

Al Thumama Stadium: Local and Global Architectural Reach

Hani Awni Hawamdeh

Arab Engineering Bureau: AEB, Doha, Qatar

hani@aeb-qatar.com

The world cup stadia have been a constant concern for the hosting countries. Many of them have become a burden on the economies of their countries, only to become white elephants after the tournaments end. Therefore, the core mission of the Supreme Committee for Delivery & Legacy in Qatar was to ensure that the World Cup Stadiums are built with a legacy and to remain functional in the long run, not just as facilities, but as cultural icons. Such efforts have promoted the exercise of stadia building in Qatar as a positive and unique experience. As a firm, we, at Arab Engineering Bureau, are honored to be part of the effort all through the making of Al Thumama Stadium, which will be discussed in this paper. Instead of a white elephant, Al Thumama Stadium is arguably a symbol of the local identity that will become part of the World Cup legacy, whilst being a state-of-the-art facility that plays a vital role in development of its surrounding neighborhood.

Arab Engineering Bureau (AEB)

Established in 1966, AEB was the first firm of its kind to be established in the State of Qatar; it was acquired by Ibrahim M. Jaidah in 1991. Under Ibrahim's leadership, AEB - which he initially acquired with only 6 employees, has evolved to be an enterprise with over 600 employees across 4 international offices and has completed over 1600 projects.

Ibrahim Jaidah's commitment to cultural awareness and growth, and his passion for research resulted in the publication of books titled as *History of Qatari Architecture*, *99 Domes* and *Qatari Style* that have been widely used as reference materials in the academia.

Supreme Committee Requirements and the Concept Design

Through a tender competition, the firm was challenged to reinterpret the Gahfiya shape into the design of a stadium. The Gahfiya, a part of the traditional headdress in Qatar and the region, is considered a rite of passage from childhood to adulthood. Young men wear it for protection from the sun, before they start adhering to the entire headgear worn by grown men. Therefore, Ibrahim M. Jaidah chose to keep the literal shape of the traditional hat, as protection against the sun is one of the hat's functions.

The Team

To meet the FIFA and the Supreme Committee requirements, a group of strong cross-disciplinary experts was actively integrated into AEB core team. AEB, as the Lead Design Consultant and Principle Architect, appointed Fenwick Iribarren Architects for the Sports Architecture, Hilson Moran for MEP and Schlaich Bergermann Partner for the Structural Engineering. Qatar University, the national university, performed the wind tunnel testing and a detailed review and verification of Computational Fluid Dynamics (CFD) that simulated the Bowl and Field of Play cooling system performance. The Principal Architect and the design management core team closely worked to manage the larger design team members to actualize the design and reach the goals set for this stadium by the Supreme Committee, in addition to complying with FIFA's Compliance Program, and local codes and regulations. Accordingly, a variety of software were also used including BIM which played a strong role in modeling the design.

Location

The Al Thumama Stadium is located south of central Doha and is well positioned between the Al Wakrah and Aspire Precincts. It lies at the Eastern end of Al Thumama Street, close to the neighborhood

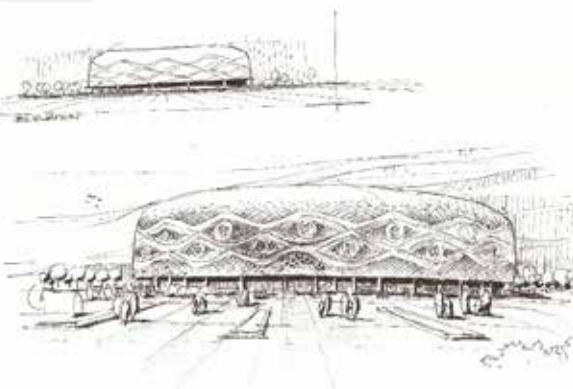
of Al Thumama, soon to be surrounded by important new highway developments and residential zones. Surrounded by a variety of different uses, the design responds to each one of them and creates a balanced and ordered site master plan. Therefore, the masterplan focused on responding to the needs of the neighborhood and connectivity with its surroundings, while playing the role of a buffer between the neighboring residential and industrial areas and having social integrity by reflecting the local culture.



Stadium Facade and Roof

The facade aimed to embody the true essence of the Gahfiya being light in weight and white in color. By using different aperture sizes and strategic positioning of the cladding material, a traditional woven pattern was achieved.

The roof is created to maximize the sun light penetration while considering the comfort of the spectators in the stands and the cooling strategy.



Urban Integration

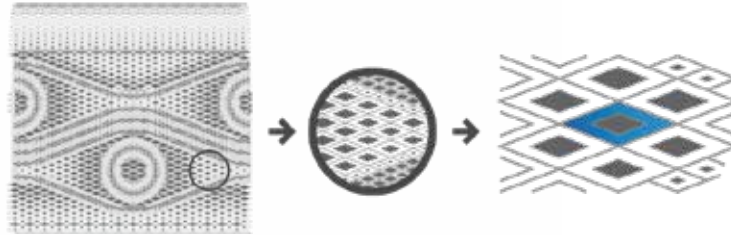
In all the stadia built for the World Cup, Supreme Committee required strict adherence to the three modes plan, which is Base Build, Tournament Mode and Legacy Mode. The Base Build Mode is to construct the stadium and the essential precinct facilities needed to receive the testing events before the tournament. The Tournament Mode is how the design of the stadium and the site will accommodate the spectators for the World Cup, while the Legacy Mode is how the design will be transformed after the World Cup to remain a vital component of its surroundings. Therefore, the site is designed to integrate and respond to, complement and enhance the surrounding area, instead of only occupying the space. The stadium is located at northern part of the plot along an uncovered parking area dedicated to VIP, Hospitality, Media and FIFA/LOC in the Tournament Mode. In addition, the existing venues at the center of the plot include the training fields and the Showcase Stadium. Traffic impact assessment was carried out to cover a wider area of the city, as to ensure proposing the required mitigations to maintain the smoothness of traffic flow. Finally, the Legacy Mode includes disassembling the upper tier and adding new components including two clinics, a boutique hotel and two clubs' headquarters.

Design Language

Integrity of design language was sustained through the rhomboid shape, which can be seen in the facade, dissemination across the design. The diamond is a very popular figure, has movement and is more commanding and distinguishing than the square or circle. It is also an important element in

Arabic calligraphy, as it resembles the trace of the calligraphy pens used for most of the prominent styles. Such a phenomenon has allowed the design language to become even more deeply rooted in the local culture.

Building on the established architectural language, the design team created a seamless transition in space between the outside and the inside through the patterns on the internal walls and the iconic Gahfiya wall in which different kinds of local hats are displayed. The external facade experience is also taken inside in both hospitality designated areas and the bowl of the stadium adding richness to the visitors' experience through light and shadow and reflection of the past.



Al Thumama Stadium is a placemaking project, with a unique look, aimed to become more than a building. It was designed to become part of the FIFA World Cup 2020 legacy and to continue on connecting the neighborhood and attracting families and individuals into a culture of sports. It is a design that reflects the past and opens doors to the future.

Heat and Air Quality

Due to the high temperatures in summer in Qatar, much attention was given to overcoming the heat challenge. Sun path analysis were done to determine the shape and size of the oculus on the roof, allowing for a sufficient amount of light without disturbing the viewers. Simulation was done to assess the CO₂ concentration within the bowl to determine the fresh air flow requirements. Wind pressure analysis was completed in collaboration with Qatar University to ensure the building structure stability and the effect of the wind on the indoor air temperature and quality. CFD analysis was done to estimate the cooling load and to decide on the right airflows and distribution to ensure maintaining the targeted temperatures on bleachers and playground. All types of tiered seating will be provided with cool air, delivered via a displacement principle below the seating to maintain the required environmental conditions. The methodology of supplying the cooling air will vary with the type of seating and the location within the stadium, to reflect the solar load imposed in different parts of the stadium.

Cybernetics

To ensure the comfort and safety of the spectators cybernetics systems were devised in the entire site, including BMS, ESCADA system, data & telecommunication, security systems, CCTV, access control, BAG & MAG screening, fire alarms, broadcasting, lighting controls, and central clock system.

Sustainability Strategy

The project design targets a GSAS 4 Star rating for GSAS Design and Build (GSAS Sports v2.1) and under GSAS Construction Management v2.1 - Issue 3.0 with a focus on: energy and water efficiency in addition to material and resource management. The design combines passive design strategies with advanced building systems to deliver a sustainable and iconic building that provides a safe and comfortable experience for its occupants including the indoor environment inside the Stadium and the outdoor experience within the site and Precinct. The project has so far achieved exemplary performance standards in the use of recycled materials, sustainable sourcing of products, building

energy performance and reduction of water use. It is on track to optimize its energy performance to achieve an improvement of 30-35% above international benchmarks including ASHRAE 90.1.

Cite this article as: Hawamdeh H.A., "Al Thumama Stadium: Local and Global Architectural Reach", *International Conference on the 4th Game Set and Match (GSM4Q-2019)*, Doha, Qatar, 6-7 February 2019, <https://doi.org/10.29117/gsm4q.2019.0024>