PROJECT Stadium 974

YEAR
2021

LOCATION
Doha, Qatar

USE
Public Assembly

CONSTRUCTION
New Construction

ARCHITECT
Fenwick Iribarren Architects

ENGINEER
schlaich bergermann partner

DEVELOPER
Supreme Committee for Delivery & Legacy

BUILDER
HBK Contracting

SUPPLIER
0

SPECIALISTS
0

GROSS AREA
1,003,200 sq-ft

MEAN ROOF HEIGHT
145 ft

STORIES ABOVE GRADE
6

STORIES BELOW GRADE
0

RISK CATEGORY
III

COST INFORMATION
Unavailable

LCA INFORMATION
Unavailable

Credit: schlaich bergermann partner

DESIGN FOR DISASSEMBLY	SCALE	SYSTEMS	MATERIALS
PRINCIPLE	Elemental Subsystems **Whole-structure**	Non-structural Envelope Balconies **Stairs/ramps** Foundations Beams **Bracing** Walls **Roof** **Floors** **Columns**	Other Earthen Wood **Steel** Masonry Precast concrete Insitu concrete
STRUCTURAL COMPONENT REUSE	Whole-structure Subsystems Elemental +Deconstruction	Columns Floors Roof Walls Bracing Beams Foundations Stairs/ramps Balconies Envelope Non-structural	Insitu concrete Precast concrete Masonry Steel Wood Earthen Other

SUMMARY

Stadium 974 was designed as a 40,000 seater temporary stadium for the FIFA World Cup 2022 in Qatar. The stadium can be easily demounted and re-established as many smaller stadia or moved to an entirely different location.

SUSTAINABILITY GOALS

Four-star certification in the Global Sustainability Assessment System (GSAS) for both its construction and design.

CIRCULAR ECONOMY STRATEGIES

The structure was designed for disassembly so that the valuable land adjacent to Doha could be reused, and to limit the permanent oversupply of large sports facilities in relation to the population size of Qatar.

The structure consists of a steel frame that evokes a high-bay warehouse. This frame is designed with a modularized system of beams and columns and special pin connections that allow for easy disassembly and reassembly. Within this frame fit independent shipping containers that house the concessions, hospitality and mechnical plant. The structural frame elements can be easily dismantled and transported within standard shipping containers, including the long ties at the back of the roof trusses, which feature a series of splices to allow for transport. The only elements which cannot be transported within shipping containers are the longer roof trusses, which are split into two parts and transported without being placed within shipping containers.

The roof panels, concourse floor panels, and grandstands can also be easily stacked and transported. The concourse floor panels are modular lightweight orthotropic steel deck units and the granstands are thin steel plate sections. The floor panels and shipping containers are fixed to the steel frame using flange clamps.

KEY FINDINGS, RECOMMENDATIONS, AND LESSONS LEARNT

The simplification of the stadium cross-section and plan to allow for repetitive element reuse and a regular column grid were important to achieving a modular design suitable for future reconfiguration and reuse, in addition to the rationalization of column sizes and beam sizes to a limited number of widths, depths and plate thicknesses. The prefabrication of all elements allowed for the construction on site to progress rapidly.

The project embodies Design for Disassembly principles on a very large scale, however as of January 2024, the structure has not yet been disassembled and relocated to an alternate destination.

The design for disassembly may have increased the initial embodied carbon of the stadium as compared to a typical stadium design not designed for disassembly. This would be related to the use of steel plate to fabricate built-up beam and column sections as opposed to rolled sections; further rationalization of beam and column dimensions of the modular frame system as compared to a project-specific permanent stadium installation design; and the design of connections that facilitate easy disassembly and reassembly. A study evaluating the embodied carbon impacts of the stadium related to these changes has not yet been completed.

FURTHER INFORMATION AND RESOURCES

Engineer website: https://www.sbp.de/en/project/stadium-974/

Architect website: https://www.fenwickiribarren.com/en/proyecto/974stadium.html#

Stadium-specific website: http://stadiumdb.com/stadiums/qat/stadium_974

Construction photos and drawings: https://arquitecturaviva.com/works/estadio-974-en-doha

Engineering-specific award website: https://www.istructe.org/structural-awards/projects/2022/stadium-974/

Architectural press: https://www.dezeen.com/2021/11/24/stadium-974-fenwick-iribarren-architects-qatar-world-cup/#

AVAILABLE QUANTITATIVE DATA

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ABOUT THE DATABASE

This case study has been prepared by the Structural Engineering Institute Sustainability Committee Circular Economy Work Group with the goal of sharing and promoting the excellent circular economy work that project teams are working on throughout North America and the world. Often it is hard to find information on how circular economy principles are implemented in practice; these circular economy case studies aim to better share information amongst the industry.

Some case studies have been prepared directly by a project team member, while others have been prepared based on available texts and publications. In the second case, the text descriptions are a summary of information available from other sources. These sources are referenced in the *Further information and* resources section.

While reasonable efforts have been made to ensure the information is representative and accurate, we cannot guarantee there are no errors. Please contact the case study team to provide additional information, suggest updates and amendments, or with any other questions. To submit a new case study to the database, please use this submission form. Thank you!