



OHIO DIMENSION STONE

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 ranks in the top 20 of dimension stone-producing states and in the top five of dimension sandstone producers. Ohio dimension sandstone resources are rated as some of the highest quality products in the United States and have maintained their popularity for decades since they were first developed in the mid-1800s. Today, nearly all the dimension stone produced in Ohio is sandstone; however, limestone and granite dominate dimension stone production nationwide, consisting of over two-thirds of total production.

Ohio dimension stone represents a link to Ohio history, both as a clue to the geologic landscape of the state millions of years ago and as a reminder of the struggles and accomplishments of early settlers. As the economy, technology, architectural trends, and public perception have transformed over the past two hundred years, 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 European colonizers 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 was not only 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 especially in the counties bordering Lake Erie. The older Silurian-age Dayton Limestone was used widely throughout Dayton and southwestern Ohio as well. Its laterally continuous bedding and resistance to weathering made it popular in the region.

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 more recently the Mississippian-age Buena Vista Sandstone of the Cuyahoga Formation in Scioto County. The quarrying of some of these formations was generally unprofitable in the long term because of impurities present in the rock, lack of extent or thickness, or more suitable replacement formations 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, and they dominate the present-day Ohio market. The Berea Sandstone has been the most extensively quarried and widely used dimension stone in Ohio. In the early 1800s, the first Berea Sandstone quarries were opened in Cuyahoga County, and they continue to operate today. The Berea is more than 200 feet thick in some locations and less than two feet thick in others, depending on the stream channel depths and distance from the sediment supply over 350 million years ago. 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 continues in both Coshocton and Knox Counties today. The Massillon sandstone continues to support a regional market and 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.



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

PRODUCTION METHODS

A multitude of production techniques are used at other sites and for other lithologies around the world, but the methods used in Ohio are limited to those appropriate for the local sandstone and most suitable for each company. Sandstone is removed from a quarry 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 either by 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 as with lower cost-per-ton commodities. Waste rock material that is not suitable as dimension stone can be cleared from the quarry and sold as aggregate or used for reclamation purposes.

The most interesting and publically 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. 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; thus hiring capable stone carvers is exceptionally difficult.



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

No matter what production or finishing method is chosen, an operation can face numerous problems that are often out of its control. Some of these include unexpected variations in rock color or gradation, fractures, thin bedding, mineral inclusions

or banding, and inconsistent textures. Quarrying a single block of dimension stone requires significant time, so losing viable product to defects or error can become a financial liability.

MARKET FOR OHIO DIMENSION STONE

The use of native Ohio stone for construction should be praised and supported both for its economic benefits to the state and cultural benefits it will give future generations. Ohio will face ever-increasing competition from international sources of dimension stone because of the economic feasibility of long-distance transport and increased overseas production. The use of dimension stone for historical building preservation is a growing market in Ohio which 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 age and new construction eventually succumbs to time.

Recently, a concentrated education effort by building-stone affiliated organizations and professional publications has encouraged “eco-friendly building” or “green building” through the use of dimension stone. 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.

FURTHER READING

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