

Green architecture in Hong Kong towards a sustainable future with Verbena Heights

Citation for published version (APA):

Jonge, de, S. (2000). Green architecture in Hong Kong towards a sustainable future with Verbena Heights. In C. Boonstra, R. Rovers, & S. Pauwels (Eds.), *Sustainable Building 2000, 22-25 October 2000, Maastricht, The Netherlands: proceedings* (pp. 350-352). Aeneas Publishers.

Document status and date:

Published: 01/01/2000

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

GREEN ARCHITECTURE IN HONG KONG TOWARDS A SUSTAINABLE FUTURE WITH VERBENA HEIGHTS

Sander de Jonge, MSc.
Eindhoven University of Technology
PO Box 513, 5600 MB Eindhoven, The Netherlands

350



*Courtyards and large canopies
in building mass*

*General overview of building complex and
surroundings*

*View from pavement at wind
deflector at main roadside*

INTRODUCTION

In Hong Kong there is a serious conflict between the possibilities of consumption and the limits of growth (Planning Department 1994/1998, Citizens 1998, EPD 1999, Study 1998, White Paper 1998). The conflict should stimulate architects to consider sustainable building as an integral aspect of building in Hong Kong. That's why this paper focuses on the following two questions. What is the state of the art of sustainable building in Hong Kong and what are its future chances?

To answer this question, I will analyse the high-rise blocks of *Verbena Heights* (Anthony Ng Architect for the Hong Kong Housing Society in Tseung Kwan O) as a case of contemporary *best practice* of sustainable building in Hong Kong. The case is considerably chosen after a general overview was given on Hong Kong's best-known sustainable building projects and is put in a broad context of sustainability in Hong Kong. The aim of the research is to create a better understanding of approach, level, category and impact of measures undertaken to reduce environmental loads. Data for the case was collected by means of a literature search, field-research and interviews.¹

The results indicate that the technical level of measures to reduce environmental pressure is rather high and comparable with Dutch examples of sustainable building. Therefore, sustainable building in Hong Kong doesn't appear to be a technical problem, but rather a socio-economic and cultural problem.

Chances for refined sustainability are to develop a broad integral vision on building and leave pragmatic solutions to specific problems. Other chances are the government's stimulation of sustainable research and building regulations, joining knowledge and experience of sustainable building and the co-operation between those who are involved. Barriers might be the public awareness of necessity of a sustainable approach and a strong confidence in the economy of consumer society.

PRESENTING VERBENA HEIGHTS

¹ For literature, see list of references. The field-research consisted of two visits at daytime of three hours each, in which district and direct neighbourhood of Tseun Kwan O as well as exterior and interior of the blocks were analysed. Interviews with experts and designers (see list of references) provided more profound and background knowledge.

Introduction

The high rise housing in Tseung Kwan O was developed by the Hong Kong Housing Society, to provide appropriate, high quality and environmental friendly but affordable apartments. At the newly reclaimed land of 21.000 sq. meters, a total gross floor area of 140.000 sq. meters was planned for domestic accommodation and 6.000 sq. meters as (semi-) public space. This means a total number of 3000 flats or approximately 8000 people, resulting in an average of 17.5 sq. meters per capita or 45 sq. meters per flat with averagely 2.6 dwellers. The flats consist of three types: 1-, 2- or 3-bedroom apartments with kitchen and bathroom with a gross floor area of respectively 15, 22 and 30 sq. meters (rental flats) or 40, 55 and 65 sq. meters (saleable flats). The new housing estate should furthermore integrate shops, market stalls, social welfare centres, nursery, kindergarten and communal recreational areas for local self-sufficiency.

Verbena Heights is located in the south east of the New Territories in a dense populated area, which is concentrated in strips between green hills and connected with the rest of the city. This causes a few problems. Busy highways run along the blocks. Because of its specific geographical location, strong winds or (ordinary) typhoons are amplified and can cause serious inconvenience and problems. Due to the sub-tropical climate, with hot and humid summers, heating up of dwellings is another problem. In summer, afternoon day temperatures often exceed 31 °C, whereas night temperature is normally 26°. A last characteristic is that the project is part of a new planned district, starting in 1993 with a population of 127.000, which will reach a total of 400.000 in 2010.

Design principles and characteristics

The design differs from Hong Kong's standard configuration of 'pencil' blocks, in which apartments encircle a central space for vertical transport. Instead, the flats in Verbena Heights have a linear composition of corridors, enclosed with apartments. These apartments are arranged around three central courtyards and above a podium, which contains a variety of communal facilities as social welfare, recreational green areas, a kindergarten, a day nursery, a children & youth centre, a social centre for the elderly and retail. The podium aims to encourage social interaction and community spirit and consists of a few levels. These levels are reached by a multi-level pedestrian system. This system can be reached by a limited number of main entrances to the site. Motor vehicles use the U-shaped roadway at ground level that penetrates the site and ends in a car park below the podium.

Ecological aspects

When reviewing Verbena Heights on environmental aspects, we focus on the themes and method of approach. The case shows different themes on which is focussed: 1) energy, 2) noise, 3) building material, 4) water, 5) wind and 6) waste treatment. With respect to **energy**, the designers strive for a reduction of energy by using 'passive', natural systems on which the building shape and lay out are based.. Natural ventilation and shading are used to reduce energy consumption for cooling. Natural ventilation is optimised through a mounting building height (or 'steps') in the wind direction, strategic apertures in the building mass that increases the permeability of the whole block and finally by a linear building layout instead of a crossed layout so that more facades are exposed to air movement. Shading is achieved by 'interblock' shading, orientation of the blocks in relation to the sun as well as using horizontal shading devices above windows and vertical devices hanging in front of the façade. Alternative sources as solar water heating, wind turbines and photovoltaic cells were found too expensive and space consuming to implement.

With respect to **noise**, the designers focussed on reducing the effect of noise by placing noise barriers at street level and acoustic screens above windows. The screens have a dual purpose: awning and noise mitigation. The second measure is adjusting the building mass to escape from zones where noise levels are inevitably high.

With respect to **building materials**, local or regional products were chosen as much as possible, in order to save transport energy. Examples are the local-made ceramic tiles and Chinese granite

surfaces. Besides transport, other criteria have been developed in order to choose building materials. These were: 1) low embodied energy, 2) sustainable sources, 3) recycled contents, 4) durable, 5) recyclable and 6) CFC free. Choices are not made on Life-Cycle Assessments and most recommendations could not be implemented because of high prices. Furthermore, the designers analysed the possibility to reduce the consumption of **potable water** by using sea water for flushing the toilets. It would have reduced total consumption with 30%, but was considered impossible, because some parts of the New Territories are not (yet) provided with seawater infrastructure. The alternative was low-flush (7,5 l) water closets, instead of the normal 9-14 l closets.

With respect to **strong winds**, effects of *channelling*, *funnelling* and *downwash* are minimised by placing large *canopies* and wind *deflectors* at strategic points. The comfort at pedestrian zones should be improved by these means. According to the designers, comfort and well-being are also increased by vegetation in communal spaces and on surfaces such as the inner court and the façade. Lastly, the designers concentrated on **waste treatment**. Domestic solid waste and construction waste are Hong Kong's two largest waste streams. A cradle-to-grave approach is proposed to reduce stress on landfills. For the recycling of household solid waste, litter bins are placed at appropriate locations. The inhabitants are supposed to separate their waste in four sections: paper, plastics, aluminium and glass.

CONCLUSIONS

Further steps towards sustainability

The green concepts presented above mean a serious step towards sustainable building. Although, *themes* and *strategies* in green design, related to every *stage* of the building process, could be further developed and *researched* in relation to the typical Hong Kong context of culture, geography, technology, climate and psychology. This research could develop checklists and systems for the environmental assessment of city planning, buildings, systems and products, as a tool for designers of green design.

Other chances to stimulate green design in Hong Kong are to 1) focus on experiments of new practices and ideas resulting in extraordinary examples of best practice in green building, 2) consider specific Hong Kong sustainable aspects and develop specific visions on aspects like the relationship between building in high densities and private personal space, the relation between high-rise building and human scale or built environment and green spaces, 3) generate possibilities to subsidise green architecture, 4) develop ideal, utopian views on sustainability in relation to the far future besides practical green solutions, 5) explore new ways of expressing green architecture. Lastly it should be emphasised that the main barrier towards green Hong Kong architecture is the absence of a conscious approach to life as a whole. It is not only the partial solution that counts, but also the necessity of a broad and integral approach to the building task, which is beyond pragmatic solutions, considering the whole life cycle of the building, all relevant themes and all possible relations.

REFERENCES

- (NG 1997) NG, A. & WONG, K.S. (1997): Sustainable Housing Design in Hong Kong. Verbena Heights (TKO Area 19B) and Beyond, *HKIA Journal* 9 (2): 56-65.
- (CUHK 1995) The Chinese University of Hong Kong: 'Eco-Design of High Rise Housing in Tseung Kwan O' (<http://www.arch.cuhk.edu.hk/conference95/tko/team.htm>).
- (Citizens 1998) Citizens Party (1998): *Building Better, Building Greener* (Hong Kong).
- (White Paper 1998) Planning, Environment & Land Branch (1998): *Fourth Review of Progress on the 1989 White Paper on the Environment*, Hong Kong (<http://www.pelb.wpelb.gov.hk/fourth>).
- (Study 1998) Planning, Environment & Lands Bureau (1998): *Study on Sustainable Development for the 21st Century*, Hong Kong (<http://www.info.gov.hk/planning/susdev>).