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REVIVING NEW ORLEANS' OLDEST CEMETERY: PRESERVATION OF ST. LOUIS CEMETERY NO. 1 THROUGH THE RE-INTRODUCTION OF TRADITIONAL MATERIALS*

Dorothy S. Krotzer[1]

Abstract

St. Louis Cemetery No. 1 is the oldest of New Orleans' early Creole cemeteries. However, years of abandonment and vandalism have taken their toll on the site, contributing to loss of physical integrity and historical character. To arrest the physical deterioration and initiate a program of sound preservation for the cemetery, the non-profit entity Save Our Cemeteries, Inc. obtained a grant from the federal Save America's Treasures (SAT) program in 2001. The funding went towards the development and implementation of a preservation program for some of the most threatened and significant tombs in the cemetery. The program included the restoration of an entire alley of tombs (or "tombscape") within the cemetery through the re-introduction of historically appropriate materials, such as lime washes and hydraulic lime-based stuccos. The goal was to provide an alternative approach for the repair of deteriorated tombs, other than the cast-in-place concrete construction in use at the time. The use of historically appropriate and compatible materials allows these structures to be repaired instead of replaced, thus encouraging their long-term preservation.

Keywords

St. Louis Cemetery, hydraulic lime, limewash, preservation

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[1] Conservator, Dorothy S. Krotzer Architectural Conservation, dkrotzer@mindspring.com.

1 St. Louis Cemetery No. 1: Description and Background

Established in 1789, St. Louis Cemetery No. 1 was New Orleans' second cemetery but the first outside the city's ramparts. In the first cemetery, all burials were below ground and frequent flooding caused the unsightly and unsanitary problem of unearthed corpses (Huber et al. 1974). In an effort to separate the living from the dead and thus prevent the spread of disease, the Spanish Colonial government relocated the city's cemetery to an area outside of the city boundaries (Huber et al. 1974). In addition, the burials in the St. Louis Cemetery No. 1 were to take place in above-ground tombs. This cemetery is the resting place of such notable New Orleanians as Jean Etienne Boré, the city's first mayor and the man who commercialized the sugar refinery process, and Homer Plessy, plaintiff in the famed “separate but equal” Supreme Court case (Huber et al. 1974). While the St. Louis Cemetery No. 1 originated as a Catholic cemetery, a large portion of it became dedicated to non-Catholic burials in the early nineteenth century as the city's population evolved to include a variety of religions (Wilson and Huber 1963). Today, however, only a small portion of the Protestant Section remains at the rear of the St. Louis Cemetery No. 1. Most of the Protestant burials were relocated to another cemetery as part of a public works project that demolished a portion of the St. Louis Cemetery No. 1 in order to extend city streets through the site.

The New Orleans tradition of above-ground burial was born in the St. Louis Cemetery No. 1. Borrowing from French and Spanish funerary practices, as well as nineteenth century architectural design, tomb structures were produced in unique styles reflecting the prevailing taste of the times. There are both family tombs, usually consisting of one or two vaults, and society tombs, typically much larger and consisting of anywhere from four to twenty-four vaults. St. Louis Cemetery No. 1 holds examples of some of the earliest tomb designs, popular in the early nineteenth century. These were the simple step tomb, the platform tomb, and the later temple or pediment tomb. The former most likely evolved from a simple, casket-sized rectangular structure and became modified through additions such as one or more stepped platforms or triangular pediments (Huber et al. 1974). The pediment or temple tomb has triangular pediments at the end gables and often has several vertically stacked single vaults rising two to four vaults high.

Most tombs in St. Louis Cemetery No. 1 are constructed of brick, covered with stucco and finished with a layer of limewash, which was often pigmented. More elaborate, elite tombs are constructed of marble and are often designed to resemble a sarcophagus. All tombs are sealed with an inscription tablet, usually made of Italian marble or sometimes black limestone, set in an opening framed by marble jambs, a lintel, and a sill. Many tombs are embellished with statuary and metalwork in the form of railings, either partially or completely surrounding the tomb.

2 Construction Materials

As is evident throughout the Vieux Carre as well as in St. Louis Cemetery No. 1, solid brick was the traditional structural building material in New Orleans. This is due mainly to the eighteenth-century fire prevention codes that mandated masonry construction. The lack of a natural source for building stone in the region also made locally manufactured brick favorable. For tomb construction, brick is a good choice. Brick has high compressive strength and can easily carry the load of the tomb structure and its contents. In addition, the local brick has high porosity and can adjust well to variations in capillary rise in ground water. However, these early New Orleans bricks often had poor weathering characteristics and had to be protected by the application of stucco (Peters 2002, p 35-36). Stucco, a sacrificial rendering typically composed of lime and sand, was applied over the brick in order to protect the structural brick body that exists beneath it. Limewash is yet another layer of protection that was applied over the stucco. The limewash and stucco are both intended to be repaired and re-applied as necessary to insure the protection of the brick and the long-term survival of the structure as a whole.

The majority of the tombs in St. Louis Cemetery No. 1 are covered with stucco. This fact again mirrors the building traditions observed in the rest of the city. Although architectural historians acknowledge the use of stuccos on New Orleans buildings and tombs alike, very little research has been carried out to identify the type of binder used in the stucco mixture–high calcium lime, natural cement, or hydraulic lime. Natural cements and natural hydraulic limes are derived from limestones that contain clay impurities in varying proportions. Once burned, these “argillaceous limestones”, as they are known, will produce limes with varying characteristics, including degrees of hydraulicity (Teutonico 1997). Hydraulic refers to the ability of a lime to set and harden in the presence of water. Hydraulic materials set by chemical reaction with water, as opposed to non-hydraulic (high calcium) limes that harden by reaction with carbon dioxide in the air (Ashurst 1989). This characteristic allows the hydraulic materials to set faster and be more resistant to frost damage and other severe weather conditions. Hydraulic limes are traditionally classified by the amount of active clay materials (silica and alumina) they contain and can range from “feebly” hydraulic (contains less than 12% reactive clay) “to “eminently” hydraulic (contains between 18-25% reactive clay). Natural cements are yet another class of hydraulic materials that lie somewhere between eminently hydraulic limes and modern artificial cements. They typically contain 25-55% reactive clays (Teutonico 1997).

While high-calcium lime, which can be obtained by burning oyster and other mollusk shells, would have been readily available in nineteenth century New Orleans, it is likely that natural cements and hydraulic limes were also used. The ability of hydraulic limes and natural cements to cure in moist environments would have made them an ideal material for use in humid, damp climates like that of New Orleans. However, the lack of natural deposits of clay-containing stone in the New Orleans area means that hydraulic lime or natural cement would have been available only through importation. Hydraulic limes and natural cements were available in the United States since the early nineteenth century and the cosmopolitan community of architects in New Orleans would probably have been aware of them. One such architect, Thomas K. Wharton, was familiar with hydraulic lime and specified its use in a brief estimate written in his diary that called for “Cement (Hydraulic) – 14,370 barrels, Lime – 9,646 barrels, Sand – 52,619 barrels and Shells – 18,818 barrels” (Wilson 1999). But, for the most part, there appears to be very little written documentation relating to the use of hydraulic materials in the masonry construction of New Orleans (Peters 2002, p 44).

The lack of information on the ingredients of historic mortars and stuccos in New Orleans prompted additional research to be conducted at the University of Pennsylvania’s Graduate Program in Historic Preservation. As part of a masters thesis on the decay mechanisms present in the St. Louis Cemetery No. 1, Judith Peters explored the constituents of mortars and stuccos found in the cemetery and the physical properties they impart. As part of her research, she conducted numerous laboratory techniques in order to identify both the mineralogy and the microstructure of the historic materials. Following visual examination and categorization of representative mortars and stuccos removed from the cemetery, Peters performed optical microscopy, polarized light microscopy, and advanced instrumental analysis on select samples. She also performed laboratory tests such as water vapor transmission, capillary absorption and drying rates in order to understand how these materials interface with moisture (Peters 2002, p 91). Understanding how these materials relate to water is crucial to identifying the ways in which they degrade as well as the best means for repairing them.

Several conclusions can be drawn from Peters’ research. For instance, her analysis shows that the brick mortar is the weakest material in the tomb structure and the material most susceptible to deterioration in the presence of moisture. The mortars do not have a hydraulic component, but appear to be made predominantly of clay and silt fines combined with small amounts of lime and aggregate. Her research did show, however, that many of the historic stuccos in the cemetery appear to be composed of hydraulic limes or natural cements. Peters used X-Ray Diffraction (XRD) and TGA/DTA

(Thermal Gravimetric Analysis/ Differential Thermal Analysis) to identify the presence of signature compounds that can only be found in hydraulic lime or natural cements, most notably dicalcium silicate and calcite (Peters 2002, p 151). Although Peters emphasizes the need for additional research, her findings provide substantial evidence that hydraulic materials were used in the stuccos of the St. Louis Cemetery No. 1.

Because the timing of Peters' research coincided with the development of a preservation strategy for the cemetery, the decision was made to re-introduce hydraulic limes and/or natural cements to the cemetery. Mortars containing hydraulic components have many beneficial properties and are ideal for moist, humid climates like New Orleans. These mortars offer low shrinkage; moderate compressive strength; good flexural strength and water vapor transmission; they are compatible with historic mortars; and cure in the presence of moisture. This last feature is especially important in a humid environment where typical lime-based mortars, which need air to set, may not fully cure for many years. A more rapid set-time means less susceptibility to extreme weather conditions, like heavy rainfall or freezing temperatures. In addition, when hardened, hydraulic lime mortars are more water-resistant (Peters 2002, p 41).

At the time of the SAT project, commercially manufactured natural cements were unavailable in the United States. However, a hydrated hydraulic lime was being distributed by Riverton Corporation of Virginia and was selected for use in the cemetery preservation project. The Riverton HHL is moderately hydraulic and, at the time of the work, was readily available and inexpensive.[2] The ease of acquiring this material and its low cost were important factors because a chief goal of the program was to get the Archdiocese of New Orleans to use more historically appropriate masonry materials. The Archdiocese would only continue the efforts of the project if the recommended techniques and materials were readily available and affordable.

3 Restoration of a Tombscape

In November 2001, the non-profit organization Save Our Cemeteries obtained a grant from the federal Save America's Treasures (SAT) program to develop and implement a preservation strategy for the St. Louis Cemetery No. 1. The grant was matched by significant contributions from the Archdiocese of New Orleans, the University of Pennsylvania's Graduate School of Design, and the Booth-Bricker Fund. Using a pilot tomb preservation project completed in 2000 as a guide, as well as Peters' research, a technical preservation plan was developed for the cemetery. A key component of the preservation plan was the restoration of a typical row of tombs, a "tombscape", to its late nineteenth century appearance using traditional building materials and techniques. The restoration of a tombscape provides the visitor to the cemetery with a more accurate vision of its historical appearance. Alley 9L, at the rear of the cemetery, was selected for restoration because of the diversity of tomb types and conditions of deterioration exhibited by its thirty-one structures. This alley was also photographed by G.F. Mugnier in the late nineteenth century as part of a commercial series of souvenir views of the city. These images provided graphic evidence for restoration. (*Figure 1*)

At the beginning of the SAT project, a plan for the preservation and restoration of each tomb was developed. The work plan for each tomb was different, as each was unique in the type and severity of conditions. Some tombs were in relatively good condition and needed only to be limewashed, while others demanded significant reconstruction and re-stuccoing. Those tombs that required reconstruction had experienced some type of significant failure. The chief cause of structural failure in the tombs was found to be lack of maintenance. Lack of maintenance begins a sequence of

[2] Unfortunately, the manufacturer has since stopped production of this material. At the time of this writing, the only hydraulic lime commercially available in the United States is imported from Europe.

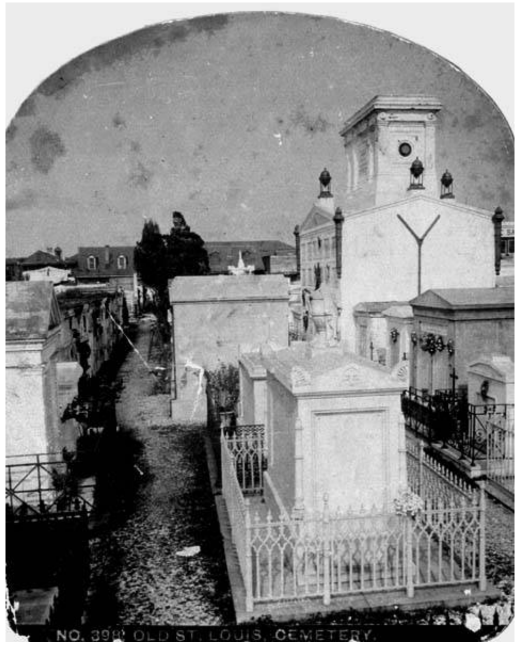

Figure 1. A circa 1875 view of Alley 9L in the St. Louis Cemetery No. 1, taken by photographer G.F. Mugnier (photograph courtesy of the New Orleans Public Library, Louisiana Collection).

deterioration that typically involves the breakdown of the tomb's protective stucco skin. When cracks appear in the stucco, they are left unattended and become an entry point for rainwater and a bed for invasive plants. The water washes out interior mortar joints and promotes the growth of invasive plants. These plants grow quickly, displacing bricks and stucco and, ultimately causing collapse of the tomb structure.

Once individual treatment plans were developed for each tomb, they were photographed and all molding profiles recorded by measured drawings. Following the documentation, the restoration work began. Restoration work typically involved cleaning, re-setting bricks, re-stuccoing and limewashing. Losses and cracks in flat stucco, where water and plant roots could easily invade, were filled with mortar and open brick joints were re-pointed. In addition, a local mason repaired the larger areas of stucco loss, such as on tomb rooftops and areas of ornamental stucco. For ornamental work, such as cornices and pilaster capitals, the mason was provided with a scaled drawing of the molding profile to be replicated, from which he created a sheet-metal template for the repair work. For small repairs, he carefully matched the existing molding through the use of hand-held masonry tools. (*Figure 2*)

Hydraulic lime-based mortars were used for the majority of the masonry work. These mortars were used mainly because of the historic precedence of their use in the cemetery as established by Peters' research, but also because evidence of the historic stucco's durability is evident throughout the cemetery. Many of the existing stuccos, which Peters determined to contain hydraulic components, have weathered well and are only damaged in instances of significant structural movement. In addition, the compatibility between these stuccos and the early soft brick is visible on site and was substantiated by Peters. The brick and the hydraulic-content stuccos have similar degrees of permeability and rates of water vapor transmission. The stucco protects the brick from thermal cycling and erosion due to wind and water (Peters 2002, p 118). Throughout the cemetery, deterioration of bricks appears to be caused mainly by exposure to the elements or use of incompatible, high-Portland cement repair mortars.

Figure 2. A mason applies a hydraulic lime-based stucco on a step-style tomb. The new material is applied where the original is missing and care is taken to cover the new work with damp burlap (photograph by author).

For all stucco repairs and new stuccowork, a mixture of 1 part hydraulic lime to 2 parts sand (by volume) was used. This mix was based on the average results of Peters' acid digestion analysis of numerous stucco samples removed from the cemetery. In general, she found that the ratio of ingredients was typically between 1:1 to 1:2 (binder: aggregate) (Peters 2002, p 137). The bricks were re-pointed with a slightly softer mix, as Peters found that the mortar was the weakest component of the tomb construction (Peters 2002, p 177). The brick mortar was composed of a 1:3 (by volume) mixture of hydraulic lime and sand. Although Peters' research indicates that the original brick mortar does not contain hydraulic components, it was decided that such a mortar would be more durable than the original and would still be soft and permeable enough to be compatible with the historic materials. The only portion of the tombs where hydraulic lime-based mortars were not used was the roof. For the roofs, a 1:2:9 (by volume) mixture of white Portland cement, hydrated lime and mason's sand was used because it would produce a slightly harder and more weather-resistant protective skin on the tomb's most vulnerable surface. The roof, which receives a much stronger assault from weather than the sides, is typically the first area to deteriorate. Physical evidence has shown this to be true. Although historically, manufactured cement would not have been used in the stucco, it was used in this instance to better synchronize the rate of weathering of the tomb as a whole.

In order to return the tombs of Alley 9L to their historic and traditional appearance, it was decided that each tomb would be limewashed. While some tombs retained only one or two layers of white limewash or modern paint, others contained numerous layers of washes in a variety of colors. At the onset of the project, gray, red, yellow and orange-colored finishes could be seen on many Alley 9L tombs. To supplement these *in situ* observations, samples of the finishes were removed from protected areas on the tombs and taken back to the conservation laboratory for analysis.

Examination of the samples revealed numerous layers of limewash and the sequence in which they were applied on each tomb. Unfortunately, it was impossible to identify which limewash color was on a tomb at a specific point in time. This ambiguity made selecting a consistent period of interpretation for all of the tombs on Alley 9L difficult. Therefore, each tomb was finished with one of its historic limewash colors, as documented in the laboratory analysis. This created a historically accurate appearance for the alley, although it was not strictly interpreted to one point in history. The limewashes were recreated using lime putty and iron oxides, much as it would have been done in the nineteenth and early twentieth centuries. In an effort to encourage the revival of this traditional finish, the materials had to be readily available to the Archdiocese and individual tomb owners. The lime putty was based on bagged hydrated high-calcium lime and the pigments were purchased from an art supply store. Workshops are frequently held locally instructing New Orleanians on how to apply this most traditional of tomb finishes. (*Figures 3 and 4)*

Figures 3 and 4. The Malard Family tomb, before and after restoration. Work on this tomb included significant re-stuccoing, repair of marble closure tablets, recreation of missing metal decoration and application of its historic colored limewash (photographs by author).

4 Conclusions

The long-term effects of the St. Louis Cemetery No. 1 preservation project will be assessed for many years to come. The key goals of stabilization of threatened tombs, re-introduction of traditional materials and training of local craftspeople to use these traditional materials were all achieved. The project leaves behind a legacy of trained New Orleans conservators, masons, and other artisans educated in appropriate preservation techniques.

Unfortunately, the most challenging part of the project was, and still is, persuading the Archdiocese of New Orleans to adopt the preservation techniques and materials introduced during the program. Although the project succeeded in finding economical means to repair and reconstruct tombs through a preservation approach, the Archdiocese remains reluctant to discontinue their practice of total tomb replacement using concrete construction. It must be demonstrated to the Archdiocese and the general public that the use of traditional materials for repairing tombs is more historically appropriate and that these materials will outlast modern ones. However, this will only be proven through the monitoring of repairs over time.

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