

A BRIEF HISTORY

Our Upstate cobblestone landmarks are works of art created by pioneer craftsmen in the middle third of the Nineteenth Century from an Ice Age palette of glacially rounded native stones. Without American precedent, those craftsmen of the 1830's and 1840's perfected a form of folk art: the masonry wall. For approximately 30 years they created a variety of decorative wall treatments on hundreds of buildings. Today their creations remain remarkably unique among all those structures erected in the Great Lakes Region before the arrival of the Industrial Revolution rendered such craftsmanship economically obsolete and a new generation found cobblestone masonry 'old-fashioned'.

The evolution of the humble cobblestone began with two phases. From 475 to 325 million years ago, during the Ordovician, Silurian and Devonian periods of the Paleozoic era, all of the Great Lakes Region west of the present Hudson Valley was a great shallow salt sea, filled with living creatures whose remains, gradually falling to the bottom, became layers of limestone deposits. Erosion from the young Appalachian Mountains, a more ancient land mass to the east of this salty sea, washed down additional layers of sand and clay depositing these in thicknesses of thousands of feet. Gradually, under enormous pressure, these various layers of sediment became limestone, dolomite, sandstone and shale. Finally, some 250 million years ago, as the salty, sediment filled sea dried up and the land mass rose above sea level, new rivers began to cut into and expose our regional underlayment of sedimentary bedrock. Erosion, pressure and time that produced this bedrock, were much later to produce the cobbles that later were wrought from this same bedrock.

In only the last million years or so, the Ice Age redesigned our landscape, sculpted all loose stones above the bedrock surface into a generous supply of cobblestones, and for good measure, created virtually all of our beautiful lakes and waterfalls. These glaciers or ice sheets, advancing very slowly southward from Labrador, picked up rock rubble, carried it south and eventually left it in vast amounts on the land when the ice melted. In addition to slowly moving the local sedimentary rocks - sandstone and limestone - the ice mass brought south and slowly tumbled a small amount of harder Canadian metamorphic stones, such as gneiss and quartzite. This glacial deposit of rocky rubble redeposited over the bedrock surface is called by the geologists the till sheet or drift mantle. The layman calls it topsoil and subsoil.

There are two types of till or drift deposits; the ice-laid and the water-laid. Stones from an ice-laid deposit are partially rounded fragments of many sizes and kinds of rock. They show striation and faceting, their edges are sharper and they are only roughly rounded. These are what have come to be called field cobbles: perhaps more properly they should be called glaciated cobbles. The glaciated cobbles are found predominating in the drumlin areas of central and western New York, between Rochester and Syracuse. In contrast, stones from water-laid deposits have had their sharp edges rounded and their surfaces smoothed. These are the stones that were released from the ice and then subjected to additional tumbling action in glacial-born waters of streams and lakes. They have come to be called water-rounded stones and are found predominating in the moraine areas of central and western New York. Lake Ontario's present shoreline for the most part is lined with water-rounded stones and here wave action continues the

never ending process of cobblestone polishing. Thus through the advent of natural forces, a natural building material was deposited and shaped in central and western New York.

Following the American Revolution, the ex-colonials and their children began to push (and be pushed) westwards into new lands in central and western New York. Initially, survival and conquering the forested land were their immediate problems. Forests had to be cleared to provide farm lands on which food crops were planted for the settlers' subsistence. The houses they built first on their new lands were usually log or hand-hewn frame cabins.

Virgin hardwood forests of maple, beech, and oak did not surrender easily to the farmer's axe. To the first generation of farmers the axe, broadaxe, froe, saw and other woodworking tools were no less important than the plow. With these he began many years of forest removal and with them he put up his rude log and frame cabins in the forest clearing. Sawmills, gristmills and other water powered mills were rapidly constructed wherever streams could be dammed. Locally milled lumber was a necessary luxury when increasing numbers of farm buildings were needed for a completely self sufficient subsistence farm economy.

The farmer's remaining woodlots of uncleared land supplied fuel and free construction materials for the growing farm complex. With a broadaxe, felled trees would be squared into massive beams and then pegged together to form the skeletons of barns, animal shelters, stables, carriage sheds, woodsheds, graineries and other required outbuildings. Split logs and fieldstones became fences. Lumber for walls and floors was cut at the closest sawmill.

Hand split wooden shingles made excellent roofs and siding. As the necessities of life were secured, larger frame houses replaced log cabins to accommodate a growing family of six, eight or more children. Between 1800 and 1820 brickyards, stone quarries, lime kilns, and glass factories were appearing in every corner of the state to offer farmers and townfolk alike a choice between wood, brick or stone construction.

In central and western New York settling the land proceeded slowly, due mainly to the scarcity of natural transportation routes. Waterways formed the simplest mode of transportation and west of the Mohawk River there was scarcely anything of this sort. So in 1817, following an unsuccessful attempt to have the Federal Government build an artificial waterway to the West, New York State started the project on its own. Determinatively called by its opponents "Clinton's Ditch" (in honor of the governor and principal proponent), the Erie Canal began to thread its way westwards towards Lake Erie. The Canal required construction workers of various skills, among them masons - to quarry and lay stone for canal locks and aqueducts. To build these the remnant of the pre-historic sea - limestone - was quarried for stone blocks. Quarried limestone was also crushed and burnt to produce lime for mortar with which these blocks were laid. As the Canal was pushed westwards it provided the first opportunity for subsistence farmers to become cash crop farmers for their crops could now be carried back east to established centers of population. In 1825 the Canal finally was connected with Lake Erie, providing the connection of the Great Lakes with the Atlantic Ocean, via waterways across New York State. From New England more Yankee farmers came west to take up lands in western New York to achieve financial prosperity marketing their wheat,

flour and other cash crops on the Atlantic seaboard.

With the arrival of inexpensive canal transport for cash crops these established farmers were ready to build enduring homes reflecting their new prosperity and confidence in the future. Building materials in those days usually came from the immediate area and only in rare instances were they transported great distances as is now common. Central and western New York had, in addition to timber and clay for bricks, all the stones left by the glacier of long ago. Sometime after 1825 the first cobblestone building was constructed in upstate New York, probably in Wayne or Monroe counties, and the cobblestone era began. We do not know which was first, or where it was, or who the mason was. In the years to follow virtually every type of building was constructed in this regional masonry style, incorporating within them most of the popular architectural styles of the early nineteenth century.

In all, well over 700 cobblestone buildings appeared in the counties to the south of Lake Ontario. Most are concentrated in the Lake Ontario Plain and among the Finger Lakes; but some isolated examples appear as far south as Bath, Elmira, Cortland and Cazenovia. Yorkers, following the frontier, soon carried their craft west to new farms and villages in Southern Ontario, Canada, southern Michigan and beyond Lake Michigan as far as Beloit, Wisconsin. There on both sides of the Illinois-Wisconsin border appeared the second largest group of cobblestone buildings in the 1840's and 1850's. A much less significant number are found scattered in a thin line eastward through the Mohawk Valley to Guilderland, Albany County, Bennington and Brattleboro, Vermont. 850 miles and almost as many cobblestone buildings

separate those in Brattleboro from Beloit, but their dates clearly indicate that the idea moved west and east from its origin in central western New York.

COBBLESTONE MASONRY CONSTRUCTION

Cobblestone masonry is a folk art, grown from the soil, primitive at first and highly refined toward the end of its short life. As with other folk art, a good deal of lore obscures the facts. Some of the makers are known, other names are lost. Little can be inferred from the makers' names that are known which could not be 'read' in the buildings themselves. Workers learned quickly from each other, if only by examining finished buildings. Undoubtedly, each mason had his preference of wall construction, cobblestone size and pattern and type of mortar. They relied on the age-old rubble wall construction for their buildings. From those known masons only a few built more than three or four houses, hardly enough for a life-long sustenance of a trained craftsman. Obviously these masons also worked in brick and cut stone and were not cobblestone masonry specialists.

Since cobblestone construction is extremely durable, few of the buildings have deteriorated to the extent where the construction can be studied conveniently. Three basic types of masonry wall construction have emerged. The earliest cobblestone walls were laid up with a complete integration of the outer and inner wall. Here, just as in early Roman rubble walls, the exterior layer cannot be distinguished from the interior structure. The entire thickness of the wall is laid up in one operation - a durable form of construction. With the gradual refinement of exterior textures a second method can be discerned: a facing of cobbles, usually the water-rounded variety, is laid up with extra-long stones reaching into the rubble core to bond facing to core. The facing stones are of varying dimensions, but the outside exposed faces match in shape and size. The facing was laid up along with the backing wall. This too is durable construction. The third method

is the least permanent: a rubble wall (of varying compositions) is laid up first and the cobblestone and mortar veneer is added separately, cobbles are small and there are no bonding stones. Buildings which show finest wall textures, i.e. the Munro house in Elbridge, Onondaga County, are usually laid in this method and are prone to damage. When cracks occur in the veneer due to irregular settling of the wall, water can penetrate behind and frost wedging sets in, forcing the veneer from the rubble wall behind. Repairs of such damage can usually be detected by the different color of the mortar. Portland cement, commonly used in mortar today, has a blue-grey color and is darker than the warm-colored mortars used in pre-Civil War Buildings. There are doubtlessly variants of these methods, but these three seem to be basic.

There are contemporary accounts describing cobblestone building construction The Genesee Farmer & Gardener's Journal, published by Luther Tuck at Rochester, N. Y. carries in the January 1838 issue an inquiry about 'cobblestone walls'. The anonymous inquirer suggests a more extensive use of cobblestones for building: "for their extreme plenty here, would render them far cheaper than brick or flat stone... The stone must be picked up at all event, and we might as well put them together for a building, as... But will these walls stand... and if so, how are they constructed? The answer comes in the March issue of the same year from Chester Clark of Marion, Wayne County:

"... I cheerfully transmit a few facts... Having erected two or three buildings each season, for several years past, I shall only mention one which I built last season. It is 40 x 60, four stories high. The foundation is

three feet high, the first story 10 $8/12$..., making from the foundation to the plate 48 $4/12$ feet in height, with a wing 24 feet by 34, one story. The whole was built of cobblestone (not of the first quality). The outside was laid in courses of cobblestone four inches in thickness, and larger stone on the inside... As regards the durability, I am perfectly convinced that if they are laid with good materials, they will stand and their solidarity increases as their age increases. The quality and quantity of sand with the lime is very essential. The coarser and purer the sand, the stronger will be the cement and the firmer the wall. As for the proper quantity of sand with the lime, it depends on the coarseness and the purity. The proportion which I generally use, is from five to eight bushels of sand to one of lime in the stone."

Mr. P. S. Bonsteel (the name is now spelled Bonesteele), in a letter to the Cultivator, v. IX 1842, no. 7, furnishes some information about the thickness of the walla of his house, built in 1835:

"... My plan for thickness of wall was, the cellar wall 20 inches thick to first floor, drop off two inches to second floor, then drop off two inches and extend out to top... Sort your stones so as to have the outside courses 3 or 4 inches, with straight lines for cement. Take the coarsest of sand... I used the common stone lime, one bushel to seven of sand."

Another letter comes from Cayuga County to the Cultivator v. VIII 1841, no. 3. This letter describes the method which may have been used in the construction of another house:

"Cobblestones of any size not exceeding six inches in diameter may be used, but for the regular courses on the outside those of two inches in diameter should be preferred. Small stones give the building a much neater aspect. Two inch stones are very neat, though three inch stones will answer. The inside row of stones may be twice as large as those on the outside... Mortar... eight to nine bushels of clean, sharp sand to one bushel of fresh stone lime... the strength of the building depends on the goodness of the mortar... The thickness of the wall is sixteen inches, though twelve inches will answer very well for the gable ends above the garret floor... When the foundation, or cellar wall is leveled and prepared, a layer of two (or two and a half) inches of mortar is spread over it, and the stones are laid down into the mortar in two rows which mark the outside and the inside of the wall leaving about an inch between each adjoining stone in the same row. If the wall is to be grouted (mortar, sufficiently fluid, poured in between the stones filling the interstices) the two rows are formed into two ridges by filling the vacancies between the stones with mortar, and the space between these ridges (about a foot in width) is filled with such stones as are not wanted for the regular courses. The grout is then applied. If the wall is not to be grouted however, the mortar should be carefully pressed around every stone, making the wall solid without flaw or interstice. When one course is leveled, begin another.

"P.S. Since writing the above, I have received two communications... One says 'the thickness of the wall is measured from the outside of the stones. Pieces of timber, four to six inches and two feet long,

Are used for setting the lines. These are laid in the course just finished, and the line is drawn through saw cuts just 16 inches apart.'"

This is the Roman technique of infilling the rubble with mortar. Unfortunately there are no written accounts of the use of planks to keep the wall plumb and the lines in the veneer straight. But oral testimony of the use of planks has come down to us, and an investigation of walls reveals that certain patterns could hardly have been created without such a device. The method has been employed since Roman times. We find a description for 'Cobblestone Facing' in H. G. Richey's The Building Mechanic's Ready Reference, New York, 1907:

"To keep those stones straight and in line until the mortar hardens is a very difficult piece of work for the mason. A quick and easy method is to build a form of plank for the face of the wall... and build the cobblestones up against this form. This will make a straight and even wall, such as can be obtained in no other way. After the mortar has hardened, the form can be taken down and the joints between the cobblestones cleaned out and pointed."

In passing it should be mentioned that it has been discovered in several cobblestone houses, when new openings were cut through old walls there existed an air space from two to three inches thick the full height of the wall for apparently the express purpose of insulation. This is what is called a 'cavity wall'. Then there is the Cobblestone Society's 1849 schoolhouse at Childs. This very rare construction method is a wooden building with an outside six-inch veneer of water-rounded cobbles.

The Twentieth Century mind is easily confused by the seeming contradictions of early masons' widely varying formulas for the mortar mix of their cobblestone buildings. This is because we have become almost completely dependent on Portland Cement since the 1880's. Portland Cement is a patented formula for an exceptionally strong and unyielding, waterproof cement. It assures a highly standardized product of uniform consistency, more suitable to modern types of construction.

Cobblestone masons were describing an entirely different product. Their lime-sand mortars (not cement) had been in common use for centuries. In contrast to Portland Cement, lime mortar was comparatively soft, slower to set, more flexible and of more varied consistency, depending on the quality or purity of the limestone, sand and water sources locally available. Early masons knew how to gauge the variables involved to produce a good mortar.

Limestone outcroppings were readily accessible throughout the Great Lakes Region. Large quantities of limestone fragments or "lime rock" together with large quantities of firewood were stacked into hillside lime kilns and burned to 1,650 degrees F. for nearly two days. After carbon dioxide was given off, the lumps remaining became calcium oxide or "quicklime". It was essential for this quicklime or unslaked lime when cooled, to be kept free from moisture until ready for use. For any long term storage or shipping it was put in tightly sealed wooden barrels.

Slaking pulverized quicklime, just as in slaking one's thirst, requires simply the addition of water. Several methods for this were known, but perhaps the most common was to prepare a protected pit on the construction

site and in it make a lime paste by mixing with water. The slaked lime paste gave off heat and expanded in volume before it was ready for use as a clear white paste. The color of the mortar largely depended on the color of the sand that was added.

Limestone obtained from different locations had varying chemical components and impurities. Likewise, sand deposits might be sharp or rounded granules with varying amounts of organic or soil impurities intermixed. Knowing the qualities of their local lime-sand resources, these masons combined experience with skill to vary the proportions of slaked lime and available sand to create a durable mortar.

Once mixed, the lime mortar remained plastic for only a few hours before it "set" and could support the weight of the masonry - if work did not progress too rapidly. Hardening (again in contrast to modern cements) took place at a slow rate over months and even years before the final strength was achieved. Fortunately this gave the new building time to gradually settle and adjust to the site without cracks appearing.

Of equal importance as the foregoing descriptions of mortar and wall construction methods are the treatment of the window and door openings and building corners. Here we find the use of wood, fieldstone, cut stone, and brick. Door and window frames are wood with the cobblestones coming directly to the frames at the sides in most instances. Window sills are of wood or cut stone. Lintels over doors and windows were most often cut stone, infrequently brick is used. There are a few instances where the lintel is a jack arch of roughly squared fieldstones. The corners of the buildings are, for the most part, formed with stone quoins, cut stone being the rule. But we also find

building corners with brick quoins, wooden pilasters, roughly cut stone piers and even a few incorporating rounded cobblestone corners.

Cobblestone masonry is mentioned in only one of the builders' handbooks of the pre-Civil War era - The Economic Cottage Builder by Charles P. Dwyer, Buffalo, N. Y. 1855. Dwyer apparently had no real knowledge of cobblestone masonry techniques for he said inaccurately that the cobblestones of the outside veneer were simply hammered into a coat of mortar. The date of the appearance of this book is on the downswing of the pendulum of cobblestone masonry.

HISTORICAL ANTECEDENTS OF NEW YORK STATE'S COBBLESTONE BUILDINGS

The cobblestone masonry technique may have come to Western New York from England. There were masons of English origin who helped build the stone-works for the Erie Canal. But this connection is conjecture and has not been proven, perhaps it never will be. In southeastern England, in and around Brighton, Worthing, Rottingdean and Ovingdean; beginning about 1790, a number of structures were built utilizing 'beach flints', laid in straight rows with the horizontal mortar joints troweled to a flat projecting 'V'. These English beach flints are the local stone and are what we would call water-rounded cobbles. Further north in England, in and around Sherringham, Norfolk is another group of beach-flint buildings, but without any special emphasis of the horizontal mortar joints.

The English technique of constructing buildings of flints has a long history. One historian even credits the Saxons with its origin¹ Flints are found with chalk deposits and vary in color from yellowish-gray to black. They were laid sometimes in straight rows, sometimes in a random, uncoursed pattern without any special mortar joint emphasis (until c.1790). Corners were built up using cut-stone or brick where cut-stone was not readily available. Flints were also combined with bricks to make patterned walls.² In the 16th Century walls faces with 'knapped' (i.e. split) flints made their appearance.

The Normans, who conquered England in 1066, also utilized cobblestones in masonry walls. Carl Schmidt, in Cobblestone Masonry (Scottsville, N. Y., 1966) cites examples in the French Province of Normandy in and around Dieppe. Other areas with cobblestone buildings in France are in the provinces of Dauphiny Bearn, as well as the Hautes Pyrenees.

In Northern Italy, at Palledio's Villa Barbaro (1560) and his Tempietto (1580) at Maser the low walls lining the approaches to these two buildings are of cobblestones (with no emphasis on the mortar joints). Across northern Italy are a number of Lombard church buildings (c.800 - c.1300) whose walls incorporate cobblestones, even occasionally laid in herringbone patterns.³ The Lombard buildings are sometimes called "Romanesque" and it was the practical Romans who perfected the construction of rubble stone walls. Wherever the Romans went in their conquests they adapted their building methods to the materials locally available. In northern Italy with her mountain rivers, 'river pebbles' were employed and the rubble wall became the standard form of building construction. The rubble walls that the Romans built were generally the grouted type⁴ whose construction was the same as that described in the 1841 letter to The Cultivator.

Notes

1. The English Parish Church J. Charles Cox, London, 1914
2. The Charm of the English Village P. H. Ditchfield, London, 1908
3. Lombard Architecture Arthur Kingsley Porter, New Haven, 1915
4. Roman Architecture and its Principles of Construction Under the Empire G. R. Rivoira, Oxford, 1925