

PDCA 2004 PROJECT OF THE YEAR
(Over \$1 Million)



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Bienvenue and Welcome to Louisiana's New L'Auberge du Lac Hotel and Casino!

By Lisa Kopochinski, Piledriver Editor

Louisiana (the most intriguing state in the Union, in this author's opinion) is the home of the exciting new L'Auberge du Lac Hotel and Casino.

The casino, which opens in May, is located in Lake Charles, Louisiana, a locale with a rich and fabled history. This premier facility will be ideal for the business traveler or the customer who is looking for the ultimate in hospitality and dining experiences, plus non-stop gaming action.

The property, owned by Pinnacle Entertainment, Inc., sits on 227 acres and contains approximately 770,000 square feet.

Construction on the project began in September 2003. The architecture was inspired by that found in the Texas Hill Country and will provide a unique addition to the gaming market in southern Louisiana. Natural materials, including stone and wood, will set the overall relaxing and welcoming mood of the facility.

Set amidst lush landscaping of the resort's golf course, guests will enter the property through a wood-adorned ceiling vestibule, which leads to a fireplace lobby lounge. This space, reaching up three stories to a beamed ceiling, will be layered with a ring of balconies and lit by skylights providing natural light. The main lobby will feature massive stone fireplaces, defining a lobby lounge on one side and a coffee bar on the other. Warm woods, natural stone and rich fabrics add color and texture to the space (see sidebar).

Driven-pile considerations

L'Auberge due Lac Hotel and Casino was selected as the PDCA Project of the Year (over \$1 million) for a number of reasons.

This project was a major \$325 million development at a site with unusually poor foundation conditions. Soil conditions

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Installation of steel sheet pile to construct casino vessel basin.


included a shallow stratum of very soft organic clay which had been overlain by a loose, saturated hydraulic fill of silt and sand. Ground subsidence and long-term settlements were a major issue for all of the hotel and other structures, as well as for construction of a boat basin for the floating casino.

PDCA member Boh Bros. Construction Co., LLC of New Orleans, was the piledriver on this fascinating project.

“The project schedule was extremely tight,” explains Fred Fuchs, project manager at Boh Bros. “The general contractor, Manhattan Construction Co., had 20 months to complete the project. We worked an expedited schedule from the start with as many as three rigs to install pre-stressed concrete piles rigs and one sheet-pile installation rig.”

Many alternatives were seriously considered for this project, including auger cast piles, drilled shafts and ground treatment technologies of a variety of types. Ultimately, more than 35 miles of driven prestressed concrete piles were utilized because of the economy and reliability of this foundation alternate. Steel sheet piling was used for the boat basin and rock structures.

In order to achieve the optimum economy and reliability with the driven pile solution, an extensive test pile program was conducted. Wherever possible, short piles were driven to achieve bearing in a shallow but relatively thin sand stratum. These piles achieved little or no setup after installation. The heaviest loads on the site were founded on deeper piles penetrating to depths of about 80 feet into stiff over consolidated clay. These piles achieved

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Installation of prestressed concrete bearing pile.

The Players

Owner: Pinnacle Entertainment, Lake Charles, LA
Piledriving Contractor: Boh Bros. Construction Co., LLC, New Orleans, LA
General Contractor: Manhattan Construction, Lake Charles, LA
Architect: Bergman, Walls & Associates, Las Vegas, NV
Structural Engineer: M.A. Engineering, Las Vegas, NV
Geotechnical Engineer: CBK & Associates, Lake Charles, LA

enormous setup, which was utilized for design and construction to achieve maximum economy. The pile testing program was used to help establish which areas and structures could utilize the shorter and more economical piles. The most heavily loaded structure on the site was the high-rise hotel, which was founded on a pile-supported raft foundation.

“The working relationship between the owner, design engineers, the general contractor, and our personnel was probably the most enjoyable part of the project,” says Fuchs. “On-site project manager, Kermit Miller, did a spectacular job of coordinating our crews with the requirements of meeting the critical milestones of pile installation for the various structures.”

Design considerations

The major design considerations for bearing piles included the settlement consideration of heavily loaded structures, the additional settlement possible from down drag of the fill overlying the soft organic soils and the installation sequence with the sheet piling in the nearby boat basin. Settlements of the 26-story hotel were a major consideration because of the intense heavy load under this structure. The solution was a pile-supported mat which provided a very stiff and uniform platform for support. The lateral loads on the boat basin sheet piling were quite large for the height of the wall and the bottom of the basin was so soft that bottom stability precluded dewatering the basin without a major subsurface dewatering project. Ground treatment was seriously considered in this area, but the organic soils were difficult to treat economically. Ultimately, the use of cantilever steel sheet piling proved to be the most reliable solution which could be installed in a timely manner with a minimum of disruption to nearby ongoing construction activity.

Obstacles

Fuchs says there were definitely a few problems to be overcome during construction. The first was the thinning of the shallow bearing sand stratum in the area near the river and the fact that short bearing piles in this area did not achieve the required capacity and had little or no setup. Thanks to the early and ongoing testing program, these areas were identified and appropriate modifications made to the installation plan so that the short economical piles could be used where possible, but longer piles used where needed.

Another potential problem was the tendency of some piles to drift off location during installation and a few piles were even broken. Fortunately, due to close inspection on the jobsite by the project geotechnical engineering team, the few damaged

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Project Highlights

- Single level riverboat casino with non-stop gaming
- Tom Fazio-designed championship golf course
- Pool and lazy river with a sandy beach and private pool-side cabana courtyard
- First-class spa and fully-equipped exercise facility
- A variety of innovative dining options, including:
 - an upscale steakhouse – seating for 150
 - a 400-seat buffet
 - a 24-hour casual dining experience – seats 150
 - a noodle bar featuring Asian-fusion cuisine – seats 36
- a Cajun barbeque brewpub/entertainment lounge – seats 225
- an ice cream parlor
- Coffee bar
- VIP check-in
- Bus center
- Meeting and Events Center
- Performance Venue
- Large Event Lawn
- Arcade
- Retail Shops

piles were quickly identified and additional piles added before a small problem became a large one.

“There were many advantages of a driven-pile foundation on this project since the underlying soils were erratic,” explains Fuchs. “Geotechnical Consultant Ron Jones of CBK was onsite nearly everyday to review the pile installation records and to adjust the installation procedures. The extensive test pile program using both dynamic pile testing as well as static load tests was crucial to optimizing the pile lengths and sizes, which resulted in considerable savings in project costs. Since a driven pile is a tested pile, the adequacy of each pile installed was evaluated daily and the project progressed with confidence in the foundation. The old adage that driven piles are cheaper, faster, and safer was proven out on this project. Driven piles allowed for pile caps to be poured within 24 hours of the installation.”

Unique Application of Driven Piles

The most innovative aspect of the project was the ongoing inclusion of testing and evaluation during construction to maximize economy of the foundation system and to ensure reliability in spite of variable conditions for pile driving.

“No project is successful without good communication and coordination between all the parties involved,” adds Fuchs. “This project was really about the application of tried and true foundation technology with innovation applied to testing and monitoring as a perfect demonstration of the motto “a driven pile is a tested pile.” ▼



A shot of the casino and hotel from late February 2005.

Photo: Patrick Mercantel, Focal Point Media

Piledriving Used in the Project

The project included a variety of difficult types of driven piles. A list of the types and lengths is as follows:

- Test Pile Program – an extensive test-pile program was performed using both static and dynamic testing of 16-inch x 16-inch and 18-inch x 18-inch prestressed piles. Static load tests up to 400 tons ultimate load were performed.
- Prestressed Concrete Piles – more than 2,950 prestressed piles were installed, a total of 186,000 linear feet.
- More than 1,050 18-inch square prestressed concrete piles were installed ranging in length from 65 feet to 80 feet. The design load was 120 tons. The piles were pre-drilled using a wet rotary drill and then driven with Vulcan 010 and 012 pile hammers.
- Over 1,900 16-inch x 16 square prestressed concrete piles were installed with lengths ranging from 30 feet to 75 feet. The design load for these piles was 85 tons and driven with Vulcan 010 and 012 pile hammers.
- 14 x 89 x 80 foot steel H-piles were installed at the casino vessel mooring points. The piles were battered 4 on 12 and driven with a Vulcan 010 pile hammer.
- Permanent Steel Sheet Pile – Over 1,575 wall feet of Arbed AZ-26 and AZ-48 steel sheet-pile was installed to form the casino vessel basin. This sheet pile was coated with 16 mils of coal tar epoxy and installed with MKT V35 and ICE 44-50 vibratory hammers.
- Temporary Sheet Pile – a 90 foot x 115 foot cofferdam was installed at the hotel tower elevator core foundation. The cofferdam was constructed of PZ-27 x 40 foot steel-sheet pile.
- Concrete Cylinder piles – Five 54-inch x 56-foot spun-cast post-tensioned cylinder piles were installed to support the vessel emergency egress ramps on the riverside of the casino vessel. A Vulcan 020 pile hammer was used to install these piles.

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