Interior Design Materials

Stone Materials

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Stone

Brick

Concrete Masonry Units (CMUs)

Definition

- The term **masonry** is defined as building with natural or manufactured units of stone, brick, or concrete that are usually mortared together. Masonry units are typically produced in standard sizes for modular construction

STONE

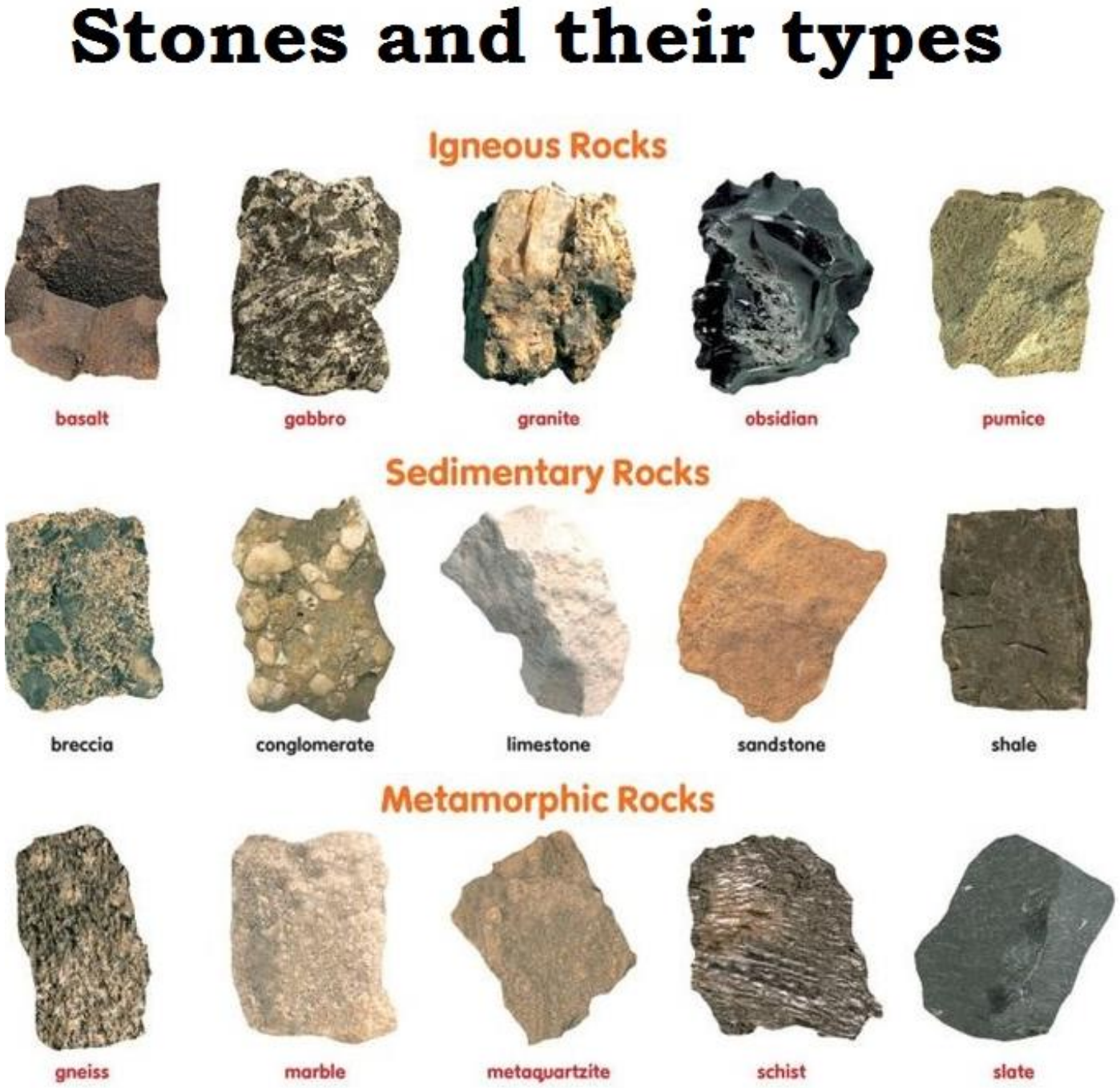
- **Rock** is stone before it is moved from where it is found.
- **Stone** is rock removed from its bed for use. After stone is taken from a quarry and mechanically **dressed** (worked to the desired shape and smoothed on the face), it is referred to as **dimension stone**. Dimension stone consists of blocks or slabs of a specified size and shape

Properties

- The primary building qualities of stone are strength and durability. Stone is strong in compression, but typically its shear strength is much less. The workability of stone may be limited by its hardness and **grain**. Most stone is very dense; its degree of porosity affects its ability to withstand staining.

Types of Stone

- Stone is categorized by how it was formed.
- **Sedimentary** rock consists of compressed deposited sediment.
- **Igneous** rock is formed from molten magma.
- **Metamorphic** rock is created by subjecting rock to new conditions of temperature and pressure. The hardness of stone is related to its origin: igneous granite is hard, metamorphic marble is softer, and sedimentary sandstone is even softer than marble.



Igneous Rock

- Granite is the most common igneous rock used in building interiors, It is a hard, durable rock made from feldspar and quartz, usually with mica or hornblende. It resists staining, scratching, and chemicals. Granite's fire resistance is poor; it crumbles when exposed to intense heat. Its coarse, dense grain cuts, shapes, and polishes well.
- Granite comes in black, white, gray, beige, yellow, brown, blue, green, pink, and red.
- It is available in slabs, tiles, bricks, and blocks, and cut for steps, treads, risers, and decorative stone circles and medallions. Granite is used for floors, walls, counters, fireplace surrounds, and showers.

Sedimentary Rock

- Limestone, sandstone, and travertine are sedimentary rocks commonly used in interiors.
- Limestone is made of calcium carbonate from coral and shells. Colors include off-white, buff, cream, gray, and blue. Limestone is durable, very heavy, and not very water-absorbent. It is available as slabs, pavers, blocks, and treads for use on walls, floors, treads, and fireplaces.

Sandstone

- Sandstone is formed from layers of quartz or feldspar sand pressed together and cemented by minerals between sand grains (Figure 5.8). Colors include white, buff, gray, brown, and red.
- Sandstone is easy to work and is highly absorbent. It is available as tiles, slabs, and blocks for use on walls and floors, and processed into **balusters** and window and fireplace surrounds.

- Travertine is a banded, compact type of limestone formed by precipitation near hot springs or limestone caves.
- Travertine is white, tan, or cream in color. Travertine varies in hardness and can be etched by acids; it should be sealed with a penetrating sealer. Travertine can be given a **honed**, brushed, tumbled, or polished finish. It is available as building stone and as tiles and is used for walls, flooring, and fireplaces.

Metamorphic Rock

- Metamorphic rocks used in building interiors include marble, quartzite, slate, soapstone, and alabaster.
- Marble is recrystallized from sedimentary rocks, and comes in white, black, red, pink, and green, with colored veins deriving from impurities.
- Marble takes a high polish well. Marble is available in blocks, slabs, and treads and risers, and is used for fireplaces and walls. Red wine and other substances can stain marble.

- **Quartzite**

- is a metamorphic form of sandstone that comes in white, black, red, pink, and green. It is a hard, compact, granular material. Quartzite tiles and slabs are used as wall and floor finishes and fireplaces, and crushed quartzite aggregate is used in flooring.

Processing Stone

- Stone is quarried in large blocks and cut into thick, broad slabs or other pieces. Whether stone is cut parallel, perpendicular, or at a 45° angle to the layers of its bed affects its appearance.

Stone Definitions

- **Fieldstone:** loose, unfinished building stone found on the surface of the soil. It can be split to produce a flat surface.
- **Rubble:** rough fragments of broken stone; also masonry built of rubble stone
- **Dimension stone:** quarried and squared stone 24” (610 mm) or more in length and width and of a specified thickness; commonly used for wall panels and flooring
- **Flagstone:** flat stone slabs used for flooring and horizontal surfacing
- **Ashlar:** smooth squared stones with very thin mortar joints, laid in horizontal courses with stones of the same height

- **Riverbed pebbles:** rounded rock or mineral fragments from 0.08″ to 3″ (2 to 75 mm) in diameter

- **Composite Stone** Engineered composite stone products are formulated from stone aggregate and synthetic resin matrix materials. Engineered stone is strong, nonporous, durable, and flexible. Quartz is the most common aggregate, although marble, colored glass, shells, metals, and mirrors are also used. Engineered stone products are available as tile units and sheets for horizontal and vertical applications.

Environmental Impacts of Stone

- Stone's thermal mass is ideal for passive solar design. Large areas of stone will collect the sun's heat slowly and later release it to cooler surrounding air.
- The amount of embodied energy in processed stone is related to how difficult it is to remove from the earth and how far it must be transported.
- The use of stone from local sources reduces the amount of embodied energy, as do local finishing, cutting, and manufacturing facilities.
- Quarrying rock removes vegetation and soil and generates dust and noise. The resulting holes may speed up erosion and damage the water supply. In the U.S., most of the water used in the process is required to be recycled.

Interior Applications for Stone

- Interior designers specify stone for the tops, bases, and panels of furniture.
- Stone panels and tiles are used for floors and walls. Stair treads, toilet partitions, countertops, columns, and other architectural features are also made of stone.

Stone Tiles

- Stone tiles are sawn from larger blocks and are usually made of granite, marble, sandstone, or limestone.
- Stone tiles are no more than 3/4” (19 mm) thick, and from 4” (102 mm) to 39” (1 meter) square.

Stone Treads and Risers

- Interior steps are often made of thinner and lighter stone treads and risers rather than solid stone slabs. They are available with **flamed** (thermal) and polished surfaces. Treads and risers are most commonly granite, with marble, sandstone, and limestone used as well.

Stone Mosaics

- Stone **mosaics** are made from small pieces of colored stone, typically 3/8″ (10 mm) marble cubes, arranged into decorative designs .
- Stone mosaics are available in round, oval, square, and octagonal shapes, and as custom designs. Natural sandstone, granite, limestone, and slate, as well as engineered stone, are used.

Tumbled Stone and Pebbles

- Tumbled marble tiles have softly rounded edges and are used for floors and walls .
- Tumbled limestone has a dull, porous surface that does not show wear, and is popular for backsplashes, countertops, tabletops, and small floors. Tumbled slate is very durable, water-repellant, and acid-, stain-, and fire-resistant; it is used for floors, walls, and fireplaces

Cost Factors for Stone

- Stone costs depend on quarry location and transportation distance, and on the extent of quarrying and the amount of processing required.

Installing Stone

- Natural stone is laid in mortar much like clay and concrete masonry units to make both bearing and nonbearing walls, or used as a facing veneer tied to a concrete or masonry backup wall.
- Stone floors are set on mortar beds to accommodate variations in stone thicknesses for a total subfloor-to-finish thickness of 1-1/2″ to 2″ (38 to 51 mm).

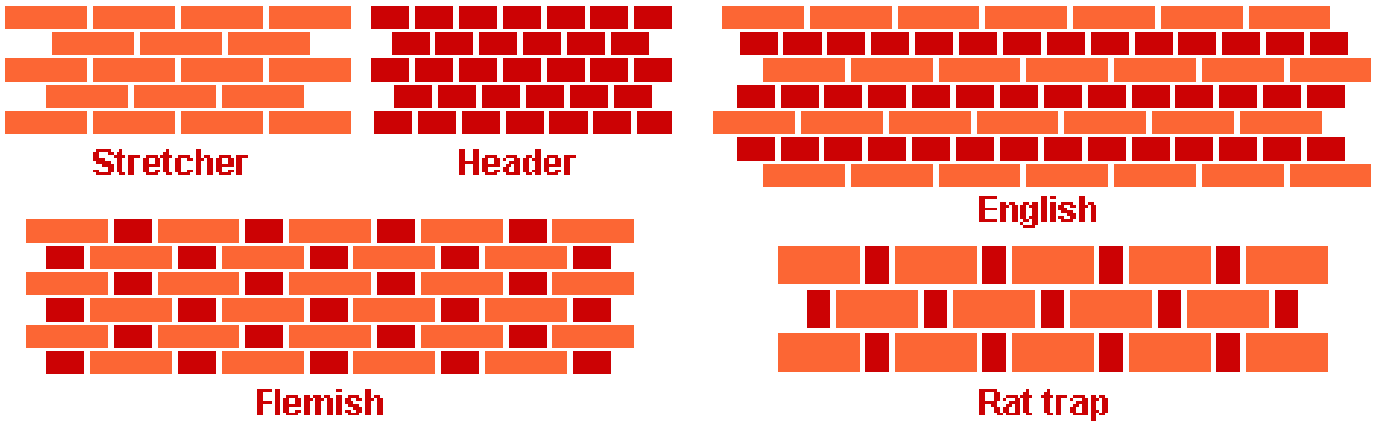
- Wire tie anchoring systems with plaster or mortar spots are traditional methods for installing interior stone wall facing. Wire ties are anchored to the gypsum board, masonry, or concrete walls

BRICK

- A **brick** is a rectangular masonry unit made of clay that has been hardened by drying in the sun or baking in a kiln.

Physical Properties

- The physical properties of brick include compressive strength and durability.
- The strength of a brick construction depends on these qualities combined with the strength of the bond—the pattern in which it is laid

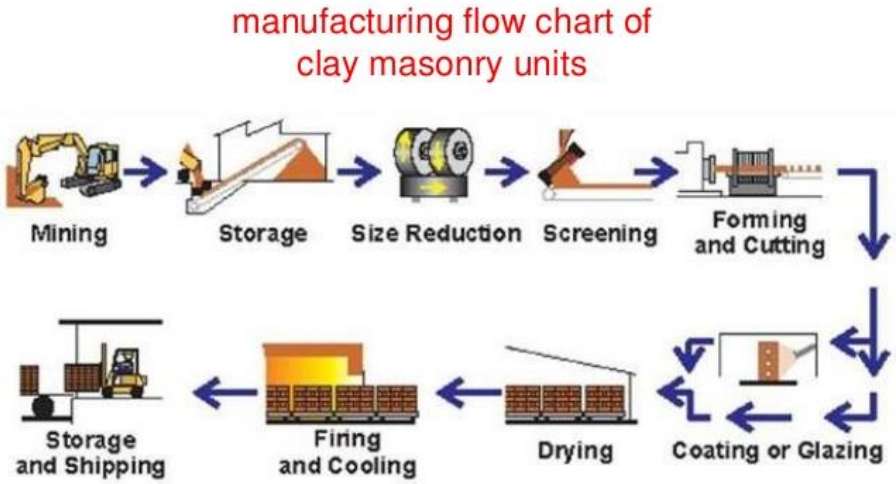


Types of Brick

- In addition to common and facing bricks, there are several other types of bricks used in interiors.
- Thin brick comprises fired clay units with normal face dimensions and reduced thickness, and is used for adhered veneer applications.
- Paving bricks in a wide range of shapes and sizes, including thin brick, are used for interior floors and walkways.
- Ceramic glazed bricks consist of an impervious colored ceramic glazed face fused to clay body.

Manufacturing Brick

- Bricks have traditionally been made from local clay and sand. Many types of additives have been added to brick to improve handling properties.



- The soft mud method is the most common and least expensive way to make bricks.
- Bricks are also made by the dry pressed and extruded methods. Typically, sand is mechanically mixed with some type of colorant to produce a coating for brick

Environmental Impacts of Brick

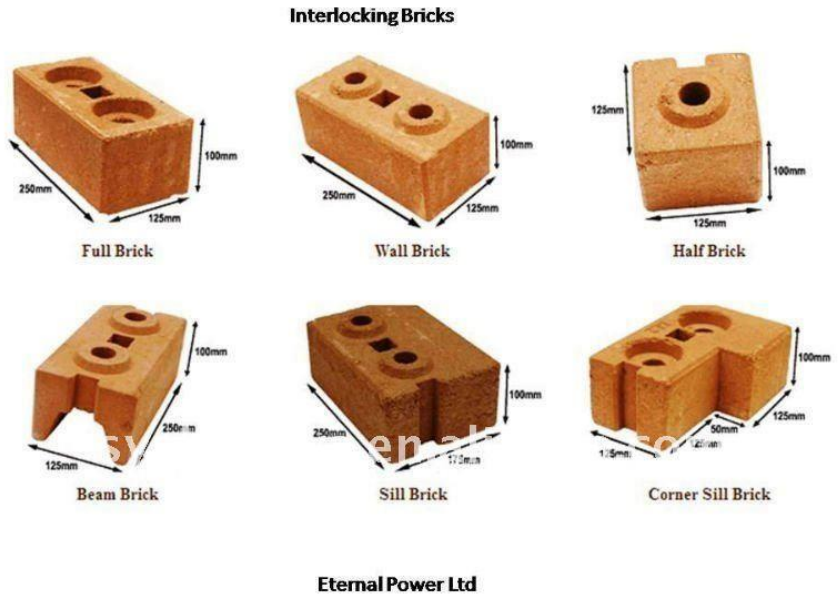
- Brick construction is durable and long lasting.
- have high thermal capacity and can provide shelter from excessive solar heat or keep warmth within an interior.
- transportation costs, bricks traditionally have been made on-site or at a local kiln.
- The small size and modular nature of bricks allow on-site construction waste to be reduced through careful design and detailing.
- antique bricks can be reused for interior walls.

Interior Applications for Brick

- brick floors are durable, strong, and relatively maintenance free.
- A brick fireplace can be hand-built or supplied in a kit form
- Brick interior walls may be either load-bearing or nonstructural.

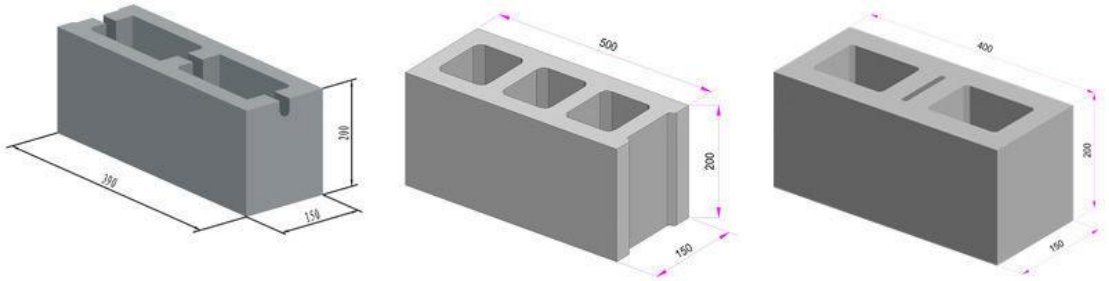
Installing Brick

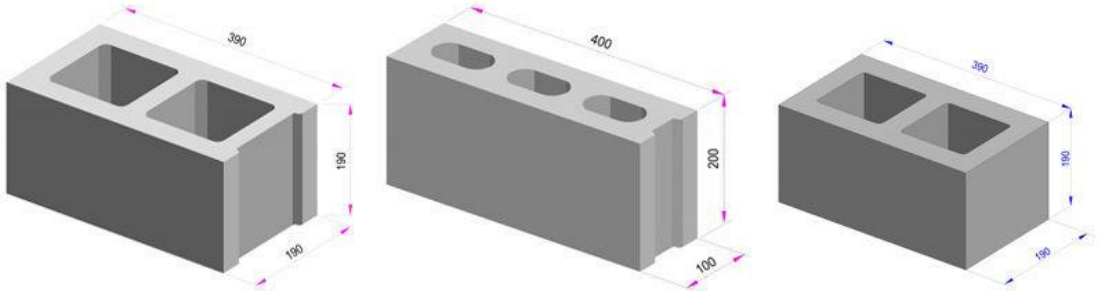
- Brick bearing walls can support interior structural elements .
- Face brick is used where appearance is important. A nonstructural outer facing of brick is tied to the wall's internal structure.
- Thin brick is also bonded to a 16" × 48" (406 × 1220 mm) substrate for a small, lightweight, modular panel that can be installed easily using ceramic tile techniques.
- Glazed brick is generally installed in the same manner as face brick. A 3/8" (10 mm) joint size is typical.



CONCRETE MASONRY UNITS (CMUs)

- comprise precast portland cement with fine aggregate and water molded into various shapes. Technically, the term “concrete masonry unit” includes blocks made of cinder concrete (cinder blocks or breeze block), hollow tile, and ordinary concrete blocks





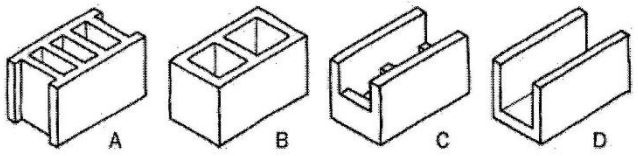
Properties of CMUs

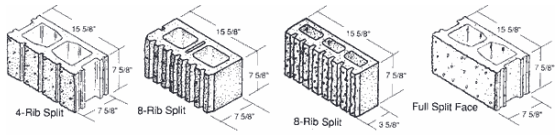
- A standard common concrete masonry unit is nominally 8″ × 8″ × 16″ (203 × 203 × 406 mm), usually manufactured with two hollow cores to reduce weight and make handling easier.

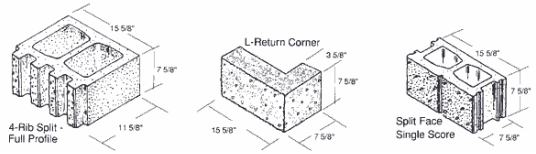
- Concrete blocks have excellent structural strength and fire resistance, and maintenance requirements are minimal.

Types of CMUs

Stretcher block
Partition block
Bullnose block
Corner block and returncorner block
Sound-absorbing masonry unit
Faced block
Scored block
Screen block







- CMU walls are used in schools, office, and hotels for noise abatement, fire separation, and durability. They are also used as backup for facing brick or other finishes.

Environmental Impacts of CMUs

- The high thermal mass of concrete blocks allows them to reduce heating and cooling costs.
- CMUs can be recycled by selective demolition, much like bricks, although breakage is more of a problem.
- Crushed CMUs are used as aggregates in concrete.
- Although CMUs have less embodied energy than bricks, their cement content makes their production energy-intensive.

Installing CMUs

- Concrete block partitions have nominal thicknesses of 4”, 6”, 8”, 10” and 12” (102, 152, 203, 254, and 305 mm). Block lengths are typically a nominal 16” (406 mm), although some are 24”
- (610 mm). A standard 3/8” (10 mm) mortar joint is used between concrete masonry units, as with brick. The actual dimensions are consequently 3/8” (10 mm) less than the nominal dimension.
- CMUs can be left unfinished, or furred and covered with gypsum board or paneling. Plaster may be applied directly on the block, or self-furring lath can be applied before the plaster. CMUs may also be epoxy coated or painted.