'SILKS' - A FABRIC STRUCTURE'S CREATION AND PERFORMANCE AT MOONEE VALLEY RACECOURSE, MELBOURNE

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"Silks" is an elegant lounge with an architecturally dramatic roof in the members area of the Grandstand at the Moonee Valley Racecourse, Melbourne. It was opened for the 1988 Spring Racing Carnival yet a mere 3 months before, the area had been a concrete floored Beer Garden, open to the vagaries of Melbourne weather.

This paper examines how this transformation took place, the reasons why a tension fabric canopy roof was chosen and how it performed both during construction and on completion.

Introduction

Moonee Valley Racing Club's Chief Executive Ian McEwen, visualised a plush members lounge housed in an architecturally dramatic structure on the site of the existing Beer Garden. In June 1988, following preliminary discussion with consultants and contractors, McEwen received approval from his Chairman and Committee to proceed with covering the Beer Garden. The condition of the approval was that the opening be within 3 months for the commencement of the Spring Racing Carnival.

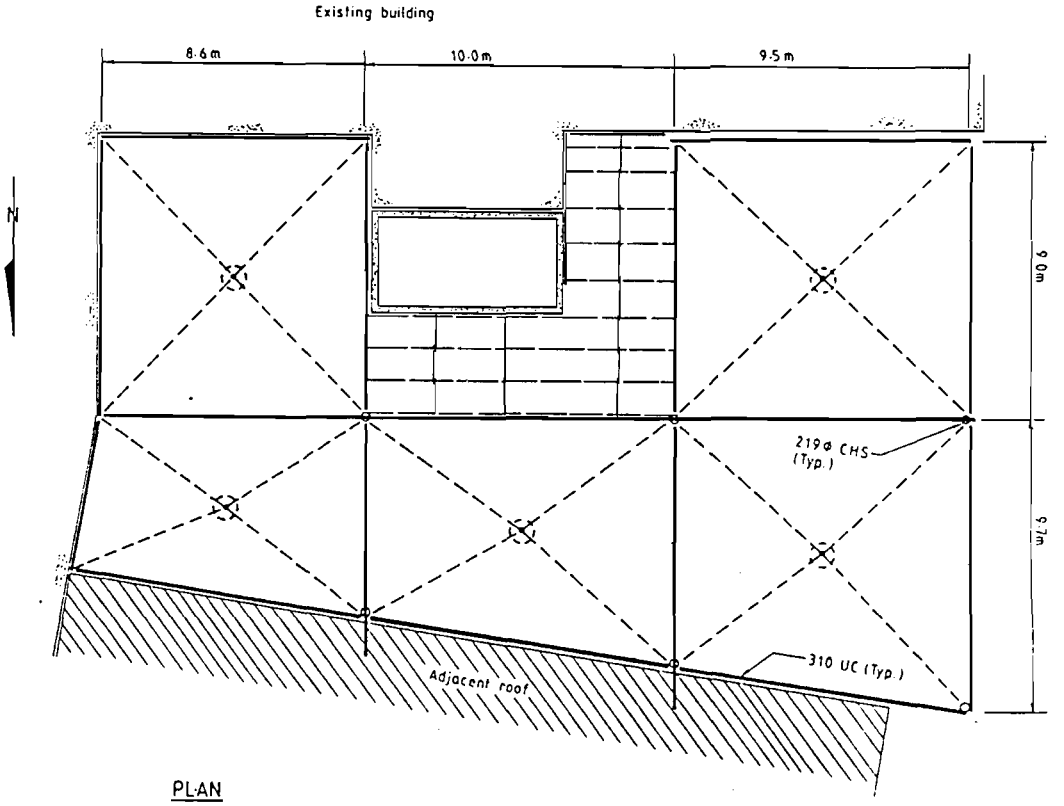
A fabric structure was chosen for a number of compelling reasons. First and foremost it would create the special atmosphere that McEwen had in mind for the bar by a series of translucent cones creating a soaring ceiling over an enclosed space flooded with natural light. Secondly, a fabric structure could meet the tight programme. Lastly the use of a fabric structure would impose minimal loads on the existing structure.

Design Process

Ian McEwen was very well aware of the demands of the programme and knew exactly how to tackle it. This type of programme relies on a preselected team of designers and constructors, co-operation of all parties and willingness by all to meet the programme set down.

Ian McEwen selected Connell Group to lead the design and co-ordination of the structure and fabric roof. The other consultants and contractors selected for the project were:

Edward F. Billson	to provide the architecture.
Spacetech Pty. Ltd.	to design (in co-operation with Connell's), fabricate and erect the fabric roof structure.
Bek Industries Pty. Ltd.	to fabricate and erect the structural steelwork.
A.G. Coombes Pty.Ltd.	to design and install the air conditioning system.



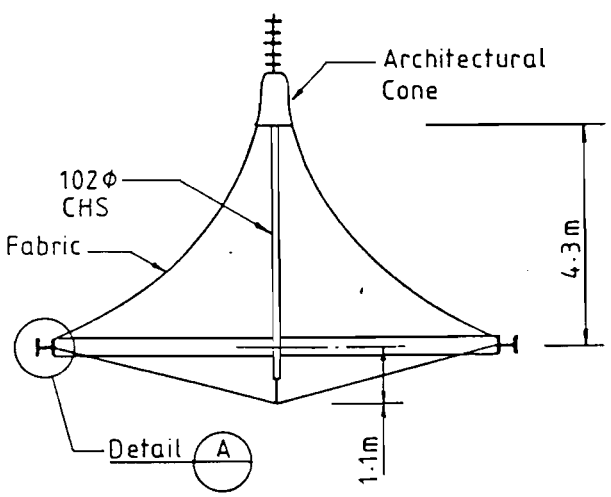
PLAN

Early in June, the feasiblity of the scheme was examined. The initial idea, of a single fabric structure in the form of a cone supported from the adjacent structures, was simplified by dividing the area into five separate cones supported by a structural steel frame. This was a critical decision. It meant that the design of the fabric could be standardised and the fabric patterns, while slightly different for each cone, were similar in nature. The project could be fabricated in elements of a manageable size (in fact, for construction of the structure a crane was only needed to erect the perimeter steelwork) and construction could be carried out progressively allowing a number of trades to work concurrently. The design also minimised complicated interaction with the existing building, which could not have been easily otherwise achieved given the complex shape of the perimeter.

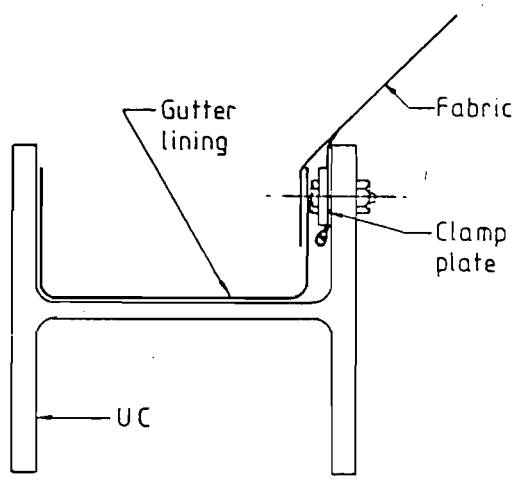
The choice of five cones was also an important architectural consideration since it divided a very irregular area into an area where an architectural form could more easily be developed.

Each cone is made from white P.V.C. coated polyester fabric that was already in stock in Australia. The warp/weft fabric stresses varied from 1.5/0.8 to 2.0/0.6 kN/m within the cone. Fine tuning of the fabric stresses was required to ensure that sufficient slope was retained in the corners of the cones to prevent any waterponding problems.

The fabric is clamped onto perimeter steel members (U.C members) which also carry the drainage gutters. A fabric flashing is provided over the perimeter connection and a lining is placed in the UC to ensure watertightness is maintained as shown in the diagram below. At the centre of each cone is a 700 diameter steel ring beam which is supported by a "flying mast" which is suspended from cables attached to the perimeter steel frame. The flying mast has an inner sleeve to enable the cone to be prestressed and to facilitate any future retensioning that maybe required. The top of each cone is capped off with an aluminium cone, which while modern, recalls something of the Victorian era finial.



ELEVATION OF TYPICAL CONE



DETAIL A PERIMETER CONNECTION

The internal environment of the lounge is controlled by an air conditioning system. In its design the areas of high peak solar loads, air distribution and condensation were addressed.

The effects of high peak solar loads on the temperature can be reduced by using either a double layer fabric or a translucent insulated fabric. These options were not seriously considered in the project as they are both cost inefficient and virtually defeat the purpose of using translucent fabric in the first place. Anyway, the third option, adopted here, is to simply accept a small drift in indoor temperatures at times of maximum solar load.

The visual demands of the structure dictate that the air distribution was confined to the perimeter. To supply the large air quantities required, conditioned air vents were placed at approximately 3.5m spacing. The return air was kept at a low level in order to stratify the lower 4.0m of the space.

The third principle area addressed by the air conditioning designer was condensation. Condensation occurs on the inner surface of the roof fabric in Winter from excess heating. As for high peak solar loads this can be minimised by use of double or isolated fabrics. It was decided to control it in this project by restricting the indoor temperature.

Construction

The transformation of this area proceeded according to programme despite it being winter. The key dates stated below show the speed at which the consultants and contractors mobilised in order to meet the client's requirements.

. First project team meeting (Preliminary design tabled by Connell Group)	8th June, 1988
. Drawing issued for preparation of steel shop drawings, fabric cutting patterns	14th June
. Steel shop drawings approved.	20th June
. Commencement of fabric structure fabrication	24th June
. Commencement of roof steelwork erection on site	1st July
. Commencement of fabric structure erection	25th July
. Completion of fabric structure erection	12th August
. Completion of fit out	9th September

The Result

"Silks" is fast approaching its first birthday. From recent discussions with the Club, they are delighted with the structure. It is an enhancement to the existing highly successful facilities of the Moonee Valley Racing Club, growing to be a most popular area of the course and still a talking point for the members. In the words of Ian McEwan, "Silks is unique in Australian racing. No other course has an equivalent facility".

The structure has performed excellently on many aspects. The lighting level is excellent, air conditioning good and to date there has been no weatherproofing problems nor any need for maintenance or restressing of the fabric. The self cleaning properties of the fabric has surprised even the skeptics at the club.

In conclusion this structure demonstrates the capacity of fabric structures, given an experienced team and a well co-ordinated programme, to perform and give elegant, architecturally interesting structures quickly.