

Basement Repair and Moisture Protection

Edited by Kelly M. Page

A few blocks away from Seattle's world-famous Pioneer Square, situated in the triangle formed by Fifth Avenue, Yesler Way, and Terrace Street, the Yesler Building has played a key role in the city's history for nearly 100 years.

The five-story, flat-iron-shaped building is the namesake of Henry L. Yesler (1810-1892), who founded Seattle's first water system, established its first community hall and theater, and served as the city's mayor in 1874 and again in 1885.

Originally named the Seattle Public Safety Building, the Renaissance Revival-style Yesler Building was constructed in 1907, when it housed the original Seattle City Hall and Jail. Today, the building is home to the King County municipal offices and courts. It's located within the Pioneer Square National Historic District and listed in the National Register of Historic Places.

Severe Deterioration

In 2003, the Yesler Building was beginning to show its age, particularly in the two-level basement. The structure's original, cast-in-place concrete walls were highly porous, allowing moisture to leak through. Over time, with repeated freezing and thawing, the concrete had begun to deteriorate and the reinforcing steel had become seriously corroded. The basement walls had large holes in them and leaked continuously. As the concrete continued to deteriorate, greater amounts of moisture entered the building, creating even more damage.

Conditions in the Yesler building had become so bad that the basement had been blocked off and remained virtually unused for a period of time. The musty, telltale smell of mold permeated the basement and the building's wiring had begun shorting out due to water leakage into the electrical system. King County staff realized they would need to take immediate action to stop the leakage, preserve and protect the Yesler Building, and return its basement to a useable condition.

Originally, the project team attempted to repair the basement walls and joints by injecting liquid bentonite into the holes, where it would spread out and block the flow of water. When they began pumping bentonite into the first hole, however, they realized the hole was much larger than had been previously thought. After

using all the bentonite that had been allocated for the entire project in just the first hole, the team realized they would need to find another solution to repair, protect, and fortify the Yesler Building.

The county staff consulted with a waterproofing expert, who recommended using an advanced crystalline concrete waterproofing system instead of conventional waterproofing barriers, such as bentonite.



Crystalline Concrete Waterproofing System

When applied to existing concrete or added to the concrete mixture, crystalline technology reacts chemically within the concrete mass to form billions of needle-shaped crystals. These crystals grow throughout the concrete, blocking the pores, voids



and microcracks between concrete particles and permanently blocking the movement of water and waterborne contaminants, even against significant hydrostatic pressure. Porous concrete is permanently transformed into a powerful, waterproof barrier.

If subsequent cracks form in the concrete, incoming moisture will trigger the process to begin again. Additional crystals will grow, self-sealing the cracks, guarding the structure against moisture penetration, and providing long-lasting protection against water damage.

Crystalline technology can be applied to the positive or negative side of the structure, making it ideal for treating areas that are difficult to reach, such as blind walls, basements, and other below-grade structures. And since the majority of the crystalline chemicals migrate into concrete within the first 28 days, its concrete waterproofing properties are not affected even if the application is later chipped off.

Repairs Begin with Test

Naturally, having not used crystalline concrete waterproofing before, the King County team wanted to see the system demonstrated before undertaking this large-scale repair project. A small section in a corner of the basement was treated with the crystalline crack repair system. When this test proved successful, the test area was expanded and monitored. Once the county was comfortable that the crystalline concrete crack repair and waterproofing system performed as promised, they authorized its use on the most damaged and deteriorated areas of the Yesler Building basement.

The larger holes in the basement walls—some big enough for a person to fit through—were cleaned out, pre-soaked and filled with a fast-setting crystalline waterproof grout specially designed to repair concrete cracks, holes, and joints. With strong bonding ability and very high compressive and flexural strength, the grout is able to withstand significant hydrostatic pressure.

Once the large cracks and holes were filled, the entire wall surface was cleaned to remove paints, sealers, oil, grease, and other contaminants, and a two-slurry crystalline crack repair system was applied to the entire wall surface. A leaking horizontal cold joint and a number of major holes and cracks were repaired using this procedure.

One section of an inside wall was in such a deteriorated state, however, that once the holes had been grouted and the two-slurry system had been applied, a reinforcing steel grid was built and shotcrete, infused with a crystalline concrete waterproofing admixture, was applied to create a new, 4 in. (100 mm) deep wall.

Naturally, when cracks and problem areas in



concrete are sealed, water begins to search for other weak sites in which to seep through. Once the first round of repairs had been completed in the Yesler Building basement, a handful of new leaks and weeping areas were identified. As new cracks and leaks were identified, they were sealed and repaired using the crystalline grout and two-slurry crack repair system. Finally, no more weeping could be detected.

Repairs to the Yesler Building basement were completed in the late summer of 2003 and the King County team was pleased with the results. For the first time in years, the basement was dry and useable. More importantly, however, the deterioration had been halted, and this historic building was protected against future water damage.

This protection was put through an unexpected “flood test” shortly after the basement repairs were finished. An 18 in. (460 mm) water line broke next to the Yesler Building, flooding the street and tearing out a recently installed sidewalk. While some water did enter the building through the ventilation system, the recently repaired area stood watertight. A few minor weeping areas were detected outside the site of the original repair area, and these were quickly repaired using the crystalline concrete crack repair and waterproofing system.

Today, more than 18 months after the repairs were completed, the Yesler Building basement remains dry and watertight.

Yesler Building

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Waterproofing Consultant

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Repair Contractor

Cutter, Inc.
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Material Suppliers

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