SPRINGER BRIEFS IN ARCHITECTURAL DESIGN AND TECHNOLOGY

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Dense and Green Building Typologies

Research, Policy and Practice Perspectives

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Chapter 8
RGB: Red, Blue, Green as a Model for Living Environments

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Certain important principles have always guided the design ethos of Tierra Design and PODesign. These include the integration of the allied design disciplines—Landscape Architecture (as many of our professionals come from this field), Architecture, (because some of these same professionals were trained as architects) and Urban Design (because the combination of landscape and architecture fully illustrates how people live and use dynamic spaces). Using this ethos, Tierra Design and PODesign have worked towards liveability and love-ability or what they consider as living in a biophilic city where humans have an inherent connection with nature. For designers, the challenge then is to ensure that their designs are for living in a city that works for people.

The journey to greening started modestly in the year 2000, when Tierra designed the landscape for a small condominium called 'The Loft' (Fig. 8.1) in collaboration with W Architects on a small plot of land on Nassim Hill. This project is considered one of Tierra's first designs of vertical green. A 50 m-long architectural wall that Tierra usurped and brought into its design was incorporated with green landscape strips over a modular granite clad wall. This was done to hide an irrigation system. As one of the first vertical green expressions, this became an integral part of the architecture. Modular PVC cells were applied onto the granite walls and grass was planted into this system. At this time in Singapore (2001), there were no other similar systems. Nobody had attempted any kind of vertical planting design and maintenance was an issue because organic coco-peat instead of an inorganic planting media was used which in time must be replaced.

158 Cecil Street (Fig. 8.2) was an invitation from architect Kelvin Kan to create an intervention for a blighted interior atrium space of seven storeys. The challenge was to make the atrium in this building more attractive and rentable. Layers of vertical greenery were added that rose from the first to the seventh floor inside the atrium. Insufficient natural light from only south-facing windows meant that plants would not thrive. The solution was to augment the space with artificial lighting to ensure that the plants would have enough light for photosynthesis and chlorophyll production. A potted planting system was designed and hung from new structural

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Fig. 8.1 The Loft, Singapore; *Credit to* Tierra Design

elements which allowed for a 400 mm maintenance space behind the potted plants. The vertical greening intervention completely transformed the interior space and the offices which now look out into the garden atrium were soon all rented. For some time, it was home to Google Singapore until the company moved into a much larger facility.

Another recently completed project is the landscaping for the National University of Singapore's Natural History Museum (Fig. 8.3), a building designed by W

Fig. 8.2 158 Cecil street, Singapore; *Credit to* Tierra Design

Fig. 8.3 Natural History Museum, Singapore; *Credit to* Tierra Design

Architects. This project's green intervention is different because the design utilised planting as part of the architecture and is easily accessible from the occupied floors.

Fig. 8.4 Changi airport terminal 3, Singapore; *Credit to* Tierra Design

In the year 2000, Tierra won a competition to facilitate the interior planting of Changi Airport Terminal 3 (Fig. 8.4), which took a total of 8 years to build. After analysing the spatial layout, the design took its influence from the concept of a greenhouse, utilising all the skylights above it. There are three layers to this project: the entrance layer crossing the bridges, the transitional area between the land side and air side and the air side lounges along the tarmac.

Another project is a private condominium development by Wingtai called 'The Tembusu' (Fig. 8.5). This project was designed to complement the principles of PUB's Active Beautiful and Clean (ABC) Waters programme. It has a vegetative swale, soak-away planting beds and rain gardens. It is a successful project even though there were some compromises, something many projects unfortunately suffer from because of budget constraints.

A much larger urban scale mixed-use project called IAPM was designed and implemented in Shanghai (Fig. 8.6). Tierra was asked to design the streetscape as well as a small garden at the corner of the site. However, its design and urban site context had hidden opportunities as all the buildings in the southern portion were single-storey retail shops located next to an MTR terminal building. Going beyond the design brief, the architectural configuration gave Tierra a chance to green the rising site and also the architecture both vertically and horizontally. Planting was installed over the vertical sides and on the top of the building structure.

Tierra and POD are determined to work on future landscape solutions. Central to our vision is to design with biophilic principles in mind. By 'biophilic' we mean a family of organisms that are in a friendly relationship. We must always consider that

Fig. 8.5 The Tembusu, Singapore; *Credit to* Tierra Design

we only have one planet and one city that we call home. There are many projects today which offer biophilic strategies that we can learn from and adapt and apply their principles in many other places. For example, creating soak-away planting beds for drainage systems alongside roads and incorporating urban farming projects to create a community (kampong) spirit within a garden setting.

Another issue to consider is the ageing population of Singapore, which will be significantly larger by 2030. Tierra wants to help our seniors to age well in a safe and friendly environment. The ultimate goal is to help keeping our elderly population fit and engaged so as to slow down the effects of ageing.

As for our design approach, developments can be measured by a few metrics. A green plot ratio (for landscape design), a blue plot ratio (for water management), a yellow plot ratio (for community inclusiveness) and a red plot ratio (for road efficiency). As building designs have advanced, these metrics have undergone progressive changes. Firstly, the blue plot ratio was improved by adopting PUB's ABC Waters incentive programme and the green plot ratio was improved by utilising the Green Mark scheme encouraging 100% site area replacement with more greenery on buildings. Developers started trying to make mega-developments more accessible by adding multiple skygardens and more green elements to buildings to further enhance the green plot ratio. More recently, clusters of these mega-developments have been conceived. These match density with even more liveability with buildings connecting at higher levels to create a truly biophilic design between buildings for people (Fig. 8.7). Within these developments, people feel that they can walk out and enjoy green spaces anytime, reducing their stress levels when they are in nature. As

Fig. 8.6 IAPM, Shanghai; *Credit to* Tierra Design

buildings have evolved in this way, more spaces have been progressively developed for walking, biking or using personal mobility devices, which, in turn, result in fewer cars on the main roads, but still allowing for taxis and buses. Meanwhile, opportunities for community engagement in the form of urban farming have increased, leading to more community interaction and a higher yellow plot ratio.

In the Jurong Lake District Plan project, Tierra addressed challenges to integrate buildings with strategies to lower the road plot ratio (Fig. 8.8). Within the project, we replicated the sense of climbing a mountain of green in different buildings. Overall, we drew our inspiration from the kampong (community) spirit and put in place the hardware, the 'heartware' and the software by making the whole development open, connected and interactive. People want a healthy life and ultimately happiness. Tierra tries to pursue this through public and private partnerships and Singapore is the right place to explore and to take the lead on the greening of the city.

When designing the Jurong Lake District project, Tierra also looked at how to implement interconnected biophilic infrastructure from the scale of individual land parcels all the way to the urban scale. The project was proposed as a biophilic canal city that provides environmental, economic and social resiliency, lower road plot ratios, greening of different layers with connections ranging in heights from underground to sky terraces and skywalks, while utilising various modes of transport and even personal mobility devices (Fig. 8.9). Tierra is determined to create such

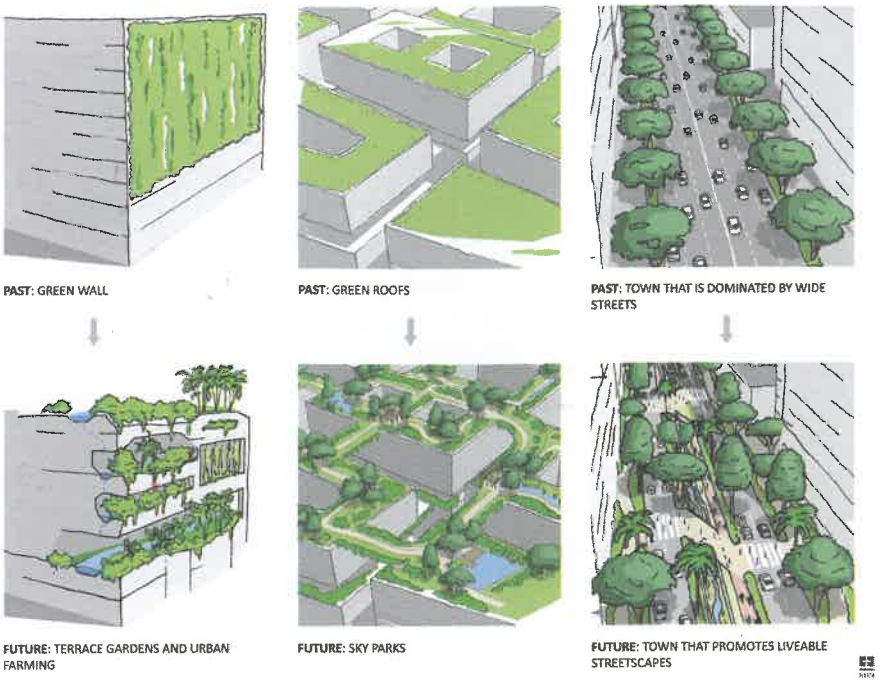

Fig. 8.7 Evolution of building design in Singapore; *Credit to* Tierra Design

environments as they are inevitably our future. With such ideas, there is an attempt to integrate the community and the city to create a biophilic city. Other fundamental questions that Tierra explored are possibilities to increase the green plot ratio to have food within the city itself, within its architecture. This can be achieved by placing sky farms and productive gardens at various locations. The project also aims to infuse water throughout the whole infrastructure, taking water from the lake and distributing it through the new business district.

Another project completed by Tierra several years ago was the landscape consultancy for the Marina Barrage (Fig. 8.10). The goal was to conceptualise the building to be more than just a pump station but also a public space.

More recently, Tierra has completed the concept design for Singapore's fourth desalination plant, a building that is 107 m wide by 220 m long and at its apex 13 m high. Sinking the building 7 m into the ground enabled the plant to look less monumental. The design allows water from the freshwater reservoir and the sea to flow into the desalination plant without pumps as part of the desalination process. Another key design strategy was to capture all the rain that falls on the building's surface and channelling it into a retention area through a vegetative swale to cleanse the water. While the result of this process is not potable water, it is sufficiently filtered to be used for water features designed around the entire building. During heavy rainfall, the system uses a bypass pipe to channel the water directly into a

Fig. 8.8 Jurong Lake District conceptual drawing, Singapore; *Credit to* Tierra Design

Fig. 8.9 Jurong Lake District conceptual drawing, Singapore; *Credit to* Tierra Design

culvert. These rainwater collection strategies could be utilised in future buildings by collecting all the water from the building itself, channelling it through planters, filtering it and then harvesting it for use. Once the water has gone through all these systems, it gets displayed as water features and cascading walls of water and finally falls into a retention pond where it is collected for use and recycled again.

Fig. 8.10 Marina barrage, Singapore; *Credit to* Tierra Design

Mr. Franklin Po's journey of many years in the design discipline had its roots at the University of California, Irvine. These early years witnessed the beginnings of his interest in art and design. Artists Vija Celmins, Craig Kaufman, Robert Irwin, Ed Moses and Larry Bell were all influences. Celmins introduced him to the work of Van Gogh and Max Ernst, to Dada, to Surrealism, to Man Ray, to The Bauhaus and to the architects Walter Gropius and Mies van der Rohe. Enrolling in architecture classes at the California State Polytechnic University he met Richard Neutra, Buckminster Fuller and Raymond Kappe (Founder of SCI-Arc). A Welton Beckett fellowship enabled Franklin to attend the UCLA Graduate School of Architecture and Planning. Graduating in 1973 with a Masters Degree in Architecture with Design Honors, he nonetheless was taught a tough lesson by architect Yoshio Taniguchi that would serve him well during his 20 years of practice in Los Angeles. Tanaguchi's sharp words continue to remind him to examine his work critically: "...SO WHAT!" Franklin continues to guide Tierra's focus as a strong proponent of integrative design and landscape urbanism. In 2015, Franklin won the Singapore President*s Design Award Designer of the Year.

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