ancestor worship, and veneration of the emperor as a descendant of the Sun-Goddess, Amaterasu.

**Shimmi-zukuri**  
A style of Shinto shrine embodying the original style of Japanese building, before the introduction of Buddhism. It consists essentially of a small unpainted rectangular structure raised above ground level on posts inserted directly into the earth. A railed veranda surrounds the structure at floor level, a freestanding post at each gable end supports the ridge, and the bargeboards extend outward from the thickly thatched roof, forming chigi at each end.

**kodo**  
An assembly hall for monks in a Japanese Buddhist temple, in which sacred texts are read.

**to**  
A Japanese pagoda enshrining Buddhist holy relics.

**sorin**  
The crowning spire on a Japanese pagoda.

**kondo**  
Golden Hall: the sanctuary where the main image of worship is kept in a Japanese Buddhist temple. The Jodo, Shinshu, and Nichiren sects of Buddhism use the term hondo for this sanctuary, the Shingon and Tendai sects use chudo, and the Zen sect uses butsuden.

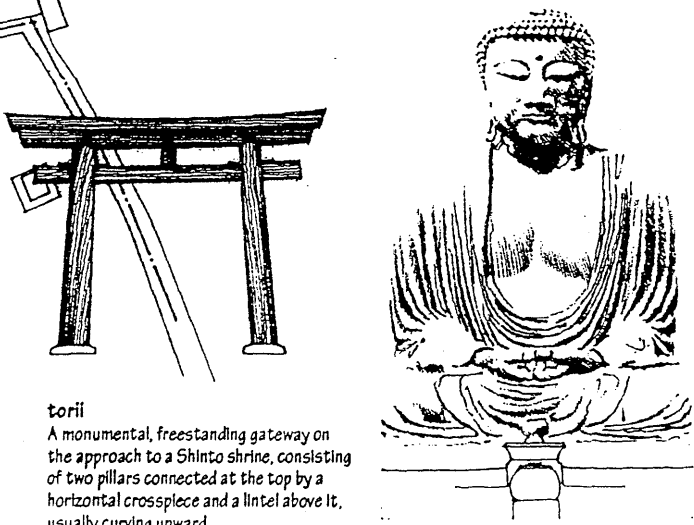
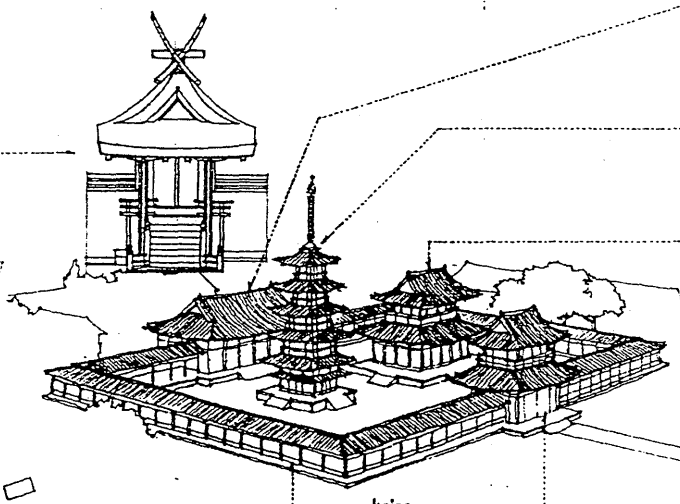
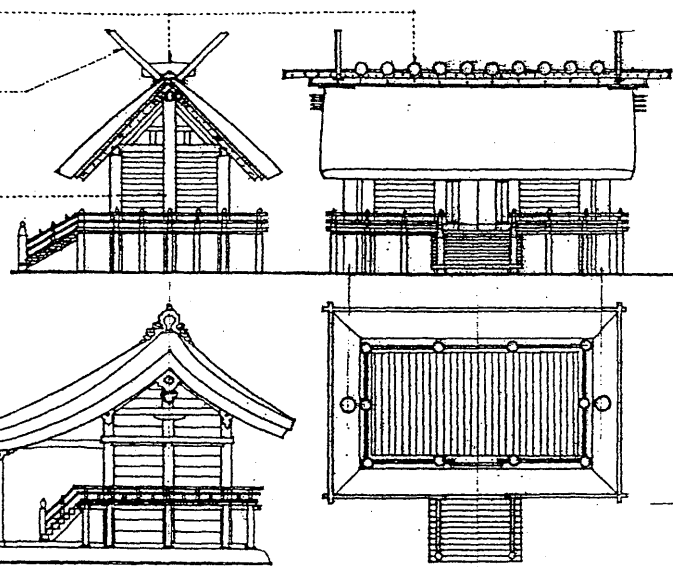
**nandaimon**  
The principal south gateway to a Japanese temple or shrine.

**chumon**  
The inner gateway to the precinct of a Japanese Buddhist temple.

**shoro**  
A structure from which the temple bell is hung, as one of a pair of small, identical, symmetrically placed pavilions in a Japanese Buddhist temple.

**butsu**  
A representation of Buddha.

**daibutsu**  
A large representation of Buddha.



# THEATER

A building, part of a building, or an outdoor area for housing dramatic presentations, stage entertainment, or motion-picture shows.

## Greek theater

An open-air theater, usually hollowed out of the slope of a hillside with a tiered seating area around and facing a circular orchestra backed by the skene, a building for the actors' use.

### orchestra

The circular space in front of the stage in the ancient Greek theater, reserved for the chorus.

### chorus

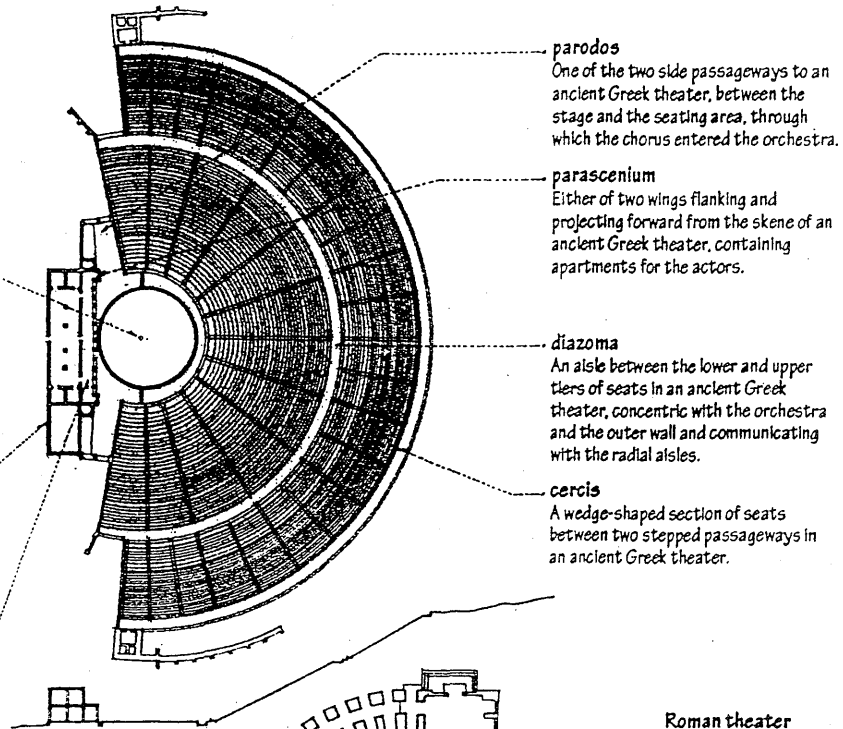
The group of actors in ancient Greece that served as major participants in or commentators on the main action of the drama.

### skene

A structure facing the audience in an ancient Greek theater, forming the background before which performances were given.

### proscenium

The front part of the stage of an ancient Greek or Roman theater upon which the actors performed.



### parodos

One of the two side passageways to an ancient Greek theater, between the stage and the seating area, through which the chorus entered the orchestra.

### parascenium

Either of two wings flanking and projecting forward from the skene of an ancient Greek theater, containing apartments for the actors.

### diazoma

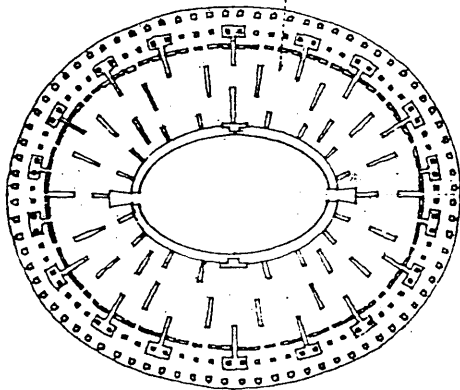
An aisle between the lower and upper tiers of seats in an ancient Greek theater, concentric with the orchestra and the outer wall and communicating with the radial aisles.

### cercis

A wedge-shaped section of seats between two stepped passageways in an ancient Greek theater.

### gradin

One of a series of steps or tiered seats, as in an amphitheater. Also, gradine.

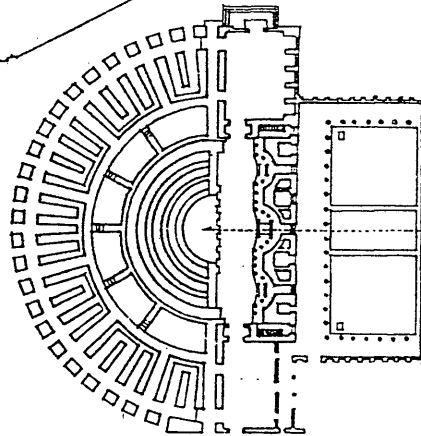


## amphitheater

An oval or round building with tiers of seats around a central arena, as those used in ancient Rome for gladiatorial contests and spectacles.

### podium

A raised platform encircling the arena of an ancient Roman amphitheater, having on it the seats of privileged spectators.



## Roman theater

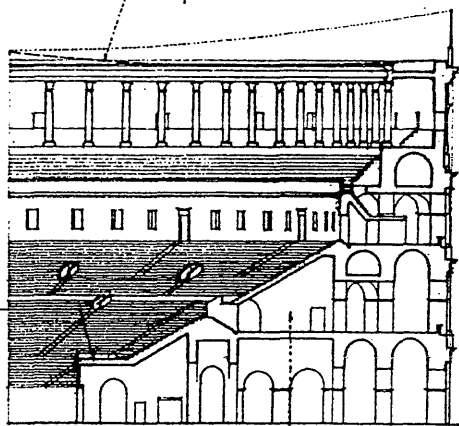
An open-air theater modeled upon that of the ancient Greeks, but often built on level ground with colonnaded galleries, a semicircular orchestra, and a raised stage backed by an elaborate architectural structure.

### orchestra

A semicircular space in the front of the stage of an ancient Roman theater, reserved for senators and other distinguished spectators.

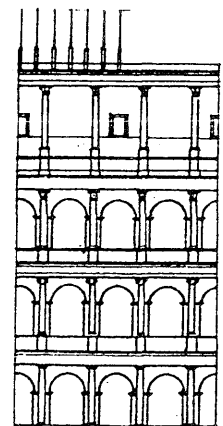
### velarium

A canvas awning drawn over an ancient Roman amphitheater to protect the audience from rain or sun.



### vomitory

A large opening, as in an ancient Roman amphitheater or stadium, permitting large numbers of people to enter or leave. Also, vomitorium.



### supercolumniation

The placing of one order of columns above another, usually with the more elaborate orders at the top.

**proscenium stage**  
A stage that is framed by a proscenium arch.

**proscenium arch**  
The arch that separates the stage from the auditorium. Also called *proscenium*.

**seating**  
The arrangement of seats in a theater, stadium, or other place of assembly.

**continental seating**  
A theater seating plan in which there is no center aisle, but with wide spacing between each row of seats to permit ease of passage.

**aisle**  
A walkway between or along sections of seats in a theater, auditorium, church, or other place of assembly.

**blind row**  
A row of seats having its first seat at a side aisle and its last seat at a side wall.

**stagehouse**  
The part of a theater on the stage side of the proscenium, including the stage, wings, and storage area.

**gridiron**  
A steel structure above the stage of a theater, from which hung scenery and equipment are manipulated. Also called *grid*.

**flies**  
The space above the stage used chiefly for storing and hanging scenery and equipment. Also called *fly loft*.

**bridge**  
A gallery or platform that can be raised or lowered over a stage and is used by technicians and stagehands.

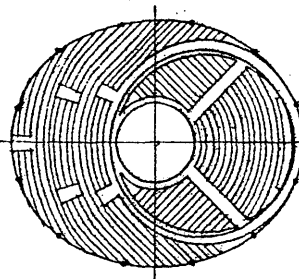
**batten**  
A length of metal pipe hung from the gridiron, for suspending scenery or equipment, as drop scenes, flats, or lighting units. Also called *pipe batten*.

**flat**  
A piece of scenery consisting of a wooden frame, usually rectangular, covered with lightweight board or fabric.

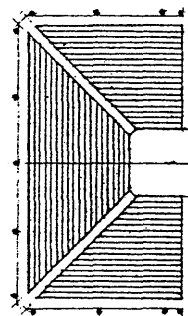
**orchestra shell**  
A sound-reflecting structure that closes off the flies and wings of a stage to form a performing area for music.

**stage**  
The platform, usually raised, on which the actors perform in a theater. Also, the platform and all the parts of a theater back of the proscenium.

**drop stage**  
A stage floor that moves vertically on an elevator, usually so that one set can quickly replace another. Also called *lift stage*.



**surround theater**  
A theater or concert hall in which the seating is arranged around or on all four sides of a central stage.



**arena theater**  
A theater with seats arranged on at least three sides around a central stage. Also called *theater-in-the-round*.

**thrust stage**  
A stage that extends beyond the proscenium arch and is usually surrounded on three sides by seats.

**spotlight**  
A strong, focused beam of light for calling attention to an object, person, or group on a stage. Also called *spot*.

**houselights**  
The lamps providing illumination of an auditorium or the seating area of a theater.

**fire curtain**  
A curtain of asbestos or other fireproof material that can be lowered just inside the proscenium arch in case of fire, sealing off the backstage area from the auditorium. Also called *safety curtain*.

**border**  
A narrow curtain or strip of painted canvas hung above the stage to mask the flies and form the top of the stage set.

**teaser**  
A drapery or flat piece hung across the top of the proscenium arch to mask the flies and, together with the tormentors, frame the stage opening.

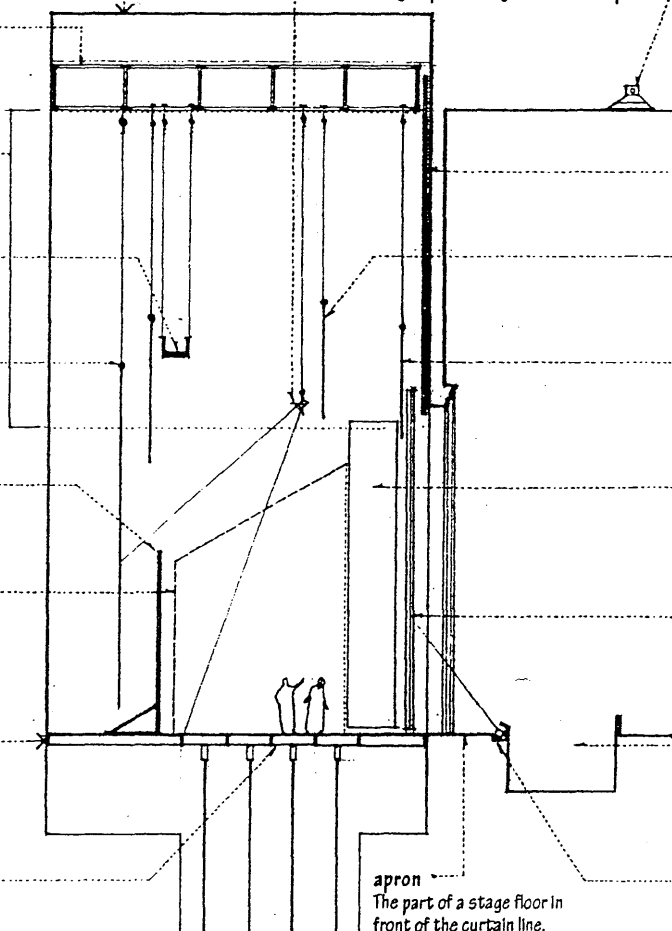
**tormentor**  
A curtain or framed structure used directly behind the proscenium at each side of the stage to screen the wings and sidelights from the audience.

**act curtain**  
A curtain for closing the proscenium opening between acts or scenes. Also called *act drop*, *house curtain*.

**orchestra pit**  
The space reserved for musicians, usually the front part of the main floor, sometimes wholly or partly under the forward part of the stage.

**footlights**  
The row of lights on the front of a stage, usually set in a trough, nearly on a level with the feet of the performers.

**apron**  
The part of a stage floor in front of the curtain line.



# THEATER

**opera house**  
A theater devoted chiefly to the public performance of operas.

**front of the house**  
The parts of a theater that are on the audience side of the fire wall.

**balcony**  
A gallery that projects over the main floor of a theater to accommodate additional people.

**gallery**  
An upper floor projecting over the main floor of a theater or hall.

**wing balcony**  
The part of a balcony that extends along the sidewalls of an auditorium.

**loge**  
A private seating area for a small group of spectators in a theater or opera house.

**peanut gallery**  
The rearmost and cheapest section of seats in the uppermost balcony of a theater.

**sight line**  
Any of the lines of sight between the spectators and the stage or playing area of a theater or stadium.

**dress circle**  
A curved or circular division of seats in a theater, opera house, or the like, usually the first gallery, originally set apart for spectators in evening dress.

**mezzanine**  
The lowest balcony or forward part of such a balcony in a theater.

**grand tier**  
The first tier of boxes immediately above the parterre in a large opera house or theater.

**tier**  
One of a number of galleries, as in a theater.

**orchestra**  
The entire main-floor space for spectators in a theater or auditorium.

**parterre**  
The rear section of seats, and sometimes also the side sections, of the main floor of a theater, opera house, or concert hall. Also called **parquet circle**.

**backstage**  
The area behind the proscenium in a theater, esp. in the wings and dressing rooms.

**auditorium**  
The space set apart for the audience in a theater or meeting hall.

**lobby**  
A hall serving as a passageway or waiting room at or near the entrance to a theater, hotel, or apartment house. Also called **foyer**.

**lounge**  
A large public waiting room, as in a theater, hotel, or air terminal, often having adjoining washrooms.

**box office**  
The office of a theater or stadium at which tickets are sold.

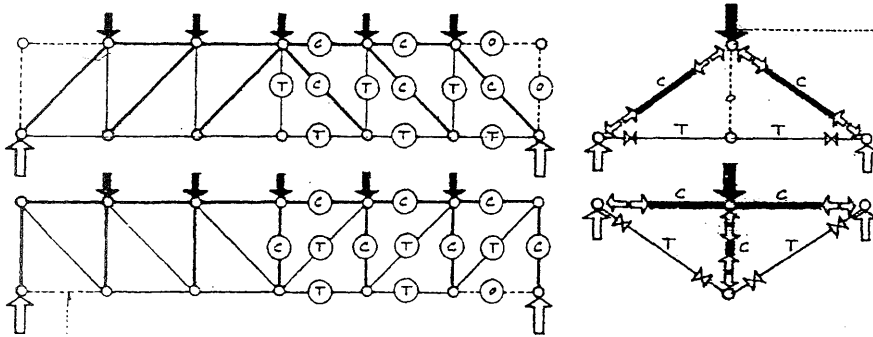
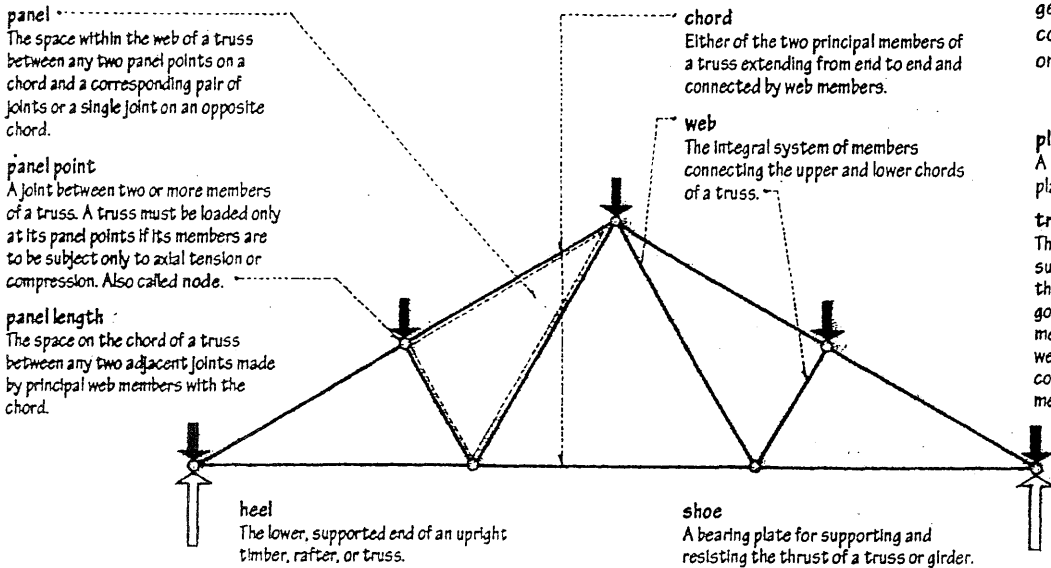
**marquee**  
A tall rooflike projection above a theater entrance, usually containing the name of a currently featured play or film and its stars.

**dressing room**  
A room for use in getting dressed, esp. one for performers backstage in a theater or television studio.

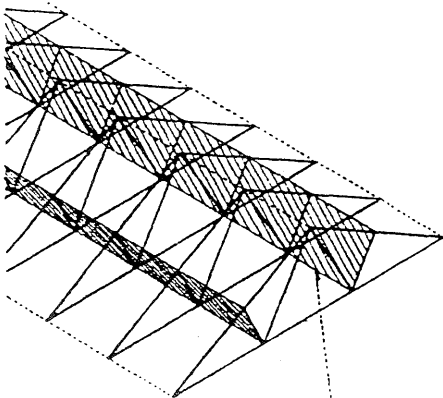
**wing**  
The platform or space to the right or left of the stage proper.

**runway**  
A narrow platform or ramp extending from a stage into the orchestra pit or into an aisle of an auditorium.

**green room**  
A lounge in a theater, concert hall, or broadcasting studio, for use by performers when they are not on stage.

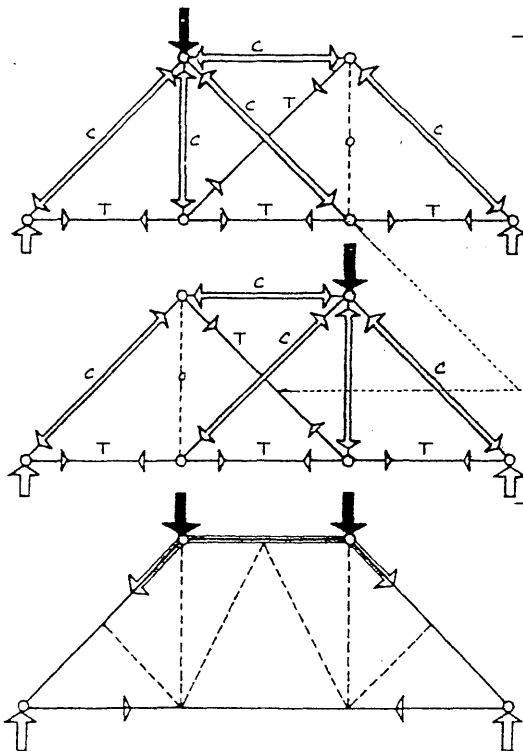


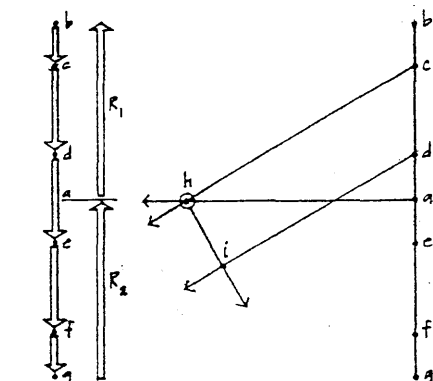
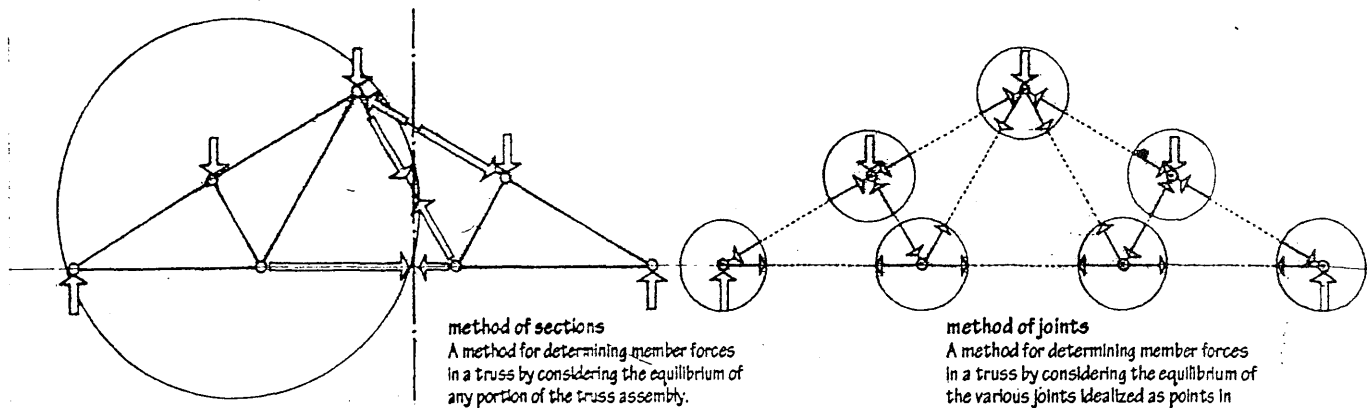
**zero-force member**  
A truss member that theoretically carries no direct load and whose omission would not alter the stability of the truss configuration.



**trussing**  
A structure formed by trusses. While rigid in its own plane, a truss must be braced in a perpendicular direction to prevent lateral buckling.

**local buckling**  
The buckling of a thin compressed element of a structural member, leading to failure of the whole.



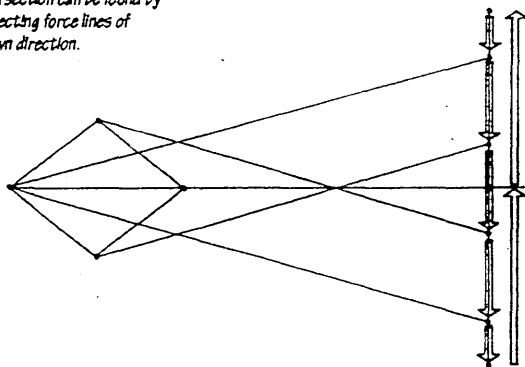


Since theoretically only axial forces are transmitted from one member to another at the joints, the direction of member forces can be drawn parallel to the truss members. Working from two known points, a third point of intersection can be found by projecting force lines of known direction.

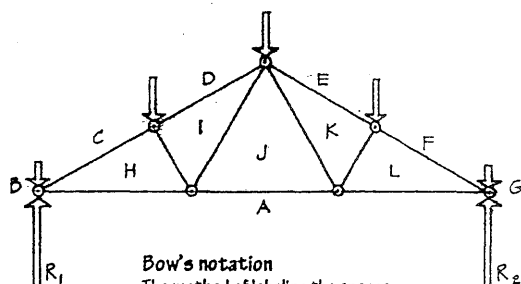
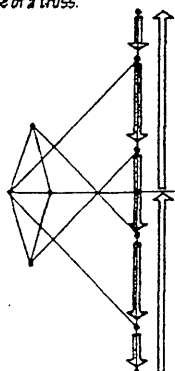
**Maxwell diagram**  
A graphic method for determining the magnitude and character of the stresses in the members of a truss.

Capital letters designate panel spaces, while lowercase letters designate ends of the force vectors.

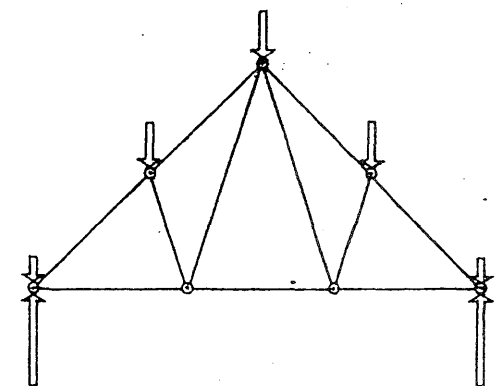
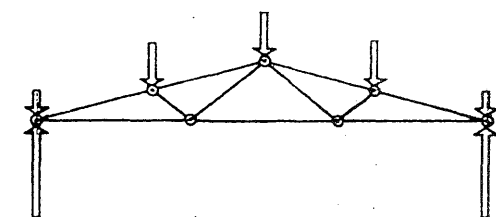
Member forces are inversely proportional to the rise of a truss.



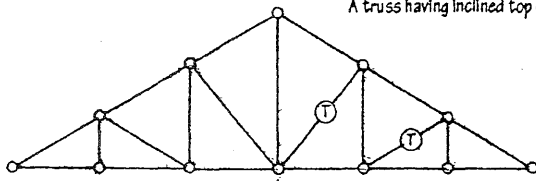
Member forces are inversely proportional to the rise of a truss.



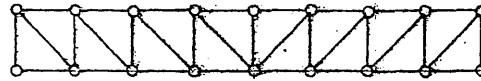
Member forces are inversely proportional to the rise of a truss.



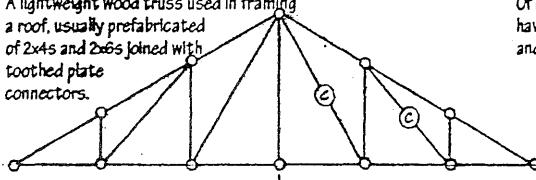
**pitched truss**  
A truss having inclined top chords.



**flat truss**  
A truss having parallel top and bottom chords. Flat trusses are generally not as efficient as pitched or bowstring trusses. Also called parallel-chord truss.



**trussed rafter**  
A lightweight wood truss used in framing a roof, usually prefabricated of 2x4s and 2x6s joined with toothed plate connectors.

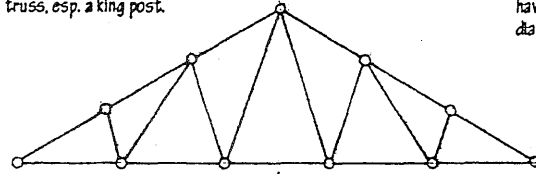


**Pratt**  
Of or pertaining to a flat or pitched truss having vertical web members in compression and diagonal web members in tension.



**trussed joist**  
A lightweight, flat wood truss used in framing a floor, usually prefabricated of 2x4s and 2x6s joined with toothed plate connectors.

**crown post**  
Any vertical member in a pitched truss, esp. a king post.

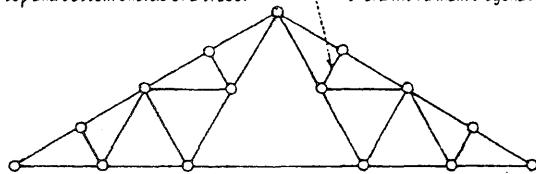


**Howe**  
Of or pertaining to a flat or pitched truss having vertical web members in tension and diagonal web members in compression.



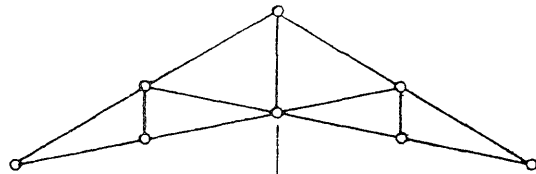
**Belgian**  
Of or pertaining to a pitched truss having only inclined web members.

**diagonal**  
An inclined web member joining the top and bottom chords of a truss.



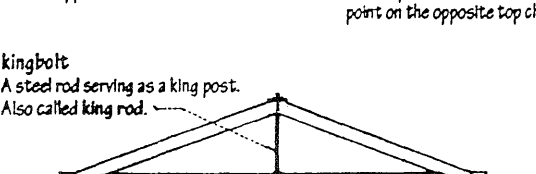
**subdiagonal**  
An inclined web member joining a chord with a main diagonal.

**fan truss**  
A truss having more than two web members radiating from a common point on the bottom chord.



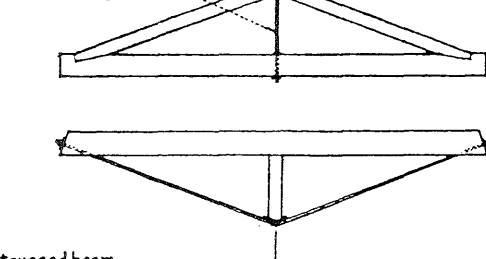
**Fink truss**  
A Belgian truss having subdiagonals to reduce the length of compression web members toward the centerline of the span.

**raised-chord truss**  
A truss having a bottom chord raised substantially above the level of the supports.

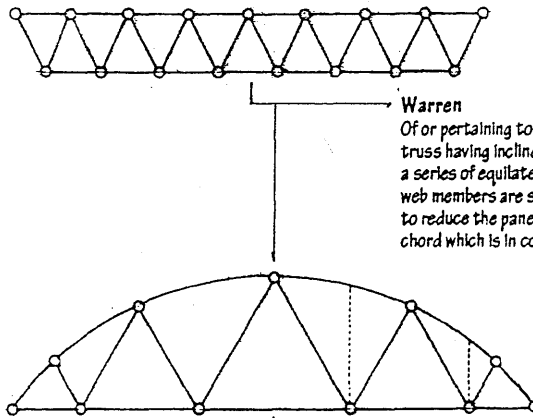


**scissors truss**  
A pitched truss having tension members extending from the foot of each top chord to an intermediate point on the opposite top chord.

**kingbolt**  
A steel rod serving as a king post. Also called king rod.

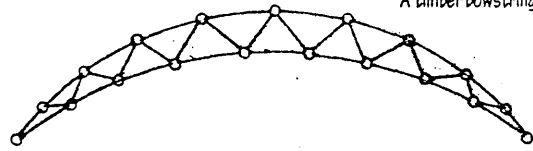


**Warren**  
Of or pertaining to a flat or bowstring truss having inclined web members forming a series of equilateral triangles. Vertical web members are sometimes introduced to reduce the panel lengths of the top chord which is in compression.

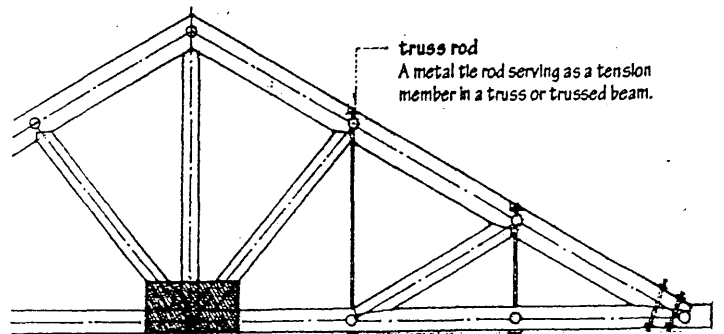


**bowstring truss**  
A truss having a curved top chord meeting a straight bottom chord at each end.

**Belfast truss**  
A timber bowstring truss.



**crescent truss**  
A truss having both top and bottom chords curving upward from a common point at each side. Also called camelback truss.

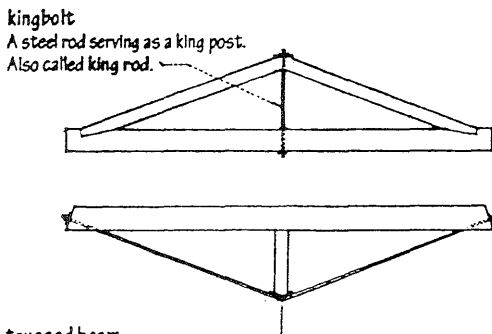


**truss rod**  
A metal tie rod serving as a tension member in a truss or trussed beam.

**gusset**  
A plate for uniting structural members meeting in a single plane. Also called gusset plate.

**composite truss**  
A truss having timber compression members and steel tension members.

**trussed beam**  
A timber beam stiffened by a combination of diagonal truss rods and either compression struts or suspension rods.



# VAULT

An arched structure of stone, brick, or reinforced concrete, forming a ceiling or roof over a hall, room, or other wholly or partially enclosed space.

## key course

A course of keystones in the crown of a masonry vault.

## vaulting course

A horizontal course forming the abutments or springers of a masonry vault.

## transverse arch

An arch for stiffening a barrel vault or supporting a groin vault.

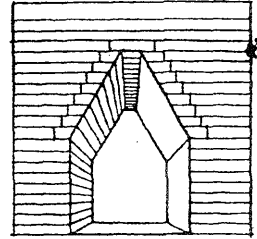
## severy

A bay between two transverse arches in a vaulted structure.

*Since it behaves as an arch extended in a third dimension, the longitudinal supporting walls must be buttressed to counteract the thrusts of the arching action.*

## buttress

An external support built to stabilize a structure by opposing its outward thrusts, esp. a projecting support built into or against the outside of a masonry wall.



## corbel vault

A vault constructed by corbeling courses of stone masonry. The resulting stepped surface can be smoothed or curved, but no arch action is incurred.

## flying buttress

An inclined bar of masonry carried on a segmental arch and transmitting an outward and downward thrust from a roof or vault to a solid buttress that through its mass transforms the thrust into a vertical one. Also called arc-boutant.

## pinnacle

A subordinate vertical structure terminating in a pyramid or spire, used esp. in Gothic architecture to add weight to a buttress pier.

## buttress pier

The part of a pier that rises to take the thrust of a flying buttress.

## amortizement

A sloping top on a buttress or projecting pier to shed rainwater.

## nosing

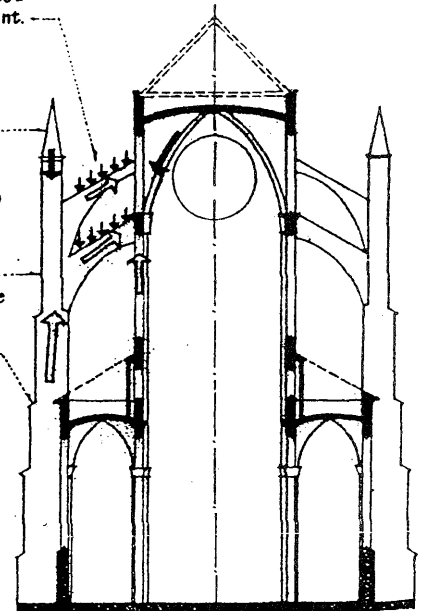
A projecting edge of a buttress.

## shaft

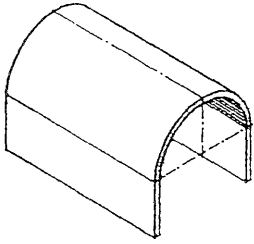
A distinct, slender, vertical masonry feature engaged in a wall or pier and supporting or feigning to support an arch or a ribbed vault.

## vaulting shaft

A shaft that leads to the springer of a rib or group of ribs, either rising from the ground or from a corbel at a greater height in the face of the masonry.

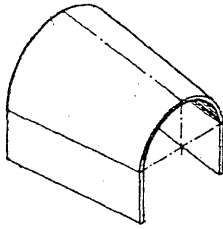






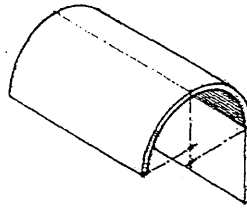
**barrel vault**

A vault having a semicircular cross section. Also called *cradle vault*, *tunnel vault*, *wagon vault*.



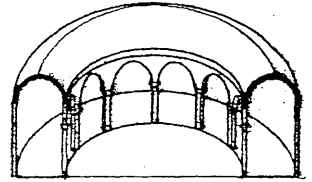
**conical vault**

A vault having a circular cross section that is larger at one end than the other.



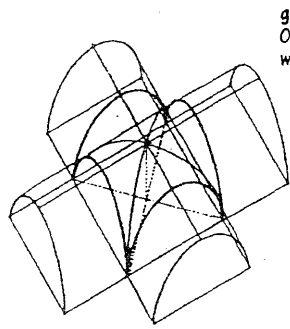
**rampant vault**

A vault springing from an abutment higher at one side than at the other.



**annular vault**

A barrel vault having a circular plan in the shape of a ring.

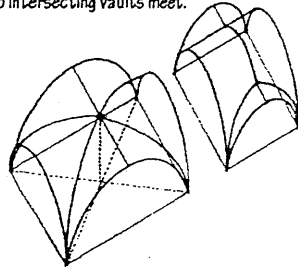


**groin vault**

A compound vault formed by the perpendicular intersection of two vaults, forming arched *diagonal arrises* called *groins*. Also called *cross vault*.

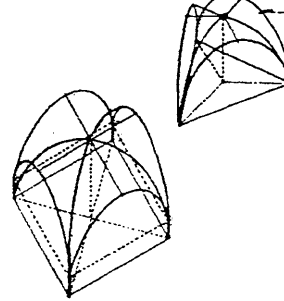
**groin**

One of the curved lines or edges along which two intersecting vaults meet.



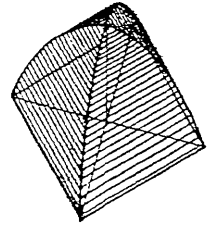
**underpitch vault**

A compound vault having a central vault intersected by vaults of lower pitch. Also called *Welsh vault*.



**tripartite vault**

A compound vault for covering a triangular space, formed by the intersection of three barrel vaults.

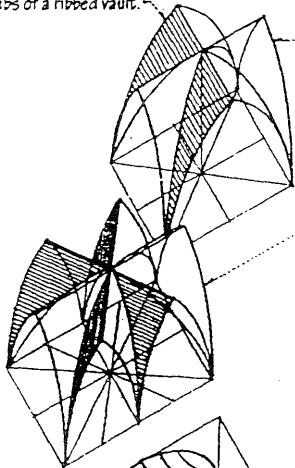


**cloister vault**

A compound vault formed by four *coxes* meeting along diagonal vertical planes. Also called *coved vault*.

**web**

A surface framed by the ribs of a ribbed vault.



**rib vault**

A vault supported by or decorated with arched *diagonal ribs*. Also, *ribbed vault*.

**quadripartite vault**

A rib vault divided into four parts by intersecting *diagonal ribs*.

**sexpartite vault**

A rib vault divided into six compartments by two *diagonal ribs* and three *transverse ribs*.

**rib**

Any of several archlike members supporting a vault at the *groins*, defining its distinct surfaces or dividing these surfaces into panels.

**arc doubleau**

A rib spanning the longitudinal axis of a rib vault and dividing it into bays or compartments. Also called *transverse rib*.

**tierceron**

A rib springing from a point of support on either side of the *ogives* or *transverse ribs* of a rib vault. Also called *intermediate rib*.

**formeret**

A rib against a wall, parallel to the longitudinal axis of a rib vault. Also called *wall rib*.

**boss**

An ornamental, knoblike projection, as a carved *keystone* at the intersection of *ogives*.

**pendant**

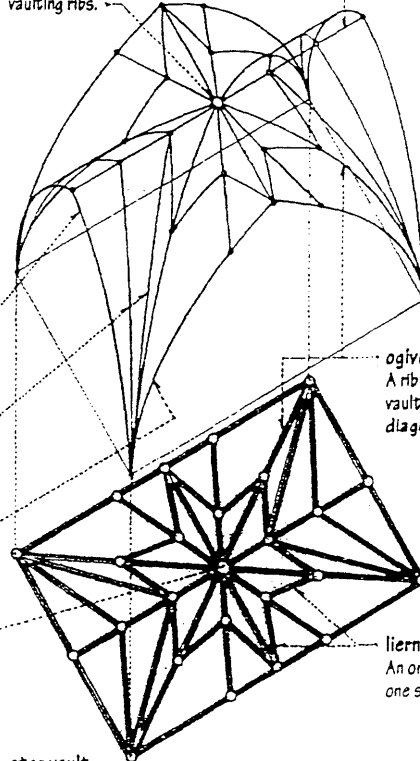
A sculptured ornament suspended from a roof truss, vault, or ceiling. Also called *drop*.

**key**

The *keystone* at the crown of an arch or at the intersection of two or more vaulting ribs.

**ridge rib**

A horizontal rib marking the crown of a vaulting compartment.



**ogive**

A rib crossing a compartment of a rib vault on a diagonal. Also called *diagonal rib*, *groin rib*.

**lierne**

An ornamental vaulting rib other than one springing from a pier or a ridge rib.

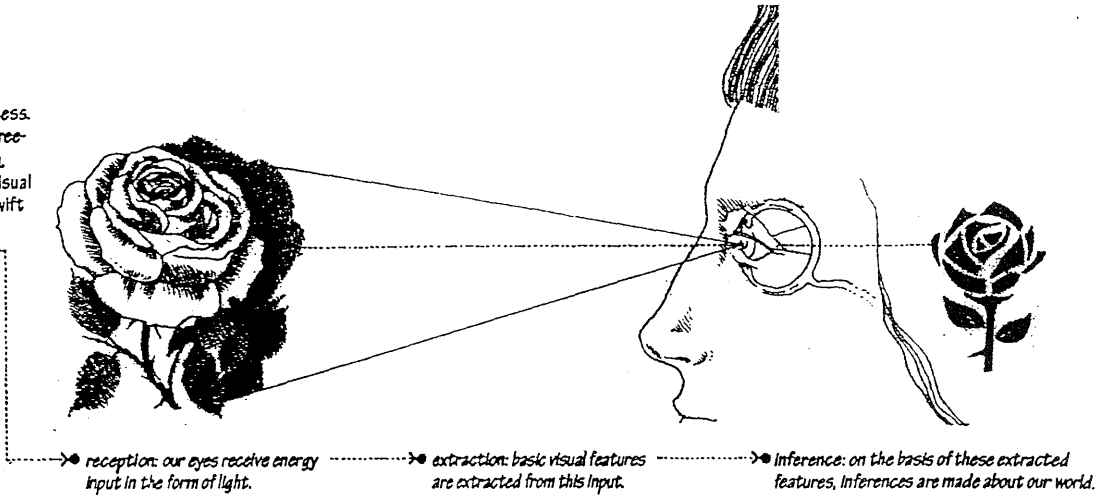
**fan vault**

A vault composed of a number of concave conoidal sections, usually four, springing from the corners of the vaulting compartment, often decorated with ribs that radiate from the springing like the framework of a fan.

VISION

Sight: the act or power of sensing with the eyes.

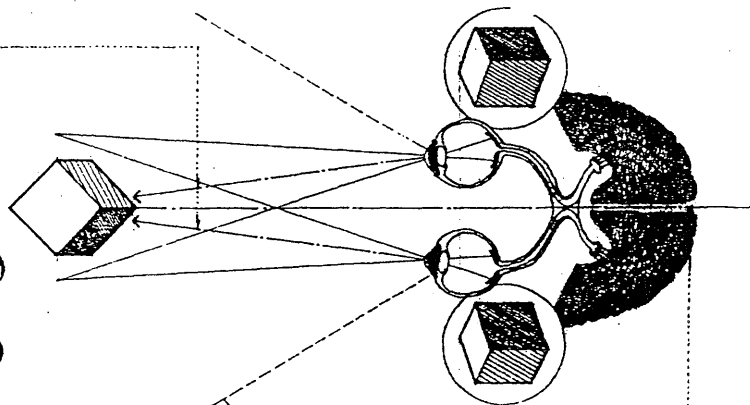
see  
To perceive with the eyes. The act of seeing is a dynamic and creative process. It is capable of delivering a stable, three-dimensional perception of the moving, changing images which make up our visual world. There are three steps in the swift and sophisticated processing which results in the images we see.



binocular vision  
The three-dimensional, stereoscopic vision resulting from the use of both eyes at the same time.

convergence  
The coordinated turning of the eyes inward to focus on a nearby point.

accommodation  
The process by which the human eye changes focus for objects at various distances, involving changes in the shape of the crystalline lens.



parallax  
The apparent displacement or change in direction of an observed object caused by a change in the position of the observer that provides a new line of sight.

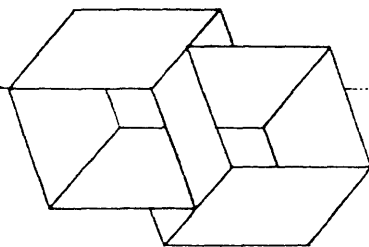
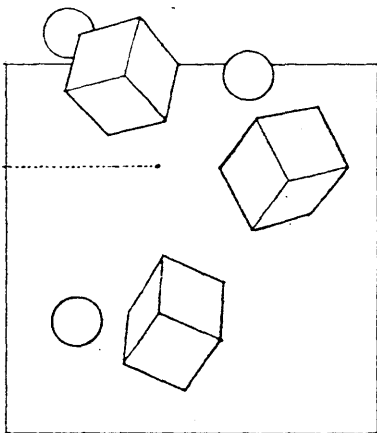
visuospatial  
Pertaining to perception of the spatial relationships among objects within the field of vision.

orientation  
The ability to locate oneself in one's environment with reference to time, place, and people.

visual literacy  
The ability to apprehend and interpret pictures, drawings, or other visual images.

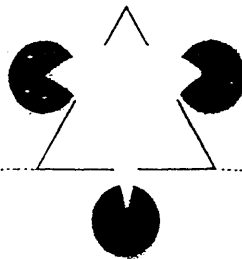
eye  
Appreciative or discriminating visual perception.

optical illusion  
A perception of visual stimuli that represents what is perceived in a way different from the way it is in reality.



field of vision  
The entire field encompassed by the human eye when it is trained in any particular direction. Also called visual field.

visual angle  
The angle that an object or detail subtends at the point of observation, usually measured in minutes of arc.

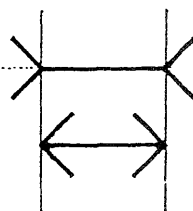


visual cortex  
The portion of the cerebral cortex of the brain that receives and processes impulses from the optic nerves.

visual acuity  
Acuteness of vision as determined by a comparison with the normal ability to define certain letters at a given distance, usually 20 ft. (6 m).

discrimination  
The ability or power to see or make fine distinctions.

aspect  
Appearance to the human eye or mind.



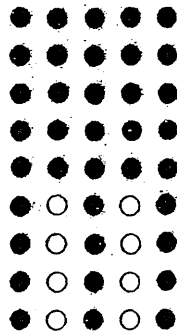
**camouflage**

The obscuring of a form or figure that occurs when its shape, pattern, texture, or coloration is similar to that of its surrounding field or background.



**projection**

A property of perception in which the mind's eye searches for meaning by imagining and projecting known or familiar images onto the seemingly amorphous shapes of a pattern until it finds a match which makes sense. This attempt to complete an incomplete pattern, or find a meaningful pattern embedded in a larger one, is in accordance with what we already know or expect to see. Once seen and understood, it is difficult to not see the image.



**similarity**

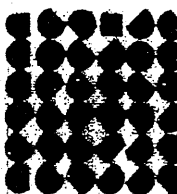
A property of perception in which there is a tendency to group things which have some visual characteristic in common, as a similarity of shape, size, color, orientation or detail.

**proximity**

A property of perception in which there is a tendency to group elements which are close together, to the exclusion of those which are further away.

**continuity**

A property of perception in which there is a tendency to group elements which continue along the same line or in the same direction. This search for continuity of line and direction can also lead to our perception of the simpler, more regular figures or patterns in a composition.

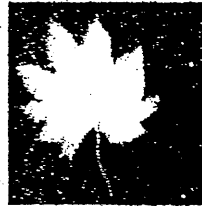
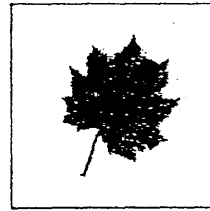
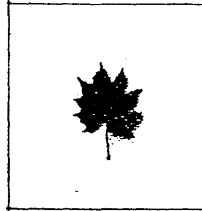
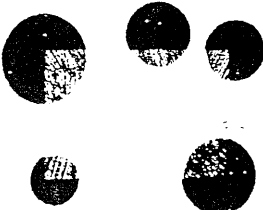


**constancy**

A perceptual phenomenon in which apparent differences in size are ignored in order to identify and categorize things, regardless of how distant they are, leading to the perception of a class of objects as having uniform size and constant color and texture.

**closure**

A property of perception in which there is a tendency for an open or incomplete figure to be seen as if it were a closed or complete and stable form.



**perception**

The act or faculty of apprehending by means of the senses or of the mind.

**visual perception**

An awareness derived by the visual system in response to an external stimulus.

**figure-ground**

A property of perception in which there is a tendency to see parts of a visual field as solid, well-defined objects standing out against a less distinct background.

**figure**

A shape or form, as determined by outlines or exterior surfaces.

**ground**

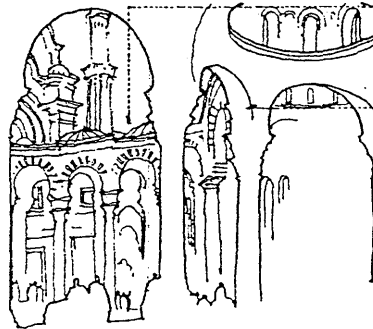
The receding part of a visual field against which a figure is perceived. Also called background.

**background**

The parts or portion of a scene, situated in the rear, as opposed to foreground.

**foreground**

The parts or portion of a scene situated in the front, nearest to the viewer.



**Gestalt psychology**

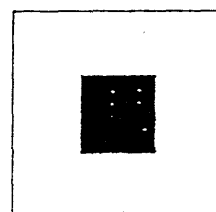
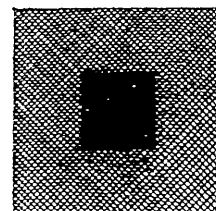
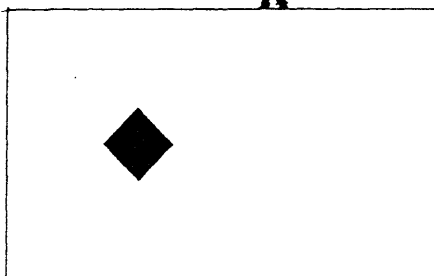
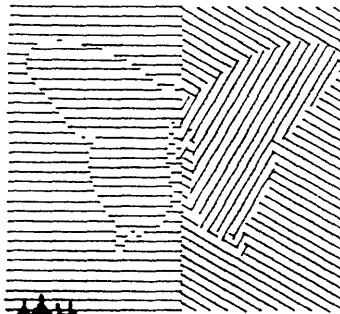
The theory or doctrine that physiological or psychological phenomena do not occur through the summation of individual elements, as reflexes or sensations, but through gestalts functioning separately or interrelatedly. Also called configurationism.

**gestalt**

A unified configuration, pattern, or field of specific properties that cannot be derived from the summation of the component parts.

**pattern**

A consistent, characteristic, or coherent arrangement based on the interrelation of component parts.



**successive contrast**

A phenomenon of visual perception in which intense exposure to one color or value leads to the sensation of its complement, which is projected as an afterimage on another color or surface viewed immediately thereafter.

**afterimage**

A visual sensation that persists after the stimulus that caused it is no longer operative or present.

**simultaneous contrast**

A phenomenon of visual perception in which the stimulation of one color or value leads to the sensation of its complement, which is projected instantaneously on a juxtaposed color or value. Simultaneous contrast intensifies complementary colors and shifts analogous colors toward each other's complementary hue, esp. when the juxtaposed colors are similar in value. When two colors of contrasting value are juxtaposed, the lighter color will deepen the darker color while the darker color will lighten the lighter one.

WALL

Any of various upright constructions presenting a continuous surface and serving to enclose, divide, or protect an area.

**bearing wall**  
A wall capable of supporting an imposed load, as from a floor or roof of a building. Also called **load-bearing wall**.

**nonbearing wall**  
A wall supporting no load other than its own weight. Also called **non-load-bearing wall**.

**canton**  
A pilaster or similar feature projecting from a corner of a building.

**pilaster**  
A shallow rectangular feature projecting from a wall, having a capital and a base and architecturally treated as a column.

**engaged column**  
A column built so as to be truly or seemingly bonded to the wall before which it stands.

**return wall**  
A short wall perpendicular to the end of a longer wall.

**pier**  
A vertical supporting structure, as a section of wall between two openings or one supporting the end of an arch or lintel.

**discharging arch**  
An arch built above another structural member to relieve its load. Also called **relieving arch**.

**lintel**  
A beam supporting the weight above a door or window opening.

**template**  
A horizontal timber or stone set in a wall to receive and distribute the pressure of a girder or beam, as over an opening. Also, **templet**.

**exterior wall**  
A wall forming part of the envelope of a building, having one face exposed to the weather or to earth. Also called **external wall**.

**interior wall**  
Any wall within a building, entirely surrounded by exterior walls.

**partition**  
An interior wall dividing a room or part of a building into separate areas.

**bearing partition**  
An interior wall carrying a structural load. Also called **load-bearing partition**.

**nonbearing partition**  
An interior wall supporting no load other than its own weight. Also called **non-load-bearing partition**.

**screen**  
A movable or fixed device, esp. a framed construction, designed to divide, conceal, or protect.

**movable partition**  
A partition capable of being moved to different locations. Also called **demountable partition**.

**coping**  
A finishing or protective cap or course to an exterior wall, usually sloped or curved to shed water.

**splayed coping**  
A coping that slopes only in one direction. Also called **wedge coping**.

**saddle coping**  
A coping that slopes to either side of a center ridge. Also called **saddlebacked coping**.

**parapet**  
A low, protective wall at the edge of a terrace, balcony, or roof, esp. that part of an exterior wall, fire wall, or party wall that rises above the roof.

**gable wall**  
A wall bearing or crowned by a gable.

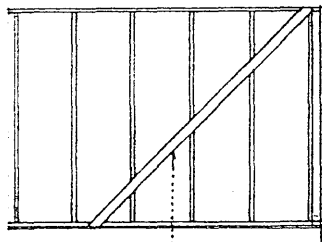
**basement wall**  
A foundation wall that encloses a usable area under a building.

**party wall**  
A wall used jointly by contiguous structures, erected upon a line dividing two parcels of land, each of which is a separate real estate entity.

**blind wall**  
A wall having no windows, doorways, or other openings.

**frame house**

A house constructed with a skeletal framework of timber, usually sheathed with siding or shingles.

**corner brace**

A diagonal brace let into studding to reinforce the corner of a frame structure.

**let in**

To insert into the surface of a stud, wall, or the like as a permanent addition.

**corner post**

An assembly of two or three studs spiked together at the intersection of two framed walls to provide a nailing surface for finish materials.

**backing**

A narrow wood strip fixed to the corner of a framed partition to provide a nailing surface for finish materials.

**firestop**

A material or member built into a building frame to block a concealed hollow space through which a fire might spread from one part of the building to another.

**ledger strip**

A piece attached to the face of a beam at the bottom as a support for the ends of joists.

**ribbon**

A thin, horizontal board let into studding to carry the ends of joists. Also called ledger, ribband, ribbon strip.

**balloon frame**

A wooden building frame having studs that rise the full height of the frame from the sill plate to the roof plate, with joists nailed to the studs and supported by sills or by ribbons let into the studs.

**plate**

Any of various horizontal timbers laid flat across the heads of studding or upon floors to support joists, rafters, or studs at or near their ends.

**wall plate**

A horizontal member built into or laid along the top of a wall to support and distribute the load from joists or rafters. Also called raising plate.

**top plate**

The uppermost horizontal member of a framed wall on which joists or rafters rest.

**blocking**

A number of small wood pieces inserted to space, join, or reinforce members of a building frame, fill the spaces between them, or provide a nailing surface for finish materials.

**stud wall**

A wall or partition framed with studs and faced with sheathing, siding, wallboard, or plasterwork. Also called stud partition.

**stud**

Any of a series of slender, upright members of wood or metal forming the structural frame of a wall or partition.

**cripple**

Any framing member that is shorter than usual, as a stud above a door opening or below a window sill.

**center-to-center**

From the centerline of one element, member, or part to the centerline of the next. Also called on center.

**soleplate**

The bottom horizontal member of a framed wall upon which a row of studs is erected. Also called shoe, sole, solepiece.

**platform frame**

A wooden building frame having studs only one story high, regardless of the stories built, each story resting on the top plates of the story below or on the sill plates of the foundation wall. Also called western frame.

**pony wall**

A dwarf wall for supporting floor joists.

**dwarf wall**

A wall less than a full story in height.

**anchor bolt**

Any of various rods or bolts embedded in masonry or concrete to hold, secure, or support a structural member.

**sill sealer**

A resilient, fibrous material placed between a sill and a foundation wall to reduce air infiltration.

**termite shield**

Sheet metal installed atop a foundation wall or around pipes to prevent the passage of termites.

**sill**

The lowest horizontal member of a frame structure, resting on and anchored to a foundation wall. Also called mudsill, sill plate.

**box sill**

A sill for a building frame, composed of a plate resting on a foundation wall and a joist or header at the outer edge of the plate, as well as a soleplate for studs resting either directly on the joists or on the rough flooring.

**L sill**

A sill for a building frame, composed of a plate resting on a foundation wall and a joist or header at the outer edge of the plate.

# WALL

## siding

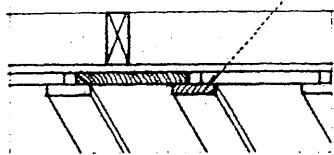
A weatherproof material, as shingles, boards, or units of sheet metal, used for surfacing the exterior walls of a frame building.

## corner board

A board against which siding is fitted at the corner of a frame structure.

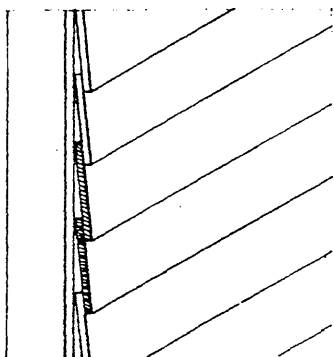
## batten

A small board or strip of wood used for various building purposes, as to cover joints between boards, support shingles or roofing tiles, or provide a base for lathing.



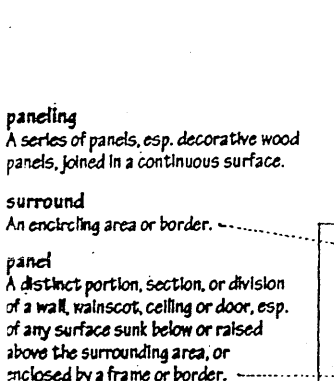
## board and batten

Siding consisting of wide boards or plywood sheets set vertically with butt joints covered by battens.



## colonial siding

Siding composed of plain, square-edged boards laid horizontally so that the upper overlaps the one below.



## paneling

A series of panels, esp. decorative wood panels, joined in a continuous surface.

## surround

An encircling area or border.

## panel

A distinct portion, section, or division of a wall, wainscot, ceiling or door, esp. of any surface sunk below or raised above the surrounding area, or enclosed by a frame or border.

## wainscot

A facing of wood paneling, esp. when covering the lower portion of an interior wall.

## nullion

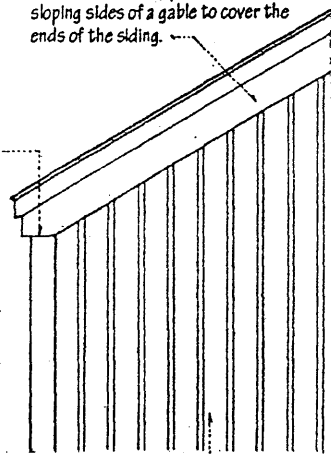
A vertical member dividing the panels in wainscoting.

## ado

The lower portion of an interior wall when faced or treated differently from the upper section, as with paneling or wallpaper.

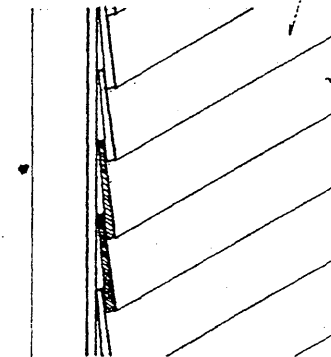
## rake

A board or molding placed along the sloping sides of a gable to cover the ends of the siding.



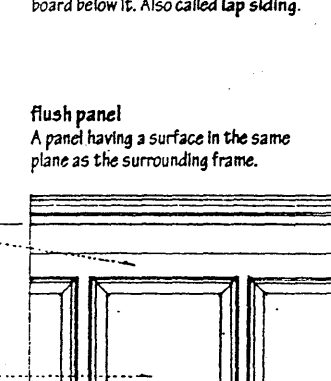
## vertical siding

Siding consisting of matched boards applied vertically.



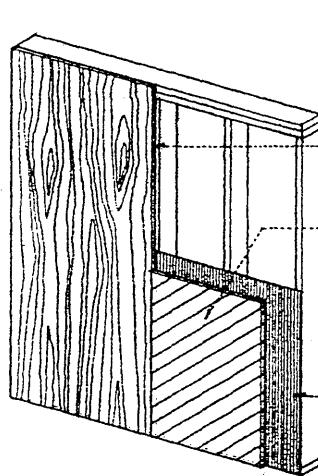
## bevel siding

Siding composed of tapered boards, as clapboards, laid horizontally with the thicker lower edge of each board overlapping the thinner upper edge of the board below it. Also called lap siding.



## flush panel

A panel having a surface in the same plane as the surrounding frame.



## sheathing

A rough covering of boards, plywood, or other panel materials applied to a frame structure to serve as a base for siding, flooring, or roofing.

## structural sheathing

Sheathing capable of bracing the plane of a framed wall or roof.

## diagonal sheathing

A sheathing of boards applied diagonally for lateral strength.

## boarding

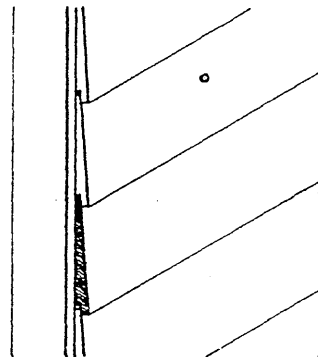
A structure of boards, as for sheathing or subflooring.

## building paper

Any of various papers, felts, or similar sheet material used in construction to prevent the passage of air or moisture.

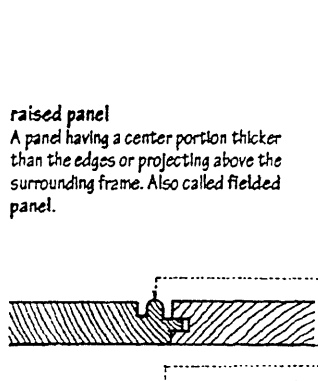
## clapboard

A long, thin board with one edge thicker than the other, laid horizontally as bevel siding.



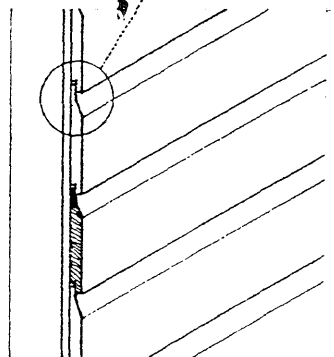
## Dolly Varden siding

Bevel siding rabbeted along the lower edge to receive the upper edge of the board below it.



## shiplap

A flush, overlapping joint, as a rabbet, between two boards joined edge to edge. Also, the boarding joined with such overlapping joints.

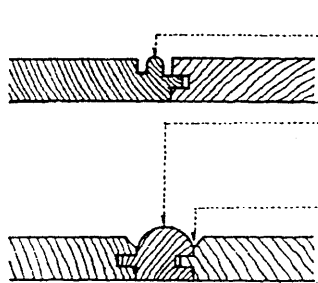


## drop siding

Siding composed of boards narrowed along the upper edges to fit into rabbets or grooves in the lower edges, laid horizontally with their backs flat against the sheathing or studs of the wall. Also called novelty siding, rustic siding.

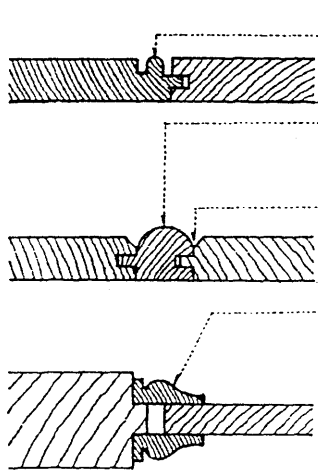
## raised panel

A panel having a center portion thicker than the edges or projecting above the surrounding frame. Also called fielded panel.



## sunk panel

A panel having a surface recessed below the surrounding frame or surface.



## flush bead

A bead having its outer surface at the same level as the adjoining surfaces.

## cock bead

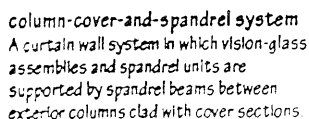
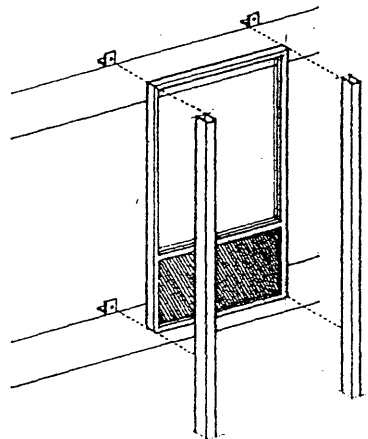
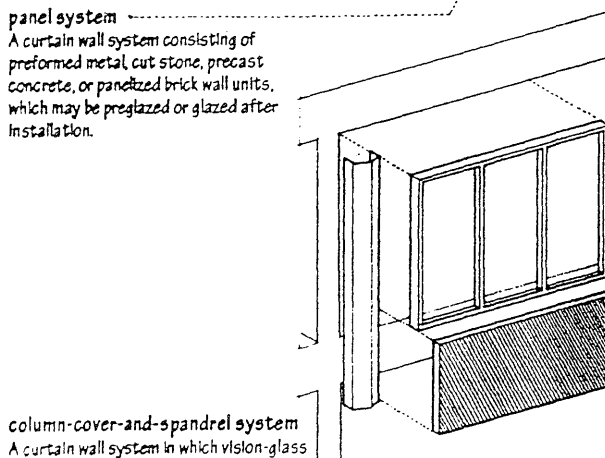
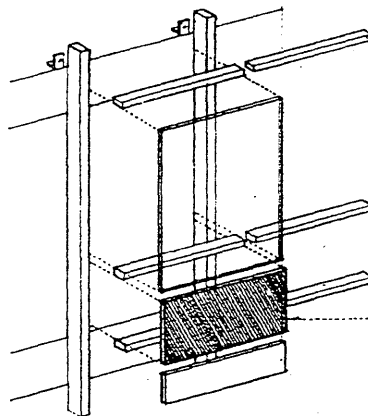
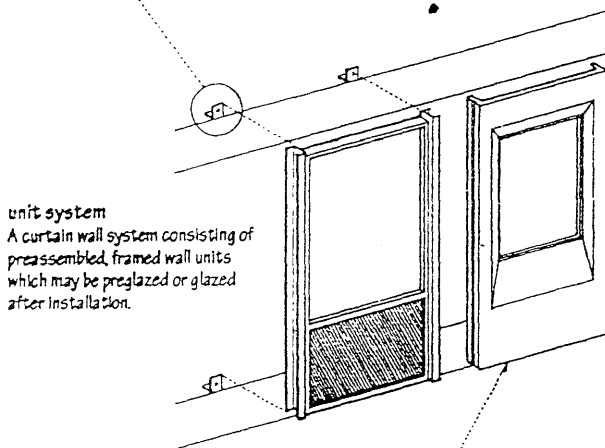
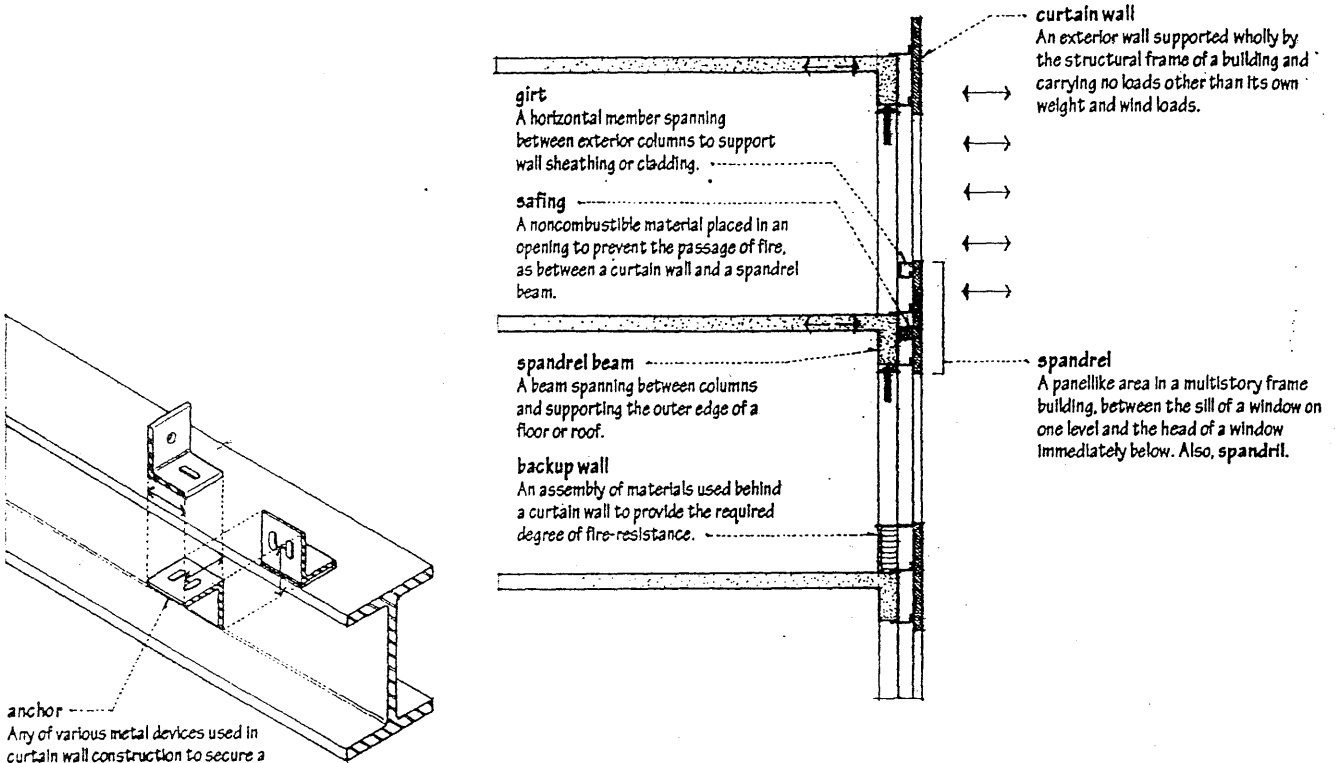
A bead that projects above or beyond the adjoining surfaces.

## quirk

A groove or acute angle dividing a bead or other molding from adjoining members or surfaces.

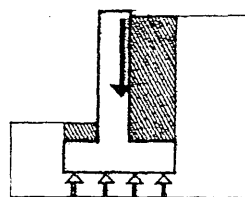
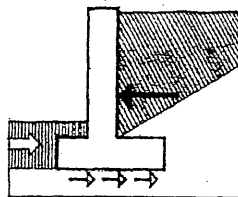
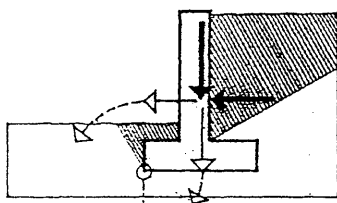
## bolection

A raised molding for framing a panel, doorway, or fireplace, esp. when the meeting surfaces are at different levels. Also, bilection.



# WALL

**retaining wall**  
A wall of treated timber, masonry, or concrete for holding in place a mass of earth. A retaining wall can fail by overturning, sliding, or settling. Also called breast wall.

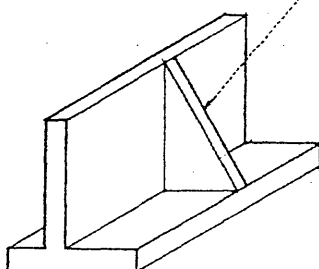
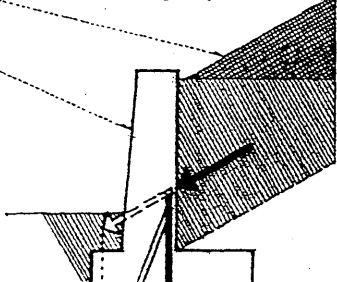


**surcharge**  
An additional or excessive load or burden, as that of the earth above the level of the top of a retaining wall.

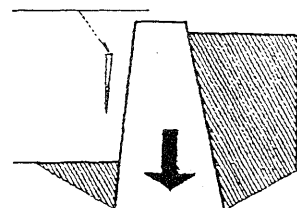
**toe**  
The forward, lower tip of the base of a footing or retaining wall, extended to give broader bearing and greater stability.

**counterfort**  
A triangular-shaped cross wall tying a concrete retaining wall to its base at regular intervals, built on the side of the material to be retained in order to stiffen the vertical slab and add weight to the base.

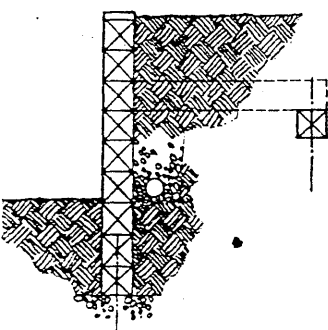
**cantilever wall**  
A retaining wall of reinforced concrete or reinforced concrete masonry, cantilevered from and securely tied to a spread footing that is shaped to resist overturning and sliding.



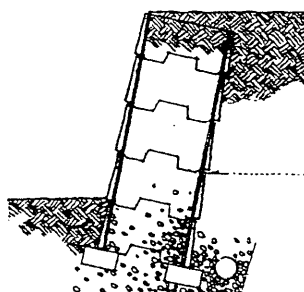
**batter**  
A backward slope of the face of a wall as it rises.



**gravity wall**  
A masonry or concrete retaining wall that resists overturning and sliding by the sheer weight and volume of its mass.

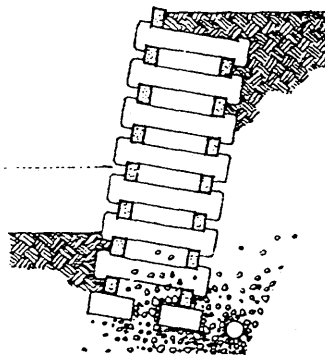


**deadman**  
A log, concrete block, or similar mass buried in the ground as an anchor.



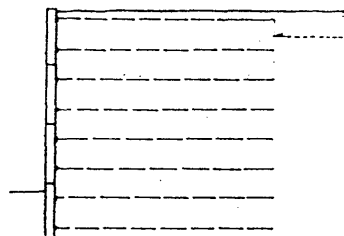
**bin wall**  
A type of gravity retaining wall formed by stacking modular, interlocking precast concrete units and filling the voids with crushed stone or gravel. Also called cellular wall.

**cribbing**  
A system of cribs for retaining earth or for a building being moved or having its foundation rebuilt. Also called cribwork.



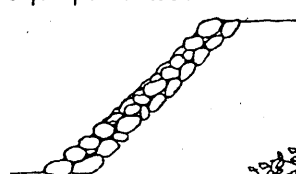
**crib**  
A cellular framework of squared timbers, or steel or concrete members of similar form, assembled in layers at right angles, often filled with earth or stones and used in the construction of foundations and retaining walls.

**earth tieback wall**  
A retaining wall consisting of precast concrete panels fastened to long galvanized steel straps extending into a compacted soil backfill.



**critical height**  
The maximum height at which a vertical cut in a cohesive soil will stand without shoring.

**riprap**  
A layer of broken stones thrown together irregularly on an embankment slope to prevent erosion.



**angle of repose**  
The maximum slope, measured in degrees from the horizontal, at which loose solid material will remain in place without sliding.

**angle of slide**  
The minimum slope, measured in degrees from the horizontal, at which loose solid material will begin to slide or flow.

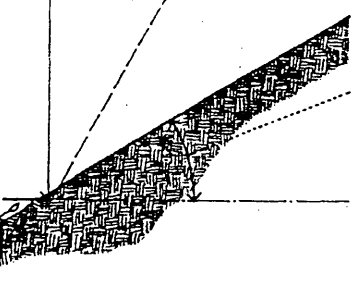
**gabion**  
A galvanized wire basket filled with stones and used in constructing an abutment or retaining structure.

**revet**  
To face a sloping surface or embankment with stone or other material.

**revetment**  
A facing of masonry or other suitable material for protecting an embankment against erosion.

**soil binder**  
A plant that prevents or inhibits erosion by providing a ground cover and forming a dense network of roots that hold the soil.

**soil stabilizer**  
A chemical admixture for maintaining or increasing the stability of a soil mass.





## window unit

A manufactured assembly of a frame, sash, glazing, and necessary hardware, made to fit a window opening.

## sash

The fixed or movable framework of a window or door in which panes of glass are set.

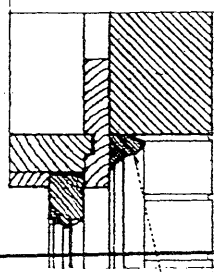
## window frame

The fixed frame of a window, consisting of two jambs, a head, and a sill.

## dressing

The ornamental detail of a building, esp. the molded framework around door and window openings.

An opening in the wall of a building for admitting light and air, usually fitted with a frame in which are set operable sashes containing panes of glass.



## brick molding

A wood molding covering the gap between a doorframe or window frame and the masonry reveal into which the frame is set. Also called staff bead.

## head flashing

The flashing over a window opening or a projection in a masonry wall.

## drip

Any of various devices for shedding rainwater so as to keep it from running down a wall or falling onto the sill of an opening.

## drip cap

A projecting molding over an exterior door or window opening for catching and shedding rainwater.

## backband

A molding surrounding the trim at the top and sides of a door or window.

## windowsill

The horizontal member at the base of a window opening, esp. the ledge formed by such a member.

## wash

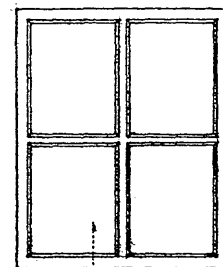
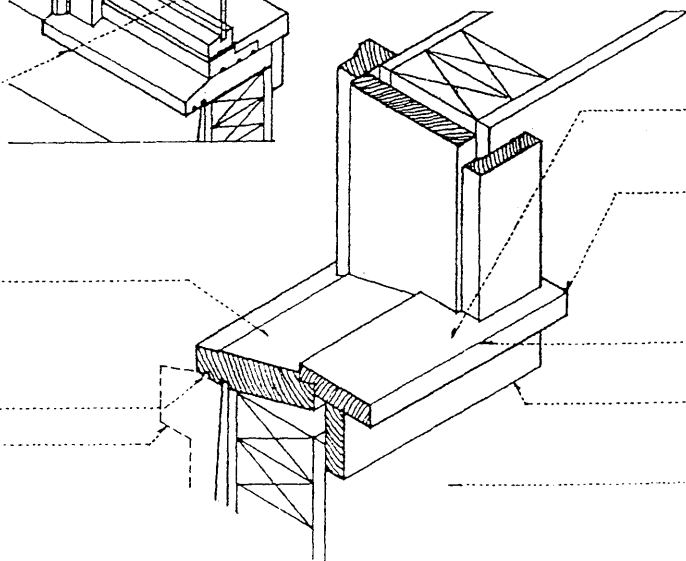
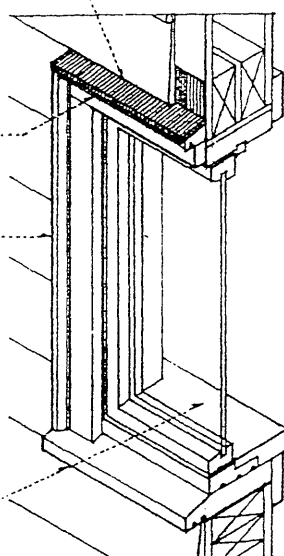
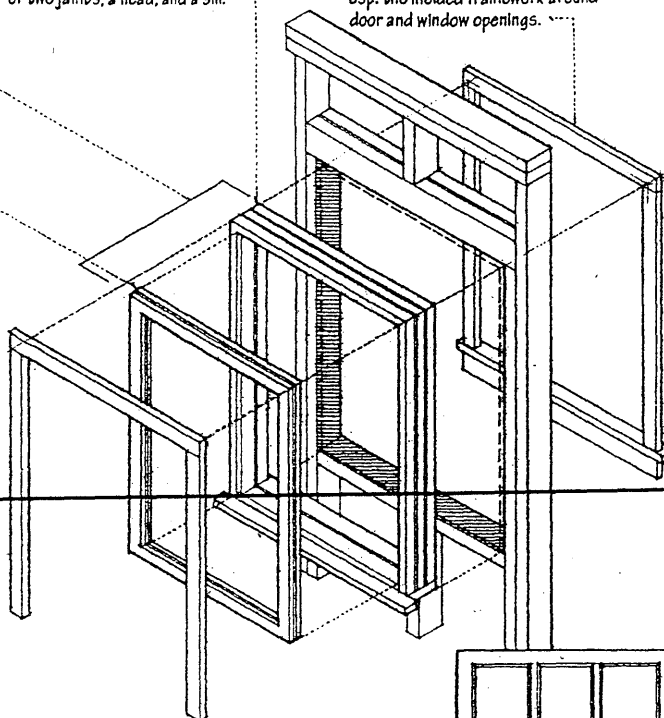
The upper surface of a building member, as a windowsill or coping, sloped to shed rainwater. Also called weathering.

## check throat

A groove cut or formed on the underside of a sill or other exterior horizontal member to prevent the capillary flow of rainwater to a wall.

## subsill

An additional sill fitted to a window frame to cause rainwater to drip farther away from a wall surface. Also called sill drip molding.



## pane

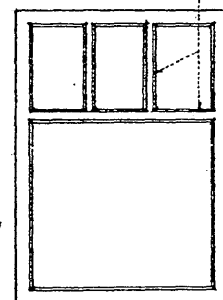
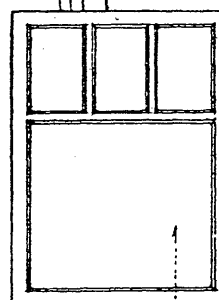
One of the divisions of a window or door, consisting of a single unit of glass set in a frame.

## windowpane

A pane of glass fitting a window sash.

## muntin

A rabbeted member for holding the edges of windowpanes within a sash. Also called glazing bar, sash bar.



## mullion

A vertical member between the lights of a window.

## light

A medium for admitting light, as one compartment of a window or window sash. Also called day.

## slip sill

A sill cut to fit between the jambs of a window or door opening.

## lug sill

A sill extending beyond a window or door opening and built into the jambs.

## horn

That part of a jamb extending above the head of a door or window frame, or the horizontal extension of a windowsill beyond the jamb.

## stool

The interior sill of a window.

## apron

A flat piece of trim immediately beneath the stool of a window. Also called skirt.

## back

The area of interior wall, usually paneled, between a windowsill and the floor.

# WINDOW

## double-hung window

A window having two vertically sliding sashes, each in separate grooves or tracks and closing a different part of the window.

## hung sash

A vertically sliding window sash balanced by a counterweight or a pretensioned spring on each side so that it can be raised or lowered with relatively little effort. Also called **balanced sash**.

## meeting rail

The rail of each sash in a double-hung window that meets at the rail of the other when the window is closed.

## sash fast

A fastener on the meeting rail of one sash which swings across to the meeting rail of another sash and engages with a spur on it. Also called **sash fastener**.

## check rail

A meeting rail, esp. one closing against a corresponding rail with a diagonal or rabbeted overlap.

## plain rail

A meeting rail equal in thickness to the other members of the frame.

## box-head window

A double-hung window constructed with a pocket in the head, into which one or both sashes can pass to increase the opening available for ventilation.

## drop window

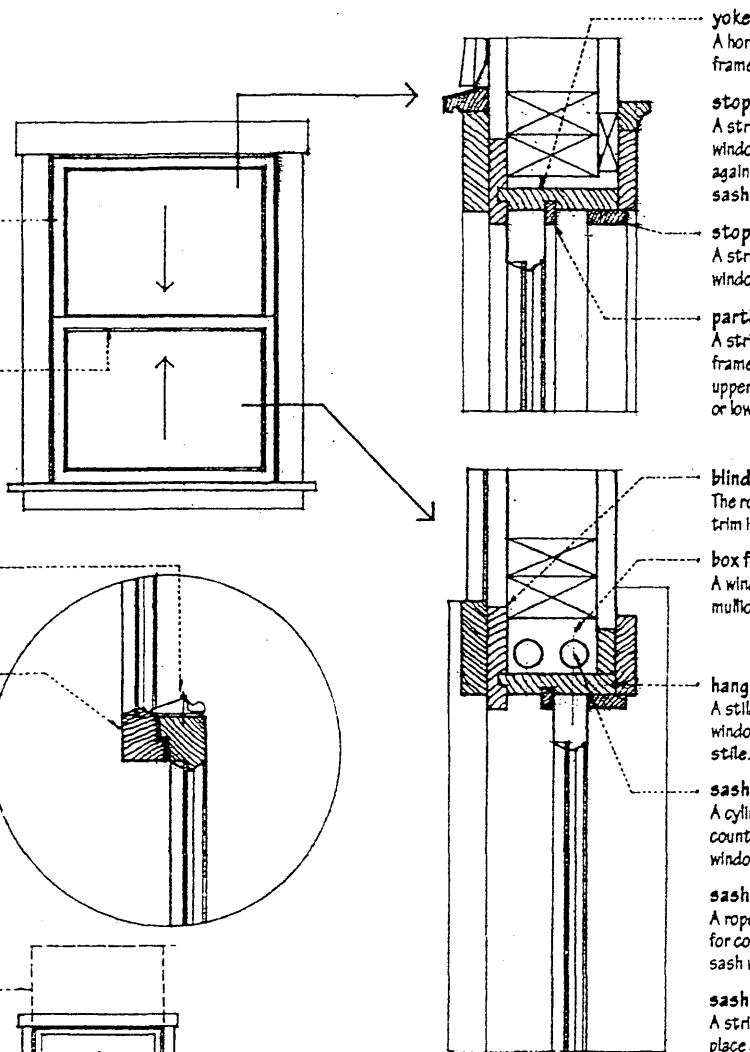
A window constructed with a pocket below the sill, into which a sash can slide to increase the opening available for ventilation.

## horizontally sliding window

A window having two or more sashes, of which at least one slides along horizontal grooves or tracks.

## sliding sash

A sash that opens by moving horizontally along grooves or tracks at the top and bottom of the window frame.



## yoke

A horizontal piece forming the top of a frame for a double-hung window.

## stop

A strip of molding along the inside of window frame for holding a sliding sash, or against which a sash closes. Also called **sash stop**, **window stop**.

## stop bead

A strip of molding along the inside of a window frame for holding a sliding sash.

## parting bead

A strip of molding used on each side of a frame of a double-hung window to keep the upper and lower sashes apart when raised or lowered. Also called **parting strip**.

## blind casing

The rough casing of a box frame to which trim is secured.

## box frame

A window frame having hollow jambs or mullions for sash weights.

## hanging stile

A stile in a window frame against which a window sash slides. Also called **pulley stile**.

## sash weight

A cylindrical casing of iron or lead used as a counterweight to balance a vertically sliding window sash.

## sash line

A rope (sash cord) or chain (sash chain) for connecting a vertically sliding window sash with a counterweight.

## sash ribbon

A strip of steel or aluminum alloy used in place of a sash cord to connect a vertically sliding window sash with a counterweight.

## pocket piece

A removable part of a hanging stile permitting access to insert a sash weight or to replace the sash line.

## single-hung window

A window having two sashes, of which only one is movable.

## vertically sliding window

A window having one or more sashes which move vertically and are held in various open positions by means of friction or a ratchet device instead of by sash balances or counterweights.

## sash balance

A spring-loaded device used in place of sash weights to counterbalance a vertically sliding window sash. Also called **spring balance**.

## extension casement hinge

A hinge for an outward-swinging casement window, located to allow cleaning from the inside when the window is open.

## casement stay

A bar for holding a casement in any of several open positions.

## lever operator

A gearless device for operating a casement and holding it in an open position.

## cam handle

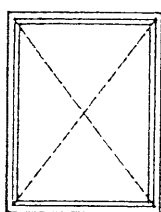
A handle that locks a hinged sash in a closed position by wedging it against a keeper plate. Also called locking handle.

## roto operator

A crank-driven worm drive for opening and closing awning windows, casement windows, and jalousies.

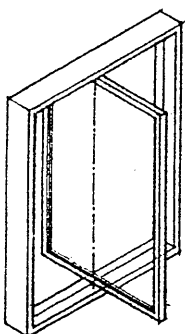
## wicket screen

A small sliding or hinged portion of a larger screen providing access for operating a window sash.



## pivoted window

A window having a sash that rotates 90° or 180° about a vertical or horizontal axis at or near its center, used in air-conditioned multistory or high-rise buildings and operated only for cleaning, maintenance, or emergency ventilation.



## jalousie window

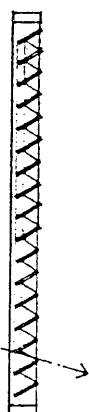
A window having horizontal glass or wood louvers which pivot simultaneously in a common frame, used primarily in mild climates to control ventilation and to cut off visibility from the outside.

## jalousie

A blind or shutter having horizontal slats that can be adjusted to admit light and air but exclude sun and rain.

## shielding angle

The angle below which something can be seen when viewed through a louver.



## fixed light

A window or sash of a window that does not open for ventilation. Also called fixed sash.

## operable window

A window having a sash that may be opened for ventilation.



## casement window

A window having at least one casement, often used in combination with fixed lights.

## casement

A window sash opening on hinges generally attached to the upright side of its frame.

## folding casement

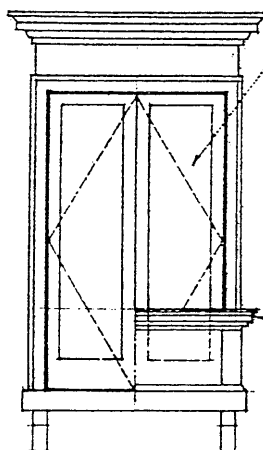
A pair of casements with rabbeted meeting stiles, hung in a frame having no mullion.

## hanging stile

The stile of a window frame from which a casement is hung.

## meeting stile

One of the abutting stiles in a pair of casement.



## French window

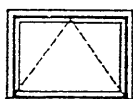
A pair of casement windows extending to the floor and serving as a doorway, esp. from a room to an outside porch or terrace.

## cremorne bolt

A vertical bolt used on a French window or the like, consisting of two rods moved by a knob mechanism and extending into pockets in the head and sill of the opening to provide a secure fastening. Also, cremone bolt.

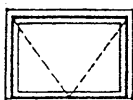
## balconet

A railing or balustrade projecting slightly beyond the plane of a window and reaching to the floor, having the appearance of a balcony when the window is fully open. Also, balconette.



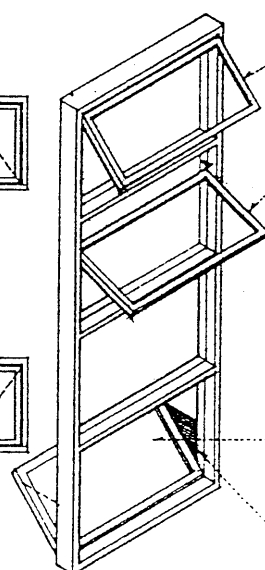
## awning window

A window having one or more sashes swinging outward on hinges generally attached to the top of the frame.



## projected window

A casement or awning window in which the inner end of the sash slides along a track on the sill or jamb as the sash swings outward.



## hopper window

A window having one or more sashes swinging inward on hinges generally attached on the bottom. Also called hospital window.

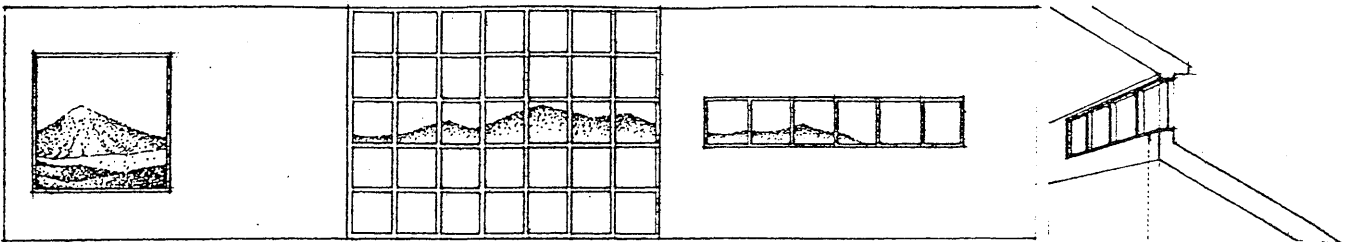
## hopper light

A window light hinged on the bottom and swinging inward. Also called hospital light.

## hopper

One of the triangular draft barriers on each side of a hopper light.

WINDOW



**picture window**  
A large, usually fixed single-pane window, placed to frame an attractive exterior view.

**window wall**  
A nonbearing wall composed primarily of vertical and horizontal framing members containing a combination of fixed lights and operating sashes.

**ribbon window**  
A horizontal band of windows, separated only by mullions.

**clerestory**  
A portion of an interior rising above adjacent rooftops and having windows admitting daylight to the interior. Also, clearstory.

**bay window**  
A window or series of windows projecting outward from the main wall of a building and forming a bay or alcove in a room within, esp. one having its own foundation.

**window seat**  
A seat built into a recess of a window between the jambs.

**cant bay window**  
A bay window having canted slides.

**bow window**  
A bay window having a rounded projection.

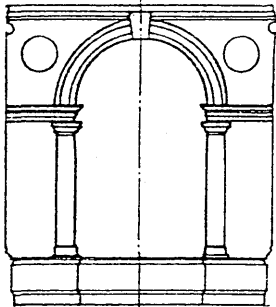
**dormer window**  
A vertical window in a projection built out from a sloping roof. Also called luthern.

**internal dormer**  
A vertical window set below the line of a sloped roof.

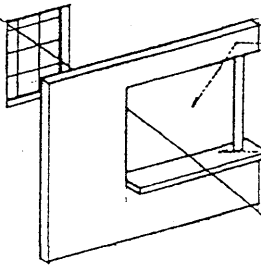
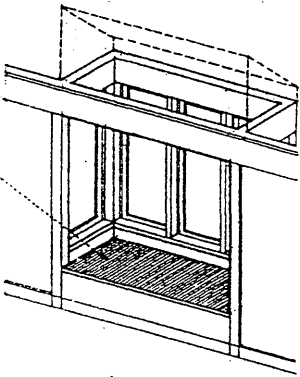
**lucarne**  
A dormer window in a roof or spire.

**oxeye**  
A comparatively small round or oval window, as in a frieze or dormer. Also called oeil-de-boeuf.

**hood mold**  
A projecting molding over the arch of a window or door, esp. in interior work. Also, hood molding.

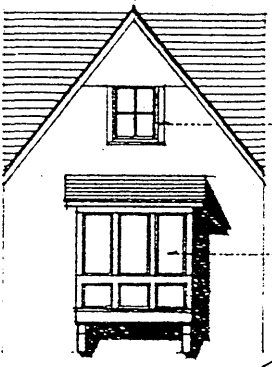


**Palladian motif**  
A window or doorway in the form of a round-headed archway flanked on either side by narrower compartments, the side compartments being capped with entablatures on which the arch of the central compartment rests. Also called Serlian motif, Venetian motif.



**borrowed light**  
A window opening in an interior partition allowing light to be transmitted from one space to another.

**pass-through**  
A windowlike opening in a wall or partition through which things may be passed, as between a kitchen and a dining room.



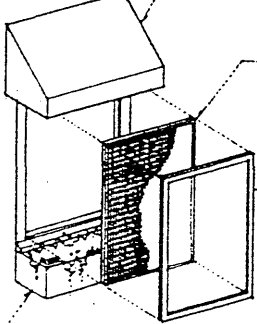
**gable window**  
A window in or under a gable.

**oriel**  
A bay window supported from below by corbels or brackets.

**meshrebeeyeh**  
An oriel screened by latticework, through which the air may draw freely while the interior is concealed from view, found along the streets of Cairo and other towns of the Levant. Also, mashrebeeyeh, mashrebeeyah.

**lychnoscope**  
A small window set low in the wall of a medieval church, permitting the interior to be seen from the outside. Also called lowside window.

**awning**  
A rooflike cover of canvas or other material extending in front of a doorway or window, or over a deck, to provide protection from the sun or rain.



**screen**  
A frame holding a fine mesh of metal or fiberglass, placed in a window or doorway, or around a porch to admit air but exclude insects.

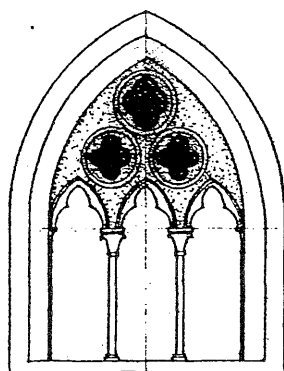
**storm window**  
A supplementary sash placed outside an existing window as additional protection against severe weather. Also called storm sash.

**combination window**  
A window equipped with interchangeable screen and glass sections for summer and winter use.

**window box**  
A box designed to hold soil for growing plants at or on a windowsill.

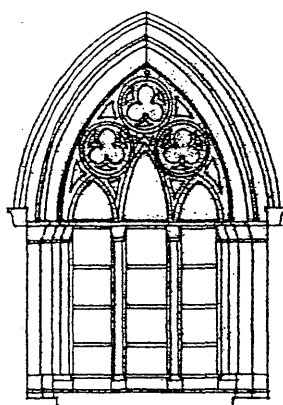
## tracery

Ornamental work of branchlike lines, esp. the lacy openwork in the upper part of a Gothic window.



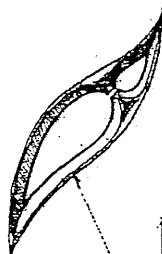
### plate tracery

Early Gothic tracery formed of pierced slabs of stone set on edge, the design being in the shape and disposition of the openings. Also called perforated tracery.



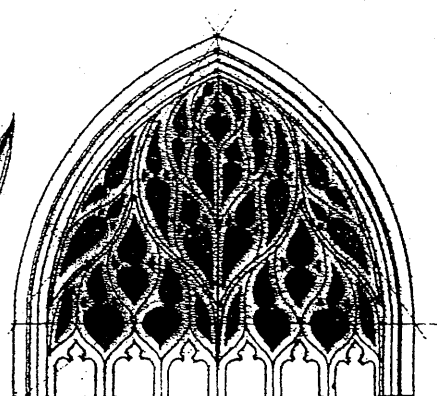
### geometric tracery

Gothic tracery characterized by a pattern of geometric shapes, as circles and foils.



### mouchette

A daggerlike motif found esp. in Gothic tracery, formed by elliptical and ogee curves.

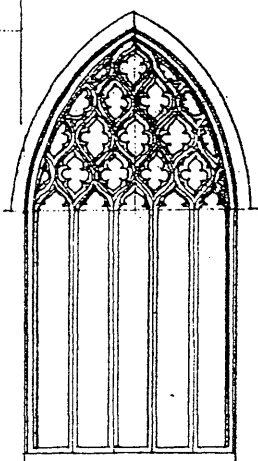


### curvilinear tracery

Gothic tracery characterized by a pattern of irregular, boldly curved forms. Also called flowing tracery.

### bar tracery

Gothic tracery that succeeded plate tracery, consisting of molded stone mullions that divide into various branching elements which fill the window head.

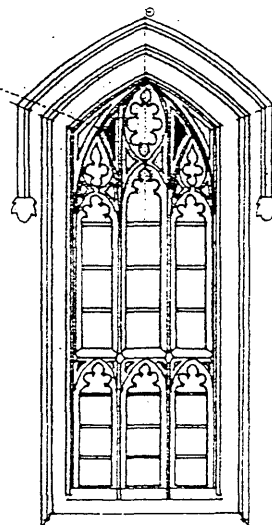


### reticulated tracery

Gothic tracery consisting mainly of a netlike arrangement of repeated geometrical figures. Also called net tracery.

### angel light

A triangular light in a Gothic window, formed by the arch of the window, an arch of a lower tier of tracery, and a mullion of an upper tier of tracery.



### perpendicular tracery

Predominantly vertical Gothic tracery having mullions rising to the curve of the arch, crossed at intervals by horizontal transoms. Also called rectilinear tracery.

### foil

Any of several arcs or rounded spaces divided by cusps and tangent to the interior of a larger arc, as of an arch or circle.

### foliation

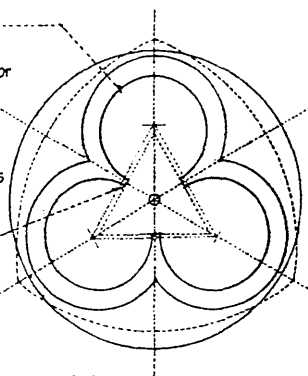
Ornamentation of an archway, window, or other opening with foils or representations of foliage.

### cusped

A pointed projection formed by two intersecting arcs, used esp. to vary the outlines of intradoses or to form foils.

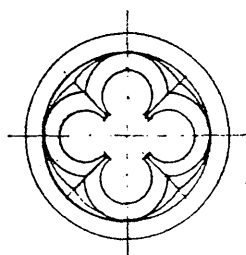
### cuspidation

Decoration with cusps.



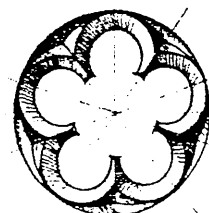
### trefoil

An arrangement of three foils divided by cusps and radiating from a common center.



### quatrefoil

An ornament composed of four foils, divided by cusps and radiating from a common center.



### cinquefoil

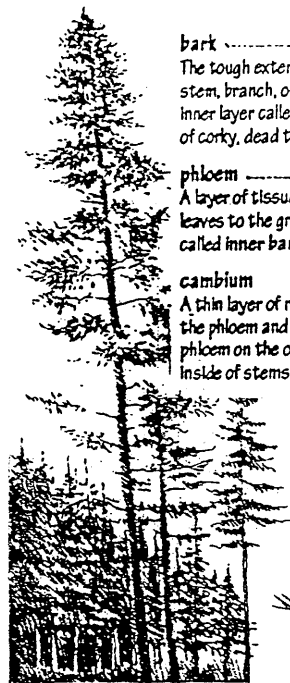
A design composed of five foils, divided by cusps and radiating from a common center.

### multifoil

Having more than five foils.

# WOOD

The tough, fibrous cellular substance that makes up most of the stems and branches of trees beneath the bark.



**bark**  
The tough external covering of a woody stem, branch, or root, composed of a living inner layer called phloem and an outer bark of corky, dead tissue.

**phloem**  
A layer of tissue that carries food from the leaves to the growing parts of a tree. Also called inner bark.

**cambium**  
A thin layer of reproductive tissue between the phloem and xylem, which produces new phloem on the outside and new xylem on the inside of stems, branches, and roots.

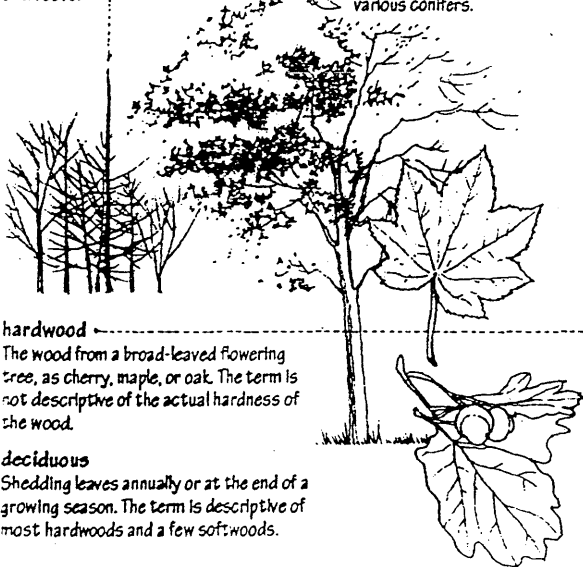
**softwood**  
The wood from a conifer. The term is not descriptive of the actual softness of the wood.

**conifer**  
Any of various predominantly evergreen, cone-bearing trees, as pine, fir, hemlock, and spruce.

**evergreen**  
Having foliage that remains green and functional throughout the year or through more than one growing season.

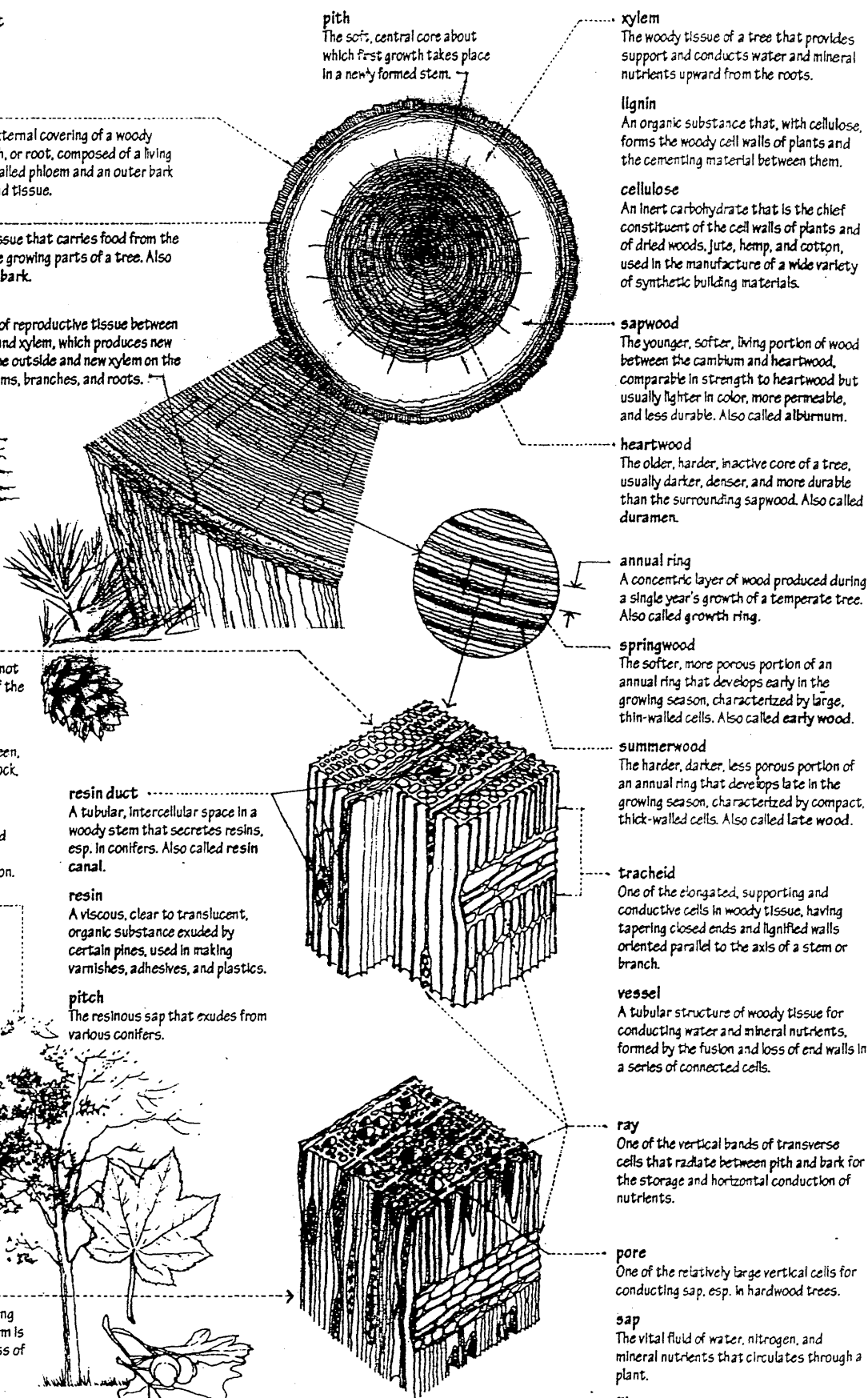
**crown**  
The leaves and living branches of a tree.

**trunk**  
The main stem of a tree apart from its branches and roots.



**hardwood**  
The wood from a broad-leaved flowering tree, as cherry, maple, or oak. The term is not descriptive of the actual hardness of the wood.

**deciduous**  
Shedding leaves annually or at the end of a growing season. The term is descriptive of most hardwoods and a few softwoods.



**pith**  
The soft, central core about which first growth takes place in a newly formed stem.

**xylem**  
The woody tissue of a tree that provides support and conducts water and mineral nutrients upward from the roots.

**lignin**  
An organic substance that, with cellulose, forms the woody cell walls of plants and the cementing material between them.

**cellulose**  
An inert carbohydrate that is the chief constituent of the cell walls of plants and of dried woods, jute, hemp, and cotton, used in the manufacture of a wide variety of synthetic building materials.

**sapwood**  
The younger, softer, living portion of wood between the cambium and heartwood, comparable in strength to heartwood but usually lighter in color, more permeable, and less durable. Also called alburnum.

**heartwood**  
The older, harder, inactive core of a tree, usually darker, denser, and more durable than the surrounding sapwood. Also called duramen.

**annual ring**  
A concentric layer of wood produced during a single year's growth of a temperate tree. Also called growth ring.

**springwood**  
The softer, more porous portion of an annual ring that develops early in the growing season, characterized by large, thin-walled cells. Also called early wood.

**summerwood**  
The harder, darker, less porous portion of an annual ring that develops late in the growing season, characterized by compact, thick-walled cells. Also called late wood.

**tracheid**  
One of the elongated, supporting and conductive cells in woody tissue, having tapering closed ends and lignified walls oriented parallel to the axis of a stem or branch.

**vessel**  
A tubular structure of woody tissue for conducting water and mineral nutrients, formed by the fusion and loss of end walls in a series of connected cells.

**ray**  
One of the vertical bands of transverse cells that radiate between pith and bark for the storage and horizontal conduction of nutrients.

**pore**  
One of the relatively large vertical cells for conducting sap, esp. in hardwood trees.

**sap**  
The vital fluid of water, nitrogen, and mineral nutrients that circulates through a plant.

**fiber**  
One of the slender, thick-walled cells which together serve to strengthen plant tissue.

**timber**  
Wood suitable for use as a building material.

**log**  
A length of trunk or large limb of a felled tree, ready for sawing.

**rough lumber**  
Lumber that is sawn, edged and trimmed, but not surfaced.

**dressed lumber**  
Lumber that is surfaced with a planing machine to attain a smooth surface and uniform size.

**lumber**  
The timber product manufactured by sawing, resawing, passing lengthwise through a planing machine, cross-cutting to length, and grading.

**seasoned**  
Of or pertaining to lumber that has been dried to reduce its moisture content and improve its serviceability.

**kiln-dried**  
Of or pertaining to lumber seasoned in a kiln under controlled conditions of heat, air circulation, and humidity.

**air-dried**  
Of or pertaining to lumber seasoned by exposure to the atmosphere.

**surfaced green**  
Of or pertaining to dressed lumber having a moisture content exceeding 19% at the time of manufacture.

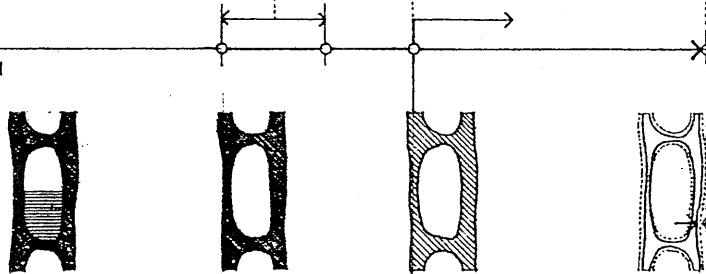
**surfaced dry**  
Of or pertaining to dressed lumber having at a moisture content of 19% or less at the time of manufacture.

**equilibrium moisture content**  
The moisture content at which wood neither gains nor loses moisture when surrounded by air at a given temperature and relative humidity.

**fiber-saturation point**  
The stage in the drying or wetting of wood at which the cell walls are fully saturated but the cell cavities are void of water, ranging from a moisture content of 25% to 32% for commonly used species. Further drying results in shrinkage and generally greater strength, stiffness, and density of the wood.

**moisture content**  
The amount of water contained in a wood piece, expressed as a percentage of the weight of the wood when oven-dry.

**oven-dry**  
Of or pertaining to lumber dried to a point at which no moisture can be extracted when exposed in a kiln to a temperature of 214° to 221°F (101° to 105°C).



**shrinkage**  
The dimensional contraction of a wood piece occurring when its moisture content falls below the fiber-saturation point. Shrinkage is very slight along the grain, but significant across the grain.

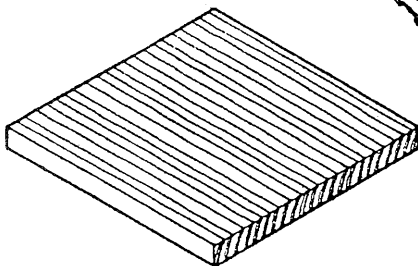
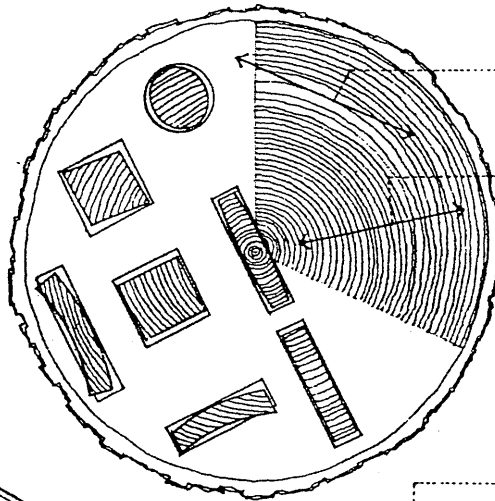
**tangential shrinkage**  
Wood shrinkage in a direction tangent to the growth rings, about double that of radial shrinkage.

**radial shrinkage**  
Wood shrinkage perpendicular to the grain, across the growth rings.

**longitudinal shrinkage**  
Wood shrinkage parallel to the grain, about 2% of radial shrinkage.

**working**  
The alternate swelling and shrinkage of seasoned wood occurring with changes in moisture content caused by changes in relative humidity of the surrounding air.

**acclimatize**  
To store wood products, as millwork and flooring, in an interior space until the materials adapt to the moisture content and temperature of the new environment.

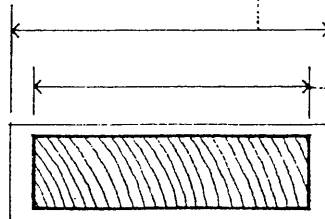


**board foot**  
A unit of quantity for lumber equal to the volume of a piece whose nominal dimensions are 12 in. (304.8 mm) square and 1 in. (25.4 mm) thick.

**board measure**  
Lumber measurement in board feet.

**nominal dimension**  
The dimension of lumber before drying and surfacing, used for convenience in defining size and computing quantity. Nominal dimensions are always written without inch marks. Also called nominal size.

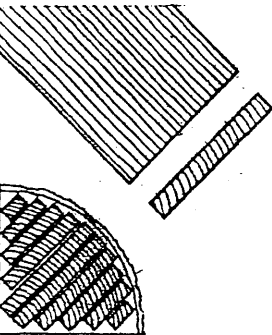
**dressed size**  
The dimension of lumber after seasoning and surfacing, from  $\frac{3}{8}$  to  $\frac{3}{4}$  in. (9.5 to 19.1 mm) less than the nominal dimension. A dressed size is always written with inch marks ("). Also called dressed dimension.



WOOD

**grain**  
The direction, size, arrangement, and appearance of the fibers in a piece of dressed wood.

**edge grain**  
Wood grain resulting from quartersawing, having the annual rings forming an angle of 45° or more with the broad faces of a piece. Also called **vertical grain**.



**quartersaw**  
To saw quartered logs approximately at right angles to the annual rings.

**warp**  
Any deviation from a plane or true surface of a board or panel, usually caused by uneven drying during the seasoning process or by a change in moisture content.

**cup**  
A curvature across the width or face of a wood piece, measured at the point of greatest deviation from a straight line drawn from edge to edge of the piece.

**bow**  
A curvature along the length of a wood piece, measured at the point of greatest deviation from a straight line drawn from end to end of the piece.

**crook**  
A curvature along the edge of a wood piece, measured at the point of greatest deviation from a straight line drawn from end to end of the piece.

**twist**  
A warp resulting from the turning of the edges of a wood piece in opposite directions.

**shake**  
A separation along the grain of a wood piece, usually between the annual rings, caused by stresses on a tree while standing or during felling.

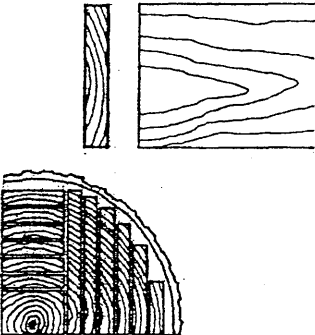
**pitch pocket**  
A well-defined opening between the annual rings of a softwood, containing or having once contained solid or liquid pitch.

**check**  
A lengthwise separation of wood across the annual rings, caused by uneven or rapid shrinkage during the seasoning process.

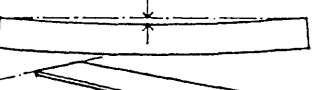
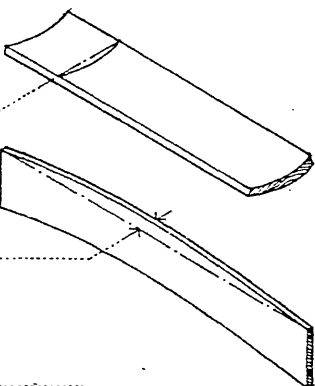
**split**  
A check that extends completely through a board or wood veneer. Also called **through check**.

**wane**  
The presence of bark or absence of wood at corner or along an edge of a piece.

**flat grain**  
Wood grain resulting from plain-sawing, having the annual rings forming an angle of less than 45° with the broad faces of a piece.



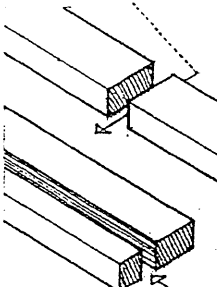
**plain-saw**  
To saw a squared log into boards with evenly spaced parallel cuts. Also called **bastard-saw**.



**mixed grain**  
Any combination of edge-grained and flat-grained lumber.

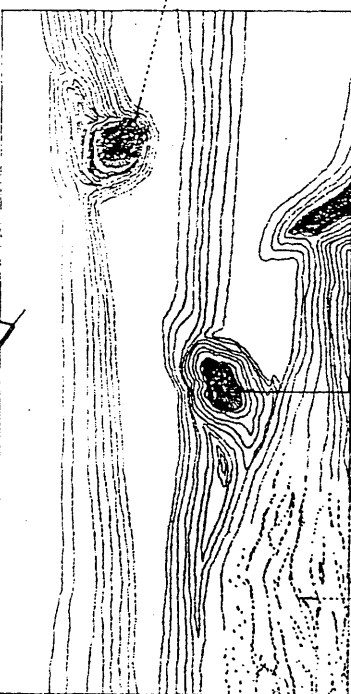
**end grain**  
Wood grain resulting from a cut across the grain.

**crosscut**  
A cut made across the grain of wood.



**rip**  
To saw wood in the direction of the grain. Also called **ripsaw**.

**knot**  
The base of a woody branch enclosed by a subsequent growth of wood in the stem from which it rises. In the structural grading of a wood piece, knots are restricted by size and location.



**diagonal grain**  
Wood grain having the annual rings at an angle to the length of a piece, resulting from sawing at an angle to the axis of a log.

**cross grain**  
Wood grain having the cells and fibers running transversely or diagonally to the length of a piece as a result of sawing, or irregularly as a result of a growth characteristic.

**close grain**  
Wood grain characterized by narrow, inconspicuous annual rings with little difference in pore size between springwood and summer wood.

**coarse grain**  
Wood grain characterized by wide, conspicuous annual rings with considerable contrast in pore size between springwood and summer wood.

**coarse texture**  
Wood grain having large pores. Also called **open grain**.

**fine texture**  
Wood grain having small, closely spaced pores.

**raised grain**  
A dressed wood surface having the denser summerwood rising above the softer springwood.

**live knot**  
A knot having annual rings intergrown with those of the surrounding wood. Live knots are allowable in structural timber within certain size limits. Also called **intergrown knot**.

**sound knot**  
A knot that is solid across its face, at least as hard as the surrounding wood and undecayed.

**tight knot**  
A knot held firmly in place by growth or position.

**dead knot**  
A knot having annual rings not intergrown with those of the surrounding wood. Encasement may be partial or complete, but a dead knot is considered to be a defect since it can easily loosen or be knocked out. Also called **encased knot**, **loose knot**.

**decay**  
The decomposition of wood by fungi and other microorganisms, resulting in softening, loss of strength and weight, and often a change of texture and color.

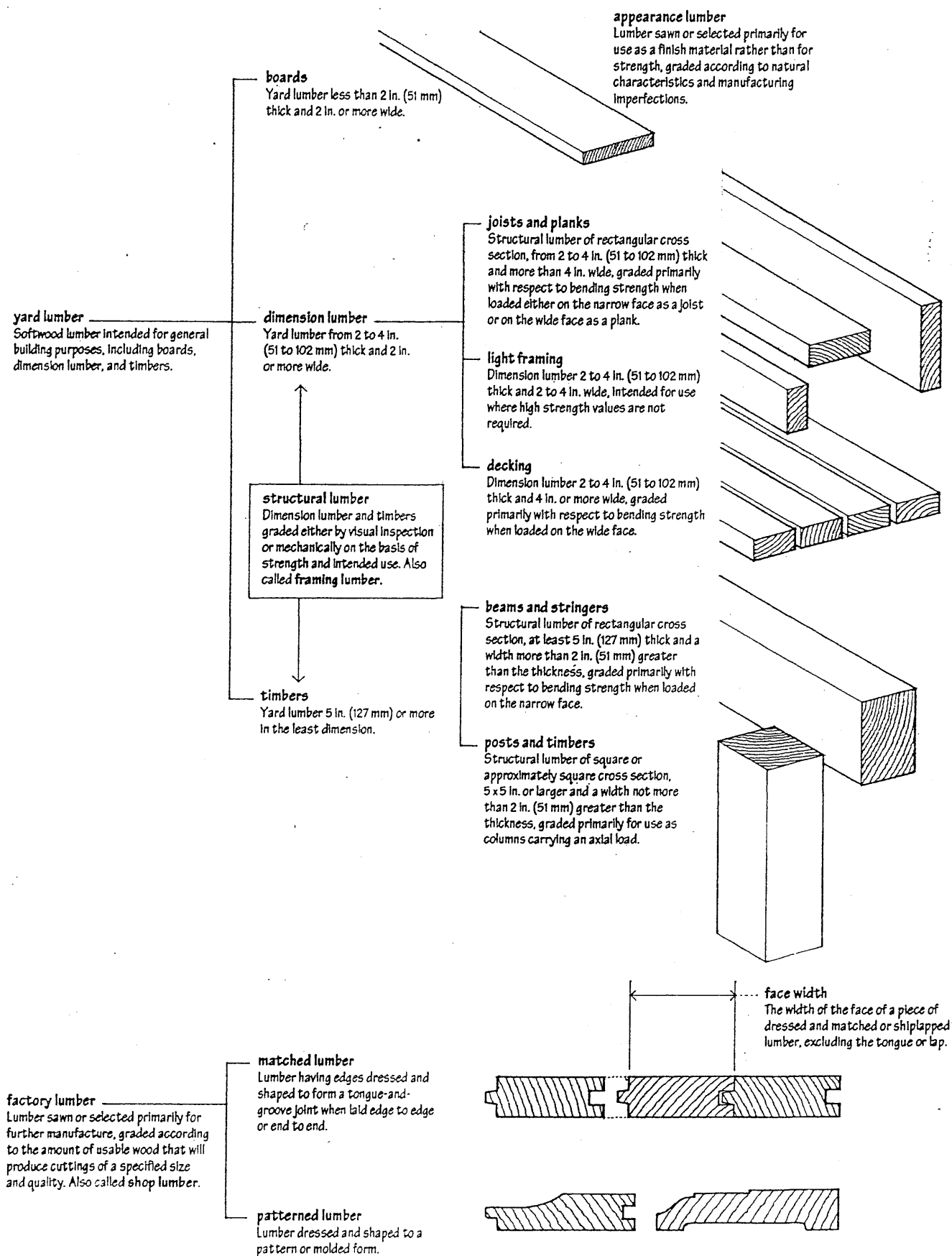
**dry rot**  
A decay of seasoned timber caused by fungi that consume the cellulose leaving a soft, brittle skeleton readily reduced to powder.

**pecky**  
Having isolated spots of incipient decay from fungi, as pecky cypress or pecky cedar.

**skip**  
An area on the surface of a board or panel missed by a planing machine.

**machine burn**  
A surface charring caused by overheating of the cutting blades or abrasive belts during shaping or finishing of a material.





# WOOD

## visual grading

The visual examination and grading of structural lumber by trained inspectors according to quality-reducing characteristics that affect strength, appearance, durability, or utility.

## machine rating

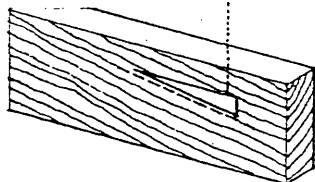
The grading of structural lumber by a machine that flexes a test specimen, measures its resistance to bending, calculates its modulus of elasticity, and electronically computes the appropriate stress grade, taking into account such factors as the effects of knots, slope of grain, growth rate, density, and moisture content. Also called **machine stress-rating**.

## grademark

A stamp applied to each piece of lumber indicating the assigned stress grade, mill of origin, moisture content at time of manufacture, species or species group, and the grading authority.

## slope of grain

The angle of grain relative to a line parallel to the length of a wood piece.

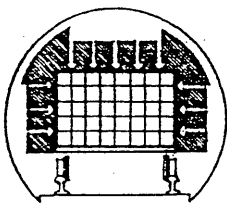


## treated wood

Wood that has been coated or impregnated with chemicals to improve its resistance to decay, insect infestation, or fire.

## pressure-treated wood

Wood impregnated with chemicals applied under pressure to reduce its resistance to decay and insect infestation.



## non-pressure-treated wood

Wood coated, dipped, or impregnated with a preservative under atmospheric pressure.

## fire-retardant wood

Wood treated with mineral salts impregnated under pressure to reduce flammability or combustibility. The salts react chemically at temperatures below the ignition point of wood, causing the combustible vapors normally generated in the wood to break down into water and carbon dioxide.

## stress grade

Any of the grades of structural lumber for which a set of base values and corresponding modulus of elasticity is established for a species or group of species by a grading agency.

## design value

Any of the allowable unit stresses for a species and grade of structural lumber obtained by modifying the base value by factors related to size and conditions of use.

## MACHINE RATED

W<sup>®</sup> 12 HEM  
S-DRY FIR  
1650 Fb 1.5E

## size-adjusted value

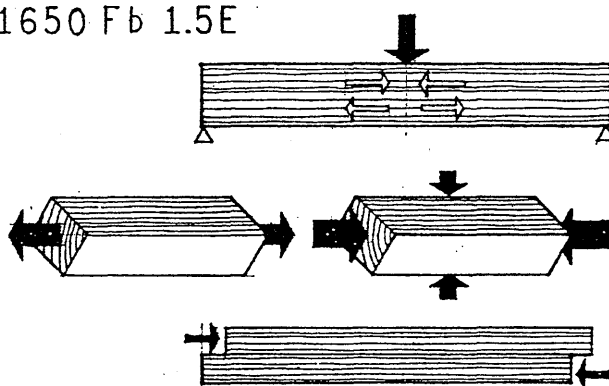
A base value for a species or group of species of structural lumber, adjusted for cross-sectional size.

## base value

Any of the allowable unit stresses for bending, compression perpendicular and parallel to grain, tension parallel to grain, horizontal shear, and corresponding modulus of elasticity, established by a grading agency for various species and grades of structural lumber. Base values must be adjusted first for size and then for conditions of use.

=

X



## full-cell process

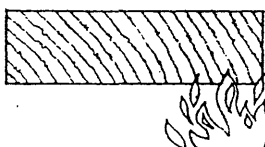
A process for pressure-treating wood in which a vacuum is first drawn to remove air from the wood fibers and allow the preservative to be absorbed by the cell walls, after which pressure is applied to force additional preservative into the cell cavities. The full-cell process leaves the maximum amount of preservative in the wood.

## empty-cell process

A process for pressure-treating wood in which the pressure of the entering preservative entraps air in the wood fibers, which expands when the pressure is released to expel excess preservative from the cell cavities. The empty-cell process yields a drier product while ensuring deep, uniform penetration of the preservative.

## vacuum process

A non-pressure treatment in which a vacuum or partial vacuum exhausts air from the cells and pores of the wood while atmospheric pressure forces preservative into the wood.



## preservative

Any of various substances for coating or impregnating wood in order to protect it against wood-destroying fungi and insects.



## size factor

A coefficient for modifying the base values of a species and grade of lumber according to the cross-sectional size of the piece.

## repetitive member factor

A coefficient for increasing the size-adjusted values of repetitive members, since the sharing of the load by the pieces enhances the strength of the entire assembly.

## repetitive member

Any of a series of three or more light framing members, as joists or rafters, spaced not more than 24 in. (610 mm) on center and joined by sheathing, decking, or other load-distributing members.

## duration of load factor

A coefficient for increasing the size-adjusted values of a wood member subject to a short-term load, since wood has the property of carrying substantially greater maximum loads for short durations than for long durations of loading.

## horizontal shear factor

A coefficient for increasing the size-adjusted horizontal shear value of a wood member having shakes, checks, or splits when their length is known and any increase in length is not anticipated.

## flat use factor

A coefficient for increasing the size-adjusted bending value for planking having a face width of 4 in. (102 mm) or more.

## wet use factor

A coefficient for decreasing the size-adjusted values for wood members when their moisture content will likely exceed 19% in use.

## water-borne preservative

An inorganic, water-soluble compound, as ammoniacal copper arsenite (ACA) or chromated copper arsenite (CCA), used as a wood preservative. ACA and CCA affix chemically to the wood cell walls and is resistant to leaching. The copper acts as a fungicide while the arsenate is toxic to wood-destroying insects. Wood treated with ACA and CCA is odorless and paintable.

## oil-borne preservative

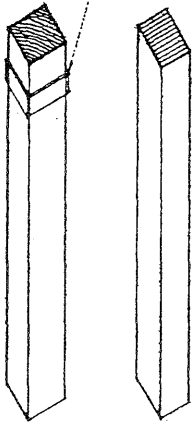
An organic chemical dissolved in a petroleum oil carrier, as pentachlorophenol or copper naphthenate, used as a wood preservative. Pentachlorophenol, the most commonly used oil-borne preservative, has a persistent odor, is insoluble in water, and is highly toxic not only to fungi and insects but also to humans and plants.

## creosote

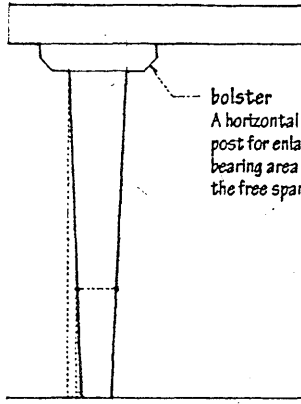
An oily liquid of aromatic hydrocarbons obtained by the distillation of coal tar, used as a wood preservative for marine installations or for severe exposures to wood-destroying fungi and insects. Creosote and creosote solutions have a penetrating odor and render wood unpaintable.

**ferrule**

A metal ring or cap placed around the end of a wooden post or handle to prevent splitting.

**bracket load**

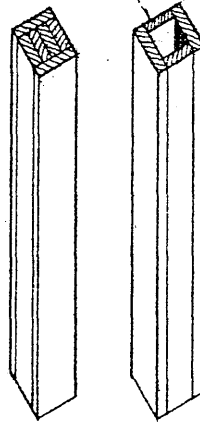
An eccentric load applied at some point below the upper end of a timber column, the static effect of which is assumed to be equivalent to the same load applied axially plus an additional side load applied at midheight.

**bolster**

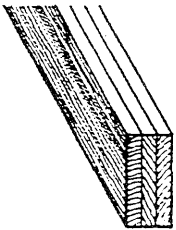
A horizontal timber on a post for enlarging the bearing area and reducing the free span of a beam.

**box column**

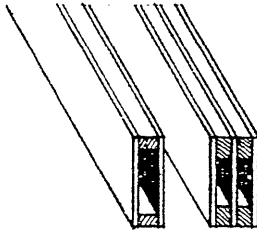
A built-up column having a hollow, square or rectangular cross section.

**solid column**

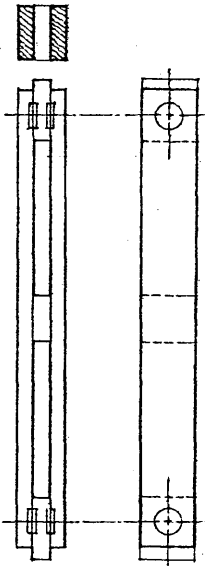
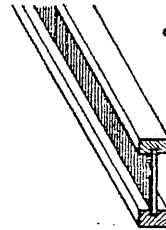
A wood column consisting of a single piece of solid-sawn or glued-laminated timber, usually square or rectangular in cross section.

**tapered column**

A wood column having a cross section that diminishes along its length. In determining the slenderness ratio for a tapered column, the least dimension is taken as the sum of the minimum diameter or least dimension and one-third the difference between the minimum and maximum diameters or lesser and greater dimensions.

**built-up column**

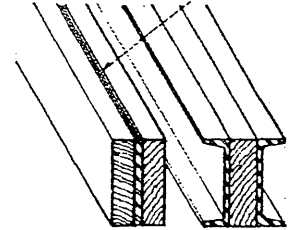
A wood column formed by fastening or gluing cover plates to two or more parallel planks, or boxing planks around a solid core. A built-up column is never equal in strength to a solid column of comparable material and overall dimensions.

**spaced column**

A wood column consisting of two or more parallel members separated at their ends and midpoints by blocking, and joined at the ends by timber connectors capable of developing the required shear resistance.

**flitchplate**

A steel plate for reinforcing a flitch beam.

**built-up beam**

A vertically laminated wood beam made by fastening together two or more smaller members with bolts, lag screws, or spikes, equal in strength to the sum of the strengths of the individual pieces if none of the laminations are spliced.

**box beam**

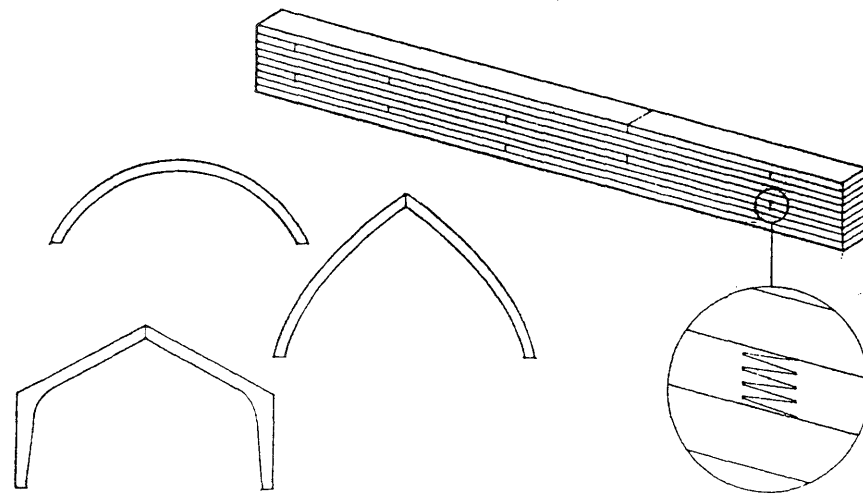
A beam having a hollow, rectangular cross section, made by gluing two or more plywood or oriented strandboard webs to sawn or laminated veneer lumber flanges.

**I-beam**

A beam made by gluing sawn or laminated veneer lumber flanges along the top and bottom edges of a single plywood or oriented strandboard web. Also called I-joist.

**flitch beam**

A vertically laminated beam consisting of timbers set on edge and bolted side by side to steel plates or sections. Also called flitch girder, sandwich beam.



examples of glue-laminated timber shapes

**glued-laminated timber**

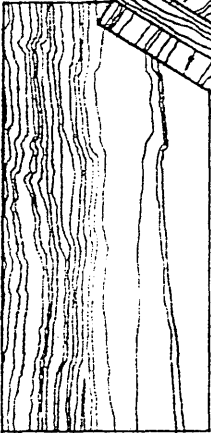
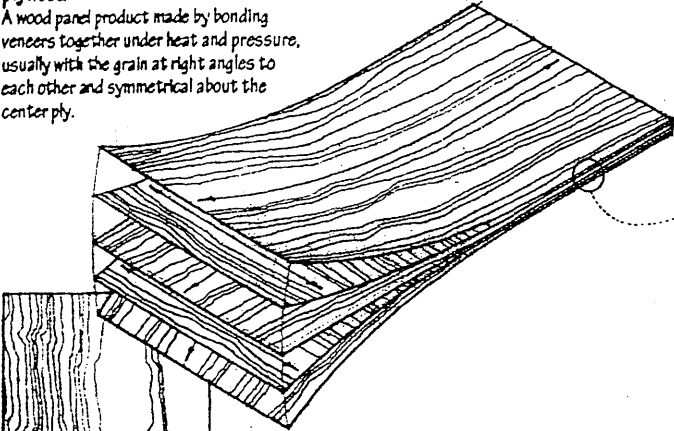
A structural lumber product made by laminating stress-grade lumber with adhesive under controlled conditions, usually with the grain of all plies being parallel. The advantages of glued-laminated timber over dimension lumber are generally higher allowable unit stresses, improved appearance, and availability of various sectional shapes. Glue-laminated timbers may be end-joined with scarf or finger joints to any desired length, or edge-glued for greater width or depth. Also called glulam.

**appearance grade**

One of three grades of glue-laminated timber – premium, architectural, and industrial – based on surface appearance as affected by growth characteristics, wood fillers, and dressing operations.

WOOD

**plywood**  
A wood panel product made by bonding veneers together under heat and pressure, usually with the grain at right angles to each other and symmetrical about the center ply.



**exterior plywood**  
A plywood panel consisting of C-grade veneers or better, bonded with a fully waterproof glue for permanent exposure to weather or moisture.

**interior plywood**  
A plywood panel made with D-grade veneers or better, bonded with an exterior, intermediate, or interior glue.



**high-density overlay**  
An exterior wood panel having a resin-fiber overlay on both sides providing a smooth, hard, abrasion-resistant surface, used for concrete forms, cabinets, and countertops. Abbr.: HDO

**medium-density overlay**  
An exterior wood panel having a phenolic or melamine resin overlay on one or both sides providing a smooth base for painting. Abbr.: MDO

**specialty panel**  
Any of various wood panel products, as grooved or rough-sawn plywood, intended for use as siding or paneling.

**texture 1-11**  
An exterior plywood panel having grooves 1/4 in. (6.4 mm) deep and 3/8 in. (9.5 mm) wide, spaced 4 or 8 in. (102 or 203 mm) on center.

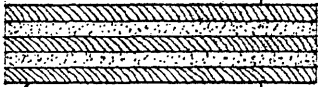
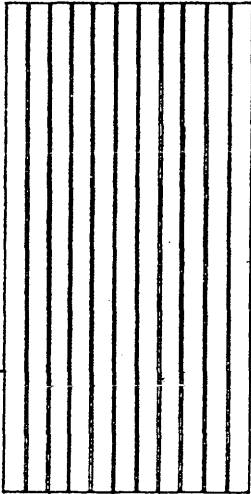
**span rating**  
A number specifying the maximum recommended center-to-center spacing in inches of the supports for a structural wood panel spanning with its long dimension across three or more supports.

**exposure durability**  
A classification of a wood panel product according to its ability to withstand exposure to weather or moisture without weakening or warping.

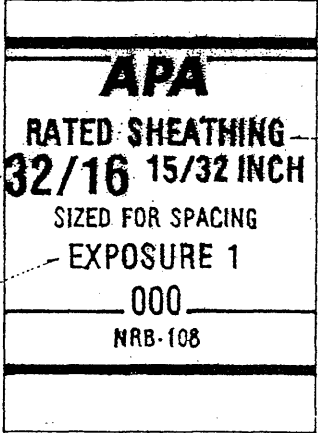
**exterior**  
An exposure durability classification for structural wood panels manufactured with a waterproof glue for use as siding or other continuously exposed applications.

**exposure 1**  
An exposure durability classification for structural wood panels manufactured with an exterior glue for use in protected construction subject to repeated wetting.

**exposure 2**  
An exposure durability classification for structural wood panels manufactured with an intermediate glue for use in fully protected construction subject to a minimum of wetting.



**group number**  
A number identifying one of five groups of species used for the face and back veneers of a plywood panel, the species being classified on the basis of bending strength and stiffness, with Group 1 containing the stiffest species and Group 5 the least stiff.



**panel grade**  
The grade of a wood panel product identified by the face and back veneer grades or by its intended use.

**engineered grade**  
The grade of a structural wood panel based on its intended use as sheathing, subflooring, or in the fabrication of box beams and stressed-skin panels.

**gradestamp**  
A trademark of the American Plywood Association (APA), stamped on the back of a structural wood panel product to identify the panel grade, thickness, span rating, exposure durability classification, mill number, and National Research Board (NRB) report number.

**veneer grade**  
A grade defining the appearance of a veneer in terms of growth characteristics and the number and size of repairs that may be made during manufacture.

**N-grade**  
A smooth softwood veneer of all heartwood or all sapwood, free from open defects with only a few well-matched repairs.

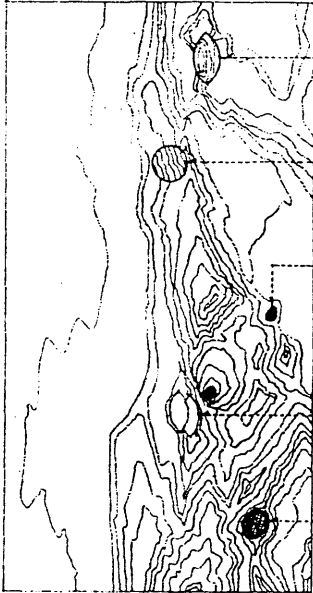
**A-grade**  
A smooth, paintable softwood veneer with a limited number of neatly made repairs parallel to the grain.

**B-grade**  
A softwood veneer having a solid surface with circular repair plugs, tight knots, and minor splits permitted.

**C-grade**  
A softwood veneer having tight knots and knotholes of limited size, synthetic or wood repairs, and discoloration and sanding defects that do not impair the strength of the panel.

**C-plugged grade**  
An improved C-grade softwood veneer having smaller knots and knotholes, some broken grain, and synthetic repairs.

**D-grade**  
A softwood veneer having large knots and knotholes, pitch pockets, and tapering splits.



**premium grade**

The highest grade of hardwood veneer, permitting only a few small burls, pin knots, and inconspicuous patches.

**good grade**

A grade of hardwood veneer similar to premium grade except that matching of veneer faces is not required.

**sound grade**

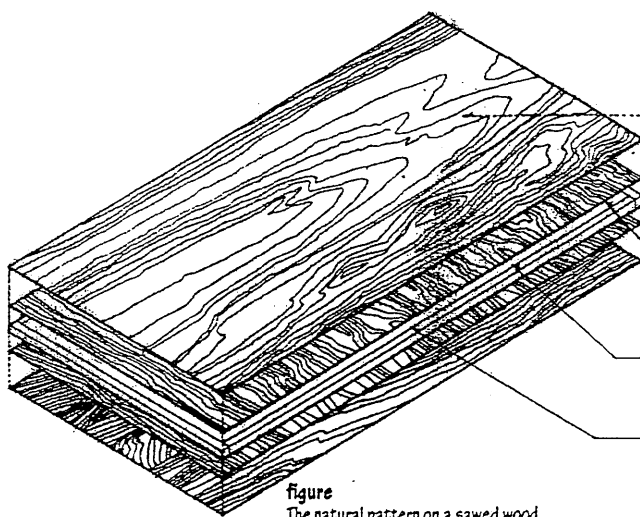
A sound, smooth hardwood veneer free of open defects but containing streaks, discoloration, patches, and small sound tight knots.

**utility grade**

A hardwood veneer permitting discoloration, streaks, patches, tight knots, small knotholes and splits.

**backing grade**

A grade of hardwood veneer similar to utility grade but permitting larger defects not affecting the strength or durability of the panel.

**decorative plywood**

Hardwood-faced plywood manufactured for use as paneling or in cabinetry and furniture.

**veneer**

A thin sheet of wood rotary cut, sliced, or sawn from a log or flitch and used as a superior facing to inferior wood or bonded together to form plywood.

**crossband**

A layer of veneer immediately adjacent to and at right angles to the face plies in a plywood panel.

**core**

The center of a plywood panel, consisting of veneers, sawn lumber, or composition board.

**banding**

The solid wood stock extending around the sides of a veneered panel, concealing the core and facilitating the shaping of the panel edges.

**figure**

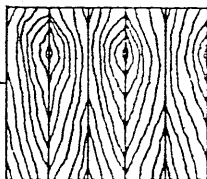
The natural pattern on a sawed wood surface produced by the intersection of annual rings, knots, burls, rays, and other growth characteristics.

**matching**

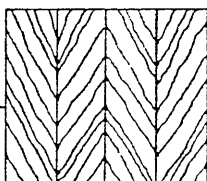
Arranging sheets of veneers so as to emphasize the color and figure of the wood.

**book matching**

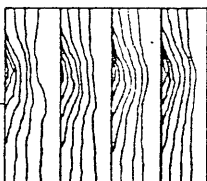
Arranging veneers from the same flitch alternately face up and face down to produce symmetrical mirror images about the joints between adjacent sheets.

**herringbone matching**

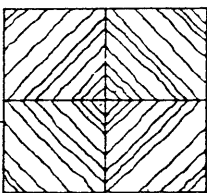
Book matching in which the figures in adjacent sheets slope in opposite directions.

**slip matching**

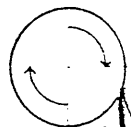
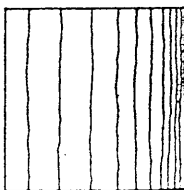
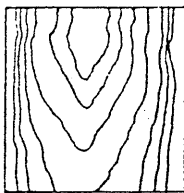
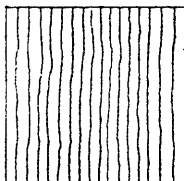
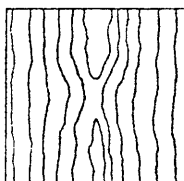
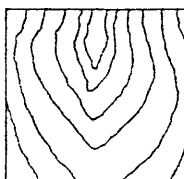
Arranging adjacent sheets of veneer from the same flitch side by side without turning so as to repeat the figure.

**diamond matching**

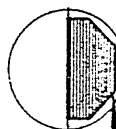
Arranging four diagonally cut sheets of a veneer to form a diamond pattern about a center.

**random matching**

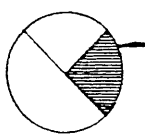
Arranging veneers to intentionally create a casual, unmatched appearance.

**rotary cutting**

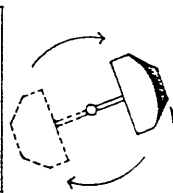
The rotating of a log against the cutting edge of a knife in a lathe, producing a continuous veneer with a bold, variegated ripple figure.

**flat slicing**

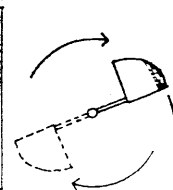
The longitudinal slicing of a half-log parallel to a line through its center, producing a veneer having a variegated wavy figure. Also called plain slicing.

**quarter slicing**

The longitudinal slicing of a quarter log perpendicular to the annual rings, producing a series of straight or varied stripes in the veneer.

**half-round slicing**

The slicing of a flitch mounted off-center in the lathe, slightly across the annual rings, producing characteristics of both rotary cutting and flat slicing.

**flitch**

A longitudinal section of a log to be cut into veneers.

**rift cutting**

The slicing of oak and similar species perpendicular to the conspicuous, radiating rays so as to minimize their appearance.

## WOOD

### oriented strandboard

A nonveneered wood panel product commonly used for sheathing and as subflooring, made by bonding three or five layers of long, thin wood strands under heat and pressure using a waterproof adhesive. The surface strands are aligned parallel to the long axis of the panel, making the panel stronger along its length.

Abbr.: OSB

### waterboard

A nonveneered panel product composed of large, thin wood flakes bonded under heat and pressure with a waterproof adhesive. The planes of the wafers are generally oriented parallel to the plane of the panel but their grain directions are random, making the panel approximately equal in strength and stiffness in all directions in the plane of the panel.

### composite panel

A wood panel product consisting of two face veneers bonded to a reconstituted wood core.

### particleboard

A nonveneered wood panel product made by bonding small wood particles under heat and pressure, commonly used as a core material for decorative panels and cabinetwork, and as underlayment for floors. Also called chipboard.

### parallel strand lumber

A structural lumber product made by bonding long, narrow wood strands together under heat and pressure using a waterproof adhesive. Parallel strand lumber is a proprietary product marketed under the trademark, Parallam, used as beams and columns in post-and-beam construction and for beams, headers, and lintels in light frame construction.

Abbr.: PSL

### laminated veneer lumber

A structural lumber product made by bonding layers of wood veneers together under heat and pressure using a waterproof adhesive. Having the grain of all veneers run in the same longitudinal direction results in a product that is strong when edge loaded as a beam or face loaded as a plank. Laminated veneer lumber is marketed under various brand names, as Microlam, and used as headers and beams or as flanges for prefabricated wood I-joists. Abbr.: LVL

### fiberboard

A building material made of wood or other plant fibers compressed with a binder into rigid sheets.

### hardboard

A very dense, compressed wood fiberboard.

### tempered hardboard

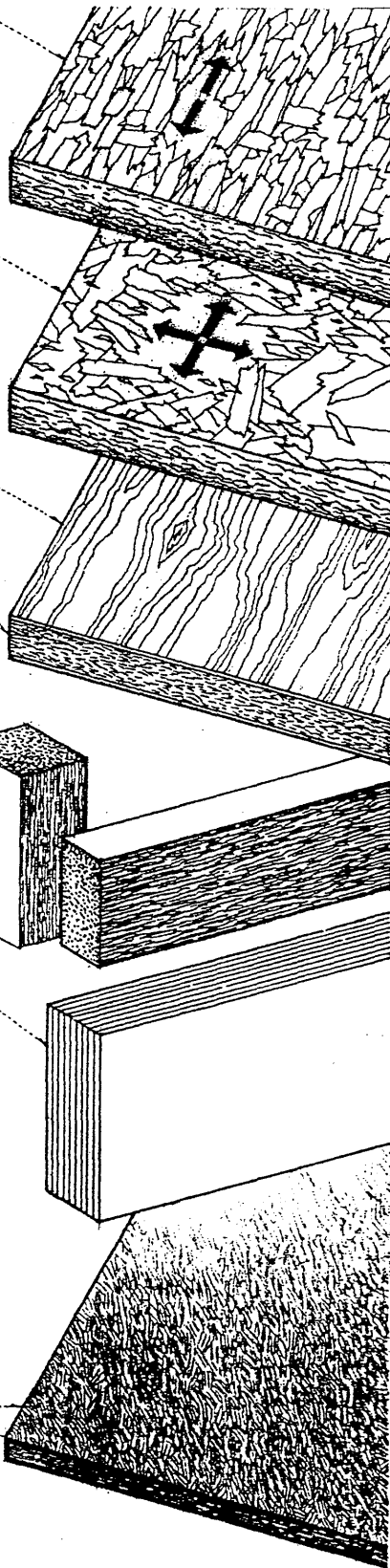
A hardboard impregnated with a drying oil or other oxidizing resin and baked to improve its hardness and moisture resistance.

### Masonite

Trademark for a brand of tempered hardboard.

### Peg-Board

Trademark for a brand of tempered hardboard having regularly spaced perforations into which hooks may be inserted for the storage or display of articles.



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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