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Author: Antony Wood, Institute of Architecture, University of Nottingham

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Culture and Personality: The right place and face for Tall Buildings

Antony Wood RIBA
Institute of Architecture
University of Nottingham
School of the Built Environment
University Park
Nottingham NG7 2RD
Email: antony.wood@nottingham.ac.uk
Tel: 0115 951 3111
Fax: 0115 951 3159

Abstract
Tall Buildings are perhaps the most keenly debated building typology currently in existence. Opinion on their contribution to the urban agenda is usually clearly divided; strongly for, or strongly against. This is especially true of cities in the UK, which have only embraced tall buildings in relatively recent times, and only in limited number.

Many of the tall buildings in UK cities act as 'urban signposts' through virtue of their size, but most are uninspiring as pieces of design and do little to relate to their setting. Unlike parts of the world where there have been strong moves to create tall buildings rooted to the specifics of 'place', much of the UK, and London in particular, has tended to cling to the import of the commercially-driven North American model - the rectilinear, air-conditioned 'box'.

This paper presents alternative visions for tall building design. It takes as its vehicle high rise design-research projects undertaken by the author in conjunction with architectural students at the University of Nottingham and explores themes of tall building design responses that relate to (a) the physical characteristics of place, and (b) the environmental characteristics of place. In doing this, it suggests appropriate starting points for the design of tall buildings and charts a brief overview of the rise of an environmental consciousness in high rise architecture.

1.0 Introduction

The popularity of tall buildings in the UK has seen dramatic pendulum swings over the past 40 years, from a time when the genre could not disassociate itself from the loathed, ubiquitous post-second world war council tenement towers, to the heady days of the 1980's when the commercially-driven policies of the Conservative Thatcher government led to the huge docklands redevelopment, with the American architect Cesar Pelli's Canary Wharf Tower as its flagship (*Pelli and Crosbie 1994*).

Today, under the enthusiastic endorsement of the Mayor of London, Ken Livingstone, tall buildings seem to be enjoying a popularity unlike anything seen previously in the UK (*GLA 2001*). The docklands development has recovered from the effects of the early 1990's recession to expand at a rapid rate, and public opinion seems to be warming to the idea of tall buildings in the City of London and elsewhere in the capital – something unthinkable only a decade or two before. The high level of public interest in the Norman Foster-curated High Rise exhibition at London's Royal Academy in the summer of 2003 (*Abel 2003*) surprised many.

Not everyone is convinced though. The Heritage Lobby, and in particular English Heritage, are concerned about the impact tall buildings will have on the historic fabric of London, and for every report that is issued in support of Tall Buildings in the UK (*CABE 2001*), there seems to be a contradictory report condemning them (*UASC 2002*).

Whilst this theoretical battle over the appropriateness of tall buildings in the UK rages, however, little has been done to improve the actual design of the built projects. Towers are appearing at an amazing rate within the Canary Wharf / docklands development, yet most of the architecture there is primarily commercially-driven. It seems to be a piece of downtown America adrift in the

east end of London. Carol Willis's 'Form Follows Finance' play on Louis Sullivan's maxim, in relation to the early skyscrapers of New York and Chicago (*Willis 1995*), is now relevant on this side of the Atlantic.

The City of London and its environs have faired better than the docklands development in the high rise quality stakes, perhaps with the added scrutiny required through the historic setting. But, even with notable high rise examples such as Norman Foster's Swiss Reinsurance Tower (2003), and Renzo Piano's 'Shard of Glass' (anticipated 2009), one is left with the feeling that these tall buildings could be situated in any city of the world (for more on both buildings, see *Abel 2003, pp 64-69*). Exciting edifices of steel and glass they may be, but what makes them right for London? What makes them specific to the time and place in which they are set, rather than just another part of the 'global' high rise mono-culture which is sweeping the world and homogenising 'local' cultures in its path?

The tall building is obviously not a typology to 'blend in' with its context. It is inevitably going to soar above, and dominate, its surroundings. But that does not mean it cannot become a positive element in the urban composition. It can and should relate to its surroundings as positively as a high-quality, low-rise building, taking its cue from site and environment, as well as client and brief. The following paper gives examples of design research that, in the author's opinion, achieve just that. Taking the Heron Tower and Minerva Tower projects as the starting point, they are a sample of exciting theoretical design approaches that could serve as a model for future tall buildings.

2.0 Design Responses that relate to the physical characteristics of place.

All of the projects in the paper to follow are based on real sites within the city, and address real physical, environmental and programmatic concerns. The programmatic brief for the experimental buildings requires a minimum of 45,000 squared-metres of mixed-use space – specifically office and residential space with retail, leisure and communal facilities – contained in a tower of 30 to 40 stories in height.

"Building as Billboard"

This design (see *Figure 1*) partly takes as its inspiration the pulsing, neon night-time imagery of East Asian cities such as Tokyo or Hong Kong. In relating to site, it acknowledges that a high rise building has a relationship not only to the direct site context as its base, but hundreds of other sites around the city through the visual linkage. In setting up a dialogue with several significant 'places' around the city, both near (e.g. St. Botolph gardens across the street) and far (e.g. Primrose Hill), the building becomes a billboard, the façade 'planes' of which are positioned in both plan and sectional angle to 'speak' to the reciprocal place, often several miles away. Internal functions are arranged so as to maximise the opportunity of solid areas for billboard coverage (e.g. lift / service cores etc), whilst allowing light and air into the building, and views out, for internal occupants. The building comes into its own during the night-time, when huge liquid crystal screens on the façade of the building and within atria for the occupants, pulse out over the city.

Figure 1: Conceptual Model

"Urban Axes"

This scheme (see *Figure 2*) is firmly rooted in its physical site context by creating two vast atriums whose axes are centred on two prominent London landmarks; Tower bridge over the River Thames and the dome of St. Paul's Cathedral. The floor plate accommodation is thus divided into four 'corners' by these atriums, linked by flying bridges on strategic levels which add drama to the tall, angular spaces. The alignment of the bridges along the axes of the atrium is such that users are perpetually offered the views out over the city, specifically focussed on the landmarks. Additionally, the orientation of the main "St. Paul's" atrium to the south offers sun / heat gain to the large vertical space which serves as an 'environmental tower', assisting to naturally ventilate the office / residential space through the stack effect. On an urban sculptural level, the changing angular geometry of mass and atrium with height in the tower is certainly a rejection of the banal singular 'shaft' which typifies many existing tall buildings. The building would certainly become an icon for London.

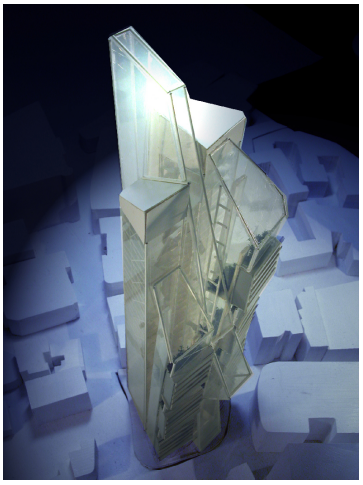

Figure 2: Model

"Building as Frame"

The "Building as Frame" design response (see *Figure 3*), on the Minerva Tower site, takes its cue from the tiny, grade II-listed St. Botolph's church on the busy traffic island fronting the site. Whilst Grimshaw's solution for this site is to create a huge glass façade as a 'neutral' backdrop to this church, the alternative design response presented here acknowledges that any tall building is going to dominate the church, but that does not preclude it from having a positive relationship with it. Thus the organisation of the form serves to frame the church, with the tall building acting as an 'arch' behind. This response gives clear indication for the arrangement of the mixed uses within the tower, with one 'leg' of the tower designated for the office function, the other leg for residential. Thus whilst on first inspection the tower appears symmetrical, on closer examination it is not; placing of circulation cores, layout and façade design are different as a conscious result of optimal planning arrangements (see plan). The shallow-plan created by this approach has the additional benefit of allowing natural ventilation to both office and residential space, via use of double skin facades as climate moderator. Structurally the design approach has major benefits also; both vertical parts of the tower act as structural 'legs', with the double-height restaurant function at the apex of the tower acting as the structural 'bridge'. The communal open gardens at levels 12 and 24 also add to this structural robustness, the open voids in the tower massing relieving wind pressures on the leeward faces.

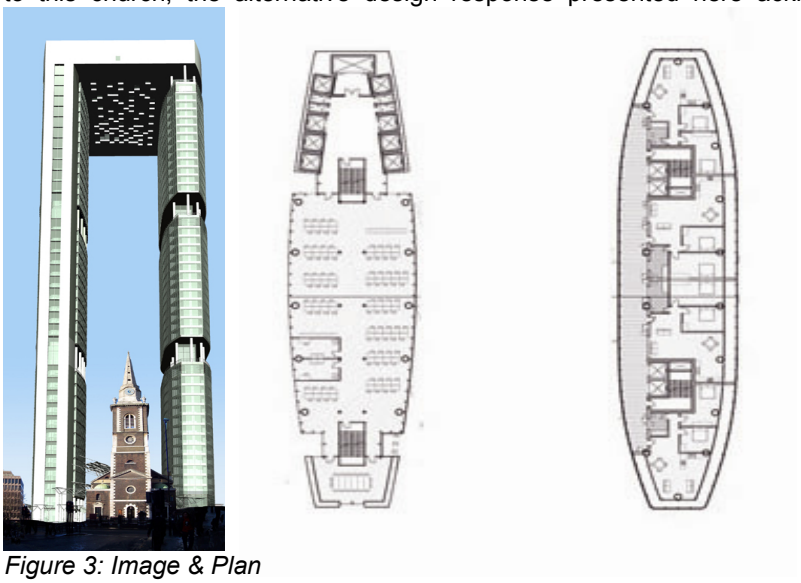

Figure 3: Image & Plan

3.0 Design Responses that relate to the environmental characteristics of place.

The "Sun Splice"

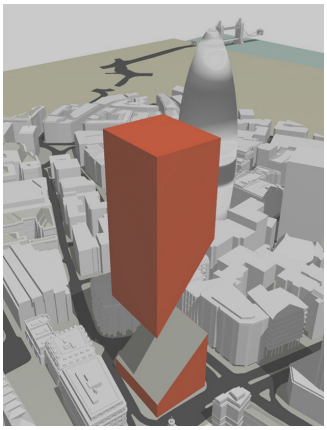

Figure 4: Conceptual Image

This scheme (see *Figure 4*) challenges one of the major problems of high rise buildings; the fact that towers create an unfavourable urban environment at the ground floor plane. The shear bulk of a tower, combined with being located commonly within dense urban fabric, acts to cut out sun, light, air and, often, even a view of the sky. Although this has been acknowledged from the moment that the massive Equitable Building in New York prompted the introduction of the Zoning Laws of 1916 and ushered in the era of the set-back block (for a further discussion on this, see *Landau and Condit 1996*), it is still true that the vast majority of tall buildings have a detrimental effect on the ground level urban environment around them.

The Sun Splice scheme sets out to change that, by creating a high rise building that has a minimum negative effect at ground level. Rejecting the idea of lifting the building up on pilotti, which often only creates a dark, overwhelmed space beneath, the design explores the sun path at different times of the year and responds by creating a huge slice in the tower's mass – punctured only by structure, services and vertical circulation – to allow sun and light to penetrate the form and project to the street level below. The size and angles of enclosing planes of this huge void are informed by the trajectory of the sun and the desire for a minimal shadow path considered in conjunction with existing surrounding buildings. Further, the lower sloping plane of the open void becomes a vegetated park, giving green space back to the city.

"Wind Tower"

Within the growth area of the sustainable high rise, a sub-area that has seen much research in recent years is the harnessing of wind energy in the tower, since wind velocities – and thus the potential for energy generation – increase with height. Drawing on the work of Stephan Behling in the School of Architecture at the University of Stuttgart (*Campbell and Stankovic 2001*), this particular design response (see *Figures 5 and 6*) is inspired by the wind in three respects; in its orientation to the predominant wind direction, in the aerodynamic plan-form of the separate petal-shaped masses, and in the incorporation of a huge wind turbine, suspended at mid height between the two forms. The aerodynamic shape of the towers act to channel the wind into the turbine area, and further assist in natural ventilation of the interior spaces through the differing pressure potential of windward and leeward faces.

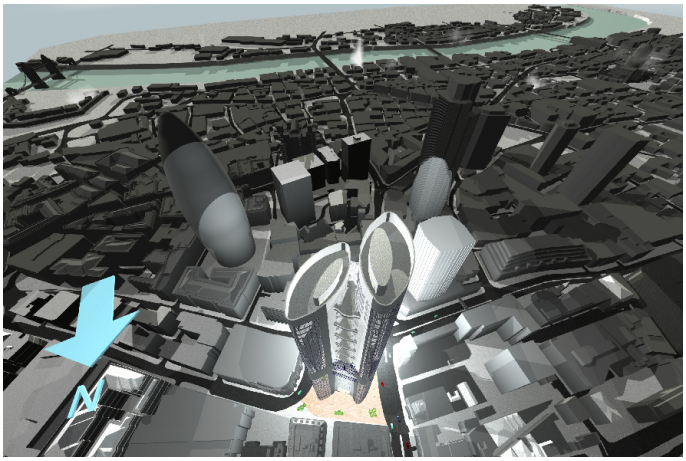

Figure 5: View in city context

Figure 6: View at night

"Shell and Core"

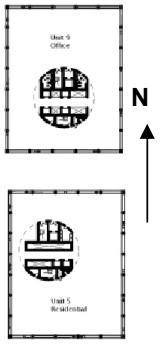

Figure 7: Plan *Figure 8: View in Urban Context* *Figure 9: View Skywards*

This project (see *Figures 7, 8* and *9)* explores the differing optimal relationships between shell and core for the differing office and residential function, in relation to both environmental context (in this case, sun) and physical context (view). It takes as its starting point the principle that, in the UK, residential space would optimally be orientated towards the sun (south) for the benefit of its inhabitants, whereas office space – with its high internal heat gains (workers, equipment) and need to reduce glare – would be optimally orientated away from the sun (north). Thus, in a residential tower, it would be beneficial to have the core placed to the north of the floor plate (to maximise useable space on the south side) and, with an office tower, vice versa. Since the project brief requires a mix of office and residential space on this approximately north-south orientated site, this project solution provides alternating six-storey 'blocks' of each function which are shifted towards north or south relative to the static core, depending on the function. Each block is also twisted in plan to be orientated towards a specific city view relative to the height of the block within the tower.

Structurally the tower works on the 'corbel' principle, with each block of 6 floors being a structural independent 'unit' which simply sits on (and cantilevers out from) the block below. The bracing elements evident within the facades of each block are in fact continuous inclined columns, transmitting vertical loads from roof to base. The tower resulting from this design solution is both complex and daring, but the placing of each element is firmly grounded in a practical philosophy rooted to both brief and context.

4.0 The Rise of an environmental consciousness in high rise architecture

The sustainable credentials of high rise buildings are constantly being called into question. On the one hand there are organisations who believe that tall buildings are inherently sustainable and positive for the environment, since they accommodate many people in a concentrated area and thus reduce urban spread, encroachment on green belt land etc (*Pank 2002*). On the other hand there are organisations who believe the opposite; that the high embodied energy expenditure in building tall does not justify the tower's existence (Roaf, 2005). This case 'for' and 'against' tall buildings is summarised below:

Tall Buildings: The Case 'Against'

- Higher embodied energy in constructing at height – structure, materials etc.
- High energy consumption in operation – elevators (up to 15% of bldg energy use), services etc.
- Higher energy consumption for maintenance and cleaning (e.g. replacement of façade silicon joints).
- Impact on urban scale; wind downdrafts, overshadowing (solar rights), wind rights, right to light, etc.
- Overpopulation in certain localities / greater demand on existing urban services and infrastructure.
- Anti-social internal environment – lack of open, recreational, communal space (esp. in residential).

- Greater wind loading at height (impact on size of primary structure, façade design etc).
- 'Sealed' environments at height; requirement for air conditioning, artificial lighting etc.
- Less net usable area to gross area and restrictions on internal planning; vertical circulation core etc.
- Safety and Security fears (especially post 9/11) – including safety during construction.
- Low ratio of external building surface area per floor area – impact on potential for solar arrays etc.
- Implications of Power failure (impact on vertical circulation, safety etc).
- Increased travel time (wasted time?).
- People suffering from vertigo – building occupation / human rights legislation?
- Recycling potential / urban impact of demolition / disposal of materials after demolition.
- Energy consumption is a small percentage of total costs (salaries etc) – little incentive for developers.
- Climate Change will increase the pressures on high rise – wind, storm, solar, power failure etc …….

Tall Buildings: The Case 'For'

- Efficient land use in population concentration – reduced suburban spread / loss of countryside.
- Denser cities = reduced transportation (and consequential impact on environment).
- Reduced size of infrastructure networks (urban / suburban, power, services, waste disposal etc).
- Proximity of residence and workplace; therefore less travel time (less wasted time?).
- Greater potential for mixed-use.
- More of the ground floor / urban level can be dedicated to 'public' use e.g. retail.
- Standardisation of floor plates and use of materials – prefabrication efficiencies?
- Higher wind velocities at height = greater potential for harnessing wind energy.
- Potential for natural ventilation through increased 'stack effect' etc.
- High 'thermal mass' potential for use in natural ventilation / heating / cooling strategies.
- Potential for good internal daylighting in narrow plans (and thus reduced energy).
- Increased quality of life at height – view etc?
- The potential for 'secure' communal/recreational spaces at height, away from traffic, pollution etc.
- Increased 'legibility' of the city – urban signposting etc.
- Life-cycle costing; re-use of building structure, services etc in refurbishments.

Irrespective of whichever of these arguments hold the most truth, the 'sustainable high rise' is probably the sub-set of the tall building genre that has seen the most research and development in recent years. Primarily through the work of Ken Yeang, amongst others (*Yeang 1999*), investigations into how tall buildings can draw positively from climate – sun, wind, vegetation – are now well documented.

5.0 Conclusion

Since the beginnings of the high rise building movement in Chicago at the end of the 19th Century (for more on this, see *Condit 1964*), tall buildings have been primarily dictated by commerce and pre-occupied with their role as a stand-alone piece of sculptural urban imagery. There has been very little design consideration of their appropriateness to a setting, and how they could be inspired by – and relate to – that setting. Even the treasured high rise buildings of the 'heroic' pre-war periods of Chicago and New York (e.g. the Chrysler Building, 1930) showed little development from the commercial model in terms of both form and internal space. For the best part of a century, most high rise buildings have exhibited a splash of money at the base of the tower, a splash of money at the top, and very little in between.

The situation is, however, changing. The commercial, rectangular, air-conditioned, high rise 'box' which has proliferated around the world is dead. Or, at least, it should be. For a building typology that has only been in existence for the past 120 years, it is perhaps not surprising that it is only in the past decade or so that we have seen a conscious move away from the import of the North American model, towards a high rise expression which is rooted to the setting; design

inspired by the physical, environmental, cultural and/or philosophical climate of the 'local' as opposed to the 'global'. Now, in small pockets of creativity around the world, we are seeing exciting developments of 'local' skyscrapers – with much more diversity in the genre as a result.

It is perhaps not surprising that it is the regions that have more recently adopted the tall building typology, unshackled by the constraints of the past, that are leading this quest for a more relevant high rise expression. In regions such as Asia and the Middle East, architects and philosophers are looking at local parameters to inform their tall buildings, increasingly rejecting the exports of the west, with exciting and inspiring results (*Abel 2003*).

But where does this leave the West? Where does this leave countries such as the UK, which were not pioneers of the tall building movement and yet have blindly imported the American model? Where does it leave America who, in the quest to re-build the World Trade Centre in New York, have rejected the most exciting design approaches (*Protech 2002*) to select from the competition process a project by Daniel Libeskind which relies heavily on non-relevant abstractism and nostalgia. As if this wasn't disturbing enough, it now seems that even these ideas will become watered down by commercial realism (*Blacker 2003*).

Currently, the UK stands at a cross-roads in high rise development. Without many tall buildings of significant design quality in the capital, it is yet to convince a sceptical public of the need for them. Whilst controversy rages about the pros and cons of building over ten stories in height, we are in danger of once again closing the door to tall buildings. It is only in widening the debate – with the ultimate aim of creating inspiring tall buildings which both cities and their inhabitants can relate to – that our urban centres can become enriched by tall buildings.

6.0 Acknowledgements

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Fig.1	Building as Billboard	Konstantinos Evangelou
Fig.2	Urban Axes	Julien McGuiness
Fig.3	Building as Frame	Annette Ward
Figs.4	Sun Splice	Tom Pickford
Figs.5-6	Wind Tower	Simon Mok
Figs.7-9	Shell and Core	Eva Young

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