Cable Supported Fabric Structure at Franklin Park Zoo

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Abstract
In September 1989, after 17 years of planning, design and construction, a unique, cable supported fabric tent structure opened at a small zoo in Boston, MA. At the time of its construction, it was the largest free-standing building of its kind in the United States. The Tropical Forest pavilion was unusual for its time, location, structural system, and program. The project brief required a large, clear-span exhibit space for tropical plants and animals, multiple support spaces, and concealed mechanical systems. To place the visitor’s focus on the animals, the architects’ and engineers’ goal was to “…design as sheer and unarticulated an enclosure as possible.” The solution to this design challenge was an innovative and highly integrated building that minimized structure and maximized useable floor area. To achieve the programmatic goals, the designers proposed a 75 ft. tall steel tripod supporting steel cables on which the fabric roof would lay. The legs of the tripod are splayed slightly for stability, and provide space for skylights. The cables are anchored into a 30 ft. wide concrete compression ring, at the perimeter of the display area. The ring also provides ample space for animal holding pens, support areas, and mechanical rooms. A portion of the ring’s roof is a horizontal concrete truss that provides additional stiffness and openings for ventilation and natural light. This paper will describe and analyze the design and construction of this unique structure that utilizes custom steel members for the tripod legs, steel cables supporting the translucent fabric roof, and a multi-purpose compression ring. The Tropical Forest Pavilion was an unusual, yet effective design solution for the expansion of the zoo’s programs. The structural features of the building provided the flexible, large-volume space for the new naturalistic exhibits. As the 30th anniversary of the building nears, the original fabric roof is still in service, and the building functions much as intended.

References