

Puerto Rico Convention Center

San Juan, Puerto Rico

Walter P Moore and Associates, Inc. was presented with an NCSEA 2006 Excellence in Structural Engineering Outstanding Project Award (other structures) for the Puerto Rico Convention Center project.



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The Puerto Rico Convention Center, a glistening new jewel on the international convention circuit, has fast become an icon for Puerto Rico's tourism and convention industry. The Convention Center District has restored a once underutilized area into a prominent waterfront development, providing economic rebirth for the community and acting as a catalyst for other development in and around the area.

The 580,000-square-foot building is the largest convention facility in the Caribbean and Latin America. The 153,000-square-foot ground-level exhibit hall is flanked by two levels of meeting rooms. A 40,000-square-foot ballroom perches above the exhibit hall and is covered by a soaring exposed roof structure. In making this project a reality, the structural engineers created an elegant, one-of-a-kind masterpiece that responded to many design challenges, including a reclaimed landfill site in a highly seismic zone with soils prone to liquefaction. The building, which is largely clad in glass, must also safely withstand Category 5 hurricanes.



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The most notable element of the building is its signature roof, which consists of two thin-shell elements that float over the building. The roof form evokes a wave in the sea, simultaneously celebrating and advertising the most important tourist attraction of Puerto Rico. While it appears to consist of complex curves, the roof is actually comprised of two simple forms. The high roof is elliptical, curving in two directions as it spans 375 feet. It reaches a height of 130 feet above the exterior plaza at its apex. The ballroom roof is a barrel-vaulted tied-arch that spans 270 feet. The roof extrudes toward the ground into a single large buttress support. This arch is comprised of a grid of curved 24- and 60-inch diameter pipes.

Close collaboration between the structural engineer, Walter P Moore, and architect TVS ensured that the roof was affordable and straightforward to construct. The structure features highly repetitive dimensions, member sizes, and connections, thereby minimizing the number of different roof elements and greatly simplifying the already complex job of steel detailing, fabrication, and erection. Walter P Moore's 3D CAD model was used to optimize the design and to define spatial coordinates for each intersecting roof element.

Walter P Moore designed all connections, working with both the architects and the steel fabricator, American Bridge Puerto Rico Inc., to make them economical and aesthetic.



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Bolted connections throughout minimized labor costs and erection time, and X-Steel sped the detailing process. Articulated bolt end splices along the length of each pipe further simplified erection. The thoughtfulness and coordination of the design allowed American Bridge to shop-assemble entire roof sections to confirm fit-up. These sections were then disassembled, shipped to the site, preassembled on the ground, and lifted onto erection towers. The pipes were shop primed and then field coated with a two-part epoxy paint system.

The 270 by 150-foot ballroom is located directly above the exhibit hall, making the convention center one of just a handful of U.S. venues with a stacked ballroom configuration. Walter P Moore developed a tuned structural system that controls vibrations under a wide variety of activities, even including rhythmic and dynamic dances. A 10.5-inch-thick concrete floor slab atop metal deck and steel beams at 10-foot centers is supported on trusses at 30-foot centers that frame the 90 by 90-foot column grid. This structural system effectively controls ballroom floor vibrations while also supporting an efficient rigging grid for the exhibit space below.

The project opened on time in November 2005. It is an excellent example of innovative engineering, uncommon collaborative design, and acute attention to construction detail. ■