The Art of Stone Masonry
In the Rockbridge County Area
(1700 to present)

Steven Connett
Archaeology 377
5/25/83
Dr. McDaniel
The art of stone masonry in the Shenandoah valley seems to be somewhat of a mystery prior to the nineteenth century. However, as some of us have learned from the anthropology 101 course: The absence of artifacts (documents in this case) is just as important as the presence of artifacts. In order to make sure that the lack of information was not due to my possible incompetence in research, I spoke with a current day stone masoner named Alvis Reynolds. Mr. Reynolds relayed to me that when he was trying to learn the skills of stone masonry he, too, had great difficulty in obtaining information and thus decided to teach himself this art through the process of trial and error. Although this information did not directly aid me in my research, Mr. Reynolds did provide me with a bit of information that allowed me to derive a hypothesis on why there is this unusual lack of information in this line of study. I will state my hypothesis in this paper; however, I will not be able to prove it or disprove it due to the deficiency in available information.

Mr. Reynolds explained to me that in the eighteenth century there were nomadic stone masoners. These nomadic workers went from valley to valley in search of people who needed help with building their houses. Since these people did not know how to cut stone themselves (after all, stone cutting is not the type of thing that is innate to most people) they had no choice but to pay these men for their services or go unsheltered. Because the stone masoners were nomadic, they probably only traveled with the bare necessities that they needed. It is my opinion that these necessities did not
include written material explaining the extent of their projects or lives. Furthermore, because the area is so large and these men were always on the move, the "nomadic masoner" would be very difficult to tax. Thus, the above ideas provide a logical explanation as to why there is so little information on eighteenth and nineteenth century stone masonry in the Rockbridge area.

As time passed and the population in the area grew there became a need for a more sedentary stone masoner whose services were more readily available. Also, some people learned from their parents or other people the basics of stone cutting, therefore, they were slowly weeding out the "nomadic masoner." In order to fully understand why stone cutting could not be done by all we must concentrate our attention to the stone itself and the methods used to cut the stone.

"Stone is a brittle material better able to support heavy weights than to be subjected to the stress of bending. It is most effectively used in walls and piers but can be used in beams of limited span."¹ If we take a look at the 44RB195 site we can see that there is definite evidence that stones were used for the walls, base and hearth of the structure. The reason that stones were used for these parts of the house is that "large heavy stones in massive groups can resist active forces because of their inertia and because only great forces can overturn them."² Quite obviously all stones are not the same and for this reason, some are more durable than others. Most of the builders in the Rockbridge County area had to use the stones available to them which were close to their building site. These stones varied greatly in both size and property.
"The natural divisions in rock are related to the crystal lattice or molecular shape of the material, so that the manner in which a given stone will break depends upon the kind of crystalline structure it possesses. Instruments that have become available in recent decades enable geologists to investigate the molecular structure of minerals and correlate it with phenomena recorded in earlier times. Often, sedimentary stone will readily split along a plane in which sediment was originally deposited—its 'natural bed.'" Many stones can be broken along a set of planes to get an approximate rectangle with a moderate amount of effort and some simple tools. The masoners in our area of study probably discovered this property long ago and have been taking advantage of it ever since.

Masoners had three basic methods they used to quarry stone. The first method they used was taking the stone from the surface of the earth. This was probably the most commonly used method for the people in our domain of study. The second method was "quarrying for occasional use" and the third method was commercial quarrying.

Although the stones were copious enough to just gather off of the surface some people still went to quarriers. There were two known quarries in the Virginia area during the eighteenth century. The first is in Aquia Creek (1757) and the second is in Richmond County (1758). After the stones had been quarried they had to be lifted and transported. The Rockbridge County area was very fortunate in that it had some rivers to utilize for the transportation of the stone. Levers were used to maneuver the material onto a sledge, stone boat or cart.
Wooden rollers were sometimes used to move large stones. "Cranes, consisting of booms and vertical masts held by stays, could handle fairly heavy loads with the mechanical advantage afforded by windlass and compound pulleys." There were also many other inventions to aid in quarrying.

One measurement of stones was a cord. The price of a cord varied between $4.50 and $6.00 per cord in 1817. This was dependent on the type of stone and where it was to be delivered. In 1818 stones were measured by the ton. At this time prices varied from 81¢ to $1.31 per ton. "The price of masonry measured in place was evaluated by the perch. The prices given for the masonry of the locks, inclusive of stone cutting was three dollars per perch of sixteen and a half solid feet. The legal definition of a perch was 24 3/4 cubic feet, but masons generally used the measure of 16 1/2."5

The art of stone masonry was an intricate web of related tasks. Quarriers extracted and partially shaped the blocks. Next, rough masons "dressed" or finished blocks and cut straight moldings. After this freemasons carved the more complex shapes. Finally, layers or setters placed the blocks into their proper place. Laborers assisted all of these specialists in their work. A master-mason directed the stonework. The master-mason checked the structure for accuracy and sometimes he even did some of the architectural work. A stoneworker usually went through an apprenticeship for a period of three to seven years.

"The early colonists in the eastern United States rarely attempted to give a fine finish to stone."6 If we take a look at some of the early stone structures in the County of Rockbridge...
we will notice that the sides of the stones are not very smoothed. This helps solidify the fact that the stones were not given a fine finish. The stones were split with a stone as along the rift and broken along the grain. "The surfaces obtained in this manner were reasonably even and were approximately perpendicular to each other. The plane of splitting became the bed when gneiss, a type of rock, was laid in a wall, and the plain of breakage formed the face. The third edge of a piece, the joint, was usually irregular and oblique."? If protrusions remained they were usually knocked off with a hammer or an axe. This type of work is fairly simple and could be handled by men with little experience and simple tools.

The sculpturing of stone for larger buildings and more finished effects required a greater degree of skill and a number of tools, each adapted to a particular operation and kind of stone. "There were five basic methods, all of ancient origin: (1) hewing with an axe or pick, (2) hammering with an axe or hammer, (3) working with a chisel driven by a mallet or hammer, (4) sawing and (5) rubbing with an abrasive. In general, the harder stones, such as granite, were hammered; the softer ones could be hewn and chiseled."? The chisel was the hardest tool to use when finishing stone. No matter what tools were being used, the first step in squaring a block was to banker up the widest surface. A pitching chisel was the tool used to banker up this surface. This rough draft was then polished with a cutting chisel. "Next, a draft was made on an
adjoining edge of the surface, perpendicular to the first one, and verified with a square. These two drafts defined the plane of the finished surface. By careful use of straight-edges and by sighting, the remaining two drafts were cut. The rest of the surface was then reduced to the degree of uniformity desired, with a point, hammers, chisels or a combination of tools. The surface just completed became the bottom bed of the stone."

Several different tools were used in a specific order to finish a stone. The process could be stopped whenever a desired degree of finish had been reached. The different properties of the stone determined which tools were used, although there was some freedom of choice.

The diverse tools served separate functions and they were applied differently. One thing that could be helpful to us is that the marks left on the surface of a stone by the last tool used, or the last two tools, can often be differentiated if the material is not too weathered. By determining the tools the people had in a specific area we can also learn something about their culture, which is the main purpose of excavation.

Sledgehammers weighed from 10 to 25 pounds. These hammers had two square faces and a long handle. They were usually used at the quarry for driving drills and wedges in order to knock off rough projections and to break stone. Certain sledgehammers were made with one square face and one cutting face so they could be used for rough shaping.
A tool called a drill was used to cut holes into rock at the quarry, to split off pieces of stone, and to subdivide large stones. Drills were mostly round, but the bottom part of them was hexagonal up to about three feet long, with a chisel-like or flattened point at one end. In order to use the drill one workman had to hold it and rotate it while another workman struck it repeatedly with a sledgehammer. A hand drill was 8 to 15 inches long and could be struck with a hand hammer. The hand drill could possibly be operated by only one person.

Iron or steel wedges have replaced the previously used wood wedge. Along with the change in material there went a change in shape. Rectangular wedges were used in fissures or channels. "In round holes a type of wedge called plug and feathers was used; a round tapered plug was driven between two hollow semicircular feathers placed in a hole. The plug and feathers were made in various lengths and diameters."10

A Mason's pick was shorter and stouter than those used for digging. It was about two inches thick at the eye from fifteen inches to two feet long and pointed on both ends. The pick was most often used for rough dressing of sandstone and limestone at the quarry. There were various types of picks. If one end had a square face the tool was called a pole-pick. If the tool had a square face and was heavy it was called a cavil. Other picks could be toothed or possibly even had a blade at one end.
"Points were round or octagonal in section, about 12 inches long when new and sharpened to a pyramidal point." Points were usually used on hard stone in order to remove material quickly. Points had to be sharpened frequently and they were often thrown away when they became too short. When the grooves made by the points were continuous the finish was called broached work. The grooves usually extended in a diagonal direction but could be horizontal or vertical. When the grooves were not continuous and were one inch apart the surface was said to be rough pointed; when the grooves were half an inch apart, it was fine pointed. The grooves were from one-quarter to one-half inch deep.

The mason's axe or stone axe, which was about ten inches long and had cutting edges at both ends, was often called a pean-hammer. The handle of the axe was up to thirty inches long. A tooth axe has its cutting edges divided into teeth. The workman hit the stone with a hammering motion; for this reason the work was called hammering. The crystals that remain attached to the rock after hammering became more susceptible to weathering than those crystals that were not struck directly. Evidence shows that the pean hammer was used in the United States since the 18th century.

The patent hammer was invented by Joseph Richards and introduced in 1831. "Documentary references to it can be misinterpreted because it was also called a bush hammer, especially in the eastern states, and an axe hammer."
The patent hammer was the usual tool used to finish sandstone, which is the most common stone seen at our sites. The counterpart of the hammer is the chisel.

When using a chisel the masoner would hold the chisel in one hand at an angle of 35 degrees to the plane of the stone. The reason it is not held at a steeper angle is because the crystals of the stone would be crushed. Once the chisel was at the correct angle it would be tapped with a hammer. In finishing stones the chisel was driven along its path with a series of taps with the hammer. Workmen with chisels received a higher rate of pay than those with hammers. Tooth Chisels were used for preliminary reduction of soft stones. The masoner cut the final surface with wide chisels having straight edges. The wide chisel removed the ridges left by the tooth chisel. If there were still marks on the stone after the wide chisel had been used the masoner would smooth the stone by rubbing with an abrasive block of hard sandstone and wet sand.

Quarrying methods were also used to hoist heavy stones when building a structure. For this reason people usually needed help, besides that of their immediate family, when constructing their house. Some stones were lifted by hand up ramps supported by scaffolding. Other stones were lifted with the mutual support of a few men. However, if we look at the size of the stone at 44RB195 we can clearly see that it took more than man power to
move some of those huge masses of stone.

The walls of simple farm buildings were often dry walls and therefore made without the use of mortar. However, most stone buildings depended on mortar. When building a stone wall the masoner had to give close attention to selecting and laying stones in order to bond or interweave them thus making the wall stronger. Bonding is most easily seen on the exterior face of the wall but the stones on the interior face of the wall must also be bonded. There are various terms for the different ways a masoner bonds. "Lumps of stone for building work are used either uncut and irregular as they come from the quarry, roughly cut to rectangular faces, more carefully shaped and selected to lie horizontal courses, or cut and shaped so that the edges of the blocks form accurate rectangles, the visible faces being rubbed true and smooth. The last type is known as ashlar; the others are all forms of rubble masonry.... Rubble masonry may be divided into two main kinds, in which the blocks are either uncut or roughly squared. Of the former random rubble consists of blocks of various shapes and sizes laid with thick mortar joints...while course random rubble refers to the use of uncut blocks selected to bed horizontally, and is found in districts where the stone splits or "cleaves" regularly...examples remain in which the stones are cut almost as carefully as in ashlar work... cut rubble is a term sometimes used for these types."
Masons used an iron or steel trowel in laying walls. The main use of the trowel was to apply mortar or to tap small stones into place. A plumb bob was used, in the same manner it's used in a trench, to make sure the wall is level. A square was used to check the right angles of the structure. "A compass with steel points was employed to draw arcs of small radius; steel points were used to draw straight scribe lines on stone. Lines were cords stretched between stakes to mark important corners. Leveling lines were stretched between corners and raised as the walling progressed." Even though these stone structures are difficult to build, they don't last forever.

A primary problem to the masoner is cracking. Cracking can be caused by uneven settlement, bulging, or deterioration of mortar. If cracking occurs it must be repaired in order to save the structure from total deterioration.

Every kind of stone is porous and absorbs moisture from different sources in the atmosphere. When capillary action occurs it also draws some of the stone's salt toward the face of the wall. If these salts crystallize in the stone's pores it can cause the surface of the wall to break off. The process of freezing can cause the stone to crack if it occurs while water is in the stone's pores. On the other extreme, heat can cause incipient cracks on the stone. In order to remedy some of these cracks the masoner must replace the stone.
Chemical treatments are usually too expensive to use on building and they often only have a short term effect.

We can see by the remains of the extant structures in Rockbridge County that stone doesn't last forever. It is obvious that it must have taken a very skilled masoner, along with some simple and some intricate tools, to construct these structures. As the demand for stone edifices, and their repairs, increased so did the demand for the nomadic stone masoner, thus allowing him to be more sedentary. In this new stable position the masoner was able to keep records and spread a good deal of his knowledge therefore allowing masonry to evolve at a more rapid pace.
Square Plug and Feathers

Stone Boat Used for Hauling Stones

Bush Hammer

16th Century Pick

7th Century Point

Pick

Tooth Chisel 19th Century

Tooth Chisel 16th Century
LIFTING JACK

FACE HAMMER
8 INCHES LONG
2 1/2 INCH CUTTING EDGE

HOISTING JACK
Sandstone course rubble with a pecked finish.
**Bankering Up A Block Of Stone**

1. Roughly squared stone as delivered from quarry.
2. The first edge is pitched off.
3. The fourth edge is pitched off and drafted.
4. The first draft is cut.
5. The third edge is pitched off and drafted.
6. The first surface is dressed.
7. The second edge is pitched off and drafted.
8. The first edge of the face is pitched.
9. The block of stone is turned.
10. The first draft of the face is cut.
11. The other drafts are cut and the surfaces dressed.
12. The first edge of the top bed is pitched off.
13. The block of stone is turned.
14. The first draft of the top bed is cut.
15. The other drafts are cut and the surface is dressed.
16. Similarly, the two joints and the back are dressed in succession.
FOOTNOTES


2 Ibid., p.9.

3 Ibid., p.11.

4 Ibid., p.18.

5 Ibid., p.19.

6 Ibid., p.20.

7 Ibid., p.20.

8 Ibid., p.21.

9 Ibid., p.21.

10 Ibid., p.23.

11 Ibid., p.24.

12 Ibid., p.27.


BIBLIOGRAPHY

1. Kimball, Fishe Domestic Architecture of the American Colonies and of the Early Republic (N.Y. Charles Scribner's Sons, 1922)

2. McKee, Harley J. F.A.I.A. Introduction to Early American Masonry (Published by National Trust for Historic Preservation and Columbia University, c. 1973, United States)
