

4.3 CAST STONE

Cast stone is most widely used as an accessory for masonry construction in the form of lintels, sills, copings, and so on (see Fig. 4-2). Some manufacturers also produce simulated stone products designed for use as facing materials. The shape of the mold used for casting will determine the appearance of the unit. Any shape that can be carved in natural stone can probably also be formed in cast stone.

Cast stone is defined as an architectural precast concrete building unit intended to simulate natural cut stone. Unlike “simulated stone” produced in random sizes as rubble or cleft-face quarried stone (see Fig. 4-3), cast stone exhibits the same finish as a good grade of limestone or brownstone which has been cut or honed.

The French made lintels and door trim out of cast stone as early as the twelfth century. Today, cast stone is made of a carefully proportioned mix containing natural gravel, washed and graded sand, and crushed and graded stone such as granite, marble, quartz or limestone meeting requirements of ASTM C33, *Standard Specification for Concrete Aggregates*. White portland cement usually is used to produce light colors and color consistency, although gray cement and color pigments are sometimes blended with the white cement. Because a rich cement-aggregate ratio of 1:3 is normally used, cast stone properly cured in a warm, moist environment is dense, relatively impermeable to

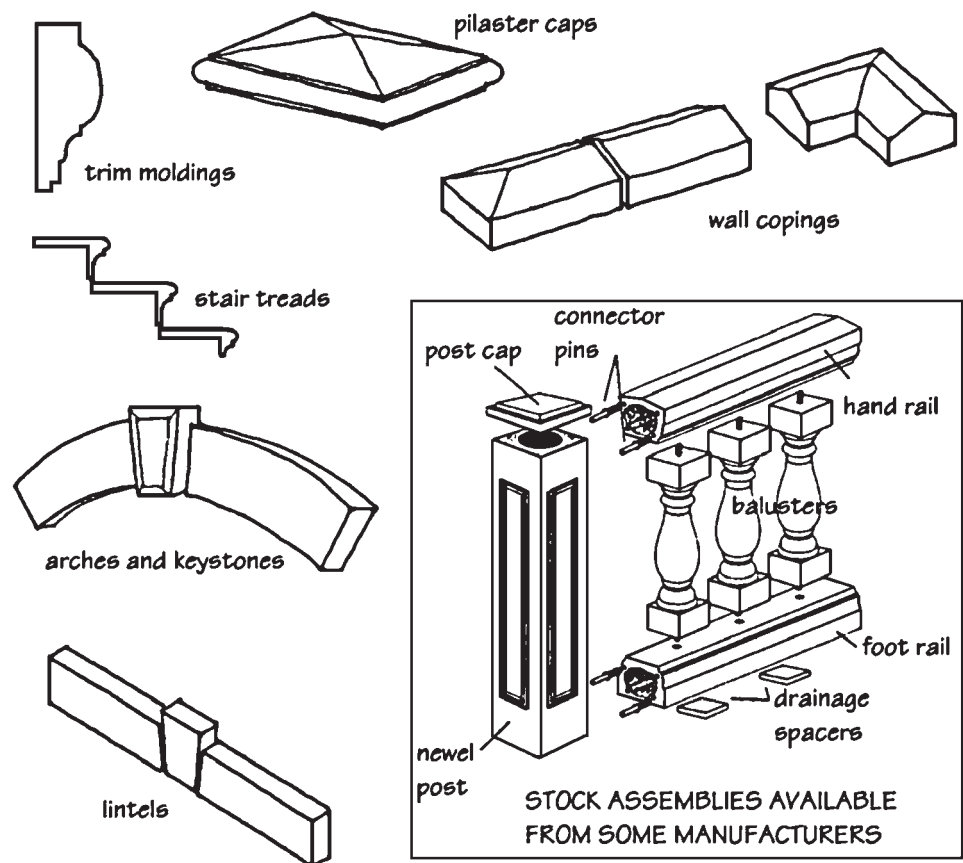


Figure 4-2 Typical cast stone elements used with stone and unit masonry.



Figure 4-3 Simulated stone made to resemble natural rubble stone is not the same strength and quality as architectural cast stone.

moisture, and has a fine-grained, natural texture. ASTM C1364, *Standard Specification for Architectural Cast Stone*, prescribes minimum physical requirements (see Fig. 4-4), dimensional tolerances, and permissible color variations. Cast stone is relatively heavy at 144 lb/cu ft, and at 6500 psi, compressive strength is higher than ordinary cast-in-place concrete.

Cast stone is made by two methods. In the wet-cast method, stone is cast in much the same way as other architectural precast concrete. If most of the stone surfaces are to be flat, the concrete is vibrated with external vibrators. If the stone is highly ornamental, it is vibrated with internal vibrators. The stone is then cured in the mold until the next day when it is stripped. In the dry-tamp method of manufacture, a pneumatic machine is used to ram and vibrate moist, zero-slump concrete against rigid formwork. When the concrete is densely compacted, it is removed from the form and left to cure overnight.

To ensure that the stone undergoes little change in appearance because of weathering, the outer surface of mortar is removed to expose the fine aggregates. Hydrochloric acid is used to etch the surface because it produces the most brilliant colors and leaves a surface that stays clean. Sandblasting and chemical retarders, which are normally used to finish architectural precast, are not used on cast stone because they dull the aggregates and cause the loss of fine detail.

Although some cast stone manufacturers produce and stock standard items of architectural trim such as balusters, door pediments, and balcony rails, cast stone is more often custom designed and fabricated for each project. For greatest economy, design shapes should be tailored to the fabrication process. Projections should be slightly angled rather than flat to facilitate removal of the molds. The length of projections should not exceed their thickness. Transitions from a finished to an unfinished surface should be sharp angles rather than feathered edges. L- and U-shaped sections are vulnerable to breakage during fabrication and shipment. Returns should be formed instead by butt jointing or mitering two pieces.