

Historic Category

University of St. Mary of the Lake Mall Area Repairs

Mundelein, Illinois

Submitted by Zera Construction Company, Inc.



Restoration project at University of St. Mary of the Lake from above

The University of St. Mary of the Lake (USML), also called Mundelein Seminary, is operated by the Roman Catholic Archdiocese of Chicago. Initially chartered in 1844, USML is the principal seminary and school of theology for the formation of priests in the Midwest and is also recognized as the first institution of higher education in the Chicago area. Its distinctive neo-Georgian architecture is laid out in a symmetrical manner surrounding the main chapel.

Located in the far north Chicago suburbs, USML occupies more than 600 acres (2.43 km²), has several lakes, and features a central mall area that overlooks Saint Mary's Lake. The mall area was designed and built in the 1920s by Joseph W. McCarthy, an apprentice of legendary Chicago planner and architect Daniel Burnham. In 1929, the seminary received a second charter, this time to grant international academic degrees directly from Pope Pius XI, becoming the first American institution to be honored as a pontifical theological faculty under the Apostolic Constitution *Deus Scientiarum Dominus*.

THE PROBLEM

USML's lakefront mall includes a boathouse, a viaduct, two lake piers, a belvedere, the tomb of First Lieutenant Edward Hines (son of lumber magnate Edward Hines Sr., who died serving in World War I), and concrete retaining walls that extend along the lake and adjacent to the mall. With

over 80 years of service, extensive deterioration was identified throughout the concrete and masonry structures. The owner engaged a structural engineering firm to investigate the various structures within the mall area to gain an understanding of the extent of deterioration and to develop contract documents for its repair.

THE SOLUTION

Beginning in March 2008, the structural engineering firm performed a detailed investigation of the mall area that included documentation of existing conditions, destructive openings, and materials evaluation and testing. After the repair documents were finalized and negotiations were settled, the general contractor pulled in the concrete and masonry restoration contractors.

Because of its size, complexity, and time line, the project team worked very closely throughout the project, particularly during its most difficult aspects: pouring concrete "upside down" within the viaduct, restoring all original university decorative elements with modern material and technology, using environmentally friendly construction practices, and working over water. At the conclusion of the project, the team successfully restored the property to its former glory.

The main restoration work consisted of:

- Replacing the interior walls and roof of the arched viaduct ceiling;
- Adding waterproofing and topping slabs for pedestrian walkways;
- Rehabilitating the walking surface of the piers;
- Renovating the boathouse and associated walking surfaces; and
- Rebuilding the severely distressed walls and balustrades and cleaning all limestone.

POURING CONCRETE UPSIDE DOWN IN WINTER

The majority of cost savings came from rehabilitating 2400 ft² (223 m²) of concrete on the underside of the arched viaduct using several methods to stay as green as possible. Work began

by removing only portions of the arch to maintain the existing viaduct shape. New reinforcing steel was then hung from the existing arched structure and all existing exposed reinforcing steel was properly prepared. After experimenting with a number of mockups to test different methods of pouring the curved ceiling structure of the viaduct, the project team began a multipour, checkerboard-like sequence that used (and reused) custom formwork. A 4 in. (100 mm) thick concrete slab was then cast over the arched viaduct ceiling “upside down” through a pair of light wells. Once poured, vibrators were used to ensure proper consolidation of concrete throughout the arch. This method of restoration provided a higher quality finish and a more durable structural system than alternative methods, such as using shotcrete or hand-patching, and was far less expensive than replacing the entire viaduct. During the project’s winter months, freezing temperatures made it difficult to pour concrete, so a heated enclosure was erected for work to continue without delay.

PRESERVING A HISTORIC ARCHITECTURAL GEM

During the design phase of the project, the owner requested that many of the historic structural and architectural elements of the mall area be restored while harnessing the benefits of new materials and technology. For example, a surface waterproofing membrane covered much of the historic clay tile paving on the promenade deck due to decades of leakage. The structural engineering firm designed a new waterproofing and drainage system and specified a colored, stamped concrete-topping slab that closely resembled the historic clay tiles.

When it came to replacing the ornamental clay tile used for the walking surface on the piers and viaduct, the project team found a way to match the original design by working with a local vendor to develop a custom stamping pattern and color. Ultimately, the entire promenade structural slab required significant structural repairs and a new waterproofing system was installed below the concrete-topping slab to protect this restored structure. Not only did the result look great, but the new monolithic surface also withstands the elements better, wears less, and offers more long-term protection to the structure.

As part of the restoration, severely deteriorated asphalt topping was removed from the two piers leading out over the water. The asphalt topping was removed along with the gravel fill, which was stored for reuse, and the concrete pier structure was restored with the installation of a new buried waterproofing system. The reused gravel fill was added back and supplemented with new appropriated graded fill and a new concrete-topping slab was



Restored boathouse at University of St. Mary of the Lake



Boathouse during restoration

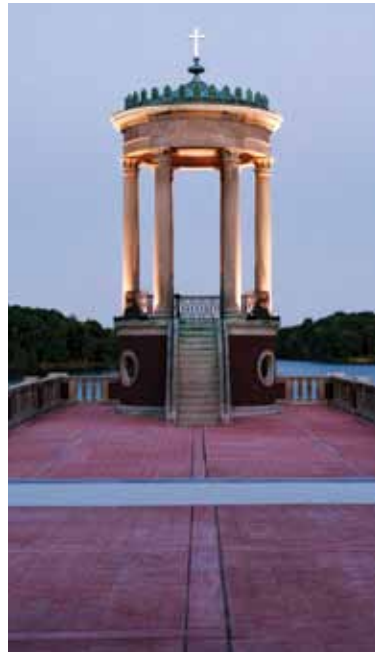


Viaduct interior during restoration

installed throughout the piers and adjacent approach areas. In addition, a pedestrian traffic-bearing waterproofing membrane system was applied to the concrete stairs and the concrete structure below the pavilions at the end of each pier. To complete the piers, historically accurate pier bollards and chains were recreated from the original design drawings.



Belvedere during restoration



Belvedere at dusk after restoration with color-stamping of concrete

In 1926, Cardinal George Mundelein walked up the steps of the belvedere perched atop the boathouse overlooking the lake and spoke to the International Eucharistic Congress, which consisted of a large group of pilgrims from all over the world. This historic belvedere remains the focal point for the mall area, and the rehabilitation work included restoration of the concrete, cast-iron railing, masonry, copper roof, and the historic clay tile walking surface using salvaged clay tiles.

TURNING NEGATIVES INTO POSITIVES

In addition to the challenging restoration work throughout the mall area, another challenge was the lake itself. Working over water—specifically for the concrete restoration contractor—was a first for the company. Before the project began, a loss control consultant was brought in who identified numerous safety standards that were adhered to, including the installation of handrails, the use of rowboats at the end of each pier, water rescue training for each foreman, and the use of ring buoys and life vests. In addition, the superintendent held “toolbox talks” every week for all concrete restoration workers on the project, each time touching on a new safety topic. As a result, there was no lost injury time.

Additionally, as structural elements were uncovered during restoration, the project team discovered that a significant increase in repair quantities was needed due to the lack of existing waterproofing of many structural elements. While this normally would have significantly increased the overall project cost, the team collaborated to develop efficient repair techniques to not only reduce the

overall cost of the additional work needed, but also to save the owner \$90,000 overall. This effort allowed the owner to get additional work completed, including renovation on the center mall that included structural restoration and waterproofing.

IT'S EASY BEING GREEN

For the project, the team used numerous environmentally friendly measures, including salvaging the severely deteriorated viaduct structure instead of full demolition, reusing all formwork (multiple times) to minimize waste, reusing nearly all gravel fill, and recycling all distressed concrete locally—a standard practice for the project team.

As for quality control, all concrete materials used on this project were tested by independent laboratories to ensure that they met the appropriate design strengths and conformed to project specifications.

JUST LIKE NEW

Today, the stunning and intricate neo-Georgian architecture of the property closely resembles the original structure that was designed over 80 years ago. The project team used innovative and green restoration practices and the introduction of newer technologies, providing a more durable structure.

The restoration work began in July 2008 and was completed in September 2009. The project was completed on schedule, even though many unforeseen repairs were needed. The successful completion of this project was due to a close relationship between the structural engineering firm, the concrete restoration contractor, the general contractor, the masonry contractor, and the property owner.

University of St. Mary of the Lake Mall Area

OWNER

**University of St. Mary of the Lake/
Mundelein Seminary**
Mundelein, Illinois

PROJECT ENGINEER/DESIGNER
Wiss, Janney, Elstner Associates, Inc.
Northbrook, Illinois

REPAIR CONTRACTOR
Zera Construction Company, Inc.
Niles, Illinois

MATERIAL SUPPLIERS/MANUFACTURERS
Glenrock Company
Elmhurst, Illinois
American Hydrotech, Inc.
Chicago, Illinois