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# The Tropical Skyscraper: Social Sustainability in High Urban Density

## 热带摩天楼: 高密度都市中的社会可持续性



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### Abstract

Asia's rapidly growing metropolises demand an alternative strategy for city planning and architecture that addresses the need to live appropriately and sustainably with our tropical climate and urban densities. This paper discusses WOHA's design approach in creating progressive, sustainable and humane environments that propagate a high quality of dense urban living in the tropics. Using (built and un-built) examples of the firm's institutional and public housing projects, these strategies involve devising (1) "Club Sandwich" typologies that radically organize programs of diverse natures into distinct, self-sustaining strata each with their own unique quality and character, and then synergize these varied strata into innovative high-density, high-/buildings designed for the tropics; and (2) "Vertical Village" models that foster community spirit by strategically forming urban clusters and weaving informal spaces along daily routes to encourage social bonding and interaction, good neighborliness, mutual care and watchfulness, a sense of shared ownership, belonging and pride.

**Keywords: Tropical, Community, Sustainability, Liveability, High Density, 3D Urban Planning**

### 摘要

亚洲的高速都市化对城市规划和建筑提出了新的策略需求，凸显了在热带气候和都市密度的一种适宜且可持续的生活方式的必要性。这篇文章阐述了WOHA在创造渐进的，可持续的和人性化的高质量高密度热带环境中所运用的设计手法。通过列举事务所的公共建筑和公共住宅项目（包含建成和未建成）展现了以下的手法：（1）“俱乐部三明治”原型，激进地将各种不同性质的功能分类到相互独立的有着独有性质和特征的层次中，再将这些不同的层次协同到一个具有创新意义的高密度热带摩天楼中；（2）增强社区性的“垂直村落”模型，通过策略性地组织都市聚落和在日常路线上编织进更多的非正式空间，能够增进社会融合与交互，良好的邻里感，相互关爱和照料，共有的主人翁精神，归属感和自豪感。

**关键词：热带的，社区，可持续性，宜居性，高密度，3D城市规划**

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**Wong Mun Summ** is the joint Founding Director of WOHA, an internationally-acclaimed architectural practice in Singapore. WOHA received the 2007 Aga Khan Award for Architecture for their first tropical high-rise tower, 1 Moulmein Rise in Singapore and garnered 4 World Building titles in 2 consecutive World Architecture Festivals in 2009 and 2010.

Wong Mun Summ是世界知名的新加坡建筑公司WOHA的联合创始人。WOHA的第一个高层建筑设计1 Moulmein Rise为他们赢得了2007年的阿卡汗建筑奖，在2009年和2010年又在两个后续的世界建筑节中获得了4个世界建筑的称号。

**Richard Hassell** is the co-Founding Director of WOHA. He graduated from the University of Western Australia in 1989, and was awarded a Master of Architecture degree from RMIT University, Melbourne, in 2002. He has lectured at universities around the world, and served as a Professor at the University of Technology Sydney, and the University of Western Australia.

Richard Hassell是世界知名的新加坡建筑公司WOHA的联合创始人之一，他1989年毕业于西澳大利亚大学，在2002年被墨尔本RMIT大学授予建筑学硕士学位。他在世界各地的大学发表过演讲，并出任悉尼科技大学，西澳大学的教授。

**Alina Yeo** has been associated with WOHA for the past 12 years and completed her Master of Architecture in 2005 from the National University of Singapore. Alina's portfolio encompasses design and project management of a variety of projects including institutional and high-rise condominiums. She was instrumental in the design of the award-winning School of the Arts, a pre-tertiary institution located at the heart of Singapore's civic district.

Alina Yeo在过去的12年里作为公司合伙人一直在WOHA工作，她于2005年在新加坡国立大学获得建筑学硕士学位。Alina的作品集跨越了从公共建筑到高层公寓不同项目的设计和项目管理。他曾经参与过一个位于新加坡核心区提供的提供基础教育艺术学校的设计并获得了奖项。

Expanding at an unprecedented rate. Asia's rapidly growing metropolises urgently demand alternative strategies for city planning and architecture that address the need to live appropriately and sustainably with our tropical climate and population densities. Working in 21st Century Asia, WOHA has spent the past 20 years investigating holistic urban planning and architectural solutions undergirded with a strong socially and environmentally sustainable vision in order to create highly dense yet highly liveable vertical cities in the tropics. This paper discusses the design approaches adopted in WOHA's institutional and public housing projects that demonstrate a paradigm shift: from piecemeal initiatives to integrated infrastructures; from 2D mono-use land parcellation to 3D multi-use program stratification; from hermetically sealed structures to breathable, verdant towers; from the hardware of urbanity to the heartware of community.

亚洲的都市化正在以一种空前的速度进行着，这对城市规划和建筑设计提出了迫切的新战略需求，并期待着一种在热带气候和都市密度下的适宜且可持续的生活方式。立足21世纪的亚洲，WOHA在过去的二十年里致力于进行整体性的城市规划和建筑设计，加强社会层面和环境层面的可持续性从而创造出一种高密度的热带宜居垂直城市。论文讨论了WOHA在办公建筑和公共住宅项目中采取的设计手法上的模式转变：从微小的设想转变为一体化的基础设施；从二维单一功能的用地分区到三维多用途的功能层化；从密封内化的结构到可呼吸的绿色塔楼；从都市的硬件到社区情怀。

### 热带都市社区建筑组团

从热带的传统生活方式中获取灵感，WOHA在乡土村落中社会场所的模式和被动式通风策略里提取出设计的脉络。通常而言，矗立在道路交叉口的棵大树与周边的一小块绿地会成为社交和仪式的中心。WOHA发现居民们会自发地聚集在大树树荫之下，不同规模的社交和互动就

## Tropical Urban Community Building Blocks

Drawing inspiration from traditional ways of life in the tropics, WOHA took design cues from the vernacular village's socio-spatial patterns and passive ventilation strategies. Typically, a large tree located at crossroads served as the social center for ceremonies, in conjunction with an adjacent village green. WOHA observed that communities naturally gathered under the tree's day-long protective shade, and that social interaction at various scales occurred spontaneously along daily routes. Areas with good visual connectivity promoted a sense of informal community surveillance and shared ownership, which improved safety and responsibility for its upkeep, while vibrancy and dynamism were generated by the diversity activities for all ages in spaces that physically extended invitations to people to participate or to observe. These foundational principles for making places that foster friendship bonds, forge collective memories and promote social opportunities, together with a keen design sensitivity to human scale and thermal comfort, shape the "Tropical Urban Community Spaces" found across WOHA's works.

### "Club Sandwich" Typology

Using the metaphor of a "Club Sandwich" with its multi-layered effect, the following four institutional projects demonstrate WOHA's radical approach of organizing programs of diverse natures into distinct, self-sustaining strata each with their own unique quality and character, and then synergizing these varied strata into innovative high-density, high-amenity building typologies designed for the tropics. This not only results in richness and diversity of cross-programming, but also minimizes the building's footprint, opens up the ground level for activity generators/landscaping and maximizes areas for facilities by considering the ground plane as an essential, duplicable layer of the city that can be replicated at strategic horizons within and between buildings in the sky.

#### School of the Arts, Singapore (SOTA)

In SOTA, WOHA's strategy was to horizontally organize the school its dual constituent parts – private academic spaces upon a pedestal of public performing art theatres – with dynamic visual links and secured physical connections across both strata. (Figure 1) Against this backdrop, the school communicates with the wider community. A high volume, naturally-ventilated public concourse designed around an urban short-cut allows the public to see the activities of the school, and students to observe the happenings of the city. WOHA's creation of a covered yet breezy civic amphitheater plaza at the corner junction of the site, under the shade of extended cantilevers and conserved trees, has also become a highly popular urban rendezvous.

The scarcity of prime land meant that a typical playing field at grade was not feasible. Instead, a Student Assembly datum and a recreational Rooftop Skypark incorporating a 400m running track were inserted as new elevated ground levels in the sky, with their large footprints spread out like giant "Urban Umbrellas" shading and sheltering the public concourse, urban plaza and academic spaces below. This canopy effect, combined with breezeways in-between blocks, was designed for optimum human comfort that is naturally conducive for congregation. The building effectively becomes a "Machine for Wind", channeling and intensifying Singapore's very light breezes through its social spaces to provide a delightful and safe environment for children to learn and play in the inner city. The academic floors are layered and staggered to encourage diagonal air movement and dynamic visual sightlines across the different levels, with pockets of sky gardens, link

会在人们日常的路径周边产生。视野比较通达的区域更容易增进社区照料感和共享感，使得这片区域更为安全和也更容易被管理。空间中不同年龄段的人们各式各样的行为带来了生机和活力，吸引着其他人们前来加入或者围观。这些在场所构筑中激发情感联结，增进集体记忆和促进社交活动的基本原则，和一种对于尺度和热舒适性热切的敏感性结合在一起，构建出贯穿WOHA作品中的“热带都市社区空间”。

### "俱乐部三明治"原型

用“俱乐部三明治”来比喻一种多层叠合效应，下文介绍的四个公共建筑中展现出WOHA激进地设计手法，将各种不同的功能分配到相互独立的有着独有性质和特征的楼层中，再将这些不同的楼层整合到一个极具创意的高密度，高舒适性的热带建筑类型中。通过这样的功能混合不仅获得更大的丰富性和多样性，并且减小了建筑的占地面积，将地面层开放给公共活动和景观绿化，还将通过将地平面看作一个重要的可以复制的城市表层在建筑和天空之间战略性的延伸，从而达到可提供给设施的面积最大化。

#### 新加坡艺术学校 (SOTA)

在新加坡艺术学校这个项目中，WOHA的策略是将建筑分置到两个水平叠加的体量中，较为私密的学术空间被放置在由公众艺术表演剧院形成的基座之上，各部分之间有动态的视觉联系和连廊联结起来。(见图1)在这样的背景下，学校与周边的社区之间产生了对话。一条穿越建筑的向城市开放的路径旁边有一个高敞而有自然通风的公共区域，使得公众得以一瞥学校内发生的活动，也给予学生感知城市活动的机会。WOHA在建筑一角的交叉口处设计了一个在深远出挑和保留树木之下形成了通风阴凉的露天剧场，从而形成了一个非常受欢迎的都市集会地。

紧张的建筑用地意味着要提供符合标准的运动场是不可行的。于是，一个包括学生集会地和一个400米跑道的屋顶花园被放到了抬升到空中的新场地层上，运动场的巨大底面的边缘延伸出去，如同一把巨型的“都市雨伞”，为下面的公共区域，城市广场和学术空间提供遮蔽和阴凉。这种遮蔽效应和建筑体块之间阵阵清风一起，优化了人体热舒适性，自然而然有利于更多的集会。建筑成为了一个有效的“风捕捉器”，为社交空间捕捉和加强新加坡非常小的环境风，为孩童提供了一个在城市中心区域玩耍嬉戏的愉悦而安全的环境。教育部分的楼层层叠错落，插入一个个空中花园，连廊和联系各个体块楼层间的大尺度交通楼梯，以便引入更多对角穿越的风，在不同的楼层之间产生更加动态的视觉联系，鼓励学生之间更多自发的交流与合作。(见图2)环境稳固，明亮并有习习微风，绿色植物织成的绿墙为其遮阳，为紧张的一天提供一个休憩沉思的好去处。



Figure 1. Two distinct strata of SOTA with conserved trees and cantilevers shading a tropical amphitheater plaza

图1. SOTA的两个不同的体量，一个在保留树木和建筑出挑遮蔽之下的露天剧场



bridges and broad circulation stairways connecting the blocks and levels together, encouraging spontaneous exchange and collaboration between students. (Figure 2) The environment is robust, bright and breezy, shaded by walls of living green that offer pause points of inspiration en route daily routines.

### BRAC University (Bangladesh, Dhaka)

WOHA further developed this “Club Sandwich” typology in the design of BRAC University in Dhaka, possibly the fastest growing and densest city in the world. Located partly over an urban lake site, the 10,000 student, high-density campus interfaces with the city’s business district at its entrance, but is encompassed by a shanty residential neighborhood on other sides. The algae-filled lake is presently a waste receptacle of the district. By lifting the Academia and spreading it out as a raised canopy of learning, the water body below can be converted into a bio-retention pond, beautified with native landscaping and transformed into the very heart and social nucleus of both the campus and the wider neighborhood. (Figure 3) To create a vibrant, memorable and imaginable milieu, this publicly accessible “Campus Park” will be activated by a breezy, buzzy lakeside promenade peppered with outdoor bistros and mini jetties, linking the student hostels, guest houses, sports hall, auditorium, and other community facilities under the “Urban Umbrella” of the Academia. (Figure 4) As with SOTA, a rooftop University Green will offer students an extensive recreational play field in the sky, large enough to accommodate a cricket pitch, swimming pool and a 450m running track. WOHA’s ultimate vision is for BRAC University to become the catalyst for gentrification of the estate and an agent for change that will build up camaraderie in the community and pride/morale of its people through the enhancement of their immediate built environment and the provision of an exemplary tropical model of environmental and social sustainability in Dhaka.



Figure 2. Social interaction spaces in SOTA's breezeways  
图2. SOTA风廊旁边的社会交流空间

### BRAC大学 (孟加拉国, 达卡)

达卡或许是世界上发展最快密度最高的城市, WOHA在这里的BRAC大学校区设计中进一步的推进了“俱乐部三明治”这一设计手法。基地一部分原是一个城市湖。这个容纳10000名学生的高密度校园在入口处与城市商业区相邻, 其他方向则被破落的住区围绕。满是绿藻的湖是周边污水的排放处。通过将教育功能抬升并作为一个学术穹顶一般延伸出去, 下方的水体转换成为一个自我循环的生态体系, 用本土的景观元素美化, 将其变成一个校园和周边社区的一个活动中心。(见图3) 为了营造出一个充满活力, 令人难忘的如画环境, 这个向公众开放的“校区公园”中穿插了微风习习的湖滨步行道, 其间散落着室外茶座和小型堤岸, 联系了学生宿舍, 迎宾馆, 运动场馆, 报告厅以及其他在“都市伞”下的教育和社区设施。(见图4) 和SOTA一样, 大学的屋顶花园能够为学生提供一个空中宽敞的休闲运动场所, 其中包括了一个板球场, 一个游泳池和一个450米的跑道。WOHA对于BRAC大学这个项目的最终愿景是希望它能够成为街区优化的触媒和一个建立社区情谊和构建人民自豪感的媒介, 提升了建成环境的质量, 并为达卡提供了一个适应热带模型以及实现环境和社会可持续性的模范建筑。

### 新加坡科技设计大学 (SUTD), 未建成

将建筑与景观整合到一个“筑景”中去的想法在WOHA入围SUTD运动与住宅设计竞赛的方案中得以展现。“俱乐部三明治”形式的中学生宿舍这个功能被构想成一个相互联结的有机网络, 散布在运动和休闲功能形成的室内外穿插, 起伏绵延的“活动地景”之上, (见图5) 为了降低热辐射吸收量和增强自然通风, 建筑体块的朝向顺应主导风向, 建筑体形利于风由架空的空间下部穿越地块。由上部的“开敞穹顶”提供的遮盖和风流创造了一个愉悦、舒适和适应热带气候的环境, 使得学生社区生活更加繁荣。



Figure 3. Academia of BRAC lifted over the urban lake site  
图3. BRAC学院浮于城市池塘之上。



Figure 4. View of the “Campus Park” at the heart of BRAC and its neighborhood  
图4. BRAC中心的“校区公园”及周边景象



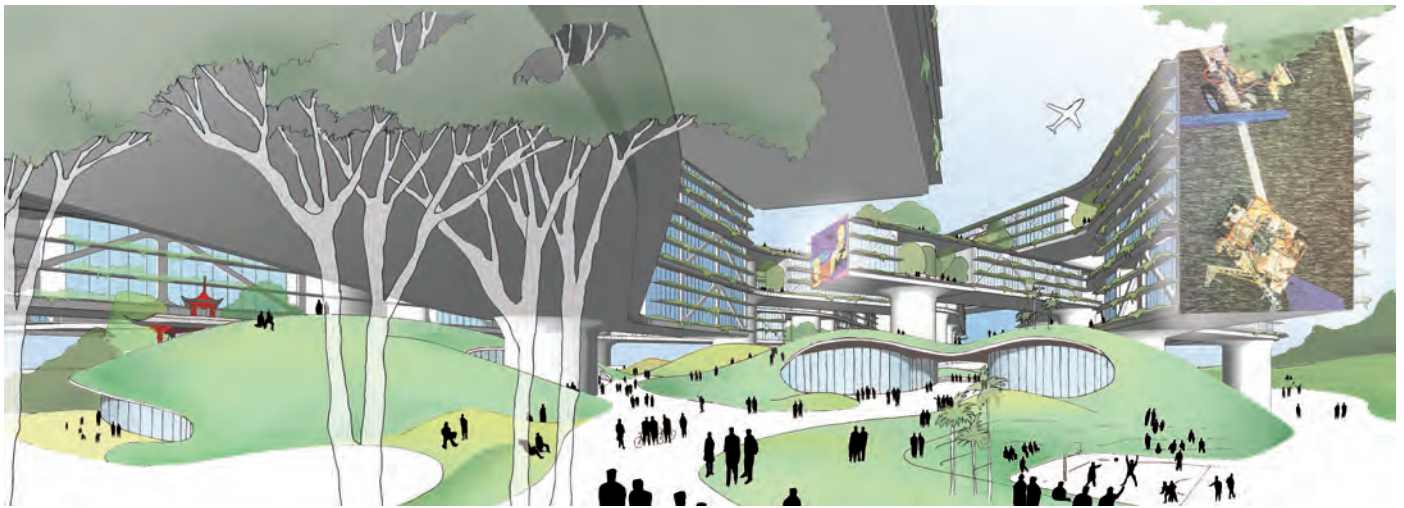


Figure 5. SUTD's Student housing "Breezeway Canopies" above the recreational "Activity Terrain"

图5. SUTD的学生宿舍区“活动地景”之上的“开敞穹顶”

### Singapore University of Technology and Design (SUTD), Unbuilt

This idea of synergizing both architecture and landscape into an "archiscape" was also explored in WOHA's sports and housing competition entry for SUTD, where "Club Sandwich" layers of student accommodation blocks were envisaged as an organic network of interconnected branches spread over an undulating sports and recreational "Activity Terrain" crafted as an indoor/outdoor, contoured, sculpted landform (Figure 5). To minimize solar heat gain and maximize natural ventilation, the housing blocks ends were orientated and shaped to direct the prevailing winds through the site and under the elevated blocks. This combination of wind and shade offered by the secure upper "Breezeway Canopies" was designed to create a delightful, comfortable and conducive tropical environment below for student community life to flourish.

### Tampines Town Hub (Singapore), Unbuilt

In SUTD, the sports stadium formed part of the "Activity Terrain" on the ground level. An inverse scheme was subsequently tested in WOHA's competition entry for the Tampines Town Hub, a one-stop community service center. By lifting the sports stadium to the roof and placing the commercial and civic facilities below, this "Club Sandwich" combination effectively reduced the site coverage by half. (Figure 6) The approach not only minimized the building's footprint but also formed a cover over the development for activity generating uses while opening up the ground level space as an uninterrupted, visually porous pedestrianized plane that physically connects and adds to the neighboring (existing) linear park. By merging the elements of park, plaza and people, a "Community Town Green" that encapsulates the dual ideas of a "Village Green" and an urban "Town Square" could be planted at the heart of this mature public housing estate. This was framed by a row of aerodynamically shaped blocks designed as wind funnels to channel breezes between the building, making up the comfortable tropical "Breezeway Atriums" at ground level. Each "Breezeway Atrium" was designed to have a street-like quality and bazaar atmosphere, with an overlooking courtyard effect that contributed to a lively and vibrant tropical town square.

### "Vertical Village" Typology

At its core, the most basic building block of community is the family unit. It was only one generation ago that Singaporeans lived in traditional villages (kampung), which was the epitome of good

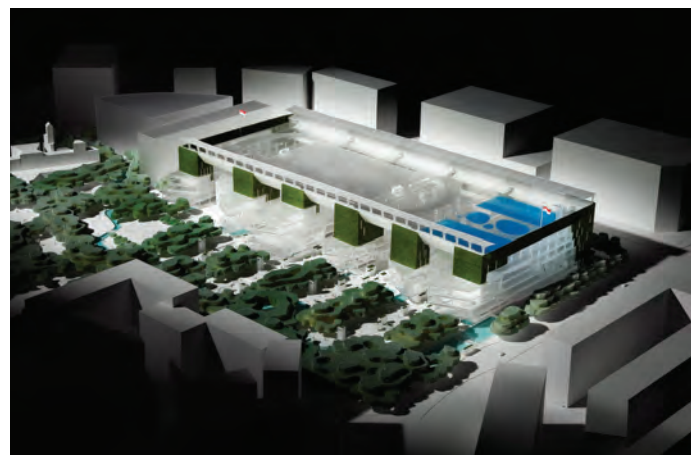


Figure 6. Tampines Town Hub's Sports stadium over the "Breezeway Atria" that flows into the existing Linear Park

图6. 淡滨尼城镇中心的运动场位于与现有线性公园相连接的“风中庭”之上

### 淡滨尼城镇中心 (新加坡), 未建成

在SUTD中, 运动场馆形成了“活动地景”在地平层。WOHA入围淡滨尼城镇中心这个一站式社区服务中心的设计里采用了恰恰相反的策略。通过将运动场放到屋顶上, 而将商业和市政设施放在下面, 这个“俱乐部三明治”有效地将建筑覆盖率减小了一半。(见图6) 这样不仅仅使建筑占地最小化, 还能为活动的开展提供遮盖, 地面空间敞开成为一个连续无阻碍的, 视觉上通透的步行层, 连接和扩展了周边(现有的)线性公园空间。通过融合公园、广场和人群, 一个既达到“乡村的绿色”又实现了“城市的广场”的“社区绿城”被植入到这个成熟的公租房区域。通过一排依据空气动力学塑形的建筑体块形成的风廊给建筑中导入轻风, 在地面层形成一个舒服的热带“风中庭”。每个“风中庭”引入了街道感的设计和市场的氛围, 通过被环视的庭院效应来构建出一个生机勃勃的热带城镇广场。

### "垂直村落"原型

在城市的核心部分, 最基本的社区建筑组团是家庭单元。仅在这一代人之前, 新加坡人还居住在象征着友好睦邻、彼此关爱互助的传统村落里。如今, 85%的新加坡人居住在高密度的公共住房中, 在当代城市现代高层居住的文脉背景下, 社区的概念已经被严重削弱了。通过以下三个设计方案, WOHA认为公共住宅不应该仅仅作为资助性私人住宅而存在。想要在发达社会中存有意义, 公共住房必须能够体现清晰的社会目标和强大的社区目的, 包括鼓励互助和分享, 培养社交网络, 防止都市疏离感, 实现孤立住宅所无法达到的愿景。

neighborliness, mutual care and help. Today, approximately 85% of Singaporeans live in highly dense public housing, and the notion of community has largely eroded in the contemporary and urban context of modern high-rise living. Through the following three design proposals, WOHA advocates that public housing needs to be more than subsidized private housing. To remain relevant in developed society, public housing must have clear social goals and a strong community agenda that includes encouraging caring and sharing, fostering social networks and preventing urban alienation, achieving ideals that the private sector will not embrace.

### Duxton Plains Public Housing Competition (Singapore), Unbuilt

WOHA's participation in the 1999 Duxton Plains Public Housing competition for seven 50-story towers led to a thorough exploration of high density living. The design investigated several scales of interaction for social bonding and building community spirit. WOHA proposed that the way to go bigger was to get smaller, and a "Vertical Village" typology made up of a system of "Sky Villages" was devised, where sub-clusters of homes were linked by covered "Sky Streets", which led residents from their local village lifts (serving individual clusters) to the common high speed lifts that brought them down to street level (Figure 7). The project also investigated scale in high-rise buildings and adopted the fine historic proportion of Chinatown's streets into the large development by introducing "Sky Parks" or community gardens for recreation, socializing and resting at 5-story intervals to avoid the feeling of inhumane vertical slots between the blocks. In using the "Sky Streets" and "Sky Parks" daily, residents would be brought into contact with each other in a natural way, encouraging community bonds to form in the pleasant, relaxed, social spaces, something which seldom happens in the tense compressed spaces of a typical lift or lobby.

### SkyVille@Dawson (Singapore)

WOHA subsequently had the opportunity to realize these ideas in SkyVille@Dawson, a 960-unit public housing development that WOHA sub-divided into 12 "Sky Villages", each an intimate cluster of 80 units over a height of 11 stories. (Figure 8) Every "Sky Village" is provided with a dedicated village green, which is a landscaped sky terrace with study areas, gathering spaces, playgrounds and community gardens within visual proximity from every apartment. These are overlooked by lift lobbies and common circulation spaces leading to each apartment, giving residents daily opportunities to meet and greet fellow villagers on their way to and from home while adding a layer of informal community surveillance and sense of shared ownership.

A myriad of other purposefully planned community spaces are also interspersed throughout the development and weaved into the fabric of the ordinary every day. These include the lofty, breezy "Community Living Rooms" at the base of each block, a Landscaped Park fronting the development, a Podium Roof Garden atop the multi-story car park and an Urban Plaza that is plugged as an activity node off the existing linear park. On the highest floor, the most privileged view that would have been exclusive to the richest individual in a private condominium is given over to the whole community. Called the "Penthouse for the People", this recreational rooftop park incorporates a 400m jogging track along stretches of viewing galleries and pavilions in the sky. WOHA also piloted a Flexi-Layout Scheme in SkyVille to address the evolving lifestyles/life cycles of the typical Singaporean family unit. As a future-proofing measure, the main space of the apartments are designed as structure-free, giving home owners full control and flexibility to adapt/modify the layout of their homes over time according to their changing family needs.

### 达士岭公共住房竞赛(新加坡), 未建成

WOHA于1999年参加设计7栋50层塔楼的达士岭公共住房的竞赛引发了对高密度居住的全面探讨。设计在几种不同的尺度上研究了社会联系与构建社区精神之间的互动作用。WOHA认为建筑趋大的方法是趋小,并且设计了一种由“空中村落”系统所组成的“垂直村落”原型——家庭的子群落被覆盖着的空中街道所联系,这使得居民从他们各自局部村落电梯(用来为个体群落服务)被引领到可以将他们引至街道层面的公共高速电梯(见图7)。项目同时也研究了高层建筑的尺度,在大型开发中采用悠久而杰出的唐人街街道比例,通过每5层一个间隔引入“空中公园”及社区花园提供娱乐、社交和休憩,避免由于建筑体块间垂直狭缝所带来的毫无人情味的感觉。在日常生活对“空中街道”和“空中公园”的使用中,居民们会产生更多自然状态下的相互交流,继而在一种令人愉悦、轻松的社会性空间里促进社区纽带的形成,这在典型的电梯或者前厅等紧张扁平的空间中是很少发生的。

### SkyVille@Dawson (新加坡)

随后WOHA在Dawson的SkyVille@Dawson项目中有了实现这些理念的机会。这是一个有960个单元的公共住房项目,WOHA将其进一步分解为12个“空中村落”,每一个都是由80个单元组成的超过11层的亲密聚落。(见图8)每一个“空中村落”都提供有一个专用的村落绿景,这是一个包含学习空间、集会空间、运动场和社区花园的空中景观露台。每一处公寓都能够看到这个露台,通往每个公寓的电梯间以及日常交通空间也能俯瞰这片绿色,给予居民们在离家或归家途中日常相遇和问候村落同伴的机会,同时增加了民间的社会照看和社区主人翁精神。

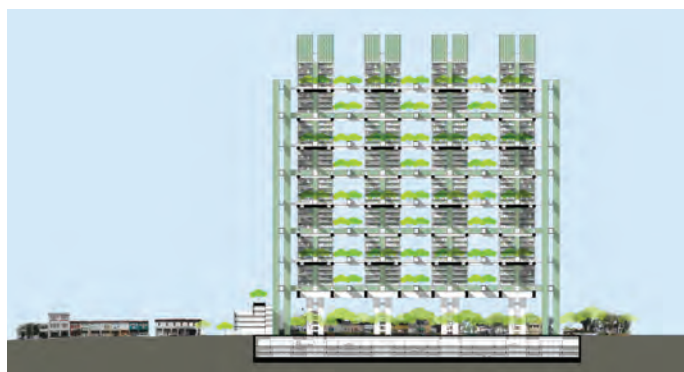


Figure 7. Duxton Plains "Sky Villages" comprised of "Sky Streets" and "Sky Parks"  
图7. 达士岭的“空中村落”由空中街道和空中花园组成



Figure 8. SkyVille@Dawson's "Sky Village" clusters of 80 homes at 11-story intervals  
图8. Dawson的“空中村落”是由11层80户的集群构成



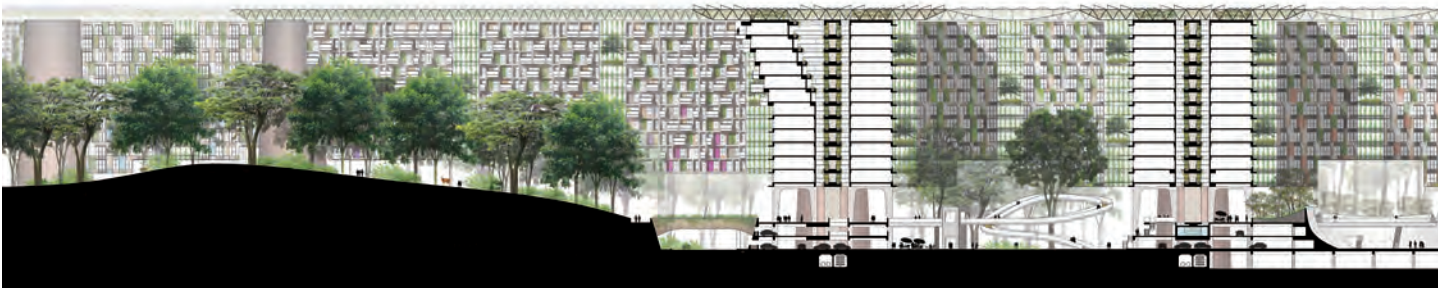


Figure 11. Four distinct “Forest” strata of the Integrated Town Master Plan  
图11. 整体化城镇设计中的四个自成体系的“雨林”层级

### Kampung Admiralty (Singapore)

Being one of the demographically oldest countries in the world, a unique kind of “Vertical Village” model has to be considered for Singapore’s seniors to gracefully age-in-place. The first of its kind locally, Kampung Admiralty is a flagship prototype public housing project that brings together a whole fleet of programs under one roof. Sited within a mature town and on prime land directly adjacent to the MRT station, the development is not intended to be an isolated senior cocoon. Rather, it is meant to serve as the new community heart of the whole estate by strengthening a collective identity through place-making and inter-generational social bonding encouraged by its invigorating mix of housing, medical, recreational, social and commercial programs.

WOHA’s proposal essentially returned to the “Club Sandwich” derivative, whereby the complementary programs are radically organized into an urban “Vertical Village” that comprises three visually connected distinct strata synergized into a fully integrated high-density/amenity complex. (Figure 9) The lower stratum features a fully public, pedestrianized and tropical “People’s Plaza” for community events and festive celebrations, made vibrant by a “Community Dining Room” (food center) that overlooks it, and is further supported by retail shops, a pharmacy and supermarket. Walking and cycling are also strongly encouraged by designing its ground level landscape to plug into the island-wide Park Connector Network and offering Singapore’s first underground bike storage facility. The plaza is fully shaded and sheltered by the large footprint of the mid stratum Specialist Medical Centre that spreads out horizontally like a tropical “Urban Umbrella” over two floors for more efficient patient circulation/flow. Medical consultation and waiting areas are intentionally made welcoming and informal. Organized around a large central courtyard, the internal air well serves to cool the plaza, while bringing daylight, natural ventilation, views/visual connectivity and a sense of focus and orientation into the center of the deep medical floor plan. (Figure 10) Senior residents needing medical attention can conveniently take the lift down to seek treatment.

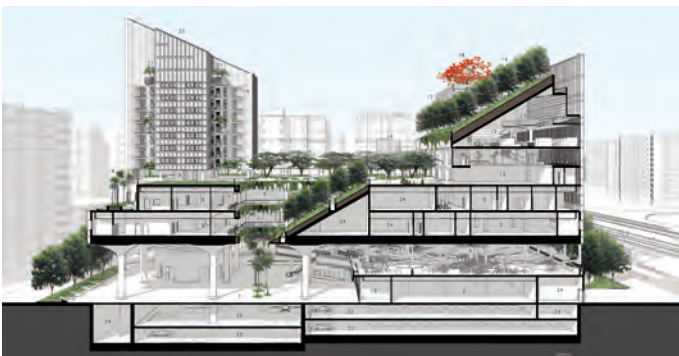


Figure 9. Three distinct strata of AID’s urban “Vertical Village”  
图9: AID的“垂直城市”中三个独立的层级

大量专门设计的社区空间散布整个项目之中，被编织入日常的各种活动中。比如，在每个楼栋底座高敞而凉风习习的“社区客厅”，朝向住宅的一个景观公园，多层停车场上的矮墙屋顶花园以及一个旁边的线状公园共同作为一个新的活动热点的都市广场。最顶层——一般在私人住区开发中会被最豪华的住宅独占的绝佳视野——在这里被整个社区共享。这个被称为“居民的顶层”包含了一个400米的慢跑道，串联起多个空中观景阁和景观亭。WOHA在空中城镇这个项目中也实验了“自由平面”设想，以便适应典型新加坡家庭的生活方式/成员构成的变化。公寓的主要空间结构上都是开放的，居民根据家庭的不同需求能够完全自由灵活地改变/调整住宅的布局。

### 海军部村庄 (新加坡)

作为人口统计学上世界上老龄化最严重的国家之一，“垂直村落”这种独特的模式被认为是新加坡老年人就地养老的一种可能性。这种模式在本地的第一个实例——海军部村庄就是一个将所有功能组合到一个屋檐下的旗舰性公共住房项目。位于一个成熟的小镇中，基地临近MRT车站。这个项目不想成为一个孤立的封闭老年社区的。反之，它将要成为这里的社区核心，通过场所的营造增强集体认同，通过住宅、医疗、娱乐、社交和商业功能充满活力的混合来提升不同年龄段居民之间的情谊连接。

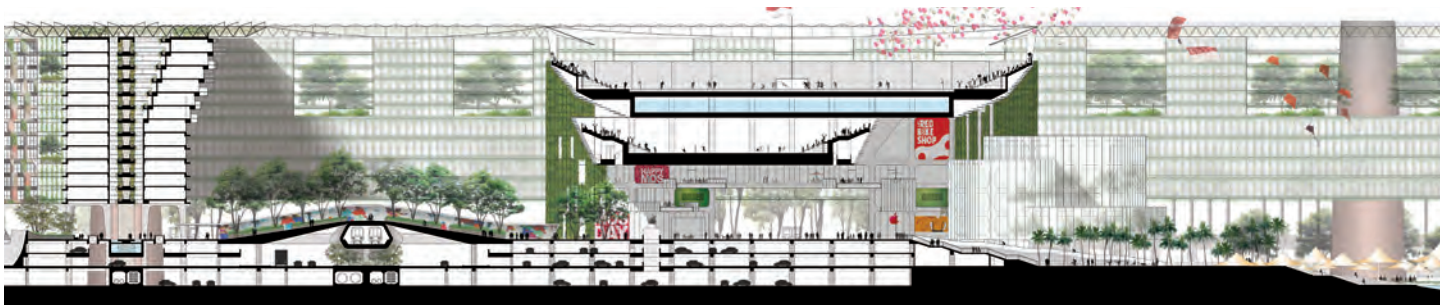
WOHA的构思本质上是“俱乐部三明治”的一种回归，辅助功能被激进地组织到一个“垂直村落”之中，由三个视线相连但各自独立的



Figure 10. View through AID’s medical center courtyard up to its Community Park and down to its People Plaza

图10: 从AID的医学中心的内庭院能够仰视社区公园，俯瞰居民广场





A new ground level in the sky is inserted at the top stratum, comprising a tranquil, more intimate elevated “Community Park” that brings young and old together with child and elder care services, rooftop farming on sky decks and studio apartments for seniors. This “Community Park” is the kampung village green, where residents and the larger community can actively come together. The bio-philic design not only provides seniors with visual and psychological relief, but also acoustically buffers noise from the passing MRT trains and harvests rainwater for irrigation. Altogether 104 senior studio apartments are provided in two point blocks. These are paired as “Buddy Units” that share sky gardens at their entrances to encourage neighborliness, mutual watchfulness and care. Future proofing is also in-built with flexibility for combining units or making internal modifications according to user needs.

### Tropical Urban Community (Future) Towns & Cities

WOHA further took up the challenge of extrapolating these ideas at a town and city scale in a recent study for an Integrated Town Master Plan, and at the 2011 Vertical Cities Asia Symposium. In both instances, 3D planning, which considers not just the horizontal parcels/programs of a town but also the vertical layers of a city, were taken into account.

#### Integrated Town Master Plan

Adopting the metaphor of a tropical rainforest with its multiple layers of stratification, each with its own ecosystem, WOHA conceived the integrated town as having four distinct but inter-connected strata, namely a “Forest Floor Ground Layer”, which is the services and vehicular zone of the town, overlaid by a “Forest Understory Layer”, which features an uninterrupted, pedestrianized “Community Terrain” raised 6m above vehicular grade. A “Canopy Dwelling Layer”, which elevates the level of residential habitation to better views and fresher air is raised above this tier, capped by a “Tropical Umbrella Emergent Layer” that stretches out as renewable energy farms above the housing blocks for the harvesting of solar energy, rainwater and Skyfield (urban farming) crops to power, shade, irrigate and feed the 100% zero energy town. (Figure 11) This town scale “Club Sandwich” model effectively frees up 50% the real ground level for landscaping at grade while offering a strategic way of segregating pedestrians from vehicles at the new ground level. The scale of activity on this extensive town-wide “Community Terrain” is completely humanized, with shaded, sheltered and seamless point-to-point connectivity under its “PV Parasol” to every part of town via a highly comprehensive network of walking paths, bicycle lanes and slow speed trams lines. The terrain also links up all the village greens across the town, each with its own unique blend of community hot spots. Co-sharing of community/institutional facilities and “Micro White Spaces” for residents are also envisioned within this stratum in the form of “Community Sheds” and “Community Precinct Pavilions”, which encourage a culture of creative exchange and enterprise.

楼层构成整合成一个高密度/文娱综合体。(见图9) 最下面一层是一个完全公共的适宜步行的热带“人民广场”，可供社区活动和节日庆典，一个“社区餐厅”(餐饮中心)俯瞰广场，带来更多活力，周边还有零售商店、药房和超市。通过将地面层的地景连接入覆盖新加坡全岛的公园带系统和提供新加坡第一个地下自行车停车场，这一切都极其鼓励步行和自行车骑行。位于中间层的专家医学中心在2层以上如同“都市伞”一般向外挑出，为广场提供遮阳和庇护，同时使病人流线更加高效。会诊室和候诊区设计得宜人而随意。建筑围绕一个巨大的中心庭院，这个内部的风井为广场降温，为进深很大的医疗部分带入日光、自然通风、视觉联系、聚焦感和方向感。(见图10) 老年居民在需要医疗关怀的时候，搭乘电梯即可很方便地下楼。

最上层是一个位于空中的新地面层，这是一个更为安静私密的空中“社区花园”。因为设有老年设施或孩童游乐设施，屋顶农场和老年活动室，男女老少聚集到这里。“社区花园”如同曾经村庄中能够聚集居民和社区活动的村口大树。这个生态设计不仅为老年人带来视觉和心理上的慰藉，也隔离了附近MRT站的噪音，还能够收集雨水用于灌溉。两栋楼汇总包含了104套老年公寓。若干套形成一个“伙伴单元”，共享门外的一个空中小花园，这样增进了邻里友谊，也能便于他们互相关注和照料。公寓之间的单元组合能灵活的改变，室内能够根据住户的不同需求进行改装，做好了未来变更的准备。

### 热带都市社区(未来)城镇和城市

WOHA在近期对于城镇总平面整体化的研究中，以及2011年的亚洲垂直城市研讨会中进一步地将这些想法推行到城镇和城市的尺度中。在两者中，三维规划不仅仅考虑城镇在水平向上的分区和规划，也同时关注城市在垂直方向上的叠加。

#### 整体化的城镇总体规划

热带雨林在垂直向上会分成数个自成系统的生态层，WOHA从这个现象中得到启发，设想出一个整体化的城镇规划——由四个各不相同但互相连接的“层”构成，首先是“森林地面层”，由镇区的运营功能和车行区域构成；然后是“森林地被层”，这是一个从地面抬升6米的步行化连续“社区地形”；“树冠住宅层”，这个层次是因抬高而获得了更好视野和更新鲜空气的住宅部分；“热带伞顶层”是位于住宅体块的上部的可持续能源农场，通过采集太阳能为城镇供能，收集雨水来灌溉，以及种植空中作物(都市农场)提供遮蔽和供给食物，从而实现城镇的100%零能耗。(见图11) 这是个扩大到城镇尺度的“俱乐部三明治”，它有效地将50%的地面层都解放给绿化景观，在策略上提供了一种新的方式，即将人行流线在一个新的地面层上与车行流线分离开来。全镇的“社区地形”提供人性化尺度的活动空间，“光伏发电伞”为之提供遮荫与庇护，通过步行道、自行车道和低速电车道的全覆盖，提供到镇区每个角落的无缝通达性。这片地形也连接了全镇的绿化空间，他们都拥



## Vertical Cities Asia

Expanding this to city scale, WOHA proposed a “Permeable Lattice City of the Future” based on a 1km<sup>2</sup> city grid with a population density of 111,111 people. Then using The Met – WOHA’s 66-story residential tower in Bangkok – as a basic module of a “City Column”, WOHA arranged these in a staggered alignment to create a high degree of perforation and porosity resulting in cross-ventilated breezeways at city scale, ensuring fresh air and natural daylighting reaches every part of the inner city. These “City Columns” free up the real ground level for nature reserves and heavy industries, and are held together structurally by a network of “City Conduits”. These conduits serve as elevated ground levels woven socially by layers of “City Community Spaces” and are vertically inter-connected by multi-cabin lifts and environmentally friendly horizontal people mover circulation systems that map out a fully pedestrianized city, entirely eliminating the need for cars above the real ground level. (Figure 12)

## Conclusion

Ultimately, these exercises in urban densities suggests that by forming layers of stacked “live-work-play” communities, introducing multiple elevated ground levels at strategic horizons that relieves the real (existing) ground level, creating openness and porosity between towers that facilitates cross-ventilation of fresh air and natural daylighting, crafting out varying scales of tropical community spaces that encourage social interaction, applying vertical greenery and designing sensitively for human scale, a super dense vertical city can be both highly sustainable and liveable, without compromising the quality of living, if such alternative strategies to city planning and architecture as they pertain to land use, urban spaces, community and vertical greenery are embraced.

有各自独特的社区热点空间。共享的社区/公共机构设施和居民们的“微型白空间”也以“社区棚”和“社区管辖亭”的形式被植入到这个层级中，增进了创意交流和发展的文化。

## 亚洲垂直城市

将这个扩展到城市的尺度上，WOHA设想了一种“未来的渗透性格子城市”，城市被划分为一个个1平方公里的容纳111,111个居民的网格单元。然后用The Met——WOHA在曼谷设计的66层高层住宅——作为一个基本的“城市之柱”模块。WOHA将这些模块错落落地排放在行列中，以便在城市尺度上达到一种多孔性，自然风得以穿越而过，在城市的内部各个部分都能得到新鲜空气和自然光照。“城市之柱”将真正的地面层解放给自然绿化和重型工业，在结构上通过“城市导管”网络相连接。这些导管充当了一个架起的平地层，与“城市社区空间”交织在一起，在垂直方向上通过多个电梯连接，环保的水平向人流流动线系统勾画出一个完全适宜步行的城市，使得在这个抬升的平地层面上完全不再需要使用汽车。（见图12）

## 结语

总而言之，这些针对都市密度的实践都佐证了一点：通过“居住-工作-游憩”层层堆积形成社区，在适宜的高度引入架高的新地面层从而解放真正（原有的）地面层，在塔楼之间形成开敞性和多孔性以便于自然通风，获得新鲜空气和自然采光，组建出能鼓励更多社交活动的不同尺度的热带社区空间，运用垂直绿化，关注人性化尺度，如果这些重视土地利用，都市空间，社区和垂直绿化的新的城市规划和建筑策略能够被加以运用，那么一个高密度的垂直城市依旧能够易于运营并且适宜居住。



Figure 12. “City Columns” of Live-Work-Play and Connective “City Conduits” of Vertical Cities Asia  
图12. 亚洲垂直城市中居住-工作-游憩的“城市之柱”和连接各处的“城市导管”