

**AMERICAN AIRLINES CENTER**

This structural roof system is a unique, innovative, and surprisingly economical response to a complex architectural roof shape. Historically, cross-vault roof forms have been supported most economically using concrete shells. The American Airlines Center demonstrates that this form can also be structured economically using structural steel, but with a twist.

Walter P. Moore added an external post-tensioned concrete tension tie embedded in the upper concourse floor framing to provide-but much more economically-the lateral resistance usually provided by buttresses in traditional barrel vault construction. This unique mix of steel and post-tensioned concrete results in a design that takes maximum advantage of the structural depth created by the arch shapes of the cross-vault form.

Internally tied structural systems have been utilized on many recently completed arenas. However, the application of such a system typically requires that the building height be increased to provide unobstructed fan sightlines. By using the external tension tie, the building was effectively shortened by 15 feet, resulting in structural frame cost savings of an estimated \$2 million, as well as savings in building facade and MEP systems, for total savings of over \$4 million. The 13 foot deep roof structure creates a 330 by 430 foot column-free space for unobstructed patron sight lines. The design also provided a long span roof steel erection method that was simple and safe.

An innovative show rigging support system is integrated into the roof-truss design to improve economy, safety, aesthetics, and to streamline building operations. By establishing a truss spacing of approximately 11 feet, and designing the truss bottom chords to resist rigging loads along their length, the engineers eliminated the need for a separate rigging grid. In addition to saving steel tonnage, this integrated solution provides riggers with safe and easy access from the catwalk system and speeds preparations for events.

A unique mix of structural steel, concrete masonry units, cast-in-place concrete, and site-cast concrete arch panels are used to support the extremely complex building facade. The architectural plan and elevation definition of the facade is highly articulated, and does not dimensionally relate well to the interior floor plates. To resolve these incompatibilities, Walter P. Moore engineers developed a cladding back-up system that stacks all load from the full height of the facade down to the ground level. Brick is supported using load-bearing, grouted concrete masonry units, which were placed in plan to easily follow the brick. Structural steel tubes and wide flanges support window walls. Brick arches are supported on arched site cast concrete panels. Three site-cast concrete panels erected to form a true arch support the four large entrance arches. The three-piece, site-cast arch is, in turn, supported on cast-in-place concrete.

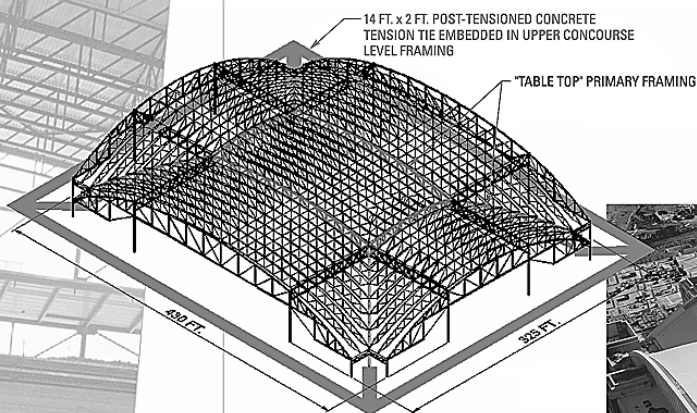
Innovative use of pour strips in the five levels of reinforced-concrete floor framing eliminated the need for expansion joints in the huge building, reducing costs and improving the efficiency of construction. Detailed three-dimensional thermal and shrinkage analysis by the structural engineer made this possible. Pour strips were located at the mid-length of each side of the building, dividing it into four quadrants. The strips facilitated for complete removal of formwork, allowing the contractor to speed construction by building and sequencing four separate buildings, which were then interconnected.

The Walter P. Moore design is innovative, practical, functional, and cost-effective. Opening on time and within budget, the American Airlines Center provides a top-notch facility for sporting and entertainment events and has become one of the leading revenue-generating arena facilities in the country.

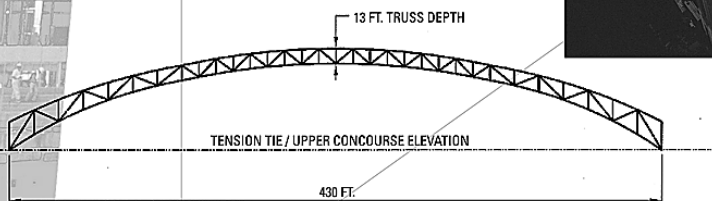
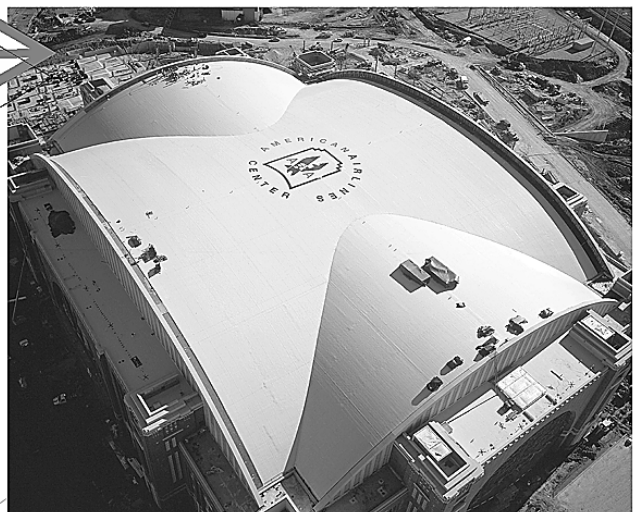
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# American Airlines Center

Unique Roof System Forms a Distinctive  
Cruciform Barrel Vault Shape for the Building



**Roof Framing System Isometric**



**Primary Truss Framing Elevation**

**WALTER MOORE**  
ENGINEERS + CONSULTANTS