



Appalachia-Science
in the Public Interest

50 Lair St., Mt. Vernon, KY 40456

ASPI TECHNICAL SERIES TP 69

MASONRY ROCKWORK IN APPALACHIA

"No one living near knows of a cabin site here... Nothing is left of this man who set his house among the forest. Nothing but the stones." - Charles McRaven

This paper wishes to inspire potential builders of borders to raised garden beds, walkways or wildscapes. The walls may be "dry stack" (without binding materials) or cemented. Dry stack stone walls built for withstanding harsh winter conditions will give with the weather; they will heave with any movement of the land such as through earthquakes. Having said this, we at ASPI do not recommend dry stack walls near our river property, where many visitors come and go. Such a style lends itself to being a snake haven, and we fear we could be inviting poisonous copperheads as well as wasps and hornets to make their abode in such walls. We prefer to cement the joints and make a solid wall for the sake of safety and utility even though cemented walls are more rigid and require a little more maintenance and care. Thus we focus here on masonry rockwork.

Appalachian Stone Structures

The ancient Appalachian Mountains are not as well known for their rock formations as are the jagged peaks of the Rocky Mountains. However, Appalachian cliffs, gorges, caves, and natural bridges are notable features of this region. Ever present stones of various types along with wood are the preeminent Appalachian building materials. This is true throughout central Appalachia where stone-walled buildings, chimneys, foundations, bridges and road retaining walls abound. The dry stack walls, especially in the Kentucky Bluegrass region, are characteristic of that sub-region. For travelers going northeast of Lexington on U.S. 68 one sees mile after mile of stone fencing which dates back over 120 years. These heritage artifacts stand out in their characteristic grays, blues, tans, browns, reds and yellows. Rock facing in structures is widely recognized for its subdued beautiful, especially when accentuated by the art of stone masons who take unusual pride in their work.



The walls, foundations and chimneys of older Appalachian houses, stores, taverns, courthouses, barns, springhouses, storerooms, and churches built in the late 18th and through the 19th century were often made with native sedimentary rock (limestone, sandstone and other). For the most part, these well-built structures continue standing in good condition today. Likewise more recent bridges and highway retaining walls, built by the WPA during the dark days of the 1930s Depression, exhibit fine works of stone craftsmanship. For the most part, stonework is enduring and a lasting legacy of the efforts of thousands of virtually nameless workmen in past times. Like stone memorials in a battlefield, they are lasting tribute to people who were satisfied in leaving their own mark in a rapidly changing world.

Rockcastle's Features

The sandstone of Rockcastle County, Kentucky is a rather soft stone which lends itself to shaping into fitted rock construction. Pioneers would chip these rocks to form some of the beautiful early foundations and chimneys of the County. Over the past two decades some of this abandoned stone work has been incorporated in the retaining walls near the ASPI Nature Center by Eddie Stallsworth, a professional stone mason along with Lewis Van Winkle and Johnny Lauder milk. In 1998, Eddie completed raised bed garden borders near our Nature Center, and in 2002 the borders of the ASPI Mt. Vernon garden. Each is a work of art of which we are proud.

General Procedures

Following are some proven pointers on good crafting of stone received in conversation with Eddie Stallsworth.

1. Discover and select the stone — Prospecting for the right stones is an art for the critical eye. One must know where to look and discover good stones. These may be found in road and railroad cuts, at the bottom of sheer cliffs, in public river banks, in discarded piles near old quarries, abandoned buildings, and other hidden places which challenge the detective work of the good craftsman/stone layer. The owners permission is required and one must be aware that excessive rock removal could hurt the facing of a stream bed. Building stone today costs many dollars a ton depending on distance to be transported and the demand of the local vicinity.

2. Build according to what you've got — You may be quite fortunate or affluent enough to select stone according to the style desired. We believe that most will have to work with what is at hand and thus modify structures according to the type and amount of stone available. The success of both dry and cemented walls of a particular type depends on the stone selection.

3. Design this stone work well in advance — The mind's eye of the stone crafter is quite important. One cannot begin construction and then change the design in mid-stream. Before starting one must be willing to follow the lay of the land for rock walls or follow horizontal lines with stair-step construction to keep it level at all times. If a wall is to curve around a tree or go near a creek, the exact route must be known before beginning. Every design detail should be sketched out (at least mentally) well in advance, so that the number and placement of the rock piles will be exact and foundations are properly built.

4. Place building stone conveniently — Plan exactly how far from the actual building foundation the stone must be piled so there is an economy of energy required in selecting each stone. Make the piles small enough so the various stone may be easily retrieved. Here design gives way to the intricate facial detail of each stone. Chip up or bury in the foundation the imperfect ones. Having the perfect stones in the right place is an art.

5. Build with care and proper tools — Don't try to do it all in a day. In becoming a builder it is best to assist a craftsman for a spell, for the instruction and experience of the other will do wonders. Use the right tools: string for line (or chalk line with plumb bob and line level), mason's level, spade, stakes, pry bar, geologists's rock hammer, along with a pounding or stone mason's hammer, chisels (point, plain or toothed) depending on the amount of cutting that is required, and other protective gear (steel-



Rock wall construction - with plenty of rocks

toed shoes, gloves, safety goggles and knee pads). Wheel barrows are useful; so are garden carts which can be upended to ease retrieving the stone.

6. Start with the less visible portion first — For the beginner, make the less visible wall portions first so mistakes are less noticeable.

7. Prepare a good foundation — All rockwork must be placed to last the test of time. Respect the movements of the earth. A foundation below the frost line is the most manageable, especially for wider and deeper foundations required for taller walls. For rock bordering, shallower foundations will suffice. In these one may use irregular rocks which can be placed at varying depths, provided only that the portions near the ground's surface is level. Divert water away from foundations.



Masonry constructed wetlands purifies greywater for Rockcastle Solar house

8. Use good stones — Not all stones are perfect for building walls. Some are rounded and mere pebbles, or “junk.” Some of this unusable stone is well suited as filler, but some will only cause trouble. Selecting good stone for a particular place is the high art of stone masonry work. Here the mind's eye is what is needed to fill the particular space. The experienced builder knows; the inexperienced but willing one learns.

9. Consider drainage — Water, collecting behind a retaining wall, could freeze in winter and result in seasonal cracks and breakup of the finished wall. For this reason drains behind or through the wall are common place to forestall the collection of ground water. Install an opening in a wall where needed for drainage. Every builder is on the lookout for such water problems, which are easily eliminated by a properly placed piece of PVC pipe.

10. Cementing with the proper mix — The actual mortar used to hold the stone in place must be of sufficient richness (one half a 94 pound bag of dry cement to twelve shovels of sand - E. Stallsworth's recipe). This may vary with the type of rock and other factors such as weather conditions. Lay the stone only when it is not freezing or precipitating.

11. Pointing and finishing — The cleaning up operation after the construction process includes pressing the cement in place to give a firm joint and brushing the face of the stone (some give a light cleaning with muriatic acid) and smoothing the cap. Good “pointing” allows for the moisture to be shed and not retained in cracks. Slant the joints outward to allow the water to flow off and not be retained. Bad pointing permits moisture to enter and be retained behind or under the mortared joints.

12. Wall maintenance — Rock walls may crack no matter how experienced the builder. The earth shifts, limbs crash onto walls, or water erodes a foundation. Regard wall-mending to be one of the spring chores. With timely attention, the bordering has a better appearance and can be repaired with far less work. Nothing lasts forever, but stone has a better chance than most other building materials. In Cuzco, Peru we marveled at over five century old stone walls built to successfully withstand periodic earthquakes.

Special Areas beyond Bordering

Stone masons move to other artifacts:

Ends and corners — Most experts will save the choice rectangular stones for corners and ends of wall structures. For short walls, a large upended square-shaped stone may suffice. For corners, interconnect the layers with stones as in regular bricklaying. The more inter-tying, the stronger the corner. Save better stones for these purposes. Build carefully because corners must take stress from both directions.

Rock furnishings — a variety of stone structures may accompany the borders mentioned. These include: bird baths and feeding areas (usually near or with a clearing), rock seats or bench areas, stone stiles and rock ladders to climb over walls, and mailboxes or pillars for signs or decorations. Stone makes a fine building material for virtually every use.

Safety in Rock Work

Stone masons work with heavy loads and can easily make a false move which can result in permanent and painful injuries to the back and other body parts. Several safety measures should be followed.

Lifting — These rocks can fool you, so protect yourself against twisting and bending over with a heavy load. Stand directly over the stone and lift with the legs, not the back. Keep your back straight while lifting stone in exactly the manner suggested for weight-lifting exercises. Keep the weight close to the body. When moving a rock load to left or right, do not twist the back. While standing with the rock, move the feet by stepping to the right or left. Again, it is important not to twist the back while holding the rock. These stones are heavy and many backs have been hurt by wrong maneuvers. You may seriously hurt yourself in an instant. Remember that familiarity breeds contempt, and so respect the weight of a stone.

Chipping stone — This applies to every stone worker but especially those who do not normally wear glasses while working. Wear safety goggles, especially when chipping stone, though some regard this as cumbersome.

General handling — Use gloves which have gripping surface at fingers. Some suggest heavy leather shoes with steel toes in case there is a fallen stone on foot. Others regard excessive gear as too hot and uncomfortable. Obviously, smaller rock and lower borders take less protective gear than more major operations. Consider using knee pads, if you are working with low borders for a length of time.

Take breaks — Stones masons emphasize the importance of novices pacing themselves, because they forget they may get dehydrated or could easily overwork muscles not normally used. Drink plenty of liquids on summer days.

Artistic Expression

Stone-laying, when done well, is an art for all to see. Often, people regard the most symmetrical stonework which may be the most costly as the most artistically valuable. However, this may not be the case. Commercial architectural design may be quite confining in its fine detail and little is left to the stone masons to ply their crafts. Instead, a certain freedom must be allowed once the overall plan evolves, the type and quantity of stone determined, and the basic design drawn up. Good art work demands a space for the artists to express themselves — and that applies to mason stone work as well as sculpturing.

References:

“Building Stone Walls,” by John Vivian, Storey Communications, Pownal, VT 05261, 1978. <www.storey.com>

“Building with Stone,” Charles McRaven, A Garden Way Publishing Book, Storey Communications, 1989.

Forestry Suppliers, Inc. 205 West Rankin Street, Box 8397 Jackson, MS 39204 (for tool supplies).

Al Fritsch - Project Director Technical Expert - Eddie Stallworth Design - Mark Spencer