ST. LOUIS CASINO STAYS AFLOAT WITH UNIQUE POST-TENSIONING APPLICATION

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Pinnacle Entertainment's $430 million Laclede's Landing Hotel & Casino Complex in downtown St. Louis is the largest privately-financed development in the city's history. State and local officials are citing the project as a major component of St. Louis' urban renewal efforts -one that will forever reshape the city's famed skyline while bringing thousands of jobs and millions in annual revenues to the area.

The four-crane project features a 75,000 sq ft "floating" casino, a new 19-story five-star hotel, a renovated Embassy Suites hotel, a business center, spa, restaurants, parking structures and a 12,000 sq ft convention center, all shoehorned into a 20-acre tract of land near the west bank of the Mississippi River. The Pinnacle building team included general contractor McCarthy Building Companies, St. Louis, architects Marnell Corrao Associates, Las Vegas and Hellmuth, Obata & Kassabaum, St. Louis, and structural engineer M.A. Engineering Inc., Las Vegas. AMSYSCO supplied the 1.7 million feet of post-tensioning tendons and worked closely with the contractor for the successful

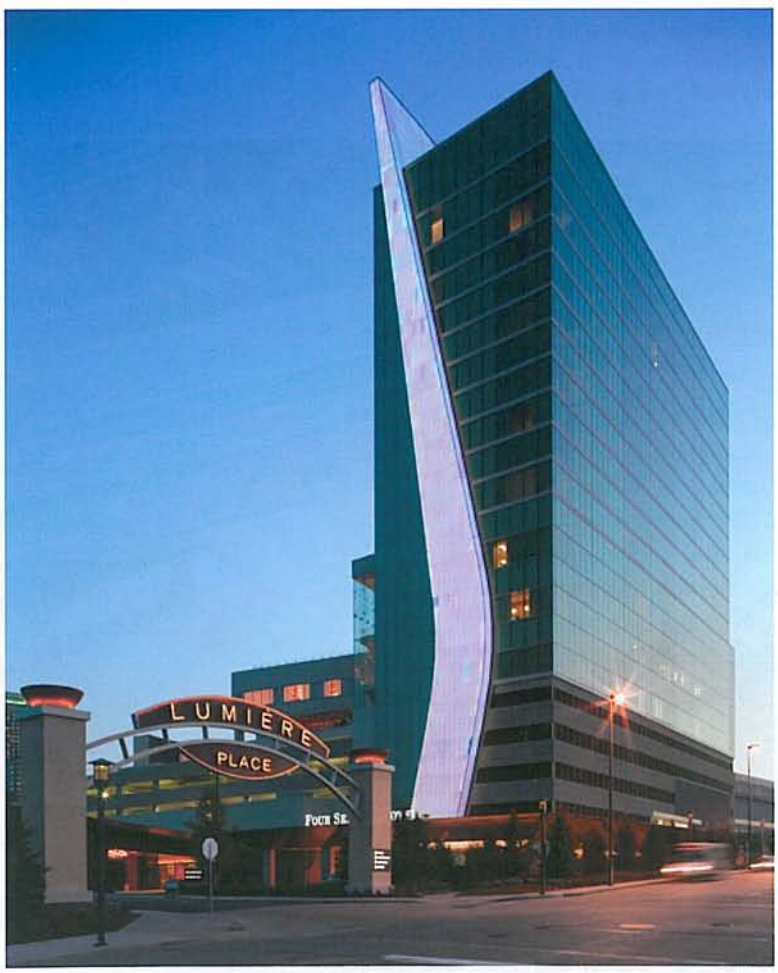

Fig. 1 - Lumiere Place the Floating Casino
Photo Courtesy: Michael Kloster, McCarthy Building Companies, Inc.

execution of the project. The architecture incorporates generous open spaces and contemporary ambience in a design theme inspired by Frank Lloyd Wright.

The Missouri Gaming Commission requires all gambling establishments to float in the waters of either the Mississippi or the Missouri River and be located within 1,000 feet of that river, the developer Pinnacle Entertainment employed an elaborate "Boat in a Moat" approach for the casino. The casino structure is essentially a large concrete barge, similar to many other contemporary riverfront gaming structures, but differs from most due to its inland location (1,000 feet west of the Mississippi). To satisfy regulations, the casino was designed to float in-side a 10-ft deep, 409 ft x 184 ft concrete basin filled with purified water pumped in from the river. The basin contains 214 watertight concrete chambers that, when filled above the chambers' perimeter wall, will float the buoyant concrete casino inside the basin with a high degree of hydraulic stability. Project officials state that there is no perceptible movement of the casino and the "seams" between land and water are indecipherable.

It was critical to reduce the weight of the structure in order for it to float. With the use of post-tensioning the designers were able to reduce the structure weight by almost 20%. In order to keep the moat watertight the 409 ft x 184 ft basin slab was poured in a single pour. The slab utilized unique combination of stressing. One group of 410-ft tendons was stressed on both ends. Two additional groups of 300-ft and 350-ft tendons were stressed one-way at opposite ends of the slab. These tendons had staggered dead ends. This process was done to reduce the compressive forces at the slab edge. Allowance was made for high friction losses due to stressing one-way over a very long length by adding extra tendons. No construction joints were utilized. The project is one of a kind and exemplifies the advantages of post-tensioning in innovative applications.

KEY PLAYERS

Owner: Pinnacle Entertainment

Architect: Marnell Carrao Associates, Las Vegas

Structural Engineer: M.A. Engineers Inc, Las Vegas

Contractor: McCarthy Building Co., St. Louis

Post-Tensioning Supplier: AMSYSCO, Inc.

Fig. 2 – Construction of the moat for Lumiere Place Casino

concrete

ST. LOUIS CASINO STAYS AFLOAT WITH POST-TENSIONED CONCRETE

Currently under way in downtown St. Louis, Pinnacle Entertainment's $430-million Laclede's Landing Hotel & Casino project is the largest privately financed development in the city's history. State and local officials are citing the project as a major component of St. Louis's urban renewal efforts—one that will reshape the city's skyline while bringing thousands of jobs and millions in annual revenues to the area.

The four-crane project features a 75,000-sq-ft "floating" casino, a new 19-story five-star hotel, a renovated Embassy Suites hotel, business center, spa, restaurants, parking structures and a 12,000-sq-ft convention center, all shoe-horned into a 7.5-acre tract of land near the west bank of the Mississippi River. The Pinnacle building team includes general contractor McCarthy Building Cos., St. Louis, architects Marnell Corrao Associates, Las Vegas and Hellmuth, Obata & Kassabaum, St. Louis, and structural engineer M.A. Engineering Inc., Las Vegas. The architecture incorporates generous open spaces and contemporary ambience in a design theme inspired by Frank Lloyd Wright.

Because the Missouri Gaming Commission dictates that all gambling establishments float in the waters of either the Mississippi or Missouri River and be located within 1,000 ft of that river, the developer is employing an elaborate "Boat in a Moat" engineering approach for the casino's foundation. The casino structure is essentially a concrete barge, similar to many other contemporary riverfront gaming structures, but differs from most due to its inland location 1,000 ft west of the Mississippi. To satisfy regulations, the casino will float inside a 10-ft-deep, 409 ft x 184 ft concrete basin filled with purified water pumped in from the river. Project officials state that there will be no perceptible movement of the casino and the "seams" between land and water will be indecipherable.

Early in the planning phases, McCarthy selected Chicago-based AMSYSCO Inc. for a negotiated contract to supply 1.7 million ft of post-tensioning tendons for the basin, casino barge, parking garage and the new hotel, along with all stressing equipment, shop drawings and technical support throughout the project. The basin's 8-in.-thick bottom slab is post-tensioned in the longitudinal direction, using unbonded single-strand tendons with lengths ranging from 332 ft to 412 ft. These unusually long tendons were placed mid-depth in the slab and stressed at both ends without intermediate anchorages to achieve the required elongation and compressive force. For the casino barge's bottom slab, AMSYSCO provided dead-end tendons placed in a staggered arrangement that reduced the stress concentration at the slab edges while providing an even force distribution. These tendons averaged 337 ft in length and were stressed from one end only in a two-stage sequence.

According to McCarthy's Project Director Jon Jacobsmeyer, P.E., AMSYSCO's longstanding track record for reliability and responsiveness made them the clear choice among potential post-tensioning suppliers. "When you're building a large, fast-track project like this one, your selection of critical path suppliers can have a big impact on your bottom line," he said. "We've worked with AMSYSCO for 23 years, and their production capacity, delivery record and quick response to changes during construction made them our hands-down choice for a negotiated contract." ■