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1. The Diplomatic Club, Riyadh (Saudi Arabia)

Owner: Gov. of Saudi Arabia
Architect: Frei Otto/Omrania
Engineer: Buro Happold
Contractor: Hanyang Corporation with specialist lightweight structures sub-contractor, Stromeyer Ingenieurbau

Works' duration: 30 months
Total floor area: 24,000 m²
Total Fabric area: 3,900 m²
Total Cable net area: 2,000 m²
Service date: 1986

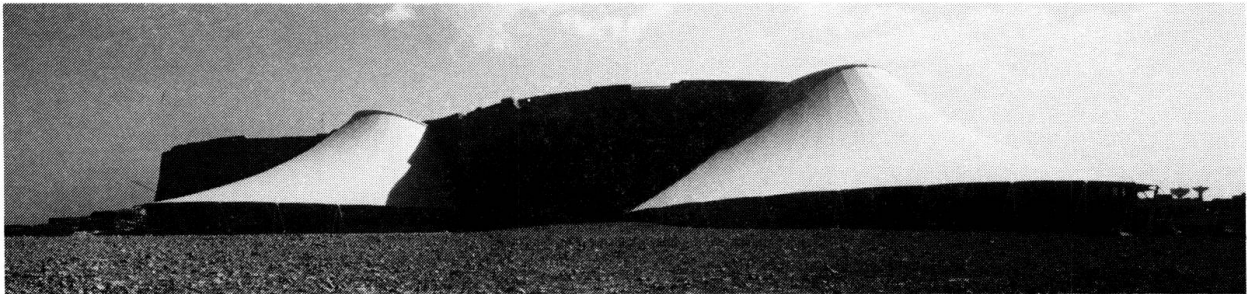
Introduction

In 1975 the Government of Saudi Arabia decided to transfer the Ministry of Foreign Affairs to the capital city of Riyadh. As a result the Diplomatic Missions were also asked to establish themselves and operate from the capital city, in the Diplomatic Quarter, a new urban quarter on the north west perimeter of Riyadh. The Saudi Arabian government planned not only to provide the infrastructure for the area, schools, public service buildings, sporting facilities and landscaping, but also, as a gift to the Diplomatic Quarter, a Club for the use of diplomats, their families and guests.

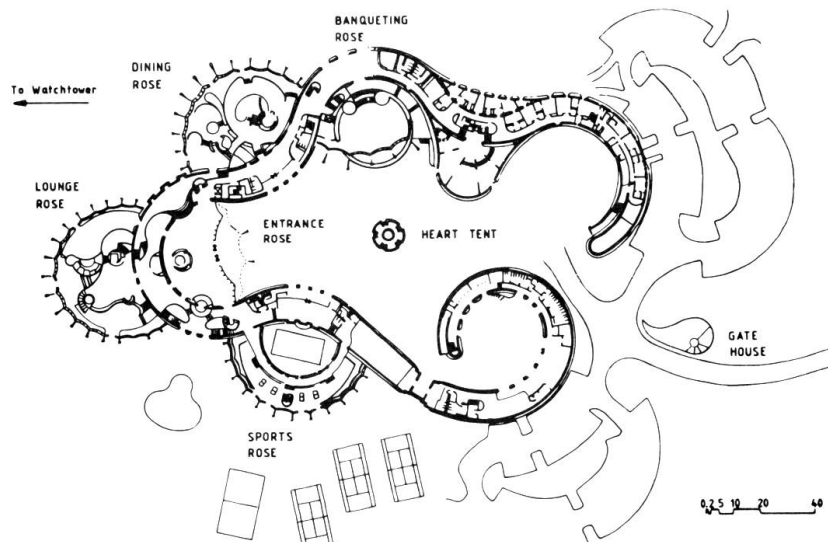
The Diplomatic Club provides facilities for both formal and informal use of diplomats and their families and houses sporting, dining, recreational, conference and hotel facilities. The building features heavy limestone masonry and concrete construction, to which contrasting lightweight cable net and fabric structures are attached.

Development of the Scheme

The scheme was initially conceived as a wall used as a unifying element between clusters of buildings, essentially traditional in character, enclosing a heavily landscaped interior garden. The wall developed to become both wall and building, having heavy mass to control and even out temperature rises and falls, and containing those functions most continually used. Functions requiring large clear volumes, which were also more often than not to be used intermittently, were to be accommodated by lightweight long-span structures clinging to the heavy character of the wall. It was proposed to construct the wall using local stone and to construct the lightweight long-span structures as tents. The two tents facing the interior garden, for reception and banqueting purposes, would be of cable net construction with insulation and tile cladding, and would blend well with the intensive landscaping of the interior garden, as well as



View from the edge of the Plateau



Site layout

provide volumes for formal functions which could be environmentally controlled with relative ease. The tents facing outwards towards the plateau, for sports, restaurant and lounge purposes, would be of translucent fabric construction, providing a sharp contrast with the massive wall in the desert landscape. These tents would be used for more informal functions requiring environmental control for intermittent and varied use.

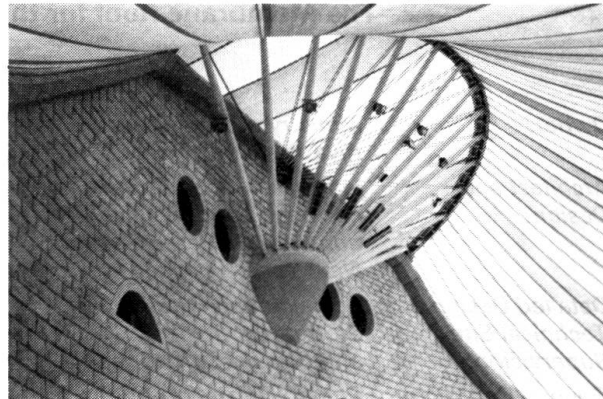
The interior garden required a central feature, and a tent covered with glass tiles was proposed, to be painted by Frei Otto's daughter, Bettina.

Outline of the Tensile Structure Systems

Both PVC coated polyester and PTFE coated glass cloth were considered for the fabric tents, the latter being chosen for its longer life span. Whilst PVC coated polyester cloth is easier to fabricate, damages less easily during handling and can accept greater tolerances in erection and patterning, the PVC degrades in ultra-violet light. The constituent materials of PTFE coated glass fibre cloth, however, are very stable and do not degrade with time, and so potentially have a long life, possibly 50 years or more compared with 10 to 20 years for PVC coated polyester cloth.

The fabric tents are fundamentally conical in form and use radial supporting cables tied via A-Frame perimeter steel masts to the ground, and to the top of the masonry wall construction via a fan mast. The fabric is attached at the bottom boundary to a cable spanning between the perimeter masts and at the top boundary to a cable spanning around the fan mast. The fabric is attached to the wall using clamping plates to a roped edge tied back with a rigging screw type connection to a short length of rail bolted to the wall.

Each of the cable net tents in the interior garden forms a single saddle surface spanning between the wall and perimeter masts. 14 mm diameter cables at 500 mm centres are used for the parallel grid net cables, with 44 mm diameter cables for the boundaries. The boundary masts were detailed in a similar way to those on the fabric roses. The cable nets are covered with timber boarding, waterproofing, insulation, and clad with blue ceramic tiles.



Fan Mast of Fabric Tent



Perimeter Boundary of Fabric Tent

The heart tent is of cable net construction, using 6 mm stainless steel strand at 326 mm centres. The boundary masts are tubular stainless steel tripods with a compression member and two ties. The 2020 painted and toughened glass tiles are attached to the cable net by stainless steel clips.

(T. Ealey)



View to Heart Tent in Interior Garden