Masonry Repair and Moisture Protection

Russian Orthodox Church of the Holy Trinity Case Study

By Kevin Yuers

Located in the East New York section of Brooklyn, the Russian Orthodox Church of the Holy Trinity was built in 1935. Constructed in a traditional Byzantine style, the masonry structure features large, onion-shaped domes, semi-circular arches, and high arched windows. Along with its notable design, the Church of the Holy Trinity is known for its collection of unique, colorful and expensive wall paintings reflecting various religious scenes and depictions.

The church features two distinctive domes, the smaller of which functions as a three-story bell tower and houses three massive church bells. At the top of the square bell tower, four louvers—one on each of the four sides—enable sound to travel out of the tower.

By the summer of 2003, the 68-year-old church was showing its age. Years of weather, soot, and air pollution had taken their toll. The church's exterior, particularly the front steps and massive front columns, were soiled with years of dirt and buildup.

Much more of a concern than the cosmetic problems, however, was the fact that the mortar in the brick exterior was beginning to erode and water had begun leaking into the bell tower and the southeast chimney. Water had also begun entering the bell tower's louvers during heavy rains.

Water that made its way into the bell tower would pool on the third level's concrete floor and then seep through to the second level and into the choir area of the church below. The plaster on the ceilings and walls of the church was being destroyed by the water damage. But most distressing was the fact that the many historic religious paintings were being damaged and destroyed.

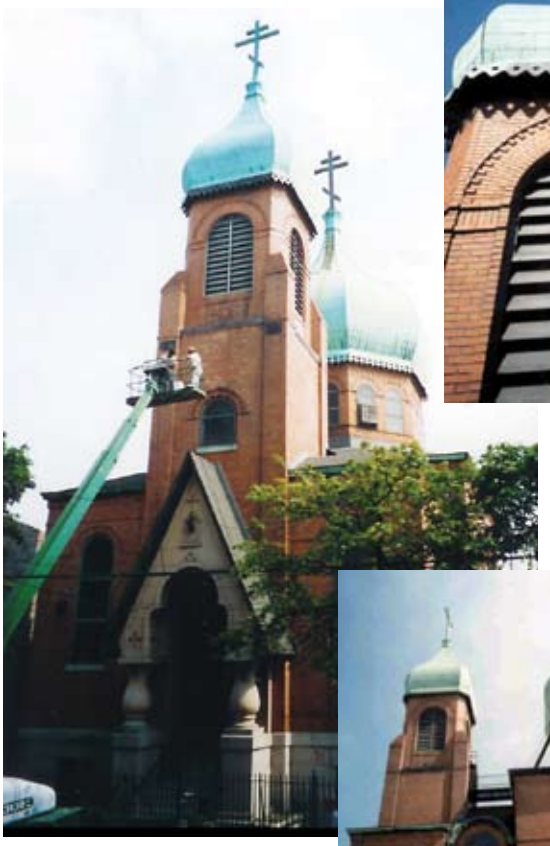
In the summer of 2003, the church decided to repair and upgrade the structure to address the immediate leakage problems and avoid further damage to the structure and its contents. The upgrade involved a general cleaning of the front entryway, cleaning and sealing the exterior of the bell tower and southeast chimney, repairing the brick in those areas, and protecting the chimney and inside of the bell tower against further leakage.

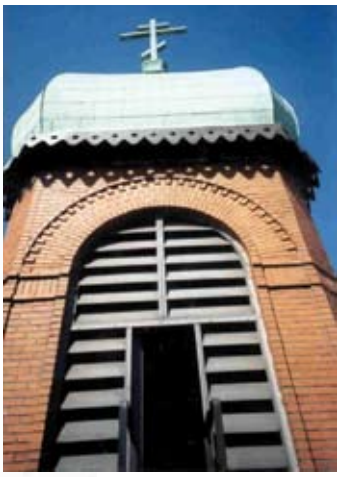
The first step in the process was to remove 68 years of urban grime from the outside of the bell tower and the southeast chimney. A local contractor was hired to power wash all the brick work in these areas using a high-pressure compressor. Then, the original, eroding mortar was removed from around the brick and replaced with new standard brick mortar grout.

Once the brick had been repointed, two coats of a fast-drying water repellent sealer were applied with a sprayer to the exterior vertical surfaces. The church elected to use a sealer containing a blend of silane and siloxane compounds designed specifically for brick, masonry, and concrete, that reacts with silicates below the surface of the brick to form an insoluble, water-repellent barrier. Because the finished application is invisible, the original appearance and breathability of the brick are maintained. The sealer is designed to not fade, yellow, crack, peel, or wear away.

When the exterior work was done, the church's interior leakage problems were addressed. On the third (top) level of the bell tower, where a sloped concrete floor had recently been created to direct any incoming water to an external drain, a local contractor applied a cementitious crystalline waterproofing product to fortify the concrete and stop water from leaking through to the second level of the tower.

The crystalline waterproofing product reacts with concrete to form crystals that migrate into the concrete to block pores, voids, and tiny cracks that would allow water penetration. Over the life of the structure, these crystals will continue to react with incoming water to self-seal small cracks, providing long-lasting protection against leakage. For extra





reassurance, the church opted for a product with a 10-year guarantee.

A similar sloping concrete slab was constructed on the second level of the bell tower to direct water to another external drain. This time, a crystalline concrete waterproofing admixture was incorporated right into the concrete slab, providing another layer of protection against leakage.

For the southeast corner chimney, the contractors created a new concrete cap top, which also incorporated a crystalline concrete waterproofing admixture. The entire chimney was then power washed, repointed, and spray-coated with two layers of water-repellent.

To finish off the repair and renovation project, the church then hired local contractors to clean the structure's front steps and massive columns. While it took some experimentation to find a solution that would remove nearly 70 years of city dirt and grime, eventually a specialized brick and concrete cleaning product was located that enabled the team to clean the columns and stairs and restore them to their original luster.

To minimize inconvenience to the church's congregation, repairs were completed between Monday and Friday over a period of 1-1/2 months. The project was completed in the fall of 2003.

Results of the renovation have been highly successful. Outside, the church entryway looks new. More importantly, though, the repair and waterproofing efforts in the bell tower and southeast corner chimney have proven to be highly effective. Despite a number of heavy soaking rains in the 9 months since the project was complete, no further water infiltration or damage has been detected.

Pleased with the results of the initial repair project, the church is now considering undertaking similar work in the rest of the structure as a preventative measure. Satisfied that the leakage problems have been solved, the church has begun selecting artists to commence repairs on the plaster and religious paintings and depictions inside the church.

Russian Orthodox Church of the Holy Trinity

Owner
Russian Orthodox Church of the Holy Trinity
Brooklyn, New York

Repair Contractor/Supplier
The Crystol Group
Huntington Station, New York

Material Suppliers
Crystol Concrete Products
Goldens Bridge, New York

Kryton International, Inc.
Vancouver, British Columbia, Canada

Kevin Yuers *is the Vice-President and Chief Operating Officer of Kryton International, Inc., Vancouver, BC, Canada, and is responsible for the operation and management of the company's assets around the globe. Yuers serves as a primary technical advisor to the Sales and Marketing Department and is responsible for the content of all technical literature and promotional materials. He works closely with Kryton's Research and Development Department on new product development and product improvement programs. Having been involved with Kryton since the age of 12, Yuers is an accomplished construction tradesman who owned and operated a successful construction and renovations company before permanently joining Kryton in 1994.*