New York Landmarks Conservancy

Common Bond

Clay tiles salvaged from less visible areas are being reinstalled on the primary roof over the nave of St. Mary's R.C. Church in Oswego, New York.

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The newsletter of the Sacred Sites Program on maintenance and preservation for caretakers of architecturally significant religious buildings.

Dear Reader:

In this edition we continue to address the shared use of religious buildings. While this may seem to have little to do with architectural preservation, it is actually an important ingredient in most restoration schemes. Our experience shows that those religious institutions whose buildings are used by the community-at-large tend to be more successful with their restoration programs. In the Preservation Profile, **Durham Memorial A.M.E. Zion Church: Making the Dream a Reality**, the Rev. Richard Stewart, the pastor, discusses how this African-American congregation's long-standing commitment to its community is now driving the campaign to restore and rehabilitate its church. **Ask the Technical Preservation Services Center** looks at the types of arrangements to consider when sharing space with another non-profit institution. **A Look at Historic Tile Roofs** examines the history, manufacture, and preservation of clay tiles, a roofing material that was widely used on religious buildings, particularly at the turn of the century.

At press time we found out that there will be one final round of funding under the Environmental Quality Bond Act of 1986. Non-profit organizations, including religious institutions, in New York State are eligible for grants under this program. The deadline for submitting applications is May 13. The **Financial Assistance** column, on page 9, offers additional information.

The Rev. Thomas F. Pike
Chair, Advisory Committee

Contents

Preservation Profile	2
A Look at Historic Tile Roofs	5
Ask the Technical Preservation Services Center	8
Financial Assistance	9
Technical Assistance	10
Helpful Publications	11
In Brief	12
Sacred Sites Program News	A-1
Conferences	A-4

A Look at Historic Tile Roofs

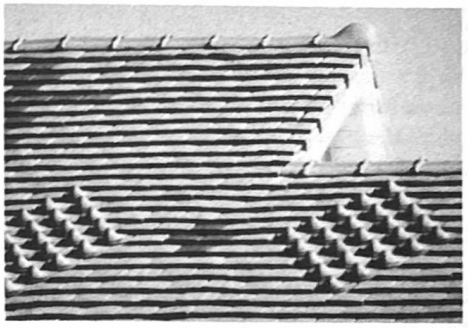
Clay, or terra-cotta, tiles are among the most ornamental and distinctive roofing materials used in historic buildings. Their aesthetic qualities, including a panoply of shapes, colors, patterns, and textures, often make tile roofs prominent stylistic features of many historic structures. Nowhere is this more apparent than in Alfred, New York, a rural town located in the Southern Tier of New York State, settled primarily by Seventh Day Baptists, that is filled with terra-cotta tile roofs. More that one hundred structures bear distinctive orange-red roofs, powerful reminders of a terra-cotta industry that thrived in Alfred between 1889 and 1909. Two companies, the Alfred Clay Company and the Celadon Terra Cotta Company (which evolved into the renowned Ludowici-Celadon Company in Ohio) transformed local high-quality raw materials into a wide variety of clay roofing tiles.

Edward T. Mohylowski

Tile roofs are often prominent architectural elements of many historic buildings, as in Sacred Heart R.C. Church in Baton Rouge, Louisiana.

Typically, terra-cotta roofs comprise a field of plain clay tiles covering the majority of a roof's flat surface, with decorative tiles used along the peak of the roof. In more ornamental installations, the field tiles may have areas of patterning created by tiles of different shapes, dimensions, or colors. Around Alfred, red tile roofs predominate, but there are many variations of clay colors, ranging from deep browns to pale pinks to buff or beige. By the end of the nineteenth century, as the use of glazed roofing tiles grew, blues, greens, and deep, nearly black, purples were popular colors.

Although clay tiles can last for centuries, the average life span of a terra-cotta tile roof is estimated to be about one hundred years. Many existing roofs in Alfred are approaching the end of their life spans. Community desire to preserve these roofs, and support from the Friends of Terra Cotta, generated a survey project that led to the publication of *The Roofs of Alfred*, which contains valuable information about the history, manufacture, repair, and preservation of tile roofs. The Friends of Terra Cotta is pleased to share some of this information with readers of *Common Bond*.



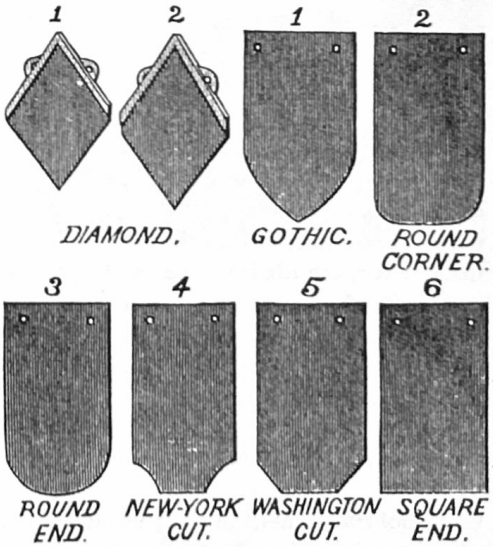
Susan Tunick

This tile roof uses raised, curved tiles, reminiscent of rhinoceros horns, to form diamond shapes. The darker, cross-shaped patterns are created by the insertion of dark brown tiles within the red field tiles.

Historical Background

> *The word tile does not often occur in the Bible; but that tiles were used in very ancient times, not only in buildings, but also for many purposes for which we employ paper, there is not the slightest doubt, and this is particularly true in regard to Assyria in which country almost every transaction of a public or private character was first written upon a thin tablet of clay, or tiles, and then baked.*

Judging from this introductory sentence on roof tiles in Charles Thomas Davis' 1884 book, *A Practical Treatise on the Manufacture of Bricks, Tiles, Terra-Cotta, Etc.*, it is clear that the history of roof tile is a long and venerable one. In North America, tiles were used by the earliest European settlers and were common in Spanish and French communities. Roof tiles have been found at the site of the 1585 settlement of Roanoke Island in North Carolina, as well as in other early English colonial towns. The Dutch also used clay tiles for roofs, importing them from Holland until 1650, when the local manufacture of clay tiles began in the upper Hudson River Valley.

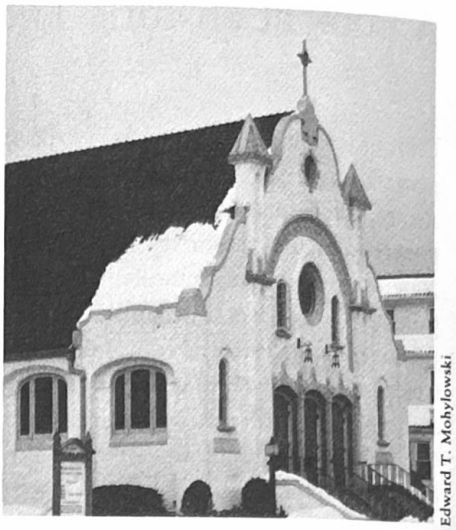


Courtesy of Susan Tunick

Roofing tiles were made in a variety of shapes, as demonstrated in this illustration from A Practical Treatise on the Manufacture of Bricks, Tiles, Terra-Cotta, Etc. *by Charles Thomas Davis.*

The popularity of clay roof tiles continued during the Colonial period. By the 1770s, they were being produced in the East, particularly in the New York and New Jersey area, and in the West at the California Mission of San Antonio de Padua. The acceptance of clay tiles was based partially on their durability, ease of maintenance, and energy efficiency. Clay tiles were also fireproof, a quality that made them particularly attractive in the crowded, tightly-packed cities of the English colonies. The terrible fires in London (1666) and Boston (1679) led to the creation of building and fire codes in several Colonial cities, including New York and Boston, which encouraged the use of terra-cotta tiles for roofs because of their fireproof qualities.

During the late-eighteenth and early-nineteenth centuries, clay tiles faced stiff competition from other fire-resistant roofing materials, including slate, and metals such as copper, iron, zinc, and galvanized iron. Clay tiles cost considerably more than these materials and were also much heavier, requiring far more substantial roof framing and sheathing. Their fall from favor was temporary. The introduction of the Italianate Villa style of architecture (which often featured a tile roof as an essential stylistic feature) in the mid-nineteenth century stimulated a renewed interest in this material. Swings in architectural taste, rather than functional issues, dictated the extent to which clay tiles were used until the end of the century. They regained popularity, especially for religious buildings, with the advent of the Romanesque Revival style that had been inspired by the early medieval buildings of southern Europe. Other eclectic revivals, such as the Mission, Spanish Baroque, Georgian, and Mediterranean styles, which were popular for religious buildings of the period, required roofs covered with terra-cotta tiles of all types, sizes, colors, and textures, prompting the vogue of clay-tile-covered roofs that lasted well into this century.



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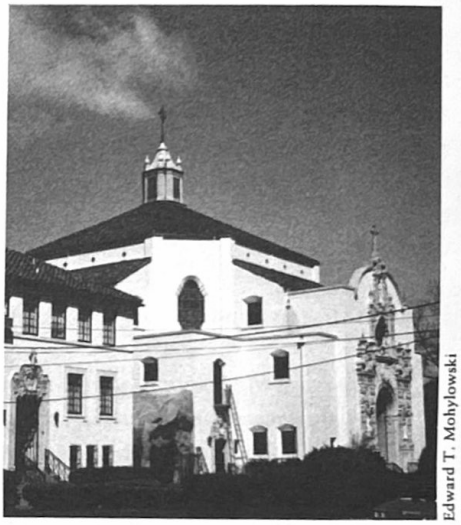


Edward T. Mohylowski

Clay tiles were often used on buildings designed in many of the eclectic architectural styles popular during the first half of the twentieth century. St. Patrick's R.C. Church, above, in Southold, New York, is a Spanish Mission example. Below, St. Leo the Great R.C. Church in New Orleans, Louisiana, was executed in the Spanish Baroque idiom.

The Manufacture of Clay Roof Tiles

Regional roof tile plants were established in areas that had easy access to large natural deposits of clay. The manufacture of roof tiles was a fairly standardized enterprise. Shale, the primary raw material used, was blasted, dug out by hand, and transported to the tile plant in horse-drawn wagons. Large crushing machines pulverized the shale and placed it in a pug mill, where it was mixed with water to form a homogeneous mass of clay. The clay was extruded into a wide strip and cut into a series of crude slabs called "blanks." These blanks were then put into pressing machines and formed into roof tiles of various sizes and shapes. Once formed, the raw tiles were placed on carts, put through a drying tunnel, and then loaded into the kiln. The tiles were baked at a temperature of about 1,000 degrees Fahrenheit, which produced tiles of excellent color and strength.

By the early twentieth century the manufacture of clay roof tiles had become a complex, industrial process. In 1908, the Celadon Terra Cotta Company operated eight presses. Five were run by power and the other three, used for molding small units, were operated by hand. The principal power presses were so efficient that daily production increased tenfold once they were put into operation. Ornamental tiles were either molded by hand, or the tile press was altered to produce an embossed design. Complex units, such as hip rolls, finials, crestings, and other ornamental pieces were pressed by hand into plaster molds. The surface next to the plaster was then smoothed by hand so that it would match the machine-made surface of the plain tile. Occasionally, one-of-a-kind pieces were sculpted without using a mold.

Tile roofs were often custom-made for specific buildings. Architects would submit roof plans to the manufacturer specifying a particular style of tile. Charles Binns, a renowned professor at Alfred University reported in an article that appeared in *The Clay Worker* in 1904 that the plan for "every hip and valley is laid out in full on the floor. Every cut tile is marked and a plaster form made to the exact angle required, and to this the tiles themselves are shaped while green, and marked each for its own place." At the Celadon Terra Cotta Company, after firing, the roof tiles were packed in straw, loaded onto horse-drawn wagons, hauled to the Alfred station depot, and shipped by rail to sites across the country.

Alfred Historical Society

A wagon loaded with of roof tiles packed in straw passes the Celadon Terra Cotta Company office building in Alfred, New York, on its way to the rail depot in the late 1800s..

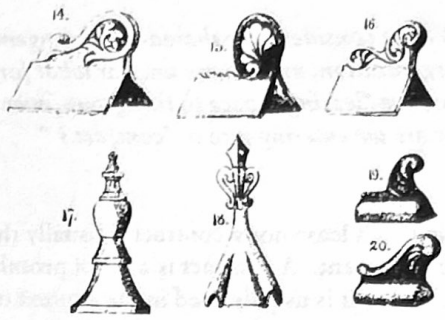
Preservation of Historic Tile Roofs

Clay roof tiles, when correctly installed, need virtually no maintenance. In fact, it is not unusual for clay tiles to outlast their original building and be reused on another structure. To foster the preservation of a terra-cotta tile roof, however, it is essential to look at the entire tile roofing system. This includes the method by which the tiles are fastened, the structural roofing members, wood sheathing, felt or roofing paper, and vertical roof battens to which the tiles may be attached.

(Continued on p. 7, following the Sacred Sites Program News insert.)

(Continued from p. 6.)

Historically, when a clay-tile roof was installed, the roof sheathing was first covered with an asphalt-saturated felt paper of between forty-five and sixty-five pounds depending upon the style of tile. Over this, the tiles were attached with a special two-and-a-half-inch metal alloy nail that resembles present-day galvanized eight-penny nails. Each nail was hammered so the head of the nail remained a quarter of an inch above the tile, thereby allowing for the expansion and contraction of each tile within the roof system. Copper sheets weighing fourteen ounces per square foot were usually specified for chimney and valley flashing. Rain gutters and downspouts were often made of the same material. After all the tiles were in position, mortar was used to seal the ridge and hip tiles. This process protected the roof from harsh weather conditions and kept birds from nesting in the natural voids created by the tiles.

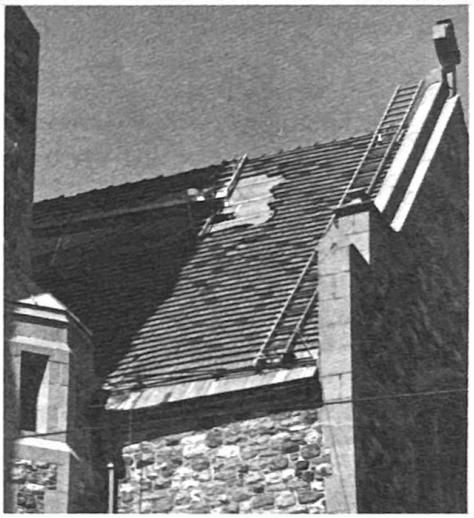


Alfred Historical Society

This page from a late-nineteenth-century tile catalogue shows several decorative tiles in varied architectural styles that were stock items available from many tile companies.

The most common failure in a tile roof is caused by a breakdown in the fastening system, which frequently consists of iron nails, although in some roofs wire and wooden pegs were used. A second common failure is the support system, which must be strong enough to bear the load of a heavy tile roof. If metal flashing, gutters, and downspouts deteriorate or are filled with debris, water will not run off the roof properly and can seep under roof tiles, damaging the supporting members. Tile roofs can also be harmed by other factors, including falling tree limbs, heavy hail, acts of vandalism, or by careless roofers walking on unprotected tiles while executing repairs.

Properly assessing the condition of a historic terra-cotta tile roof is a job for a professional. However, visual inspection by the building owner is a valuable preliminary step. Pay attention to missing and damaged tiles, as well as to signs of water damage on the interior. Although it may be obvious that the roof is leaking, the source of the leak can prove difficult to find because the water can flow over and around other building elements and not become visible until it has traveled far from its source. When the cause of the leak has been identified, and a plan for repair has been developed, keep in mind the inherent fragility of roofing tiles. Although some tiles can be walked on if adequate protection is in place, it may be necessary to remove whole areas of tile in order to provide a safe way to reach sections in need of repair. When an area of tiles is removed, care should be taken to make a diagram and create a tile numbering system that can be used to replicate the original pattern and color variations when the tiles are relaid.



St. Mary's R.C. Church, Oswego, NY.

A clay tile roof being repaired. In this example, tiles salvaged from less visible areas are being reinstalled on the primary roof over the nave of St. Mary's R.C. Church in Oswego, New York.

The appearance of historic tiles can be hard to match, requiring ingenuity in replacing missing tiles with others that are harmonious in color and texture. It may be appropriate to move original tiles to the most conspicuous areas on the roof and to use newly made or salvaged tiles in less prominent places. Many tiles are marked on the back with the name of the manufacturer and a number for the particular type of tile. Some companies still in operation can often reproduce specific tiles, sometimes even using the original molds. When reattaching tiles, new corrosion-resistant fasteners should be used.

The most important error to avoid in repairing an historic tile roof is the replacement of tiles with another material. Concrete, metal, or plastic tiles are not suitable substitutes for clay roof tiles. They do not have the same texture, shape, thickness, or surface and color variations found in natural clay tile. Another pitfall to avoid, which can lead to further deterioration, is the patching of a historic tile roof with inappropriate materials such as tar, caulk, asphalt, or sections of metal.

Terra-cotta tile roofs are stylistically and functionally very important features of many historic buildings. In today's world where architectural conformity is the rule, the distinctive aesthetic qualities that terra-cotta tile roofs add to a building are too often unappreciated. With appropriate maintenance, these durable and aesthetically appealing roofs will outlast the building on which they were installed.

This article was prepared by Susan Tunick, the President of the Friends of Terra Cotta, a national preservation organization, as well as an artist working in ceramic mosaics.