

Engineering solutions critical for Broadmoor updates

Working with one of the world's most historic luxury resorts is a once-in-a-lifetime opportunity. Supporting the resort in its most recent 30-plus-year evolution is a privilege, as it affords perspective and institutional knowledge of a property constantly evolving to meet the needs of its discerning guests.

We have provided engineering solutions to The Broadmoor since 1984. At that time, the five-star property was owned by El Pomar Foundation, the charitable organization that took over ownership in 1939 after the death of its founder, Spencer Penrose. In 30 years, we have provided consulting engineering services for upgrades, repairs and expansion of the once-Penrose-owned properties in and around Colorado Springs – from designing retaining walls above the Will Rogers Shrine of the Sun to supporting the road leading to Cloud Camp, a lodge Penrose built atop Cheyenne Mountain.

In 2011, Denver-based Anschutz Corp. purchased The Broadmoor, investing millions of dollars in the storied 3,000-acre resort complex. Over the past four years, the company has reimagined the buildings surrounding Cheyenne Lake at the hotel's main campus and built luxury amenities at three distinct Broadmoor Wilderness properties, including a fly-fishing



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school on the main property; Cloud Camp, a wilderness retreat atop Cheyenne Mountain; The Ranch at Emerald Valley, nine cabins located west of the main hotel campus in the Pike National Forest; and Fishing Camp, located on Tarryall River. Throughout the expansion, we provided engineering counsel, conducted geological analysis for Cloud Camp and managed structural engineering for The Ranch at Emerald Valley.

Project Specifics

Recently our team completed two Broadmoor projects

noteworthy for their contribution to local tourism and the engineering challenges the projects posed. Broadmoor West, part of the main complex, which first opened in 1975, reopened last year. The Broadmoor Soaring Adventure is a new attraction featuring 10 zip lines that range from 250 to 1,800 feet outside Seven Falls, a series of waterfalls in South Cheyenne Canyon that Anschutz Corp. recently acquired and renovated after they were heavily damaged from the September 2013 floods. These endeavors are examples of familiar techniques applied in new ways.

Until Anschutz Corp. bought The Broadmoor and signaled its interest in remaking Broadmoor West, the larger resort building was showing its age. Created in the contemporary style of the 1970s, it lacked character and architectural distinction. Moreover, it bore no resemblance to the main Broadmoor building constructed in 1918, adding to its incongruous image.

The Anschutz team committed to a \$57 million renovation to change the building's outward appearance and add three floors of additional lodging – but needed to complete two years' worth of work between Thanksgiving and April, when the Broadmoor would host the Space Symposium, the premier U.S. space policy and program forum. Months of



Photos courtesy CTL|Thompson

The Broadmoor West resort building, built in the 1970s, was renovated to change the building's outward appearance and add three floors of additional lodging.

preplanning by the design team and the contractor, GE Johnson Construction Co., preceded the construction start. Given the age of the building, the team had to plan for the unknown and for Colorado's weather, as work couldn't stop.

To save time, our working history of the building was a great advantage. We knew, for example, that Broadmoor West was founded on spread footing foundations on native sand and gravel soils. Adding floors and balconies would add additional loads and potentially cause dangerous settlement. Luckily, we had tested at least two dozen borings around the building over the past 20 years, which the team used to complete calculations on the stability of the existing

foundations and ability to handle the additional load. Our tests showed that any additional settlement to the structure would be well within tolerable ranges, saving hundreds of thousands of dollars in construction costs and all-important time.

Once the Broadmoor West project was completed, my colleague David Glater, a principal geological engineer and professional geologist, set his sights toward the sky, specifically the Soaring Adventure zip line project at Seven Falls. While he had evaluated and designed solutions for mile-long electrical transmission lines spanning southwestern canyons, this was the first zip line he helped

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