

## THE ROLE OF FLEXIBLE LIGHTWEIGHT STRUCTURES WITHIN THE URBAN CONDITION: THE DESIGN OF FLEXIBLE LIGHTWEIGHT CANOPY STRUCTURES AT FOX STUDIOS AUSTRALIA

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### Introduction

The design of well considered public domain elements, which can provide for a range of event places from semi enclosed spaces to shaded canopies are a challenge. The public domain of our cities is increasingly becoming a place for a whole range of events. In Sydney alone (and with the Olympic fever aside) we are seeing more and more outdoor activities and events taking place. Since outdoor eating licences were introduced in the late 1980's our public domain spaces have increasingly become inhabited and enjoyed in a far more urban way. So you can see the need for a range of temporary flexible structures.

### The Challenge

So what do we make of these structures consisting of square fabric pyramids or gable shaped clear covered PVC spaces; all seemingly crude in their details and execution.

The public spaces of our cities are increasingly being reused for events from incidental engagement to full scaled festivals. Some of these events are more restricted in use at certain times of the year. As in Sydney there is a desire to inhabit some of these well placed environments: along the beach edge, beside a park, on a street corner, or in front of a well loved building facade. In regard to the structures which occupy these spaces a series of observations about how these lightweight structures have been spatially organised and visually articulated within the urban condition can be identified.

These structures tend to occupy the foreground and middleground of our city centres where there are concentrations of use. There is a tendency for a flexible and adaptable structural system which can create shade and well defined spatial territories of a repeated module. They can also be handled with ease and be folded away and stored flat, if need be. These comments may seem to be stating the obvious but what is of concern is how these structures are resolved visually and in a way suitable to their civic character. The integration of services within these structures on the whole has not been properly addressed and the junctions between repeated elements tend to be crude and matter of fact. If these public domain elements are to function and contribute to the civic performance of our cities there needs to be a more rigorous approach to their design and execution.

### The Public Domain

The question of how we may occupy the public domain and the distinction between public and private, I would like to explore here for a moment. This may help us to deal with understanding how we may design within our urban environments, especially the design mechanisms at play during our work at Fox Studios Australia.

Reference to the public domain does not necessarily mean the problem of giving clarity between private from the public, but what I see as the difference between the nature of publicness. What I would like to present is the notion of a similar urban condition. This urban condition is a series of environments defined by streets, building alignments, pedestrian passageways and open spaces. Some are public and some are private. The notion of a spatial condition unifies these environments.

Fox Studios is built on what was known as the Royal Agricultural Showground site; public land which was made only accessible when the "show" was on officially once a year. Other events took place at the showground site but generally within a number of venues on the site. The site wide event was only of short-term duration. Consequently, at Fox Studios Australia (since leased from the NSW State Government) over two thirds of the site has been made publicly accessible, ie. public but privately leased. There is, I believe, an assumption that in order to design the city at an urban scale we need to make a real distinction between the public and the private. This assumption can be questioned.

### The Urban Condition at Fox Studios Australia

The public spaces at Fox have been designed as a sequence of spaces functionally determined and with a variety of spatial differences. In a way this large scaled site has been recreated with a sequence of spaces built upon the historic overlay on the site. In effect these spaces have been designed as a natural extension of the urban fabric – the scale of the new designated streets providing a way of mediating the programmatic commercial uses while offering activated experiences. (1)

### Market Canopies Fox Studios Australia

At Fox Studios we attempted to review and give greater emphasis to the design and expression of how flexible lightweight structures could be integrated into the public domain spaces in particular, the market canopies developed as an element within the Show Ring. This open space originally follows the outline of the former Parade Ring of the RAS. We developed a unique idea of creating an urban event park, which enables a series of varied activities to take place from performance, to markets, ice skating, rock climbing, water encounters or simple quiet enjoyment (2).

A foldaway concept of flexible structures involving a kit of elements facilitates a year round calendar of events

encouraged by interconnected and interactive links with other parts of the site. The desire for flexible adaptable structures on the Show Ring initially came about through the heritage constraint on the site – which necessitated no permanent objects above the ground. This in effect becomes a paradigm for the public domain. This constraint was turned into a design opportunity where we initiated an idea of a grid of “service” points stretching across the site into which a kit of urban elements could be placed.

The market canopy was seen as an extension of a large grid format consisting of 6 x 6m grid of inground service points ultimately to be extended across the site where power and stormwater could be drained and footings for stability could be provided. The inverted cone roof concept adopted, was a natural outcome of the idea of repeated roof elements abutting each other and the need to drain while weather proofing the junction – perhaps on all four sides. The result is a 24 x 36m covered space made up from 36 lightweight structures which can be used for a variety of uses including a market (which formed part of the original brief). The inverted cone canopy form is not a new idea but the notion of a collapsible and relocatable system of 6 x 6m inverted cones fully integrated with services and stormwater drainage is probably a little more advanced than what we have seen before. (3).

The design also enables varying degrees of enclosure to be achieved.

Key features of this structural system are:

Flag poles: at 7m these extend the height of the composition to 11m and give civic drama and presence to the site.

Structure: a central pole provides for downpipe, electric conduit and the setting out for the four canopy arms, which hold the fabric. The initial tension in the fabric is released by a socket screw mechanism, which enables the arms to be raised via cable stays, and a winching process. As the arms are raised a collar slides down to sit above the bale ring. The bale ring is separated from the column structure enabling water to drip into a separately articulated rainwater head.

Fabric: due to cost reasons and performance criteria a PTFE coated PVC fabric was selected. This offered the flexibility required over a more rigid translucent fabric. Great care was taken into generating a seam pattern, which enlivened the spatial drama. This is something lacking with other lightweight fabric structures within other urban environments. The cone profile was also developed so that a visually seductive shape was created.

Hyper links: the success of this structure to create a large undercover area relies on these fabric link elements. These are kept above the umbrella edges by the means of a bow string arch which is then tied to the adjoining poles. This element is used not only for weather protection between adjoining umbrellas but also to ventilate the space. The way light bounces off these fabric pieces is enticing to say the least.

Metal connections: each of these umbrella cones and hyper links are bolted together at each corner by a series of metal plates. In effect the whole covered area acts like an integrated structure although each umbrella was designed as a freestanding separate element. It is the design of these elements, which become a necessary part of conveying scale and ornamentation within public structures.

The integration of services: uplighters and waterproof power connections enabling dismantling are provided. During the relocation process the uplighters are hinged so that they can be folded back for protection.

Edge rain screens: due to the geometry of the umbrellas a series of vertical clear PVC drops were designed. These can be installed during times of wet weather.

Dismantling: the structural system has been designed so that it can be collapsed and relocated. Once the corner plates and hyper links are removed it only takes 3 minutes to raise the arms. The dismantling of these canopies, like larger scaled flexible exterior structural systems, takes time. So far the client has chosen to only collapse the structures and store vertically on site. The success of complete storing off site has not been tested as yet.

## Conclusion

The success of this structure comes from an understanding of how its design was to function within the urban condition together with collaboration between design and technical expertise. A successful partnership between HASSELL and Shade Structures Pacific was born.

## Notes to the Text

HASSELL was engaged by the Fox Studios / Lend Lease Joint Venture in November 1997 to provide urban design advice and to lead a team of designers in the development of the Bent Street Precinct at the Fox Studios site in Moore Park, Sydney. The Show Ring is located on the former Parade Ring space of the RAS Showground and the unique urban form of the site has been the subject of much discussion and analysis; its irregular geometry and scenography lends much to its potential as a place for the film industry and related events.

A separate consultancy occurred between HASSELL and the Fox Studios/Lend Lease Joint Venture in May 1998 to provide for the design and documentation of the Show Ring. Our brief for the project consisted of the need for grassed areas to accommodate circus tents, outdoor field events and night time performances while hard stand areas to accommodate a market area (100 stalls), iceskating and other activities. An area for the purchase of

tickets was also required. HASSELL seized the opportunity to create a flexible events park. Reference should be made to designs by Bodo Rasch for the shade umbrellas at the Prophets Mosque Media Saudi Arabia 1986. Although these structures are designed to collapse using hydraulic arms they have not been designed to be relocated.