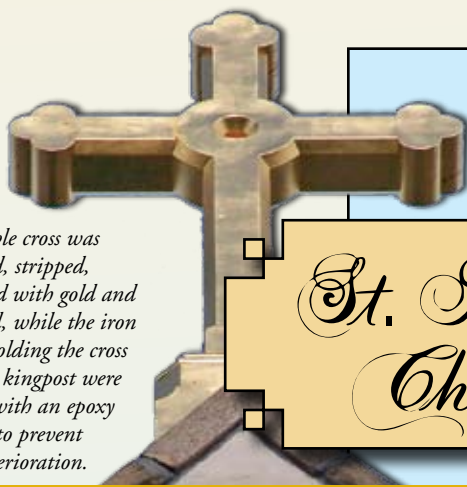


The gable cross was removed, stripped, re-gilded with gold and replaced, while the iron straps holding the cross and the kingpost were coated with an epoxy primer to prevent rust deterioration.



St. Mark's Church

Built in 1888, St. Mark's Church in Catonsville, MD is a treasured place for many in the community. Generations of families have called the church home and have come to appreciate the rustic charm of the structure. With a footprint of 80 feet by 200 feet, the two-story building is constructed of granite masonry – typical of the era in which it was built. The structure is trimmed with wooden doors and windows, as well as wooden soffits, softening the look of the concrete and stone. Throughout the structure's history, side naves and a front foyer were added using brick masonry. Today, coated stucco covers the side naves and an ornamental stucco coating surrounds the entire building, covering the original brick.

Despite its elegance and charm, by the turn of this century, age had taken a toll on this historic treasure. The front exterior façade of St. Mark's Church was in need of repair.

Historic Restoration By Mark K. Howell and Tim Crawford

Treasured Home in Need of Repair

Recognizing the need to preserve this beloved structure, the Archdiocese of Baltimore contacted a well-known restoration contractor who had performed similar repair projects for them in the past, Structural Preservation Systems (SPS). A scope of work was presented to the contractor for replacement of the gable copingstones, random stone pointing, repair and coating of the ornamental limestone stucco and crack repairs.

The first task was a visual inspection, which included walking around the structure at ground level with binoculars to check mortar joints, the condition of the faux limestone covering the masonry facade and the condition of the gable copingstones. The faux limestone is ornamental stucco that covered all brick drip edge, window edge and other various brick details on the building. Its purpose was to create the appearance of ornamental carved stone. The contractor scraped the mortar joints and used sounding techniques to determine their condition. They then used a high-reach man-lift to survey other areas that were not readily visible from the ground. This task included more tapping and sounding, as well as a significant review of the copingstones. Interestingly enough, in contrast to the proposed project scope of work, the contractor determined that the copingstones were in good condition. However,

the inspection identified a need for a great deal of tuck pointing on the masonry (Figure 1). Repairs also were needed for certain portions of the woodwork (Figure 2), and significant patching was necessary for the limestone (Figure 3). The contractor determined that there was much more deterioration in the mortar joints and the ornamental stucco repair work than originally scoped, whereas the blue stone for the coping was not as deteriorated as initially thought. The good news, however, was that the contractor determined that the deterioration was caused by age. No defects in materials were recognized; rather, it was simply an old building that had not been recently maintained.



Figure 1: The inspection identified a need for a great deal of tuck pointing on the masonry.



Figure 2: Repairs were also needed for certain portions of the woodwork.

Recognizing the importance of making the best use of the Archdiocese's limited funds, the contractor re-defined the scope of work based on the items that needed the most attention. The new scope involved repairing deteriorated mortar joints and spalled ornamental stucco. The mortar joints had been in need of maintenance for several years, and a recent, substandard repair attempt was found at the ground level. The prior maintenance attempt was performed using a hard, inappropriate mortar for re-pointing of the stone. The alternate approach presented by the contractor involved matching new mortar material, Jahn M110 Historic Pointing Mortar, in color and strength to the original mortar material. With regard to the ornamental stucco, random areas were spalling off of the granite and brick sub-base which encompasses the brick drip edge, window edge and various detail areas on the building. The contractor recommended the removal of the loose material followed by a process during which the contractor would set mechanical



Figure 3: Significant patching was necessary for the limestone.



Figure 4: Deteriorated and spalling areas were removed and replaced.

anchors in the substrate, apply mortar, carve ornamental details and stain the stucco to blend all existing sections with the new repair areas (Figure 4). This process is not pointing, but rather replacement of a detailed stucco finish. It was partial in that only deteriorated and spalling areas were removed and replaced.

Key Considerations

From the project onset, coordination with the pastor and the congregation was crucial. Most of the work to be completed was located on or around the entrance to the church, a part of the structure that many people shared an attachment to. In fact, the pastor and congregants made their voices heard with regard to the importance of keeping the same look and feel of the entrance, as it symbolized much more than just an entry point. It also was crucial to ensure that the repairs did not result in damage to any of the other areas of the structure.

The safety of the people using the structure on a daily basis was another key consideration. Specific safety concerns and methods for addressing these items were planned with the church pastor, the operations manager and an Archdiocese representative at a preconstruction conference. Scaffolding was erected at the main entrance to the church in a manner that still allowed access to the structure during the work week (Figure 5). Furthermore, there were times when the area had to be cleaned in order to accommodate larger groups of people, such as a funeral. Throughout the project, communication and coordination with the church staff and the congregation was important not only for safety but also for the morale of the church family.

Another factor in the success of the project outlined early in the process was the necessity of carefully picking the materials and tools.



Figure 5: Scaffolding was erected at the main entrance to the church in a manner that still allowed access to the structure during the work week

Because the repair work was on an historic building, it was vital to avoid damaging the surrounding areas of the building. Power tools could only be used in limited circumstances. Primarily hammers, chisels and other manual tools were utilized.

Selecting the Right Materials and Methods

An extraordinary amount of up-front effort was necessary to ensure that the appropriate materials were selected for this project. The contractor went to great lengths to select material that would not only repair the structure and its various components, but also complement the existing materials and provide durability. This involved many meetings with vendors — specifically companies that specialize in historic restoration materials for stone and other historic structures, reviewing samples and performing mock-ups and tests. Materials were selected only after numerous trials and sample reviews. For the coating, SPS evaluated a wide range of products, including acrylics and elastomerics. The final selection was a mineral-based coating that is compatible with the substrate and extremely durable. The material is, for the most part, absorbed into the substrate and stone. While no historic society was involved, the materials were approved by the Church and were chosen following the Secretary of the Interior's Standards for Rehabilitation, which states that the new features will match the existing in "design, color, texture and other visual qualities..." Although the intervention was irreversible, it was weighed against the complete deterioration and spalling of the stucco from water infiltration and subsequent debonding from the substrate, and deemed to be the most appropriate and desirable approach.



Figure 6: The spalled and deteriorated areas of ornamental stucco detail were repaired using a premium grade stone repair mortar.

Special care was taken to find the right mortar color. The original mortar joints had been dyed with India ink and had faded within the first few years after placement. Consequently, it was very difficult to match the new mortar to the color of the existing mortar because different areas had varying amounts of fading. Three other mortar colors were chosen for other repair locations, such as those made to the stucco and the Pennsylvania Bluestone gable capstones.

In addition to the optimal materials, it was important that the repair methods be performed by highly-skilled craftsmen. Therefore, a small, committed crew was selected for the project to ensure quality and consistency.

Repairing the Treasured Home

The actual repairs began with the cleaning of the gable capstone, which was then spot repaired with a bluestone repair mortar (a proprietary material, Jahn M160 — Granite and Bluestone Repair Mortar). The cross-joints were sealed with a lead weather-cap and the copingstones were then sealed with a natural stone treatment (also a proprietary material, Prosoco Sure Klean Weather Seal Natural Stone



Figure 7: Several mortar samples were made in order to find the right color mix for the deteriorated mortar ribbon joints and the random joints needing re-pointing.

Treatment). The spalled and deteriorated areas of ornamental stucco detail were repaired using a premium grade stone repair mortar, Jahn M70 Limestone Repair Mortar (Figure 6). Next, these details were cleaned with an architectural biocide and mild detergent to properly prepare the surface. They were then coated with a mineral stain that was chosen because it allows vapor permeability and maintains the stone-like appearance of the details while preventing further water infiltration and subsequent deterioration.

Several mortar samples were made in order to find the right color mix for the deteriorated mortar ribbon joints and the random joints needing re-pointing (Figure 7). Ribbon joints have a 3-D profile, consisting of an elevated bead of mortar out of plane with the surrounding mortar joint. It appears basically as the reverse of a grapevine joint. After placing samples on the wall and evaluating color after a week of drying, the contractor selected a high-grade mortar material (Jahn M110 Historic Pointing Mortar) made specifically for restoration applications to replace the original lime-sand-cement mortar mix.



Figure 8: New wood was installed in rotted areas, and the wood in all of the locations was coated with an industrial-grade exterior paint.

The contractor then cleaned and re-pointed the granite steps at the front entrance of the church, and restored and coated two sets of concrete steps that were on the either side of the entrance. Additional repairs were made to the cracks in the stucco by removing the cracked areas and filling them with a specialty repair material, Jahn M40 Crack and Void Injection Grout, which matched the color and texture of the stucco. The cracks were in the correct width range (5-15 mm) for use of this material.

Another repair area involved the wooden trim and details, including doors and soffits, which had rotted in various locations. New wood was installed in those areas, and the wood in all of the locations was coated with an industrial-grade exterior paint (Figure 8). The contractor also

replaced the protective glass that covered the stained glass windows. To achieve an aged appearance that matched the existing glass, new pieces were kiln-fired.

The gable cross was removed, stripped, re-gilded with gold and replaced, while the iron straps holding the cross and the kingpost were coated with an epoxy primer to prevent rust deterioration.

Finally, several expansion joints between the main body of the church and the sanctuary were re-caulked using a silicone urethane hybrid sealant that is a high-performance, low modulus elastomeric sealant. The front and side naves of the sanctuary were added on at a later point in history. Therefore, the caulk expansion joint was not original to the structure, though it was pre-existing before the contractor began this project. This high-grade specialty sealant was selected because it provides more durability than normal urethane products along with increased elasticity and elongation — resulting in greater compatibility with any existing urethane sealants.

Project Success

Despite the significant change in scope, the project was completed according to the revised schedule and within the original budget. Many involved in the repairs at St. Mark's Church share in the excitement of a project well done. Not only did the contractor provide the best solution for the owner through the rigorous selection of materials and methods, but also helped ensure value to the owner by better defining a scope of work that would add the most value to the structure. Although not huge in terms of dollars, the restoration of St. Mark's Church was enormous in terms of the impact made on those that call St. Mark's home (Figure 9). ■



Figure 9: The restored St. Mark's Church

Mark K. Howell is a recognized leader in concrete and masonry maintenance repair and has been involved in the restoration of many historic structures during the last decade. Howell is a member of International Concrete Repair Institute, American Society of Testing Materials E6 Committee, Sealant Waterproofing Restoration Institute, and the Exterior Design Institute.

Tim Crawford is a Senior Project Manager with Structural Preservation Systems' Baltimore Branch. He has over 28 years construction & engineering experience in building envelope restoration, concrete repair work, industrial and highway/heavy construction, support of excavation and formwork design, and geotechnical and strengthening projects. Crawford is a member of the American Society of Civil Engineers, the Maryland Association of Engineers, and the International Concrete Repair Institute.