Branson Landing project requires unique engineering solution

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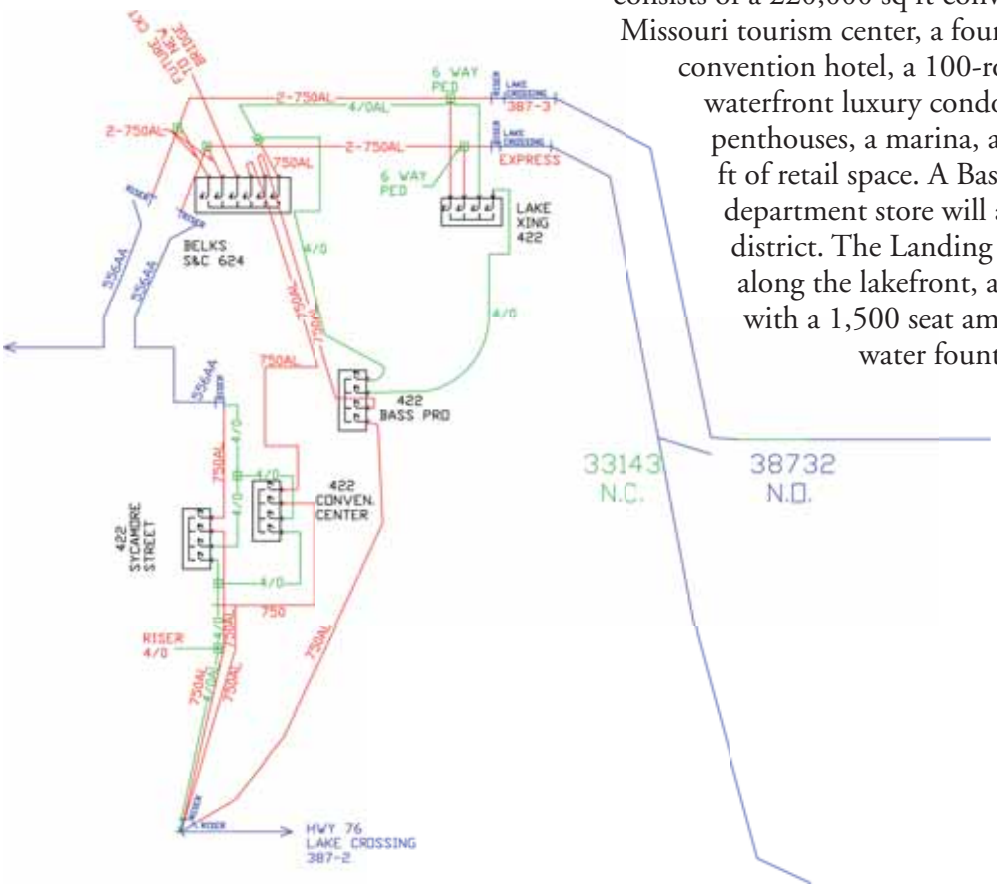
Branson, Missouri, already one of the most popular tourist destinations in the United States, is revitalizing its downtown section to further enhance its tourist attractions. Known as Branson Landing, this $300 million project is situated between US Route 65 and Lake Taneycomo near the Branson tourist district. The site occupies 95 acres including 1.5 mi of waterfront on Lake Taneycomo. Specifically, the project consists of a 220,000 sq ft convention center, a Missouri tourism center, a four-star, 260 room convention hotel, a 100-room boutique hotel, 140 waterfront luxury condominiums and penthouses, a marina, and a total of 465,000 sq ft of retail space. A Bass Pro shop and a Belk department store will anchor the shopping district. The Landing will include a boardwalk along the lakefront, a 2.5 acre town square with a 1,500 seat amphitheater, and a lighted water fountain created by WET Design, the designers of the Bellagio Fountains in Las Vegas.



Branson is experiencing a record-setting year for new construction, having issued more building permits in 2005 than in any previous year. Construction of Branson Landing began in June 2004. Scheduled completion

is April 2006 with the exception of the convention center, which is scheduled for completion in 2007.

The Empire District Electric Company of Joplin, Missouri, is supplying electric power for this project. The company's 10,000 square miles service territory encompasses southwest Missouri, including Branson, southeast Kansas, northwest Arkansas and northeast Oklahoma and has over 1,200 miles of transmission lines and 6,000 miles of distribution lines.

Electrical challenge

One of the biggest challenges in powering Branson Landing was the high-current underground service needed. For aesthetic reasons, overhead feeder lines that presently provide power to the area, are being converted to underground. Empire has considerable underground distribution experience with 200 A, but this is the first time to supply underground at 600 A. To achieve the required supply current of 836 A at 12.47 kV, we paralleled two, 750 kcmil aluminum conductors for each phase. Terminating these cables in the available space in pedestals and switchgear was a challenge; however, Hubbell Power Systems (HPS) had the answers to our many questions about working with 600-A materials and provided excellent customer service and support throughout the entire scope of the project. Also, HPS offered their materials at a fair price and delivered on schedule.

The approximately 1,500 ft. underground feeder for Branson Landing has taps that flow underground down into the development area to switchgear, pad mounted transformers, and pedestals to supply the actual loads. The one-line diagram on page 8 shows the arrangement of circuits. Our original plan was to connect each cable to its own bushing in the switchgear; that is, two bushings for each phase. However, there wasn't enough physical space to do that in the cabinet, so we had to connect two cables to one bushing. This fact greatly complicated the

Hubbell engineers worked closely with Empire District Electric Company in providing electric service to major tourist attraction in Branson, Missouri

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mounting of the various terminating products such as elbows, elbow arresters and tap connectors, and junctions. Fortunately, this challenge in mounting was eased considerably through the cooperation and engineering assistance of HPS whose terminating and arrester products we were installing.

The Hubbell products installed included 900-A 6-way junctions, 600-A elbow kits, 600-A to 200-A reducing tap connectors, and elbow arresters. The insulating plug that is usually put in the back of the 600-A elbow is removed and the 600-A to 200-A tap connector is put in its place. This arrangement converts the 600-A elbow on the back side to a 200-A tap, so you can install a 200-A loadbreak elbow, an elbow arrester, or a grounding elbow for doing maintenance. It can also be used as a place to test for voltage prior to performing maintenance and applying grounds. The reducing tap connector is installed in both switchgear and pedestals so as to not limit the ability to ground and protect the cables. In addition, every cable has a surge arrester on it at switchgear locations and at pedestals.

The 900-A 6-way junction is used inside the pedestal. It is a bus that has six bushings installed along its length. Because there is a parallel run of cable, we would need perfectly equal lengths of cable in order to avoid current imbalance, so the junction is used to overcome problems of current imbalance. (For future projects, we have decided to utilize 25 kV as our feeder voltage which will eliminate the need for parallel cables.)
We have 900 A in parallel cables coming into two of those bushings and then feeding through, going out on two of the other bushings. The remaining two bushings are tapped off to the 900-A switchgear.

Work accomplished

The cables have been successfully terminated inside the switchgear. Each parallel cable termination created a stacking height of about 36 inches inside the 900-A switchgear. The stack on each bushing includes the two cables, an elbow, a 600-A to 600-A connector, another elbow, and a 600-A to 200-A reducer to allow us to piggyback off the back and use that for an arrester. To ground the cable, we would remove the arrester and then install a grounding elbow into the reducing bushing. Everything has gone well so far thanks to the up-front help provided by HPS.

Making the transition to 600-A deadbreak material was a challenging effort complicated by the paralleling of the cable. Hubbell's expertise and assistance made this transition from 200-A to 600-A much easier. They were always there for support on this project, have been a great ally in the past, and will continue, I know, to be a great supporter in the future. ■