

## Mystery Solved! The “Lime Mill” that Built the Tower Discovery of Newport's Missing Industrial Lime Kiln

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### *Introduction*

At some distant and controversial point in Newport's Past, a team of experienced stone builders from the British Isles constructed a round tower in the scenic preserve that is known today as Touro Park. Were these renegade artisans the same bunch of Colonial philosophers who bequeathed to Rhode Island a passion for freedom of religion and justice? Were they a band of marooned Templar Masons from 14<sup>th</sup> century Scotland? Or were they just a random gang of professional handymen that Governor Benedict Arnold selected to build a more-durable stone mill to replace a wooden windmill that blew down in the furious Windstorm of 1673?

Until now, most historians have favored the “Windmill Theory;” but that enduring explanation is about to be replaced by one that is better-suited to the facts.

In April of 2014, an anonymous Patron of the Arts commissioned archaeologists and historians at the New World Discovery Institute to take a fresh look at the evidence. We were asked to determine if it was possible to reconstruct a new scenario of what really happened during those murky eons long ago when the City of Newport began to rise up from the marshes along Narragansett Bay. We are pleased to announce that we have found evidence of a previously unrecognized stone structure that was hidden away for many centuries beneath the skirts and girdle of an old Colonial mansion.

This investigation has been undertaken with the invaluable assistance of the Newport Historical Society Archive and Museum. The Museum is located on Touro Street – not far from the spectacular and mysterious Old Stone Tower, or as some say: “the Old Stone Mill.” The archivist's familiarity with the N.H.S. Collection enabled her to pinpoint key evidence from a collection of thousands of items. She identified for our research a series of snapshots that have been dated to 1898. They were taken by a professional photographer who was intrigued by the unusually grandiose stone and brick “chimney structure” that emerged from behind a cloak of plaster and lath that was removed when the dilapidated Sueton Grant House was demolished and hauled away to the City Dump.

This incidental and fortuitous photo-shoot – more than a century ago – was pivotal to our investigation. It was already determined by Norman Isham's research in 1895 that the same masons who built the Old Stone Tower also built the chimney foundation in the Grant House. If we could identify new clues from these old photographs, then there was a chance we could unlock the secrets to a mystery that has endured for several hundred years: “Who built the Tower?”

### *New Clues in the N.H.S. Photographic Archive*

The Old Stone Tower is America's Oldest Monumental Building erected by European masons. Whether it was built before, or after, the Columbus Voyage of 1492 is of pivotal importance to our understanding of American History. Hence, the origin of the Newport Tower has been an enduring dilemma for historians.

The Tower is a circular structure of stone masonry that was erected above an arcade level consisting of eight stone pillars. The approximate height is 28-feet (about 8.5m); the outside diameter varies from about 24 to 25-feet (7.3m); and the wall thickness is about 3-feet thick (or .91m). The walls are unusually wide for Colonial structures; and they constitute an enormous amount of weight that is carried by the eight pillars.

Part of the structure includes buried foundation stones that lie beneath each of the eight pillars. The approximate weight includes about 40 tons of stones. There is an additional weight of about 5 to 8 tons of mortar. Chemical testing and magnification of surface material indicates that the lime used in making the mortar was obtained from "burned" or roasted oyster shells. This was a common source for mortar used in most Colonial buildings during the early 17<sup>th</sup> century – from about 1600 to 1630. The shells were readily available in waste dumps at nearby Native villages. Remains of a small, six-foot diameter lime kiln have been excavated at the Jamestown archaeological site in Virginia dating to the early 1600s. A kiln of this size was sufficient for producing about four sixty-pound bags of lime; and this would supply enough mortar (mixed with sand) to build several small ovens or a basic house chimney. However, the typical kilns used by early European settlers in the 17<sup>th</sup> century were entirely inadequate for the demands of a structure like the Old Stone Tower at Newport. Erecting a forty-ton stone tower would have required the operation of an "industrial-grade" lime kiln.

An industrial-grade limekiln might produce as much as a thousand pounds of lime during a single "burn." This would be combined with a mixture of sand and gravel mortar. The Old Stone Tower might have required up to five tons of mortar – suggesting that as many as ten separate "burns" were required to supply masons with sufficient lime.

One of the glaring problems with the early history of Newport, Rhode Island, has always been the total absence of remains from a suitable lime kiln that was up to the task of providing lime mortar for building the Old Stone Tower when it was supposedly erected in 1673. By that point in time, most of the lime used in making mortar for chimney construction seems to have come from outside of the community – possibly from industrial kilns being operated at Providence or New Holland (later, New York City). Furthermore, the imported lime wasn't made from oyster shells; it was made from roasting crushed limestone (which in modern times is the principle source of Portland cement). Small, oyster-shell kilns are difficult to find in the archaeological record, because most of the small stones were reused in chimneys. On the other hand, it is incredibly unlikely that residents of Newport during the mid-to-late 17<sup>th</sup> century would have even used oyster-shell lime mortar – when a supply of cheap limestone cement was readily available by ship from nearby sources.

A clue to this mystery was identified in one of the 1898 Sueton Grant House demolition photographs (P9745) from the N.H.S. Archive. The photo shows what appears to be a medieval-style foundation arch beneath the ground-floor Colonial fireplace and chimney. This incredible photo, showing a 14<sup>th</sup> century medieval arch beneath a Colonial fireplace (built in about 1650) was first published in a book by Antoinette Downing and Vincent Scully, *The Architectural Heritage of Newport, Rhode Island 1640-1915* (1967, Plate 26). A drawing of this structure is presented with other illustrations at the end of this report. Two rectangular openings or "vents" are clearly visible right above the medieval arch. Vents of this type were common features of medieval lime kilns in the British Isles – although they were quite rare in Colonial and post-Colonial kilns of New

England. The eclectic style of masonry in the foundation arch, featuring a triangular keystone in the center, was characteristic of Norse-Scottish and Irish construction in the British Isles during the 14<sup>th</sup> century. Use of oyster-shell lime cement was also common at the same time in Norse-Scottish construction.

As Norman Isham noted in 1895, the style of arches and composition of mortar used in the Grant House and the Old Stone Tower are identical. Thus, we are confident in concluding that the masons who built both structures were the same; and both were constructed at approximately the same point in time. The enduring notion among historians that the Old Stone Tower was built in 1673 – during the Colonial Era – has rested almost entirely upon a brief and casual mention in the Last Will of Benedict Arnold in 1675 that he owned the “stone-built wind milne.” He certainly owned the structure – as it was situated on his property; and he certainly regarded the Tower as being a “windmill.” Because it was round, the building was vaguely-similar in shape to common, stone-built windmills in England and Holland. These mills generally used a rotating turret top that housed the wind sails (or propeller) that operated the gearbox and grindstone. However, rotating tops required special tracks and gears that were not available in New England until the beginning of the 18<sup>th</sup> century. Furthermore, the round shape of the Old Stone Tower was too wide for a standard turret; and the circular top was actually distorted from perfect roundness by about a “foot.” Consequently, it would have been impossible to use a standard circular track for mounting the required turret top that was used in Colonial “smock mills.”

Almost identical masonry to that used in building the Old Stone Tower can be seen in 14<sup>th</sup> century Norse-Scottish ruins in the Orkney Islands and at the Scottish-built Hvalsey Church in Greenland. However, aside from the two contemporaneous buildings at Newport – using eclectic masonry with triangular keystones – the eclectic style with accordion-shaped arches and triangular keystones was entirely unknown in New England Colonial architecture. This is most-certainly an “intrusive” design feature in Newport architecture that was actually present during the 14<sup>th</sup> century – or almost three centuries before English Puritans settled in the region of New England.

More surprises awaited us as we examined other photographs provided by the N.H.S. Archive Service. There were three similar arches in the foundation of the Sueton Grant House! Two of these had rectangular vents of the sort that were found in similar lime kilns in ruins dating to the medieval British Isles (11<sup>th</sup> to 14<sup>th</sup> centuries). Furthermore, the three “foundation arches” in the Grant House were built as *separate* structures – although they abutted against each other at the ends. This method of construction was not commonly encountered in the foundations that are designed for houses and chimneys. House foundations are typically interconnected along the entire perimeter of the superstructure that they are intended to support. However, separation of the three sections used for a kiln would not impair the function of burning or cooking oyster shells; and the presence of cracks between the three units could be explained as providing expansion-and-contraction joints in a structure that had to allow for frequent and considerable heat and cooling.

An industrial kiln of this sort functioned a lot like a blast-furnace: the oyster shells were baked by a continuous blast of hot air and flames over a period of three consecutive days. The Newport lime kiln was probably fired by coal (obtained either locally or imported from Fife or Baffin Island). A single firing of oyster shells would produce

several thousand pounds of lime. Thus, we have identified evidence of a structure at Newport that was suitable for "milling" adequate amounts of lime that were needed to build the Old Stone Tower. Presence of this "Lime Mill" on Thames Street in Newport, even in the condition of 14<sup>th</sup> century ruins, might have inspired the naming of "Mill Street" – which on a 1641 sketch map by Henry Bull referred only to the section of road between Thames and "Billing's Gate" Pier. The supposed builder of the "Colonial wind mill," Benedict Arnold, didn't move into Newport until ten years after the street was already named "Mill." Bull's Map is in the N.H.S. Archive. It also appeared in the book by Downing & Scully (1967); and it is featured in the author's new book – *Victorious!*

### ***Conclusions***

Extensive Internet research regarding lime kilns, masonry styles, and arches in Colonial America and Medieval Europe confirms the probable time of construction for the Old Stone Tower as being the late 14<sup>th</sup> century. The masons were most-likely Norse-Scottish – that is, they were trained in masonry traditions of Northern Scotland (which at the time was still regarded as a Nordic Province). Between 1365 and 1410, agents of Denmark and the Kalmar Union were involved in the resettlement of refugees from the Eastern Settlement of Greenland. The Settlement was a Western Province of Norway (and hence also of the Kalmar Union that consisted of Denmark, Sweden, Norway, and the Western Province of *Landanu* – that is, the "New Land").

Naturally, Queen-Regent Margaret Atterdag and her successor, King Erik of Pomerania, were deeply concerned about the welfare of their distant Christian subjects; and their care and protection were under the direct responsibility of the current Earl of the Orkney Islands – Prince Henry Sinclair. About 4,000 farmers were desperate to escape from the Arctic onslaught of the Little Ice Age. As they had no suitable oceangoing vessels to carry their belongings to new homes in the southern territories along the Eastern Seaboard, they were entirely dependent upon Norse-Scottish merchants, or perhaps Hanseatic sea captains, for ferry service. As the owner of a merchant shipping company, Sinclair was in a position to provide ferry service – which was probably done with the condition that farmers pay for their transport by turning over a portion of future earnings from goods – such as stockfish and turkey corn – that were produced for transport to the markets of North European ports.

Giovanni Verrazano's Report in 1524, which mentions "a white Native Tribe" and residents of Narragansett Bay who were "inclined to whiteness" suggests that one of the destinations of refugee farmers included the shores of Narragansett Bay. Doubtless, Nordic refugees who were transplanted to this region soon lost their ethnic and racial distinctions by merging with the local Narragansett and Wampanoag People. Legends or reports concerning the presence of a hybrid Native-European Colony in this region were probably a factor in the decision by Gerhard Mercator to identify "Norombega City" as the Capital of a European Colony alongside the shores of Narragansett Bay on his World Map of 1569. Other new settlements included Newfoundland, Nova Scotia, New York, and the Carolinas. Thus, Colonial settlers reported numerous contacts with "White Indians," Welsh, Irish, and Nordic residents who were eager to trade furs and fish for coveted iron tools and fabrics from Europe. These early European settlers in the New World provided a "cultural bridgehead" that facilitated the survival of new immigrants from the Old World.

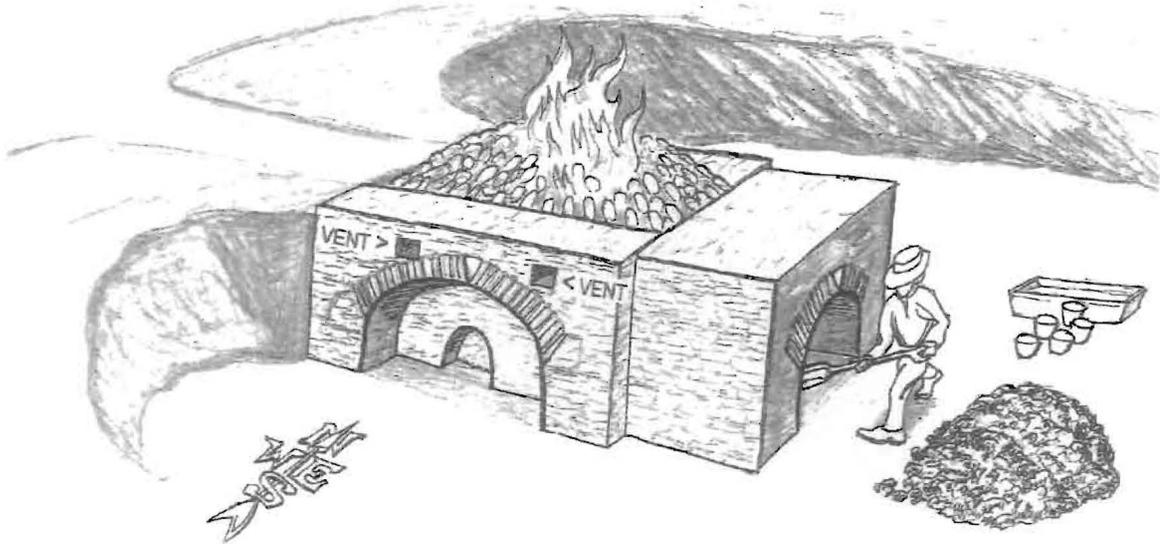
Note: obviously, the Newport Historical Society does not endorse any theory regarding the origins of the Old Stone Tower nor is any implied by the assistance provided to the author upon payment of fees for photographs used in research during this project.

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References:

- Downing, Antoinette F., & Vincent J. Scully. *The Architectural Heritage of Newport, Rhode Island 1640-1915*. New York: American Legacy Press, 1967 (Plate 26).
- Isham, Norman. *Early Rhode Island Houses*. Providence: 1895.
- Morrison, Hugh. *Early American Architecture*. New York: Oxford U. Press, 1952, 95.

## ILLUSTRATIONS



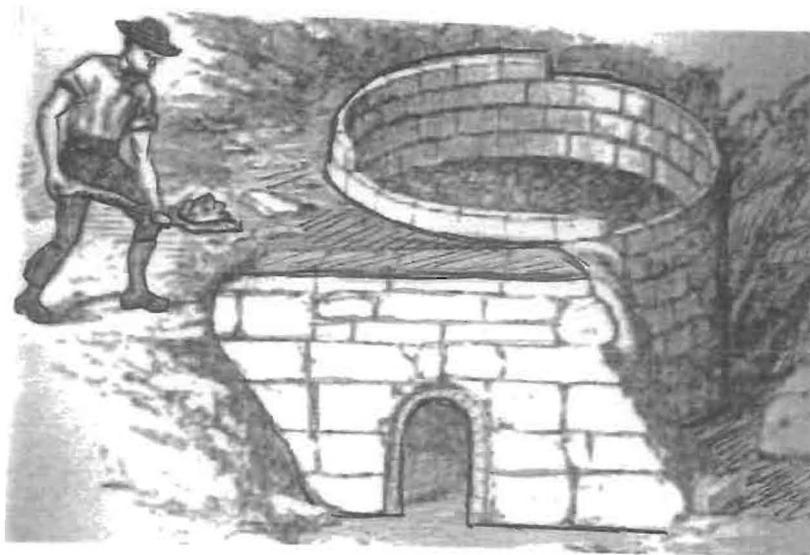
**FIGURE 1.** A medieval coal-fired lime kiln was constructed between 1370 and 1400 at Newport, Rhode Island. This kiln was used initially by Norse-Scottish masons to produce lime that was needed for mortar used in building the Old Stone Tower and perhaps a house for the Greenland Bishop that was located on the waterfront street (later, Thames Street). This reconstruction is based on NHS photographs taken during the 1898 demolition of the Sueton Grant House that was built by Jeremy Clarke circa 1670. Note presence of three separate sections and vents for a lime kiln located above the arch. These three sectional structures were not identified in a “floor plan” by Bergner (in Downing & Scully, 1967, Plate 26). Thus, they were effectively concealed from subsequent scholars. This mistake has introduced a fatal flaw in the study of evidence by most historians who simply assumed there was a direct correspondence between the *three* foundation arches and the *three* Colonial fireplaces built above them. The third fireplace was not part of the original structure; it was added later as an addition. This addition is out of alignment with the foundation.

Photographs indicate that vents were present in both the north and south sections of the foundation-level kiln. The roadway leading to the open western side was used for inserting coal or wood and subsequently removing the burned oyster-shells after the burn. The eastern archway was used to stoke the fire with coal or wood during the burn.



**FIGURE 2.** Small, “backyard” versions of lime kilns were used to fire sufficient oyster shells to make the equivalent of four sixty-pound bags of modern cement. This would be about what was needed to construct the standard bread oven or a small fireplace in a single-room log cabin. Archaeologists working for the NPS uncovered such a structure at the Jamestown Settlement Site in Virginia dating to c.1650.

(National Park Service reconstruction, Jamestown Kiln, after Project Gutenberg; <http://media.finddictionary.com/pictures/151/17/4503.jpg> – accessed December 2014)

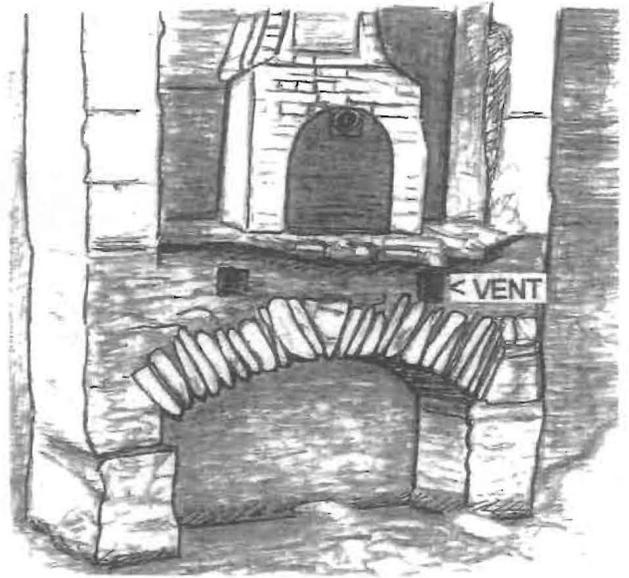


**FIGURE 3.** Colonial, top-loading Industrial-Grade Lime Kiln

Major stone-building projects, such as the Old Stone Tower in Newport, were impossible without the production capacity of an industrial mill. Layers of crushed limestone interspersed with coal, charcoal, or wood, were loaded from the top. After the burn, the converted lime material was removed by shovel, bucket, and barrel. Stones around the upper part of the kiln were never cemented – making removal easier.

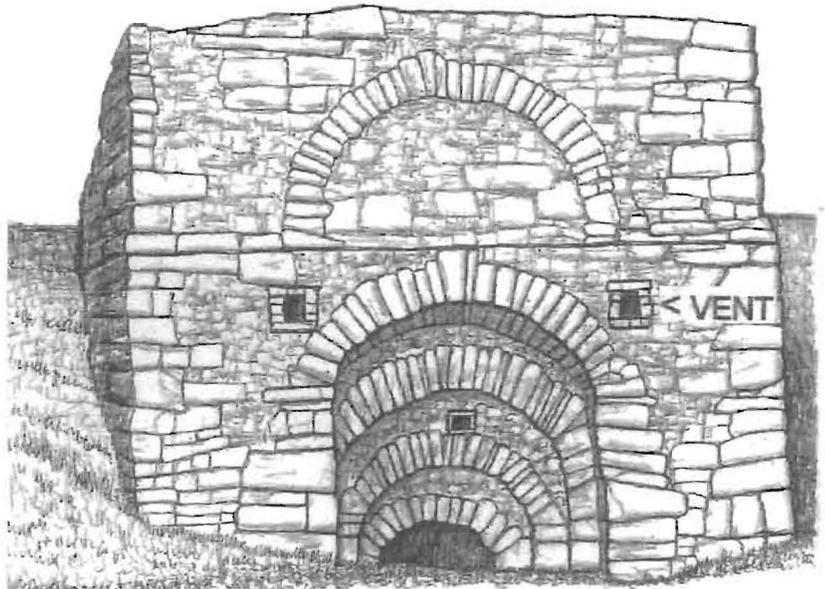
**FIGURE 4.** Demolition Photo (1898) of the Sueton Grant House in Newport, Rhode Island, shows Colonial fireplace erected above a prior, medieval lime kiln at the foundation level. Lower archway is made in the Norse-Scottish tradition using an eclectic, accordion-shaped arch with distinctive triangular keystone. This style of arch was otherwise unknown in Colonial architecture. Dark rectangles above arch are lime-kiln vents.

(After photo from Newport Historical Society Archive, P9745; Downing & Scully, 1967, Pl.26)



**FIGURE 5.** Industrial Lime Kiln at Murlough Bay, Ireland was built into a hillside. The backside of this kiln provided a route of access for inserting crushed limestone and the fire charge of coal or wood. Note positions of vents above the arches. This was a common style of kiln in medieval Ireland and Scotland.

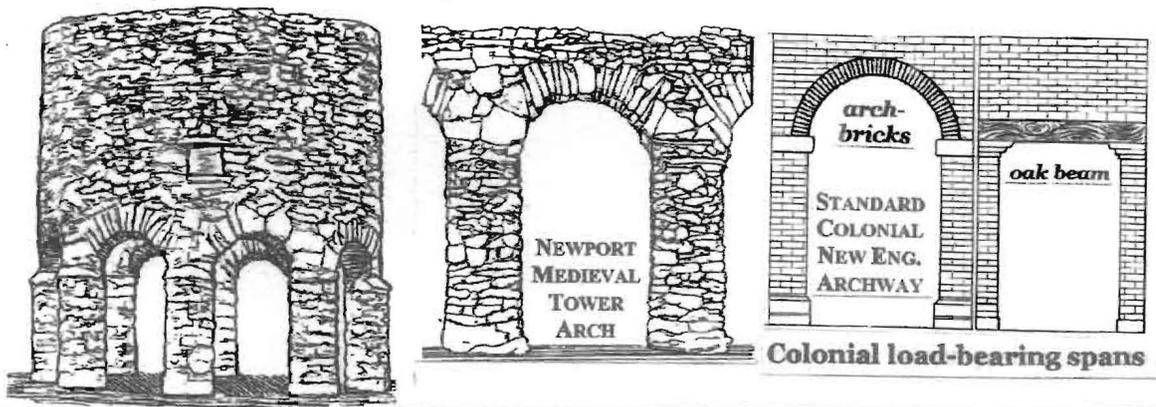
(After a photo from <http://lowtechmagazine.com/2013/09/lime-kilns.htm>)



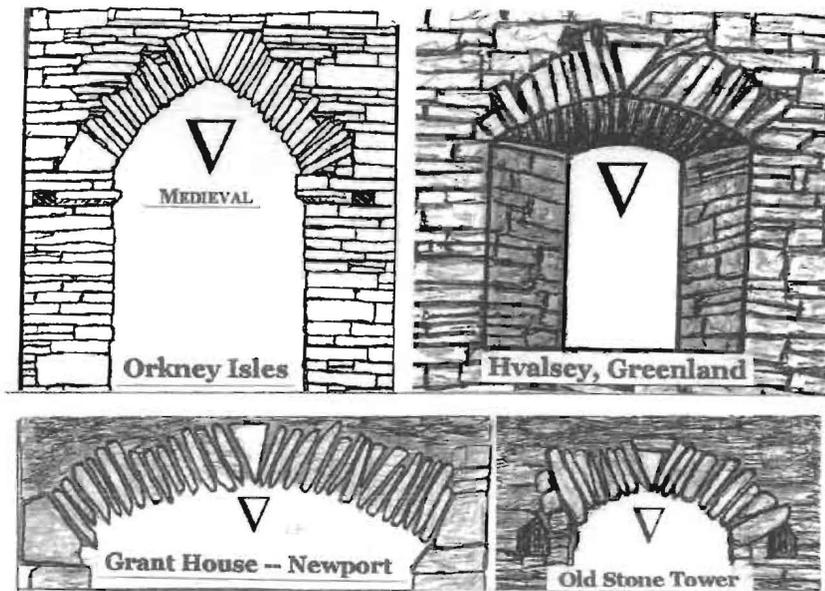
**FIGURE 6.** Medium sized Scottish lime kiln has vent above front access doorway. Most lime kilns used semicircular, Romanesque archways for access. In this case, a stone lintel spans the front opening. This example is located at Badenyon in Aberdeenshire, Scotland.

(<http://www.wikipedia/wiki/Aberdeenshire>)





**FIGURE 7.** The Old Stone Tower at Newport (left) is a circular stone structure that rests upon eight round pillars. Hugh Morrison (1952, 95) noted that: “The Newport Tower has little significance in the history of Colonial architecture. Nothing quite like it had been built before, or was ever built afterward. ... Colonial architecture was entirely traditional and almost entirely unprogressive.” In other words, the structure is entirely *intrusive* in its design. By the 17<sup>th</sup> century, Europeans living in the post-Renaissance typically built with precisely cut stones or ceramic bricks. The eclectic, “make-do” style building walls and chimneys with materials at hand was quickly abandoned in Colonial structures. Arches of the Newport Tower (center) are eclectic and medieval Norse-Scottish in design. NHS photographs confirm that *all* known Colonial arches and load-bearing spans at Newport used uniformly-cut stones, standardized ceramic bricks, or oak beams (right).



**FIGURE 8.** “Jerome’s Arch,” a distinctive Norse-Scottish design comprising eclectic, accordion-shaped arches with triangular keystones, was built by Scottish masons at Eynhallow Church, Orkney Isles, and at Hvalsey, Greenland (top row). Similar medieval arches are seen at Newport’s Grant House lime kiln and Old Stone Tower (bottom row).

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