

Christ Church Harbor Apartments/University Specialty Hospital Plaza Deck Repair

By Alaric Hergenroeder

The 30,000 ft² (2787 m²) multi-level plaza located between the Christ Church Harbor Apartments and the University Specialty Hospital is probably one of the most interesting outdoor structures in Baltimore, MD. Three levels—upper, intermediate, and lower—are laid out to draw the eye of anyone on the plaza to a prominently located water fountain. A long planter box running the length of the lower level not only provides a home for foliage, but also a base for light poles; a solution that allows for light but does not hinder pedestrian traffic. The plaza serves as an outdoor gathering area for residents of the adjacent apartments, as well as visitors and patients from the hospital. Portions of the plaza deck sit above an occupied parking structure or on grade. Overall, about 22,000 ft² (2044 m²) of the plaza is located above the parking garage with the remaining 8000 ft² (743 m²) on grade.

Originally constructed approximately 30 years ago, time had taken its toll on the plaza deck. Most of the exposed aggregate concrete topping on all three levels had deteriorated. Due to sections of failed waterproofing, water was migrating through the concrete topping and leaking into the occupied parking garage located below most of the plaza deck. Additionally, water from the fountain had leaked into the garage, causing the owners to shut the fountain down. A failed waterproofing system in the planter box was also allowing water into the garage. Finally, a fourth source of water intrusion was a stairwell with an exposed opening on the lower level of the plaza that led into the parking garage below.

Because the plaza is jointly owned—with the property line running through the plaza—by Christ Lutheran Church and University Specialty Hospital, both owners coordinated their efforts to engage a qualified engineer and repair contractor to repair the plaza deck, fountain, and planter box; prevent future leaks; and update and modernize the overall appearance of the area so that tenants and visitors could once again enjoy the plaza.

Repairing Multiple Levels

Each level was originally designed differently using a variety of materials and construction techniques. The owners wanted to maintain the visual appeal and design of the three levels, while making sure that water was kept out of the garage. As a result, several repair options were explored and used for each level.

Upper Level—Design Change Allows for Better Drainage

All of the upper level (approximately 7000 ft² [650 m²]) was located above the occupied parking structure. The existing deck consisted of a structural slab, 3 ft (0.9 m) concrete masonry unit (CMU) block wall cavities (designed to raise the deck above the intermediate and lower level), steel pan decking, waterproofing, and an exposed aggregate concrete topping. Steps on two sides of the upper level deck lead to either the intermediate or lower levels below.

The repair contractor removed the existing concrete topping and pan decking down to the cavities located above the structural slab. The 3 ft (0.9 m) CMU cavity block walls were repaired as needed and the engineer changed the specification so that the height of each wall was adjusted to allow the new pan deck slab to slope toward the new drains slated for installation—a change that would allow for better drainage. A new composite pan deck slab was installed, concrete was placed, and a hot-applied waterproofing system was applied.

The new design called for pavers to be placed on pedestals that would raise the pavers and allow for better drainage. Additionally, the pedestals worked as shims to adjust the height of the pavers to keep a level surface on the top of the plaza while still allowing the pan deck slab below to slope toward the new drains. The existing steps were left in place with repairs completed on an as-needed basis. A urethane protective coating was applied to all steps. New light poles were placed and an

access ramp was installed to give access from the intermediate level below.

Intermediate Level—Visually Tying Concrete and Pavers

Part of the intermediate level rested above the parking garage, with the remaining level on grade. The deck above the garage consisted of a structural slab, waterproofing, and 3 in. (76 mm) of exposed aggregate concrete, while the portion on grade was comprised entirely of exposed aggregate concrete. In total, the intermediate level spanned approximately 9000 ft² (836 m²) with 7000 ft² (650 m²) above the parking garage and 2000 ft² (185 m²) on grade.

Similar to the upper level, the original repair specification called for pavers on pedestals over concrete or on grade; however, this plan raised the level of the deck 2 in. (51 mm) above the entrance grade of the adjacent apartment building. Another option was to place pavers on 1 in. (25 mm) of sand; however, this alternative would not have drained well.

Based on a recommendation from the repair contractor, the specification was changed and a concrete topping slab with a broom finish was installed. Control joints to prevent cracking were tooled in, based on a pattern recommended by an architect working with one of the owners. The pattern blended well with the new paver designs on the other levels as well as the existing steps and concrete perimeter bands.

Because the intermediate level was adjacent to the apartment building, a new expansion joint was installed between the structural slab and the building, as well as tied into the existing waterproofing system.

The remaining item for repair on this level was the long planter box. This feature acted as a transition between the intermediate and lower level. When the repair contractor excavated the existing soil in the planter box to expose the concrete substrate, it was discovered that the existing concrete light pole pedestal supports were not tied into the planter structure and were not constructed in a way to sufficiently support the light poles. The engineer designed new light pole bases that were tied into the planter using reinforcing steel and dowels. Concrete in the planter box was repaired and waterproofed prior to adding fill dirt and new landscaping.

Lower Level—Bringing the Fountain Back to Life

Like the intermediate level, this part of the plaza was partially above the garage with the rest on grade. Above the garage section (approximately 9000 ft² [836 m²]) was an elevated structural slab, topped with waterproofing, gravel fill, and an exposed aggregate concrete topping. Due to cracking in the exposed aggregate topping, water would migrate downward through the gravel fill



Upper level after demolition of existing exposed aggregate concrete topping and steel pan deck. Notice the 3 ft (0.9 m) CMU block wall cavities that were originally designed to raise the upper level above the other two levels. These block walls were repaired and heights were adjusted to allow for the new composite pan deck slab to slope to new drains slated for installation



New composite pan deck on upper level prior to concrete placement, waterproofing, and paver placement

and pool on the waterproofing. As the waterproofing system failed, the water would leak into the occupied garage below. The plan called for removing the exposed aggregate concrete topping, gravel fill material, and waterproofing down to the



Lower level surrounding the fountain after demolition of existing exposed aggregate topping and removal of the existing gravel



Lower level—placement of lightweight concrete fill



Lower level after new hot-applied waterproofing system was installed

existing structural slab and replacement with a lightweight concrete fill placed directly over the structural slab, which was sloped outward from the center of the plaza toward the perimeter trench drains. A new hot-applied waterproofing system was installed over the sloped lightweight concrete fill with new pavers on pedestals installed to the final grade. Like the upper level, this system would provide for better drainage and be more aesthetically pleasing than the previous exposed aggregate concrete topping.

For the remaining on-grade section of the lower level (approximately 5000 ft² [465 m²]), the repair contractor removed the existing exposed aggregate concrete down to subgrade and excavated the existing sub-base. New compacted gravel fill was placed and sloped to several newly installed drains. The pavers on this section rested on a 1 in. (25 mm) setting bed of sand that was placed on the compacted fill. Another interesting feature of the new plaza was the installation of a labyrinth, or maze, at the end of the lower level. Installed using a 35 x 35 ft (10.7 x 10.7 m) special paver kit, this functional labyrinth added to the visual appeal of the plaza, as well as provided an activity for visitors.

Probably the most important aesthetic piece to this project was the fountain. Because it leaked, the fountain was not operational at the time of the repair. During the repair, the existing tile, topping slab, and waterproofing were removed and a new concrete and waterproofing system specifically designed for water immersion was installed. New tile was laid in the fountain, along with anti-vortex drains, new scuppers, water level and overflow sensors, and new lighting. The existing concrete perimeter of the fountain was repaired as needed and a urethane coating was applied and tied into the waterproofing systems for the fountain and the lower level deck.

The last water intrusion issue to be tackled was the uncovered stairwell leading from the lower level to the parking garage. Original design specifications called for a glass enclosure; however, the architect working with one of the owners saw the bus stop enclosures used by the City of Baltimore and asked the repair contractor to research the manufacturer and determine if this enclosure was suitable to cover the exposed stairwell opening. After contacting the manufacturer and consulting with the engineer, it was determined to be a suitable alternative. Because it also blended in better with the design of the rest of the plaza, as well as provided sufficient cover for the stairwell opening, this alternate was chosen.

Providing a Safe, Secure Construction Area

Because both adjacent buildings and the parking garage would remain occupied during the entire project, it was important for the repair contractor

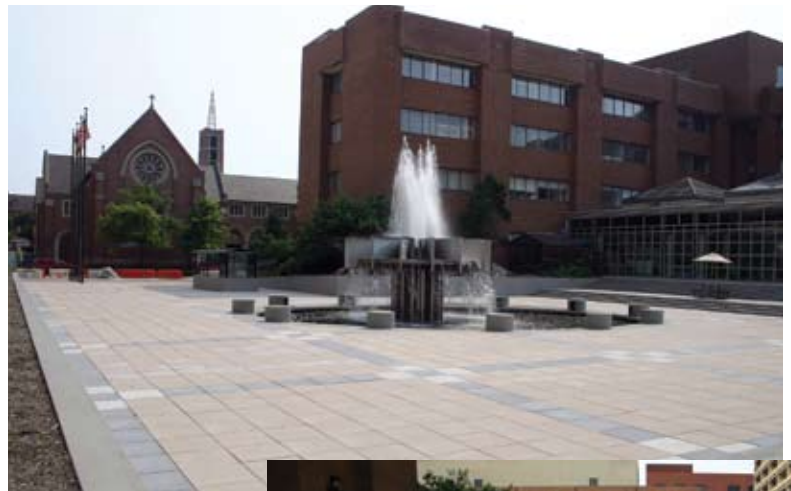
to secure well-marked construction areas, provide emergency exits and entry ways to each adjacent building, and construct ramps to provide access between levels. The safety of tenants and visitors was a high priority, as well as preserving property. For example, special netting was installed in the parking garage to catch any construction debris. Additionally, the project and specific work area was divided into phases so that portions of the plaza were still available for use by tenants and visitors.

A Vibrant Plaza

Both owners were pleased with the new plaza that will serve them well in the coming years. The project demonstrated the ability of the two owners, the engineer, and the repair contractor to collaborate during the design phase as well as the repair phase so that adjustments could be made to improve plans for items such as demolition, waterproofing, and drainage systems. Most importantly, the successful teamwork created a plaza with striking visual appeal and a centerpiece water fountain that will provide years of enjoyment to both tenants and visitors.



Alaric Hergenroeder is the Commercial Division Manager for Structural Preservation Systems, LLC, Elkridge, MD. He has more than 12 years of experience in the concrete repair industry and received his BS in civil engineering from the University of Maryland.



Completed lower level with operational fountain



Finished lower level with labyrinth and stairwell enclosure

Christ Church Harbor Apartments/University Specialty Hospital Plaza Deck

Owners

Christ Lutheran Church
University Specialty Hospital
Baltimore, MD

Project Engineer

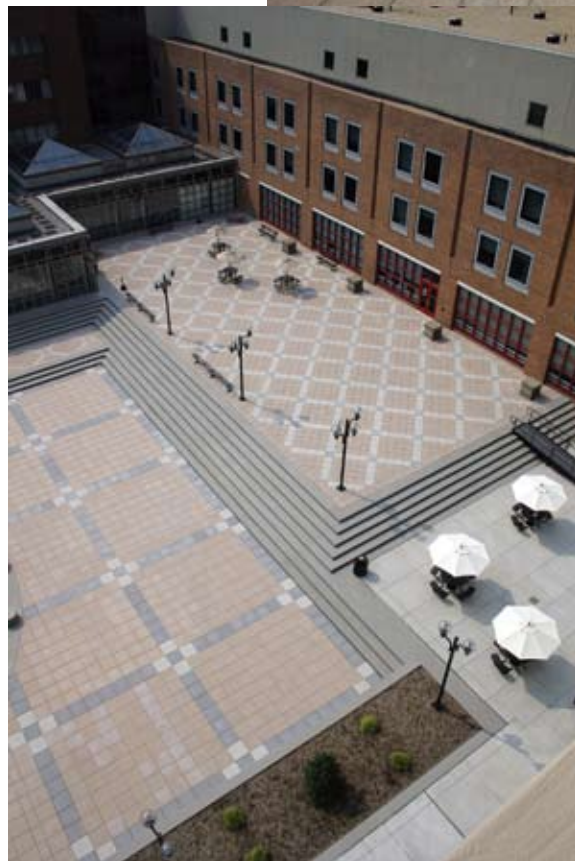
Gardner James Engineering
Columbia, MD

Repair Contractor

Structural Preservation Systems, LLC
Elkridge, MD

Material Supplier

Hanover Pavers
Hanover, PA



Complete plaza showing all three levels—notice the integration of differing paver designs of the upper and lower levels on the left and concrete slab of the intermediate level on the right