

Sports Stadium Design

An architectural rendering of the UCF Stadium, showing the large, modern structure with a curved facade and a prominent entrance. The stadium is surrounded by landscaped grounds with palm trees and a road with cars. The sky is blue with scattered clouds. The title 'Sports Stadium Design' is overlaid in large, colorful, multi-colored letters at the top.

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Our choice Arizona Cardinal



Arizona Cardinal



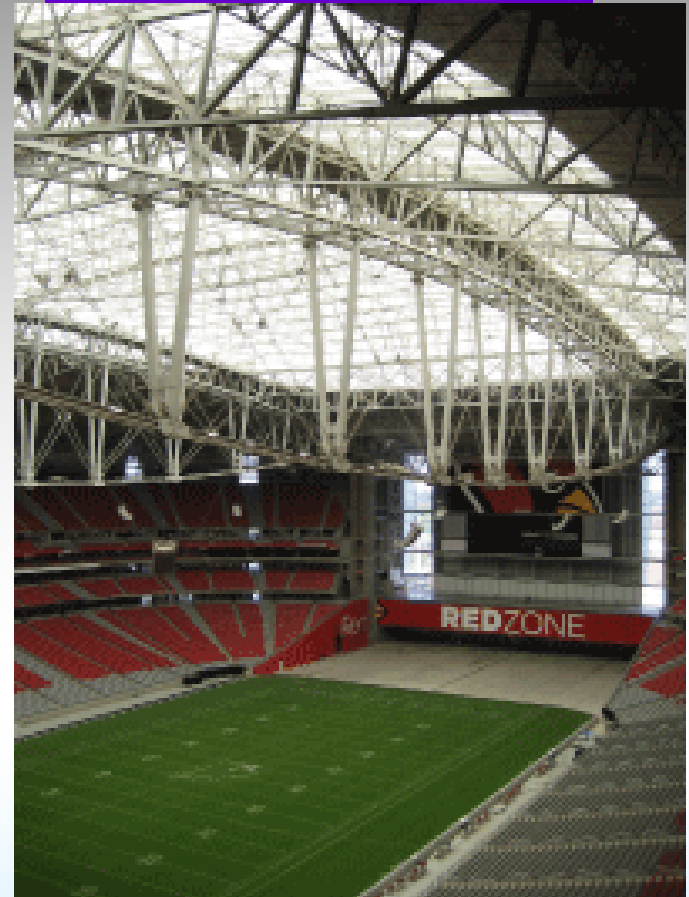
The new BIRDS NEST



Retractable Roof

- 12 minutes to open and close
- Cable-driven, rides on arc
- Panels are 258 ft by 185 ft
- Has 100,000+ square ft Teflon fabric called “birdair”
 - Reduces need for interior lighting
- Maximum .25 mph from 0 to 14 degree along arc

www.uni-systems.com/building.htm



Roll-out Field

phoenix.about.com/.../Cardinals-Stadium02.htm

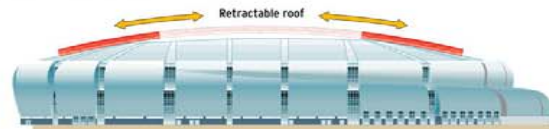
- 45 minutes to roll in or out
- Weighs 19 million lbs
- Slides out on 542 wheels
- 76 wheels are powered by 1 hp engines
- Rolls at .125 mph





The new BIRDS NEST

The Arizona Cardinals' \$455 million state-of-the-art stadium is being hailed as one of the top 10 sporting structures in the world. In addition to a retractable roof, it contains the first completely retractable field in the United States.



Retractable roof

Many sports stadiums have retractable roofs, but Cardinals Stadium is the only venue in the United States or Europe to have a retractable roof that slides along an arc. To keep the air-conditioned stadium cool, the roof will remain closed when it's not outside. It takes about 12 minutes to completely move the roof.

Each roof panel weighs 15 million pounds and is covered in Birdair, a translucent fabric. The panels move at 1/4 inch to ensure control and safety. Four of each panel's transporters are powered by engines that use cable-drum drives to winch the panels along eight cables. Each panel rides on the curved roof rails via eight transporters.

All of the cable-drum drives are housed by fiber optics and are constantly synchronized to ensure even cable tension at all times. When the panels are open, it exposes the entire playing field. Size of the roof opening is 360 feet wide by 360 feet long. Dull gear, attached to the cable drum and rotated by the motors. Cable drum with grooves that grip and advance the cable. Motor and brake. Transporter girder, wheel behind girder.

Each panel is supported by a metal framework that connects the roof with the transporters. The transporter slides along the rail girder, allowing the roof to open and close. Linear bearing. Allows the panel to move. Transporter link, which connects seven sets of transporters on each roof panel.

Always on track, the panel truss can shift up to 18 inches while moving. Rail girder. Cable trough. Cable. Rail. Linear bearing. Rail girder. Truss. Transporter. Wheel.

Who is Brunel? A world famous engineer. Sir Isambard Kingdom Brunel lived in England from 1805 to 1880 and became renowned for his innovative approach to building bridges, tunnels, harbors, rail lines and steam ships.

Two towers made from Belgium steel hold up the stadium's 5,600-ton roof. In February 2005, the trusses and two retractable roof panels were raised using eight high-powered hydraulic jacks mounted on four supercolumns inside the stadium. The lift, said to be the heaviest in North America, was done by Mammoet, a company that specializes in ultrahigh lifts.

ARCHITECTURE OVERVIEW: World-renowned architect Peter Eisenman, in partnership with HOK Sport and Hunt Construction Group, created a design for the stadium that mixed design excellence and ultimate fan comfort. The stadium's exterior was designed to look like a barrel cactus with metal panels intended to reflect the desert.

TRANSLUCENT ROOF: The retractable panels and much of the roof are made of a translucent fabric called Birdair that enables light to penetrate and gives the venue an open, airy feel.

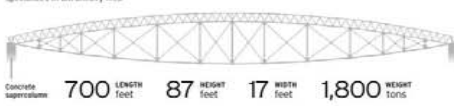
WALL OF FANS: At the stadium's entrance will be a mural in the shape of the Cardinals logo made up of photos from the first 16,000 season ticket holders.

MATERIAL LIGHT/SCENIC VIEWS: 21 vertical slots on the exterior wall of the stadium let in natural light and offer spectators a 360-degree view of the surrounding area.

Retractable field: One of the most unique features of the stadium is a completely retractable natural grass playing field – the first of its kind in the United States. The field will spend most of its time outside receiving sunlight and water until game day when it will be rolled inside. It takes about 60 minutes to completely move the field.

Rest easy: The stadium's seating capacity is about 63,400 for Cardinals games and is expandable to about 73,000 for larger events such as the Fiesta Bowl and Super Bowl.

Concrete supercolumn 700 Length Feet 87 Height Feet 17 Width Feet 1,800 Weight Tons



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Size of each photo: 1 foot by 6 inches.

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MAIN-LEVEL SEATS: 30,000 Seats are 19 inches wide, molded plastic with cup holders.

CLUB-LEVEL SEATS: 7,501 Seats are 21 inches wide, padded with cup holders.

TERRACE-LEVEL SEATS: 23,000 Seats are 19 inches wide, molded plastic with cup holders.

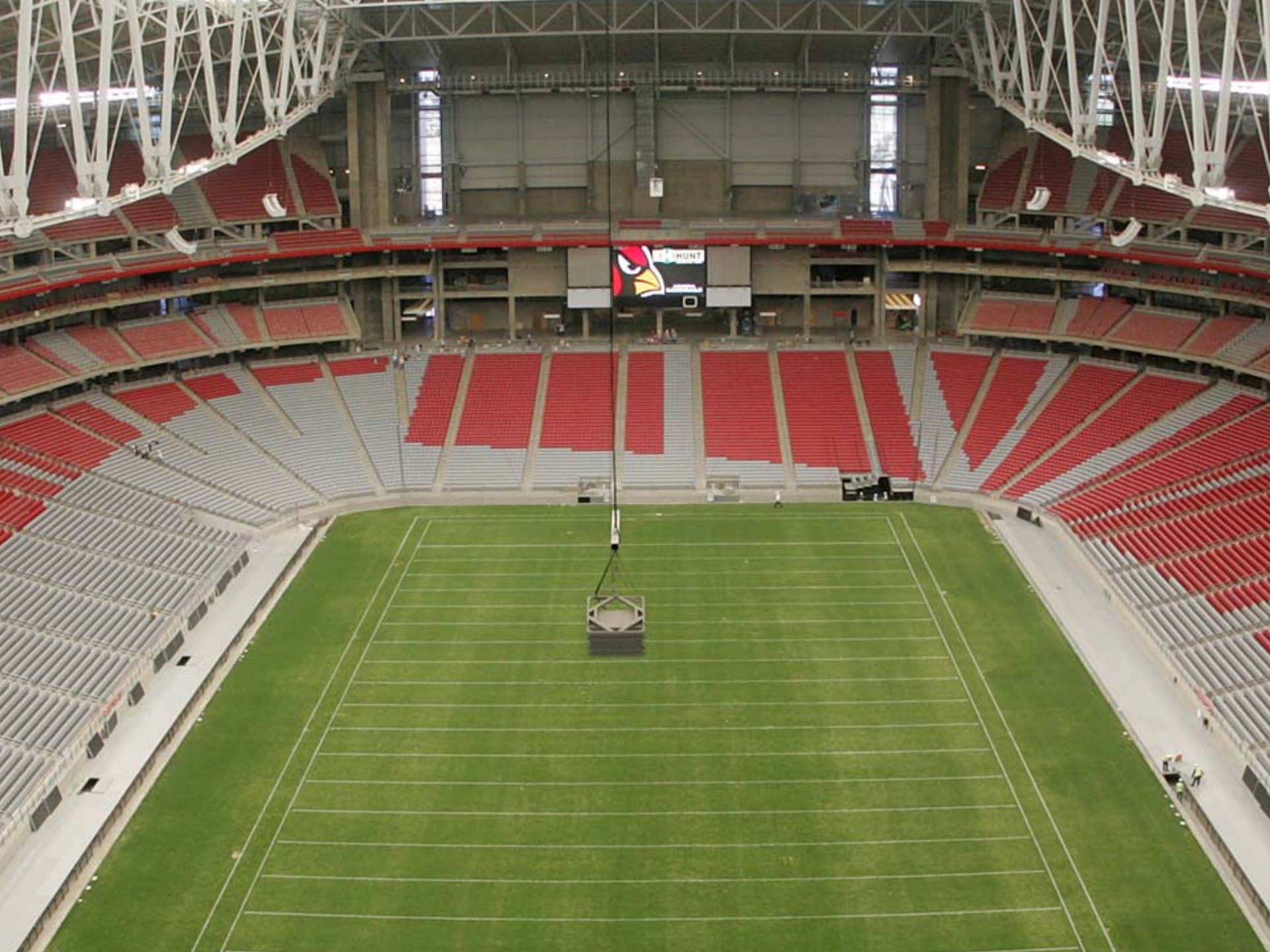
LOFTS: 88 The luxury loft amenities include preferred parking, an exclusive entrance, private rest rooms, multiple lounges and bar areas. The per-season cost of a loft is between \$65,000 and \$125,000 depending on size and location. Also included are 10 to 20 padded seats that are 21 inches wide, each with 18-inch cup holder and adjustable table to suit, etc.



Valley homes that could be cooled by the stadium's air conditioning on a game day

\$455M	63,400	14,000	310	50	10	18	1,250	2,300	3,500	\$400M
Total cost of the stadium complex	Approximate seating capacity for Cardinals games	Parking spaces on site and 12,000 more within one mile	Fixed locations for fans to purchase food and beverages	Restrooms	Elevators	Escalators	Trees planted around the venue	Valley homes that could be cooled by the stadium's air conditioning on a game day	Jobs added during the construction phase of the stadium	Estimated annual economic benefits to the area

SOURCE: Arizona Cardinals; Hunt Construction Group; Arizona Sports and Tourism Authority; Joe Breen Consulting Group; CMI Sports Engineers; Images by Scott Armstrong, Scott Stebbins, Cameron Clark; Photos by Ralph Frenn/FOXPHOTO



Cost of Design/Facts

- The Data of the Stadium
- Estimated cost \$450 million
- Stadium area 160 acres
- Concrete stadium floor area 152,000ft²
- Field tray weight 7,500t
- Field dimension 234ft×400ft
- Seating capacity At most 73,000
- Lower bowl seating 29,000
- Upper deck seating 26,000
- Club seating 7,000

Alternative Ideas

(Below) Dallas Cowboys Retractable Roof Stadium



(Above) Denver Broncos
100% grass playing field



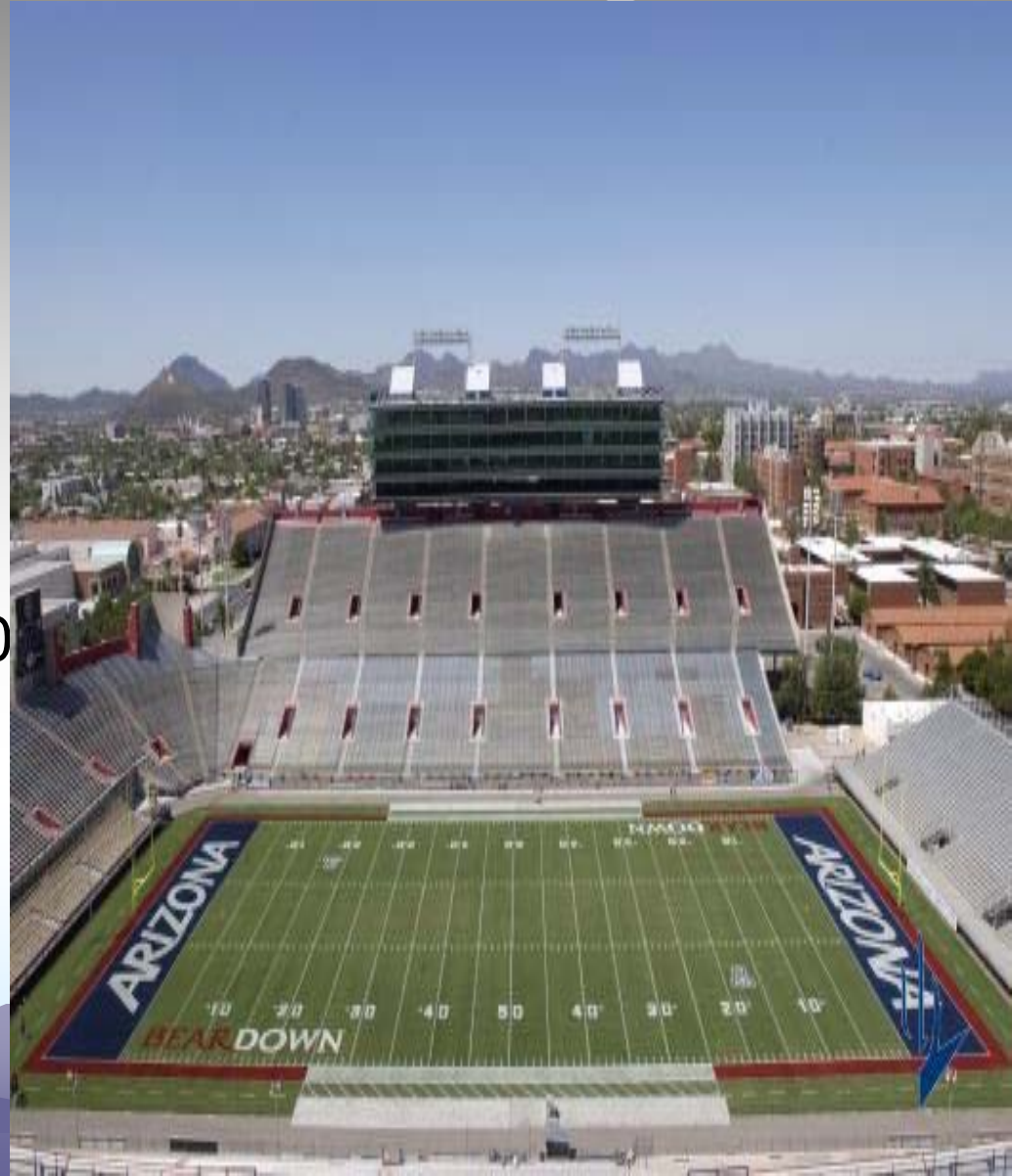
Advantages/Disadvantages

Advantages

- The stadium is aligned in a certain direction for maximum sun exposure
- Fully air conditioned
- The construction provided 3500 jobs and it added \$400 million to the economy

Disadvantages

- Huge Cost





Problems of Implementing

- Higher taxes for Arizona residents
- Emergency evacuation
- Naming rights controversy
- Parking: the stadium provides 6,000 stalls compared to the 70,000+ capacity



