



Dimension Stone in Ohio

Dimension stone is quarried rock that is cut and finished to specific sizes and shapes. Globally, dimension stone is sourced from a variety of rock types, including limestone, marble, travertine, granite, quartzite, and sandstone. The distinction between rock being labeled as either dimension stone or simply “building stone” lies in whether the final products are sawn and split into geometric shapes or merely crushed and sorted into general categories. Aggregate for road construction or riprap for erosion control also have size and shape specifications that must be met, but they typically are not classified as dimension stone. Dimension stone is often used as building blocks, ashlar veneer, wall façades, sills, paver tiles, slabs, steps, benches, or other decorative accents. Rarely is dimension stone used today for structural support purposes; instead, it is used primarily for decoration and added durability. The worth of dimension stone is not derived from its physical properties alone, but rather from the increased product value that comes with high-quality finishing and extra detail.

Ohio dimension stone represents a link to Ohio history, both as a clue to the geologic landscape of the state hundreds of millions of years ago and as a reminder of the work of early European settlers. As the economy, technology, architectural trends, and public perception have transformed, so have dimension stone uses.

History of dimension stone use

The widespread use of dimension stone in Ohio began during the mid-eighteenth century when Europeans arrived and began to create permanent settlements, which necessitated sturdier structures, agricultural equipment such as grindstones, and eventually monuments and décor. The Ohio dimension stone industry historically has consisted of western Ohio limestones and eastern Ohio sandstones.

As the population of Ohio grew, so did the demand for dimension stone, thus the number of quarries and quarrying companies increased. Many building blocks were transported via river and eventually via canal and railroad. The canal systems and the dimension stone industry mutually benefitted and propagated one another. Dimension stone not only was used in the construction of canal locks and other structures but was delivered to customers by means of these waterways.

Some of the earliest stones quarried for dimension stone were Silurian- and Devonian-age limestones. During the early 1800s, the Devonian-age Columbus and Delaware Limestones were used extensively for home building in central Ohio and in the counties bordering Lake Erie. The Ohio Statehouse in Columbus was completed in 1861 and extensively utilized Columbus Limestone in its construction. The older Silurian-age Dayton Limestone was used widely throughout Dayton and southwestern Ohio. Its laterally continuous bedding and resistance to weathering made it popular in the region.



Figure 1. The Cleveland Quarries Birmingham quarry where two distinct colors of Berea Sandstone, known as “Birmingham Buff” and “Amherst Gray,” are found.

Some other geologic units previously used as dimension stone include the limestone of the Ordovician-age Richmond Formation, Silurian-age Clinton Formation and Brassfield Limestone, the shale and sandstone of the Mississippian-age Bedford Shale, and Mississippian-age Buena Vista Sandstone of the Cuyahoga Formation in Scioto County. The quarrying of some of these formations was generally unpopular in the long term because of impurities present in the rock, lack of extent or thickness, or more suitable replacement formations or other materials becoming available.

Historically, the Devonian-age Berea Sandstone and Pennsylvanian-age Massillon sandstone were two of the most profitably mined dimension stones in the state. The Berea Sandstone has been the most extensively quarried and widely used dimension stone in Ohio (fig. 1). In the early 1800s, the first Berea Sandstone quarries were opened in Cuyahoga County. The planar continuous bedding, blue-gray to light-brown color, and resistance to weathering make it highly desirable as building stone and easily marketable as distinct varieties. Quarrying of the Massillon sandstone began during the mid-nineteenth century in Holmes County and spread to both Coshocton and Knox Counties. The Massillon sandstone is highly marketable because of its unique and variable appearance. The combination of prevalent crossbedding, impurities among quarries, and varying degrees of oxidation result in a variety of colors and patterns. Iron banding is present in some quarrying locations and is a desirable feature for some customers (fig. 2).

Production methods

Around the world, a multitude of production techniques are used depending on the site and lithology, but the methods used in Ohio are mostly limited to those appropriate for the local sandstone. Sandstone is removed from a quarry



Figure 2. Massillon sandstone slab variety referred to as “copper variegated” at The Briar Hill Stone Company in Glenmont, Ohio. Iron banding gives it a signature look that is quite popular with customers.



Figure 3. Gang saw being used to cut a block of Massillon sandstone into slabs at The Briar Hill Stone Company plant in Glenmont, Ohio. Average-sized blocks weigh approximately 10 tons.

and then fractionated into smaller pieces with more precise dimensions and details until it reaches the desired final form and size. The initial cutting or breaking of the stone from the quarry is typically achieved by either precision sawing or directional blasting with explosives. Quarry saws can be positioned to remove blocks of specific measurements by cutting blocks in two directions and then taking advantage of natural bedding planes to free them from the quarry floor. Once positioned, these saws can complete cuts automatically. Operations that employ blasting to remove sandstone blocks first will create a series of drill holes oriented in the preferred direction of blast propagation. Large columnar masses of rock can be removed all at once using this method. Natural fractures or crevices in the quarry face help to control rock column width, and diesel-powered loaders break columns into smaller portions for transport.

Once rock has been extracted from the quarry, it must be transported to a plant for processing and finishing. Depending on the quarry depth and accessibility, blocks are lifted onto flatbed trucks or railcars by either hoist or other loading equipment for transport to the production facility. Production plants ideally will be in geographic proximity to their associated quarries to minimize transportation costs, but this is not as much of a necessity for dimension stone compared to lower cost-per-ton commodities such as sand and gravel.

The most interesting and publicly visible aspect of dimension stone production is the finishing process. Multiple slabs of established thicknesses are sawn from larger blocks or boulders using reciprocating gang saws or oscillating wire saws (fig. 3). These slabs are further split into smaller geometric shapes, depending on the final product and finishing method. Preprogrammed saws then trim the sandstone into the desired shapes, and details can be added by hand when necessary. The hand-chiseling of dimension stone is a modern-day art form that requires an inherent talent which takes years to develop. Unexpected variation in rock color, fractures, thin bedding, mineral inclusions, or inconsistent textures are challenges that can negatively impact a business.

Market for Ohio dimension stone

The use of dimension stone for historical building preservation encourages domestic stone production. Crumbling nineteenth-century historic buildings in need of preservation or restoration often use stone similar in lithology and source location to the original rock. The recreating or duplication of specific features of historic buildings can grow into a larger market in Ohio as buildings continue to weather and new construction ages and eventually needs repair.

Dimension stone is often disregarded in favor of less-expensive substitutes, such as concrete, steel, glass, or synthetic materials that require significant additional energy or water to produce or that create substantial air pollution. Dimension stone production is the least energy intensive and generates the smallest amount of air and water pollution of all these building materials. It also ranks highly in durability, ease of care, longevity, and recyclability. Choosing dimension stone for a construction project becomes financially justifiable when it can be marketed as environmentally friendly, aesthetically pleasing, and durable enough to be used in buildings that history may deem as culturally significant for hundreds of years.

References & Further Reading

- Melvin, R.W., and McKenzie, G.D., 1992, Guide to the building stones of downtown Columbus: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Guidebook No. 6, 33 p.
- Peter, M.E., 2020, Statehouse fossils—a guide to fossils of the Ohio Capitol: Columbus, Ohio Department of Natural Resources, Division of Geological Survey, 38 p.
- Wolfe, M.E., 2011, Building stones of the Ohio capitols: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Educational Leaflet 19.