



Steel Meets the Pepsi Challenge

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with E. M. Phillips

Designed by the visionary architectural team of HOK/Kansas City, Denver's Pepsi Center is an ultra-modern sporting arena with the intent of not only entertaining the customer but also assuring them the best in comfort and convenience.

Home to both the NBA's Denver Nuggets and the NHL's Colorado Avalanche, the new arena comfortably seats 19,309 fans per basketball game and 18,129 fans per hockey game. Coming in at \$160 M., the Center is located on 52 acres in Denver's Central Platte Valley flanking Denver's lower downtown and Elitch Gardens Amusement park and was designed to reflect the traditional setting of the site while providing the visitor with world class amenities. The 675,000-sq. ft. center has five levels housing: a two story, 100'x75', column free practice facility; an 80,000-lb. scoreboard; 95 luxury suites; a club-level business center; 41 restrooms and 17 points of concession.

For the sporting fan, the arena experience begins visually with two

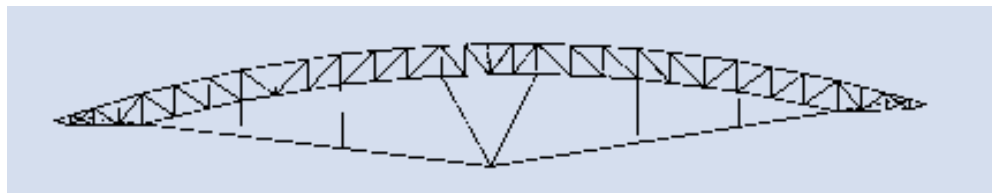
dramatic, 75' high atriums serving as the main stadium entrance. Designed with unbraced columns and an expansive glass curtain wall meant to create a forward looking approach, this clear space was achieved by structuring the perimeter columns as 30" steel-encased composite columns spanning a full 75' to the roof. Even with all of this, the biggest structural challenge to the design team was designing a roofing system that would support large snow loads while maintaining an airy and streamlined appearance with minimal structural obstructions.

The oval shaped roof spans 460' and uses a unique inverted pyramid king-post trusses system measuring 60' high with two main tension ties extending below the upper seating level. The four main trusses of the roof spine share two main tension ties reducing the number of structural elements extending below the upper seating level. At their lowest point, the tension ties extend 4' below the highest seat level creating clear sight-lines as well as the feeling of a "light" roof structure. By linking two semi-circular ends of the roof with this central support system, the roof mimics the efficiency of a dome without the need for external buttressing or tension rings.

To meet the tight structural budget of \$90 M., a unique 460' span, tied-arch roofing system was designed that required only 17 pounds of steel per sq. ft. This innovative approach to the roof support system has two significant effects that allowed for the tight schedule to be met. Firstly, repetitive truss design made quick erection and fabrication possible. Further, all trusses had depths of less than 15' making them easily shippable to the site and stimulating construction. Secondly, temporary roof supports were erected using eight shoring towers in the center of the arena and positioned to eliminate interference with the simultaneous construction of the concrete superstructure.



When the temporary erection columns are removed, the center "box" structure will support overhead scoreboards and other electrical equipment and rigging.



Roof truss with inverted king-post truss. The bottom chords are tension ties.



View of the completed Pepsi Center.

The central inverted pyramid support system, combined with a series of radial trusses, break the 460'x350' span roof into a series of 30 spans measuring about 48', further serving to minimize the tributary load to each truss.

The roof structure is designed to support all of the functional requirements of the facility, including catwalks, lighting, rigging and center stage area to support the heavy scoreboards. The catwalks and rigging beams follow the geometry of the roof trusses with the lower trusses serving as their supports. The center box section, which was key to the efficiency of the inverted pyramid tension-ties arch system, also doubles as the crossroads and power center for the lighting, rigging and scoreboard systems.

Recently acquired by Wal-Mart heir Stanley Kroenke, the Pepsi Center proves to be one the jewels in the crown of new wave, hyper-hip sporting areas. Much like the Denver Broncos new Metropolitan Stadium, the Pepsi Center makes going out to cheer for your team just as comfortable as staying home and watching from the couch.

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Owner:
Stanley Kroenke

Structural Engineers:
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Architect:
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General Contractor:
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Steel Fabricator and Detailer:
W & W Steel