FCL MAGAZINE SPECIAL ISSUE
Urban Breeding Grounds
Research Module Urban Design Strategies and Resources | Chair of Kees Christiaanse | Future Cities Laboratory
Research and Design on Rochor+
In 1964 the Japanese architect Fumihiko Maki published what was to become an influential little book, Investigations in Collective Form. The book introduced the novel urban design concept of ‘collective form’, which was defined simply as ‘buildings that have reasons to be together’. How elegant and seemingly self-evident is this brief definition. Of course, as is usually the case with self-evident things, there is a twist. Not all reasons for buildings to be together are legitimate, acceptable or desirable. Maki’s investigation was influential precisely because he offered a framework for thinking about the reasons buildings might be collected together meaningfully.

Maki developed his concept to meet the threats of a newly technocratic form of urbanisation that he saw emerging in postwar North America and Japan. For Maki, urbanisation was a rapid expansion of the physical footprint of cities enabled by freeway automobility, mass air travel, and electronic communications technology, allied with new geo-engineering capabilities that could physically reshape the natural topography in more profound ways than ever before.

In Maki’s view, the scale, speed and reach of these transformations simply outstripped the old values of architecture. A new approach was necessary. As such, he shifted attention away from architecture per se, to a looser concept he called ‘collective form’. Maki’s book was a call to reconsider architecture’s focus on the individual building, and to appreciate the myriad ways in which multiple buildings can be organised, arranged and aggregated together. This, he argued, was essential if architects, designers and planners were to engage in the then emergent phenomenon of city design.

Today, over 50 years since the publication of Maki’s book, the threats that he observed in North America and Japan have become global in scope. Urbanisation, as we now know, is one of the great planetary challenges. His eloquent call to focus on the reasons buildings have to be together, and the resulting collective form, is more relevant than ever.

This issue of the FCL Magazine reports on an interdisciplinary piece of research – or ‘synergy project’ – that takes up this call in a direct way. Focussing on and around the Rochor area in Singapore, the research team, lead by Prof. Kees Christiaanse, offers a forensic study on the multiple collective forms that have appeared in that dense and diverse neighbourhood over the past 50 years.

The study elaborates not only the reasons that draw buildings together, but also those that keep them apart. It is also concerned with the connective networks of avenues, streets, parks, laneways, sidewalks, overpasses and underpasses that play their part in the work of sustaining the urban fabric. In so doing, the study echoes and substantially expands upon Maki’s thinking on contemporary urban design in Southeast Asia.

Stephen Cairns

Diverse neighbourhoods are of vital importance for a city. Mixed-use heterogeneous quarters act as urban breeding grounds that serve as incubators for innovative entrepreneurial and cultural production. For Asian cities, traditional, diverse neighbourhoods become more important as they bring together people from different ethnic, intellectual, and professional backgrounds and create places of centrality. The module Urban Design Strategies and Resources unravels the processes, agents and potentials of diverse inner city neighbourhoods in four Asian cities: Singapore, Shanghai, Shenzhen and Bangkok.

This FCL Magazine Special Issue presents the research that investigates the mechanisms of a diverse inner city neighbourhood in Singapore. The central Rochor district including Little India, Kampong Glam, and Bugis, together with adjacent areas to the east, are the target perimeter, which is named ‘Rochor+’ in this publication. Analytical work in parallel with design research reveals specific and generic characteristics of the district and its future potential.

The analytical articles in this issue unfold various parameters that stimulate urban diversity and explain the effects of trends in the current urban development: a study on the temporal uses of public space and the coexistence of divergent ethnic groups is complemented by a documentation of the physical evolution of urban block and plot sizes. Also, research studies on traffic accessibility, the evolution of large-scale projects such as the Marina Centre, and the analysis of the architectural features and the street layout of the vital Bugis area unravel the qualities of Rochor+. The interdisciplinary research on the backlanes of the typical Chinese shophouse proposes, in addition to the analyses, an intervention concept that combines an efficient and comfortable building technology with the amelioration of usable public space.

Another set of articles comprises design projects from students from the Swiss Federal Institute of Technology (ETH Zürich), who attended the Future Cities Laboratory for a semester in 2013. Similar to the project on the backlanes, their design research projects combine empirical research and strategic urban design in their work processes. Programmatic use, gentrification tendencies, accessibility, scalar shifts, and vacant sites are thematic issues that crystallised during the extended fieldwork. The found resources from the analyses and ideas for synergies are used in the next step as drivers for context-driven transformative strategies for future urban developments. Working on multiple scales, ranging from regional to architecture interventions, leads to infill scenarios as well as overarching design strategies that explain not only projected visions, but also different applicable tools and strategies for future urban transformations.

The articles in this magazine not only illustrate the high economic and spatial potential of urban breeding grounds, but also provide an instrumentarium for policy recommendations and design guidelines that aim to initiate public discourse.

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Introduction

This issue of the Future Cities Laboratory Magazine deals with the greater Rochor area in Singapore, or what we call 'Rochor+'. The area comprises the Rochor area, including Little India, Kampong Glam, Bencoolen, and Victoria, as well as Bugis, Lavender, Crawford, Kallang Bahru, and Kampong Bugis. Rochor+ can be considered an essential centrality within the constellation of characteristic central places in the island of Singapore, among which one may count distinct urban nodes, such as the City Centre, Orchard Road, Changi Airport, Kent-Ridge Campus, Jurong, Buona Vista, and Holland Village. Rochor+ is the most diverse area in the whole island of Singapore. It has a fine, multi-directional street pattern, which, for instance, is reflected in the pedestrian accessibility index map to key points of interest, such as bars/restaurants, parks, and shops by the Future Cities Lab (Fig. 01). The area also has the largest variety in plot shapes and sizes as well as building typologies. This contributes to the proportionally longest street-front length and the greatest number of entrances in Singapore. The back allies, courtyards, and semi-public spaces within building blocks account for the largest surface of transitional space for informal and creative use on the island. On top of this, the neighbourhoods within Rochor+, such as Little India, Kampong Glam, Victoria, or Kallang Bahru, are clearly distinct in character, adding another layer of richness to the area.

It is hardly surprising that in this interesting physical environment, within walking distance of the city centre, a great diversity in social and ethnic groups, and in economic and cultural activity can be observed. This diversity, as described in Little India’s New Face and Alternative Public Spaces, ranges from the ethnic agglomeration of Tamil-speaking migrant workers in the streets of Little India, Chinese malls in Waterloo Street, backpacker hostels in surprising buildings, to creative industries in former HDB (public housing) complexes (Fig. 02-03). This diversity is not limited to old or new building typologies, or to indoors or outdoors. In Haji Lane, trendy boutiques are occupying old shophouses, whereas the Thai community centre concentrates indoors in the Golden Mile Complex built in the 1970’s (Fig. 04); and in a few rare backlanes, street-prostitution is allowed. The Lasalle Art Academy and the National Library, as well as the Raffles Hotel, also are players in this field, linking the atmosphere of adjacent top-down planned urban districts in the adjacent Marina Centre and Beach Road with the Rochor+ area. In Rochor+ the dynamic balance between...
integrating and disintegrating forces is vulnerable. A quick look into the transformation of the building stock or the increase in plot-size in the area as a result of merging plots shows a clear homogenisation trend. Although certain protection mechanisms have been installed, such as urban design guidelines or the ‘en bloc’ designation of most shophouses as heritage status, the area is increasingly threatened by large-scale re-development and ‘Singaporeisation’, meaning gentrification through the exorbitant increase of land and real estate prices by short-term rental and lease contracts (Fig. 05).

For a long time, diverse inner city neighbourhoods have widely been acknowledged as incubators of social and cultural interaction and tolerance, small scale economic growth, and entrepreneurial innovation. The ability to incubate has a direct relationship to the physical properties of diversity described above, which lead to maximised ‘contact-surface’ between social groups. As Rochor+ is the only area in Singapore with such characteristics, it is of utmost importance that its development is closely monitored and curated, as a centrality of social diversity and cultural significance. This is why the Future Cities Laboratory has chosen the area as the subject of its ‘Urban Breeding Grounds’ research. Currently, Rochor+ is not perceived as a comprehensive, coherent area. This is logical, as parts have been separated and developed in completely disjointed ways over time. For instance, the Ophir-Rochor Corridor, comprising Raffles Hospital, the Duo-building site, Rochor Centre and the Sim Lim Building, along with the construction of the North South Expressway, has driven a wedge through the area, separating Bugis and Victoria from Little India and Kampong Glam (Fig. 05). The clearance of shophouse districts in Crawford to make way for HDB estates and the Golden Mile Complex has diluted coherence on the North side. These distinct developments have also regrouped the focus of social, cultural and economic concentrations in the area, resulting in multiple sub-centres. In light of the above, any urban strategy for Rochor+ should recognize and embed Rochor+ as ‘up-scale’ as a vital node within the constellation of Singapore’s centralities, while at the same time provide a ‘down-scale’ inner concept for the area as a collection of zones of complementary character.

Therefore, we investigated the street pattern and public space system, in order to formulate recommendations for a high-quality walkable environment, connecting streets with squares, backlanes and greens; proposed safe and readable crossings of barriers; and linked open air and covered spaces in commercial ensembles. In addition, these recommendations also imply a control & laissez-faire management of accommodation for temporary and informal uses by markets or migrant groups, for instance. In a further study, we could imagine the width and direction of the main streets for vehicle traffic to be reconsidered in order to better interlink the neighbourhoods. One of the key projects of this refinement of the public space network and street front activation is the Proposal for Reimagining Backlanes project. By cleaning up the backlanes of shophouses (Fig. 07), centralising individual air conditioning units and streamlining waste disposal, the many backlanes may add to the pedestrian network, adding...
miles of potential street front length to the city and thus adding considerable value to the real estate. Here, a regulatory mechanism for the back of shophouses and their extensions is needed (Fig. 08). Another project related to this theme is the Proposal for a Multi Ethnic Neighbourhood at Farrer Park and its surroundings, which is an example of a combined re-organisation of public spaces for informal use. It provides an acupunctural masterplan for a better integrated neighbourhood, linking Farrer Park adequately to Kampong Java, where a compact building typology in between townhouses and apartment blocks is envisaged.

In order to preserve and safeguard the physical diversity of plots and buildings in the area, we propose a ‘plot-freeze,’ such that plots may no longer be merged into larger plots, while the division of large plots into smaller ones is welcomed. We have illustrated this idea by developing an exemplary urban design concept in A Proposal for a New Urban Node for the redevelopment of the Sim Lim and Rochor Centre plots in the Ophir Rochor Corridor, respecting the URA’s floor-area ratio (FAR) requirements, while at the same time developing a more small-scale environment. This is achieved by creating a podium-cum-courtyard zone, on top of which slender high-rise buildings are placed. The podium zone creates multiple possibilities for atria, double-level shopping, and combinations of retail outlets and offices; whereas the high-rises house offices, apartments, or hotels. In addition, this typology forms a good base to create quality pedestrian crossings linking Victoria with Little India. Without reducing investment volume, this concept provides an alternative to the one-plot-one-building trend, which prevails in areas such as Marina Bay, and which, when applied to Rochor+, would clearly have a negative homogenising impact on the townscape and street-life (Fig. 09).

Contemporary Asian cities often show radical contrasts in scale and building typology, and public space tends to flow both through open public and private covered spaces, both under- and above-ground. For this reason, and because of the tropical conditions, as in the case of Singapore, current Western experiences to describe and evaluate ‘urbanity’ are often not sufficient. This is very much the case in the Victoria and Bugis sectors of Rochor+, where some building-ensembles are like a little vertical city, equipped with a freely accessible fine-meshed pedestrian network, and housing all kinds of functions and amenities next to retail and commerce, as can be read in the chapter Bugis: A model for Singapore 100. The pedestrian networks within these ensembles usually have multiple access-points to important street junctions, crossings or other ensembles. Together, these public and private pedestrian systems can be read as an integrated three-dimensional connective tissue, consisting of radically different typologies of routes and atmospheres. Looking at its primary corridor plan – even a gigantic top-down development like the Marina Centre, which comprises Suntec City, Raffles City, Marina Square, and Millenia Singapore, as well as underground stations and subways – can be considered as an alternative ‘town-or streetscape’, as long as its role within the larger pedestrian network of the city is developed in a more precise way (see chapter Non-Straightforward Fortresses). This perspective, which we are setting up, inspired by Fumihiko Maki’s Group Form idea, may help (re-)connect large complexes to an Open City network and reconcile the divide between big developer-projects and a diverse, urban condition (Fig. 10).
Last but not least, we studied the northern border of Rochor+, both in its distinct character and functionality, as well as in light of a badly needed redefinition of the relation of Rochor+ to Geylang and Serangoon – two still relatively diverse districts. For the Crawford area, ranging from Lavender MRT station to the Golden Mile Complex, in A Proposal for a Modernist Neighbourhood we suggest a densification programme and retro-fit concept for the existing HDB complexes, as well as a redesign of the public space, in order to better integrate the area and increase its diversity and connectivity. For the Kallang Bahru section, we envisage a transformation of the current low profile industrial and business district into a creative industries cluster, partly mixed with housing; shown in the article A Proposal for Urban Manufacturing. Kallang Bahru may thus connect to the northern Jalan Basar area, where a process of gentrification is already in development, replacing existing hardware stores with more upgraded, diverse neighbourhood components. Finally, we developed an alternative urban vision, presented in A proposal for an Integrated Island, for Kampong Bugis the tongue-shaped peninsula at the confluence of the original Kallang and Rochor Rivers. The green site has been kept clear in favour of a large park, and the built programme, which has a comparable built substance and FAR, as prescribed by the current URA masterplan, is organised in a dense, urban typology along Kallang Road. Together, these interventions create the conditions to reconfigure the fuzzy gap, which now characterises the area between Rochor+, Geylang, and Serangoon, an area that also, thanks to its rich waterway presence, deserves a mature role, knitting together vital parts of Singapore (Fig. 11).
Despite the remarkable success of Singapore’s city building efforts in the past decades, the functionally and typologically segregated Modernist urban form that has resulted in most parts of the island state now faces significant challenges for the future. Achieving a more integrated, mixed-use and adaptable urban structure presents a gargantuan goal for the future of the city’s urban redevelopment. The model for such an integrated approach already exists in the city’s historic urban core in the Rochor district. Some of the principles of urban design observed in Bugis – a distinctive part of Rochor – that contribute to its success and resilience are outlined here as a model that can accommodate the city’s present and future needs.

In August 2015, Singapore celebrated its 50th year as an independent city-state. In the course of five decades, the island state has transformed itself from a ‘third world city’, marked by slums, congested streets, illegal trade, and a volatile economy, into one of the most prosperous cities in the world. Over a million public housing units now accommodate 84% of the city’s population; the city is home to a wide range of international and domestic enterprises that serve a global clientele; its land mass has increased by 20% through reclamation and redevelopment; and its infrastructure and governance remain second to none, both in terms of efficiency and quality. In Singapore, city development is inseparable from national development. This remarkable social and economic transformation has left a clear imprint on the spatial structure of the built environment. The urban planning efforts of the Government of Singapore have followed the original concept plan developed by Abrams, Kohe, and Koenigsberger with UN support in 1971. Five agencies, corresponding almost perfectly to the five pillars of the Athens Charter – the original template for Modernist town planning (Corbusier 1933) – were established to ensure that living, working, recreation, and circulation are delivered by the respective institutions in charge.

The Housing and Development Board (HDB) was set up in 1960 to tackle the giant issue of affordable housing shortage. Since inception, the HDB has, on average, built over 20,000 public housing units each year, making its systematic imprint visible in almost every corner of the island.
The Jurong Town Corporation (JTC), established in 1968, was put in charge of all industrial development, providing blue-collar jobs for many Singaporeans in the early days. Starting with shipbuilding, steel, and timber industries, JTC has continuously tuned its focus to the country's economic progress, now predominantly accommodating electronics assembly, biotechnology, and R&D activities of various sectors. The agency currently manages over 43.5 million square meters of usable space in industrial parks across the island. Modern offices, retail centres, and flagship downtown redevelopment projects that house white-collar jobs were assigned to the Urban Redevelopment Authority (URA). The URA also oversees redevelopment of the older city fabric though a systematic master planning, zoning, and regulatory process and orchestrates the leasehold sale of land in the city – a major source of government revenue. Recreation and green areas were placed under the supervision of the National Parks Board (NParks), which maintains, plans, and improves green spaces in the city. NPark's proclaimed achievements include the overall increase, rather than decrease, of Singapore's green ground coverage throughout five decades of rapid urban development and population growth. The fifth key agency overseeing the built environment, the Land Transportation Agency (LTA), was placed in charge of all circulation – pedestrian, vehicular, and public transit – to provide the glue between the functional parts produced by other agencies. LTA's achievements include an efficient Mass Rapid Transit (MRT) and bus system that covers most of the developed parts of the island, and policies that impose high costs on automobile ownership and driving. The latter, however, has also produced the unintended consequence of elitism among drivers, making pedestrian concerns subordinate to those of vehicle owners in the LTA's policy areas. Fifty years of bureaucratic refinement have produced an efficient and functional modernist city-building apparatus that delivers carefully planned output ahead of schedule and within budget.

This siloed institutional structure, however, has also delivered a city in which each agency's output stands in strong contrast to the others. Many of the agency staff have adopted a bounded view of urban development that only considers problems along agency lines, with little interest towards integrative planning. Albeit a common master planning process led by the URA, which involves all agencies at five-year intervals, the concrete collage formed by different agencies' development projects is both territorially and functionally segregated. The city's urban form is more a testament to the bureaucratic processes that have created it than an intentional and holistic vision (the original UN concept plan being an exception). JTC's industrial developments, though modern and high-tech, are exactly what the agency's duties require – large-scale production sites for modern goods and R&D. HDB towns are optimised for residential family life, built around transit and serviced by HDB's own shopping and service facilities. These towns have historically rarely mixed with JTC's clean industry, URA's modern office blocks, or even private housing. Sidewalks managed by LTA are well paved and clean, but lack the critical amenities, shopfronts, or living rooms to peek into, which would make walking interesting or useful. Boundaries between HDB’s, JTC’s NParks, and URA’s interventions are deeply entrenched in Singapore’s urban form. This island-wide functional patchwork of contrasting developments poses a number of challenges both
at present and for the future. Whereas in relatively low-density environments, spatial segregation of housing, industry, and commerce may present a mere economic inevitability (for example, not enough density to sustain commerce in a residential area), high-density built environments, such as Singapore, generate enough demand for a variety of jobs, businesses, and recreational destinations in all parts of the city. The separation of such activities in Singapore is not an economic inevitability, but rather, a planning and regulatory choice. I will briefly discuss three prepositions that make the present urban structure suboptimal for the Government's aspiration to deliver an internationally competitive, highly liveable, and amenity-rich urban environment for its educated, wealthy, and increasingly cosmopolitan population. Instead, the more integrated, mixed use, and diverse built environment around Bugis is better suited to address these challenges.

**Walkability and diversity**

First, no contemporary city can be recognised as a liveable home for a skilled workforce if it is not highly walkable. Good city environments are platforms for intensive information exchange – they foster encounters between people, allow their users to communicate, and to obtain goods and services seamlessly and quickly. This happens best on foot, in dense and mixed-use urban environments where diverse destinations are reached in comfortable walking range (Sennett 1994, Gehl 1987). Singapore is walkable in its central business district (CBD), but most of the island’s HDB (public housing) estates and JTC industrial estates fall far short of pedestrian-oriented environments enjoyed by the elite office workers and tourists in the city centre. The shortcomings are not manifested in the lack of sidewalks or even covered walkways; these are indeed present along most roads. In order to incentivise people to walk, walking paths need to be lined with interesting sights, encounters, and stimulating ambience – they need to be simultaneously useful and comfortable. People are more likely to walk to a bus stop, for instance, if the walk is lined with amenities, windows, and doors to peek into, shops with interesting façades that offer goods, vegetation, and seating areas to meet people. The stimuli to attract people to walk must also correspond to the socio-economic characteristics and needs of the pedestrians – overpriced shops, street cafes, and umbrellas, for instance, will not serve as attractions for those who cannot pay for them or who prefer different types of destinations (Chase, Crawford and Kaliski 2008).

Achieving walkability is not merely the domain of a transport agency, but necessitates coordination and collaboration between housing, commerce, recreation, and circulation. Such diversity at the pedestrian scale necessitates deliberate right-sizing of developments, economic planning for business, and more flexible regulations for users to customise their environment according to their own needs, leaving a personalised imprint on the visual form of the street and its bounding facades (Smithson and Team 10, 1966). At present, such integration of sidewalks and amenities falls between inter-agency lines; it is administratively challenging and discouraged by zoning as well as agency-specific regulations. The Bugis area offers an elegant example of how a stimulating and walkable environment can be achieved in Singapore’s context. Ample sidewalks are lined with privately owned, yet publicly occupiable commercial space that offers continuous stimulus and creates origins and destinations for pedestrian trips. Blocks are relatively small and occupied by a wide mix of uses, providing pedestrians with numerous route choice alternatives to a high concentration of destinations nearby. Almost every building in the area features ground floor spaces open to the public, often sheltered by a comfortable cantilever of office or living space above. Building frontages have variable widths, creating diverse sequences of encounters and façades that stand close to the street, establishing visual and tactile relationships between outdoor spaces and indoor amenities with strong personality and character.
Resilience and adaptability

Second, the functionally divided institutional planning model relies heavily on strong-handed and centralised management, which may not be resilient in the long run. A major unforeseen financial or political crisis, for instance, would risk putting HDB out of resources to manage and maintain over a million housing units and inhibit JTC's capacity to maintain a giant portfolio of industrial estates. Yet HDB neighbourhoods are designed for central management – building layouts and overly optimised circulation systems make conversions from residential to other uses difficult without affecting fellow residents. Regulations do not allow residents to claim or customise spaces outside the residential units; the large, unbroken scale of apartment blocks makes condo associations and resident governance challenging. Most housing blocks are set 10-20 meters back from streets, making commercial ground floor occupation difficult to achieve. Building coverage is low (around 10-20%), creating poorly defined open spaces between blocks. This open space could serve as infill land for non-residential uses, but its spatially fragmented nature does not offer a clear structure to suggest where and what uses could be viable (Anderson 1978).

Sidewalks are extensions of shops, homes, and work places; façades exude individuality; and green spaces are small and human in scale, enabling Grassroots Committees (GRC) to maintain them. Building types and their façades are adaptable to changing needs – new space can be added vertically when the needs arise; openings can be cut into building frontages; and apartments can be joined when families expand. This adaptability is achieved, in part, by providing direct access to most of the privately-owned spaces from the street or public walkways, allowing each owner autonomous access and circulation. Changes in the occupancy of these spaces do not hinder the functionality of adjacent spaces, and the public circulation spines guarantee that no one landlord can hinder access to a significant number of others. It is also achieved by a different grandfathered regulatory system that is much more flexible to spatial claims and neighbourly agreements than the one used by the HDB. Even HDB's older mixed-use 'condenser blocks' in Bugis have proven to be highly adaptable through time. These are structure-infill types of buildings (Habraken 1999), with non-load-bearing perimeter walls, which include multi-storey commercial podiums under high-density residential towers and rooftop parks. Flexible commercial layouts contained in 'condenser blocks', such as the Waterloo and Rochor Centres, have offered spaces for hundreds of rotating SMEs, ranging from tiny bubble tea shops to entire schools and supermarkets. Commercial podiums stand on column-beam ‘domino’ structures where partition walls and façades are relatively easy to alter, and the publicly occupiable commercial spaces are accessible by anyone via outdoor walkways around the clock.

Transportation and efficiency

Third, the segregated land use model underutilises urban space and necessitates extensive travel between functional zones. Monofunctional neighbourhoods remain unoccupied two-thirds of the day. Housing districts are empty during business hours, business districts are deserted at night, and parks exclusively serving housing towns are mainly used in the evenings or over the weekends. Spatially-segregated functions require commuting between activity zones, typically by public transit or private automobile, as the scale of the zones is well beyond walking distances. This contributes to traffic congestion, time loss, and the dilution of the intensive information exchange provided by dense, mixed-use, walkable environments. Functional segregation also makes it difficult for small businesses to survive. In employment zones, businesses rely on lunchtime customers; while in residential areas, they rely on evening and weekend customers. Mixing offices and residences may not necessarily mean that people would work near their homes, but adjacent employment and residential uses tend to generate around-the-clock demand for commercial establishments, well-utilised sidewalks, and less motorised travel. Counter to knee-jerk intuition about traffic, higher density mixed-use environments decrease rather than increase traffic on the roads, since they generate more opportunities to walk rather than drive to destinations.
Though the Bugis area presents many of the qualities of diverse, mixed-use and adaptable urban form, this area too is now going through redevelopment that threatens its uniquely resilient and adaptable qualities. The planned Ophir-Rochor thoroughfare, for instance, will introduce a sizable rupture into the pedestrian continuity between Kampong Glam and Albert Mall. New high-rise developments, such as Parkview Square, Duo, and those along Beach Road, have failed to introduce diverse and amenity-rich ground floors along sidewalks and have replaced the fine-grained urban block structure with large, free-standing towers that necessitate lengthy detours by pedestrians. Rather than making Bugis more like the rest of Singapore, redevelopment should explore the opposite. The argument is not to replicate the density or vibrancy of Bugis elsewhere around the island – every neighbourhood is unique and most come in significantly lower densities than downtown sites such as Bugis. Instead, principles and values that have led Bugis to grow to what it is today are worth paying attention to: fostering diversity by enabling diverse building types for a diverse set of residents and businesses; prioritising a fine-grain, pedestrian-scale circulation network that has a clear and comprehensible structure; fostering adaptability – the capacity for buildings and their uses to grow and change – through regulation and policy; and allowing users of buildings and streets greater autonomy to customise their environment locally rather than through central administration.

Outcomes from following these principles would differ in each case, depending on location, density, stakeholders, and their interests. Each of these principles requires deep cooperation between multiple agencies, which is presently hindered by Singapore’s agency mandates, incentives, and structures. The task of adapting the administrative structures to produce walkable, mixed-use, adaptable, and diverse built environments in all parts of the island state is huge. But the failure to do so risks making the city’s built environment obsolete for an increasingly demanding, diverse, and well-educated population. A number of projects presented in this magazine provide insightful ideas to address this challenge through urban design. Analogous ideas will be needed for institutional structures, policies, and regulations for such ideas to take shape.

References


Quantifying Diversity
An assessment of diversity indices and an application to Singapore

Attractive urban settings are easily recognised, but quantifying them is a bit harder. An easy analogy is drawn with Galster (2001) on neighbourhoods: “neighbourhoods are treated in much the same way as courts of law have treated pornography: as a term that is hard to define precisely, but everyone knows it when they see it”. Characterising and quantifying the built environment remains an elusive concept with many pitfalls. Commonly, diversity is judged by land-use plans and categorised by broad descriptions, such as ‘commercial’ and ‘industrial’. In this article, we present a newly developed concept to measure the unmeasurable, compare it to existing diversity measures, and critically assess its relevance for both urban science and city master planning.

An attractive built environment can promote active mobility and moderate motorised travel demand. It has been shown that the built environment influences travel behaviour, health outcomes and even happiness. To describe the built environment, researchers have long employed measures describing the built environment. Cervero and Kockelman (1997) coined these measures ‘density’, ‘diversity’, and ‘design’ - the three ‘D’s’. Measures that fall in these categories include: population density, intersection density, jobs-housing balance, distance to the nearest transit stop, and travel time to work. While these measures might describe whether an area possesses urban characteristics, they fall short of describing a vibrant and diverse environment. Also, the level of resolution on which characteristics of the built environment are measured differs, and similar data sources are not available for the different study regions, making comparison between regions difficult, if not impossible. In this article, we introduce a diversity and destination index that can be easily applied across regions and that describes the built environment from the pedestrian’s point of view. Before that, however, we take a step back and provide a background to the measurement of diversity and the subsequent application to land use.

Fig. 01 Combined diversity and density for Singapore. Dark colours indicate a high combined diversity and density, light colours a low combined diversity and density.
Measuring diversity

Ecologists have traditionally employed a range of diversity indices to describe the contribution of biodiversity to the functioning of ecosystems. In order to describe the diversity of an ecosystem, different structural characteristics of the system can be considered: the number of different species in the system, the characteristic features of the different species, and the relative abundance with which individuals are distributed over different species (Baumgärtner 2006). Examples of diversity measures include the Berger-Parker Index, the Shannon-Wiener Index, and the Simpson Index. To highlight these measures and their differences, a number of ecosystems are shown in Figure 01. Table 01 shows the composition of each system in detail and the resulting diversity indices. Diversity indices, such as the Shannon-Wiener Index and the Simpson Index yield a value starting at 0 up to 1. A value of 0 indicates an area with no diversity, whereas a value of 1 indicates a perfect mix of diversity in the area. However, the absolute number of each species hardly plays a role in the results that these indices yield. Often, the value is normalised to a value between 0 and 1.

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**Indices**
- Species richness: 3
- Berger-Parker abundance: 2
- Shannon-Wiener diversity: 1.00
- Shannon-Wiener equity: 1.00
- Simpson diversity: 0.71

Measuring diversity in urban planning

An analogy with urban planning is easily drawn: land-use types can be seen as the number of species in the systems, while the square footage per land-use type within the system can be seen as the number of organisms. The diversity can then be calculated on many spatial scales, varying from traffic zones to buffers around dwellings. Variations exist in the ways land-use categories are used. For instance, Cervero and Koedel (1997) consider the following land-use categories in their diversity index: residential, commercial, office, institutional, industrial, parks, and recreation.

The most commonly applied diversity index is the Shannon-Wiener Entropy Index, which has been used in urban planning for at least as far back as the work of Frank and Pivo (1994). We have calculated this index for approximately a thousand areas in Singapore and will highlight the outcome for two distinctly different areas. Little India is an area that is well known to residents and tourists alike and is characterised by mainly commercial and residential zoning (Fig. 03). Impressions of Little India can be found throughout this issue. Serangoon Gardens is located in the north-east of Singapore and is characterised by a small centre that contains a selection of shops, a popular food centre, a park, and several schools and residential streets with semi-detached housing. Figure 04 highlights the planned land-use for the Serangoon Gardens. This area is split into different zones. Different land-use types can be considered when calculating diversity. Figure 05 and 06 highlight the results, if the land-use types of commercial, business, religious, and park are included in the calculation of diversity. To enable easy comparison of the results, the numbers represent percentiles. Serangoon Gardens ranks 10th, whereas Little India ranks between 5th and 6th. These percentile rankings reveal that 90% of the areas rank lower than 10. If residential land usage is added to the calculation (Fig. 07 and 08), Little India ranks 8th, whereas the Serangoon Gardens ranks between 5th and 10th, depending on the area of residential space in the zone.
These outcomes illustrate a range of shortcomings of the use of diversity indices. In this case, the most obvious shortcoming is the failure of land-use descriptions to capture the diversity within one land-use type. Tenants using commercial property can include tailors, specialised food shops, and florists – distinctly different amenities catering to different needs and population segments. Furthermore, the index weights all categories of land use equally: an area with office and industrial usage will have the same diversity as an area with retail and residential usage (Hess et al. 2001). Second, there is the issue of ‘missing land uses’: determining which land uses should be included in the measure, and which should be left out. In this case, we highlighted this issue by evaluating the effects of residential land usage. A third issue is that an even land-split is considered ‘perfect’; a key point that lacks theoretical basis (Managh and Kreider 2003). An area split of 50/50 between two land-uses is considered better than an area split of 60/40. Furthermore, the measure does not reflect ideal land uses per category. Depending on the location of an area in the city, it is questionable whether 50% residential land usage is able to support 50% retail usage. Finally, dense urban environments are characterised by a mix of building heights and the presence of mixed-use buildings. A two-dimensional aerial view of land uses will not provide an accurate description of a true three-dimensional mixed-use environment.

Shouldn’t destinations matter more?

The application of common descriptions of land use, such as residential, commercial, and religious, in diversity indices is fuelled by data availability on one hand, and the relevance of these descriptions to policy makers and planners of future land use plans on the other. However, these descriptions reflect their economic and social functions rather than their behavioural characteristics (Banerjee and Baer 1984). These broad categories fail to capture the diversity within a single category. Descriptions of amenities, such as convenience store, supermarket, gas station, and neighbourhood park, provide better descriptions of how individuals categorise, describe, and use their neighbourhood. After all, the aim is to reach destinations. The ease with which these destinations are reached is referred to as accessibility. A larger variety and number of destinations, and lower travel times, results in higher accessibility. We take this perspective as a starting point for our study on Singapore. As a first step, we obtained amenity location data from a variety of sources: points of interest from Google Places, the Land Transport Authority, and the Ministry of Education; the road network from the readily available Open Streetmap; and building outlines from the Singapore Land Authority. Figure 09 provides an impression of these data sources. We then calculated a number of accessibility measures for each building in Singapore. The distance to each amenity is calculated using network distances, on the basis that amenities located further away are valued less than amenities located nearer to an origin. This perception of distance is captured by means of a distance decay function. Distance decay functions come in a variety of forms and are usually derived from observed behaviour. However, especially for trips made on foot, data is notoriously hard to obtain, as these trips are commonly underreported in travel surveys. For Singapore, we applied a combined rectangular and Gaussian distance decay function, as opposed to other, more commonly used functions, such as the exponential or rectangular function (Fig. 10). With this function, we assume that people are indifferent to a five-minute walk, but that destinations located more than five minutes away are valued less. A destination located 10 minutes away is valued half as importantly as a destination located within five minutes. The effect of this distance decay function is highlighted in Figure 11. In this figure, the shortest paths from a single origin to each destination within 1,200 meters are calculated. The calculated accessibility per building is used in two ways. First, we calculate the diversity based on the accessibility to five amenity categories. Second, we calculate a destination index, where each amenity category is weighted differently. These weights are determined by the relevance of each amenity to serve an individual’s daily needs. For example, supermarkets, pharmacies, and grocery stores score higher than a shoemaker or carpenter. By combining the diversity and destination indices, a value that represents the quantity and quality of destinations is obtained. This process...
can be extended to calculate the density and diversity of each building in Singapore to all destinations (Fig. 12). A different scenario emerges when destinations are used instead of land-use types. On a smaller scale, the effects of this are clearly visible in Serangoon Gardens, located at the top of Figure 12 and indicated by ‘SG’. Buildings located near the centre are assigned a diversity and destination index. On a larger scale, the diversity of downtown areas of Singapore – such as Little India (‘LI’), Rochor, and Orchard, but also local suburban centres, such as Tanjong Katong and mature HDB (public housing) towns like Bedok – is reflected through the combined diversity and destination index.

Diversity in and of itself is of relevance; the effects of the built environment on happiness, health, and travel outcomes are just as important. These indices prove to be significant, but have a modest effect in predicting vehicle ownership in Singapore, after controlling a range of socio-demographic variables. In the case of Switzerland, we have calculated identical destination and diversity indices, and have found that a more diverse neighbourhood leads to lower vehicle ownership and fewer kilometres driven. Evaluating such images and indices of a city provides insights into the usage of space based on openly available data sources. However, these top-down images do not take away the need to verify these figures with ground-truths, and certainly do not describe the character of an area. We are the first to admit that urban character cannot be captured by a mere number. In addition to these constructed indices, we calculate a range of other measures, including, but not limited to, population density, job density, intersection density, and public transport accessibility. Ultimately, the city is about people, their interactions, and transactions. However, measuring the unmeasurable can support discussion about urban form and its implications.
In the course of the 20th century, economic and demographic developments as well as a modernist ideology that responded to the socio-economic transformations fundamentally reshaped the city's built environment. Modern infrastructure for private mobility, the expansion of building volume and typology, and an increased demand for land led to enormous changes in scale within the city structure. The small sized plot structure of the 19th century was gradually replaced with the emergence of the big plot. Originating from the West, this trend and its manifestation spread across the globe, encountering wide resonance in many cities, also in Singapore. This chapter focuses on the origins of large plots in Singapore. It also looks at how buildings on large plots tend to position themselves within the urban context. Finally, it explores how ‘a policy of plots’ could be deployed to contribute to a more diverse city while still accommodating contemporary needs.

Origins of large plots in Singapore

Before Singapore was granted self-governance in 1959, uncontrolled sprawling of overcrowded slums and squatter settlements was common all over the city. Confronting the precarious housing shortage and the dire unsanitary conditions, the newly founded government took action against these issues. The Land Acquisition Act, established in 1966, allowed the state to acquire land on a grand scale. The government also formed the Housing Development Board (HDB). And in 1974 it founded the Urban Redevelopment Authority (URA), which was equipped with a great deal of executive power. In the wake of the HDB’s revolutionary social housing concept and Singapore’s Dutch-connected Ring-city concept, twenty-two new towns arose, evenly distributed across the island. Constructed on large, green plots which covered whole street blocks, their urban design is strongly characterised by the doctrines of the CIAM and its Athens Charter. Isolated, homogeneous housing estates, with cul-de-sac...
access systems, shaped the image of the city under the aegis of a centralized planning system. While in the new towns thousands of housing units were being developed, the new financial and commercial centre arose in the downtown core of Singapore. The state-backed amalgamation of the smaller sized former shophouse plots created space for bigger developments. Propelled by market forces and Singapore’s strong growth ambition, monumental representations of capital accumulation emerged.

Impacts of large plots on the cityscape

In Singapore, as in many other cities from before the 20th century, urban functions were distributed in clusters and mixed typologies. The city structure was based on a fabric of streets, blocks, and small sized, narrow plots. The morphology of the city developed within these constraints. Although the urban structure was rather rigid – with street grids, blocks, and plots – it nevertheless shaped a flexible urban texture that encouraged density and atmosphere. The building as a module often had multiple uses, such as residences, commercial spaces, and offices. Thus, several entrances existed on a relatively small section of the street that led to an intensive exchange between building and street. After the advent of modernist city planning, the dimensions of the urban structure exploded. Former individual plots were consolidated and transformed into ‘superplots’, sometimes covering an entire block. In the pioneering time when Singapore needed an incredible number of social housing units, this policy produced an urban morphology, building typologies, and public space systems that had a strong monofunctional and inflexible character (as shown in Fig. 03). The impact of the superplots on the cityscape is various. Some projects have become part of the city structure despite their expanded size, as they direct themselves towards the street and play an active role as an urban activator. A good example in Singapore is the Waterloo Centre in Bugis. This particular mixed-use HDB complex contains three slim apartment towers on top of a four-story commercial podium, where small-scale shops at street level, open to public circulation, interact with the surrounding neighbourhood.

As a result of their sheer size, however, many other large-scale projects produced internalized urban worlds, turning away from the surrounding urban context. This trend of introverted worlds became Singapore’s urbanistic paradigm. Singapore’s modernist social housing complexes and the large-scale podium towers in the downtown core, all show these characteristics. In many HDB developments, isolated building clusters, their withdrawal from the streetscape, the cul-de-sac condition of their ground circulation, and programmatic homogeneity today form a key challenge for the reactivation of public space. Some of the new buildings in the downtown core, meanwhile, also appear as introverted complexes, with little interaction with, and contribution to, the surrounding cityscape. Their homogeneity in use, the complexity, and the large dimensions of these buildings – up to 50 meter-wide towers – often result in inflexible spatial configurations that are not easily adaptable to changing market conditions. While small-scale and heterogeneous plot structures are able to nimbly react to fluctuations in market demand, the large, unwieldy structures on superplots often cannot adjust to changing demand at the same speed. Their specialized form is not conducive to accommodating transformation. An example of such a complex of intrinsic building is Suntec City (Fig. 04), a gigantic retail, leisure, and office complex north of Marina Bay. It represents its own microcosm, situated between large automobile-friendly streets. An extensive network of underground passageways, specific entrance nodes, and a conducive internal atmosphere attract people inside. The core forms the only hub for concentrated interactions between the building and its surroundings, while the exterior space around the complex is poorly designed for public use and reduced to parking lots, spaces for the delivery of goods, and ornamental spaces. This dismissal of the external spaces and the surrounding urban context contrasts to the vast atriums of the shopping paradise on the inside. It is, as Rem Koolhaas expresses in his essay “Singapore Songlines”, where “shopping eden” flourishes while the actual nature remains merely as an ornamental item, a “potemkin nature”.

(1) Total volume approximately 2'578'494 m³
(2) Outline plot - base area: 116'800 m²
(3) Nolli map
(4) Exterior space (total: 40'880 m²) - area with high sojourn quality: 4'124 m²
(5) Building entrances (red): 25 focused around the core, a few entrances via the exterior shell
(6) Feeder for goods (dark blue): mainly via the exterior shell - feeder for clients (bright blue): only in the core around the fountain and the main entrances
(7) Commercially activated ground floor - amount of the building perimeter at ground floor level: 2'256 m (17%)
Two strategies for a more diverse city

In two case-studies, we investigated how specific urban rules, based on a balance between large ‘superplots’ and small plots can satisfy diverse contemporary spatial demands and contribute to more flexible and diverse urban neighbourhood conditions (Fig. 06).

One case study area for developing such a framework of rules is the Ophir Corridor in the great Rochor district. This area between the highly frequented Ophir and Rochor Roads is currently dominated by heterogeneous, predominantly small-scale plots, which are legacies from former shophouses on the site. In the future, many of the plots will be fused together in order to allow for the development of large-scale projects. Early visualisations of URA’s concepts indicate a continuation of the building typologies found south of Victoria Street: voluminous, insular buildings that seem to disregard the surrounding streetscape and refuse a connection to the surrounding urban neighbourhood. This separation is not only physical. Many of the new projects are also high-end developments, consisting of luxury apartments and expensive hotels, causing the spatial separation also to increase socio-economic disparity. The impact on the surrounding neighbourhoods is apparent, in the resulting rapid gentrification. The proposed urban rules5, in contrast, try to counter this separation by facilitating new developments to become part of the urban fabric. Urban rules, such as continuing existing streets across the development area, subdividing large-scale plots into smaller building sites, implementing contextual building heights, and percentage obligations concerning building elevations at street edges, help to channel developments towards an integrated urban condition6.

Small plot structures prevailed from the genesis of the city into the beginning of the 20th century as the principal unit of urban development and socio-economic exchange, based on small- and medium-scale enterprises. In the second half of the 20th century, the scale jump in economic activity within the city rendered the small plot obsolete, clearing the way for shopping malls, back-offices, industry, and large public amenities. In Singapore, many shophouses were demolished. However, it soon became clear that a rich mix of plot sizes, building typologies and programmes is vital to social, cultural, and economic diversity7. The diversity of the plot structure in New York City is a good example of a balance between large- and small-scale development. Based on narrow plots, the fabric of the city transformed while adapting to evolving economic and cultural conditions. While small-scale plots fused and gave rise to larger developments, the connections to the surrounding urban fabric persisted. In the case of New York, even large-scale projects adjusted to the city’s rules and became an integrated part of the fabric. The structural basis of the city still includes numerous small- and medium-scale plots.

In reflection of New York’s success, a similar approach, for example, could be adapted by the urban fabric of the newly planned Central Business District (CBD) south of Marina Bay in Singapore. The current planning shows orthogonal street grids, where every block contains only one plot.

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Fig. 05: Perspective drawing of an envisioned Marina Bay CBD based on a dynamic plot structure.

Fig. 06: Perspective drawing of an envisioned Marina Bay CBD based on a dynamic plot structure.

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Fig. 08: Plot structure south of Marina Bay now (top), URA’s Vision with one plot one block (middle) and with smaller plots as a base (bottom).
With the current planning framework, probably all of the resulting projects will become isolated, large-scale podium towers (Fig. 07). As the tropical climate asks for specific solutions for public space design in order to create comfortable conditions, the danger is that the streets along these podiums will mainly become vehicle oriented. The extensive underground pedestrian network, which is planned in Marina Bay, will reinforce this danger of poorly used public space. Additionally, the programmatic rigidity and inflexibility of large floorplate-buildings may also pose a future challenge under conditions of rapid transformation. By introducing an alternative plot structure based on smaller modules, a more sustainable framework is proposed (Fig. 09). The proposal includes mechanisms that allow plots to fuse for larger programmes, making the blocks adaptable to changing spatial demands, while simultaneously allowing incremental development. By designing a specific set of urban rules according to which the blocks and plots can evolve, we not only expect a more sustainable urban environment, but also potentially more economic added value (Fig 08).

References

Endnotes
2 The Congrès international de l'architecture moderne (CIAM) was an organisation founded in 1928 and disbanded in 1959, responsible for a series of events and congresses arranged across Europe by the most prominent architects of the time, with the objective of spreading the principles of the Modern Movement focusing on all the main domains of architecture (such as landscape, urbanism, industrial design, and many others).
3 The author uses the term ‘superplot’ to refer to large-scale plots that result from combining smaller ones. Similar terms include ‘super blocks’, which refer to Brasilia’s large-scale blocks, and ‘megablocks’, in reference to the contemporary Chinese urban developments.
5 The term ‘urban rules’ is used by the author to describe the rules that could be prescribed to guide urban design. They allow for flexibility within a framework, but are clear in the intention in relation to the urban development. For a catalogue of urban rules, see Lehnerer, Alex (2009). Grand Urban Rules, Rotterdam, 010 Publishers.
6 For detailed information, see the article ‘A proposal for a New Urban Node’ in this Special FCL Magazine.
A Proposal for a New Urban Node

Developing the Ophir-Rochor Corridor as a Central Urban Connector

With its central location and large empty plots, the Ophir-Rochor Corridor is a key location for future developments in central Singapore. The current vision for the area consists of extending the CBD, with its large-scale, high-rise volumes, to the edges of the small-scale, low-rise volumes of Little India, at the heart of Rochor+. With typical high-ended skyscrapers, made of large floor plates, this current vision would generate a division that is not only morphological but also social, separating the adjacent historically important and culturally vibrant, urban neighbourhoods. The urban design strategies presented in this article show an approach where pedestrian accessibility, public space networks, and adaptable building types come together with small urban block sizes, to produce an urban vision that both satisfies the density requirements of rapidly growing Singapore and also enhances urban qualities.

The areas around the Ophir Road and Rochor Road and along the Rochor Canal have experienced enormous changes during the past four decades (Fig. 02). Large parts of the shophouse areas in the Ophir-Rochor Corridor, and to its southwest, in the Bras-Basah-Bugis area, have been torn down. In the Bras-Basah-Bugis area, the shophouses and their small plots have been replaced by podium towers on large consolidated plots, traversed by wide, car-friendly roads that cut through what used to be fine-meshed street grids. The pivotal area between the Ophir and Rochor Roads, together with empty sites along the Rochor Canal, up to the Sungei Road bordering Little India, make up a total surface of around 6.5 hectares that are slated for development. These centrally located sites awaiting development are surrounded by lively and culturally rich neighbourhoods.
The Bras Basah-Bugis area, to the southwest of the Ophir-Rochor Corridor, has been known historically as being the commercial centre of Singapore. Today its diverse buildings for shopping, living, and working are also complemented by Singapore’s only pedestrian zone in the city centre at Waterloo Street. The Little India area to the north, and Kampong Glam area, to the east of the Ophir-Rochor Corridor, are two well recognized historic areas. Little India is known as a show case of Singapore’s South-Asian cultural identity: while Kampong Glam had been the site of the Malay Sultan’s royal citadel, before becoming the hub of Malay heritage. The two areas today are still comprised largely of shophouses and are two of four conservation areas gazetted by the Urban Redevelopment Authority as Singapore’s Historic Districts. Their diverse functions on the ground floor, together with their small-scale plots, contribute to a vibrant street life.

The Ophir-Rochor Corridor is not only close to the well-traversed pedestrian network of the surrounding urban neighbourhoods, it is also close to a number of green spaces. The unbuilt areas along the Rochor Canal, especially in light of the recent Rochor Canal rejuvenation project by the Public Utilities Board (PUB), offer great potential for recreation.

Currently, the extension for the new North-South Expressway (NSE), which will better link Singapore’s city centre to the rising new developments in neighbouring Malaysia, is under planning. The extension for the new North-South Expressway (NSE) under the Ophir-Rochor Corridor is part of the reason for the demolition of many of the existing buildings. At the same time, completed large-scale projects like the Gateway, the Raffles Hospital, and, more recently, the DUO complex have extended the central business district (CBD) into the Rochor area. Their large volumes, and disconnected ground spaces, surrounded by wide roads for automobiles, have inadvertently separated the adjacent neighbourhoods from one another spatially. This separation has made pedestrian accessibility from one neighbourhood to another perceptibly challenging. The current construction of the expressway and the planned further extension of the CBD to the Ophir-Rochor site, thus, may create an enclave condition in the Corridor, where the current and envisioned high-rise projects may further spatially disconnect the Bras Basah-Bugis area from the historic neighbourhoods of Little India and Kampong Glam. In response, a strategy that facilitates better connectivity and walkability would be crucial to integrating the new developments in the Ophir-Rochor Corridor into the existing context. Together with connectivity and accessibility, urban rules guide the development of the new blocks in the Corridor. Such an urban design strategy would not only make the new developments accessible for diverse users who have culturally enriched the adjacent neighbourhoods, but also show new ways for flexible public space development.

**Fig. 02** In the last 30 years, large parts of the old city with the typical shophouse rows were replaced by large-scale developments.

**Fig. 03** Overview of the new developments along the Rocher River with the urban context. The existing and proposed main pedestrian links are marked in brown.
An integrated pedestrian and public space network

Singapore has built an advanced road network composed of efficient highways and local thoroughfares. But this has often taken place at the expense of pedestrian connectivity. Despite popular preference for automobile ownership and climatic reasons for avoiding extensive periods of walking outdoors, pedestrian activity nevertheless is still important for public urban life. Especially in the central area of a city, multi-directional pedestrian connectivity is important not only for the density of users who live, work, and shop there, but is also vital to sustaining the vibrant attractive spaces that have given a unique identity to the central neighbourhoods. Given its remarkable location between the historic neighbourhoods, and the impending realization of the NSE that could potentially further cut off the Ophir-Rochor Corridor’s connections to them, and them from one another, a system of pedestrian connectivity that links the Corridor developments to the neighbouring quarters is crucial to the urban design proposals for the site.

In the alternative proposal, multiple pedestrian linkages, via both bridges and underground passages, which already successfully connect many parts of the Bras Basah-Bugis, would be further extended to the Corridor developments. Underground connectivity of the proposed Mass Rapid Transit (MRT) stations with the existing one at Bugis, together with above ground pedestrian bridges that link the many existing shopping centres to the new developments would make it a node accessible both to local users as well as visitors from different parts of Singapore. Along with connecting Ophir-Rochor Corridor developments to the vibrant commercial area of Bras Basah-Bugis, the proposed pedestrian and public space network would also link key public spaces of the new Corridor developments to the historic Little India and Kampong Glam areas, countering the blockage that the NSE could cause. Proposed densification on the currently vacant sites to the northwest of the Corridor would follow a similar strategy of public spaces to allow pedestrian flow to cross the Rochor Canal, integrating its waterfront green space upgrades, and arrive in Little India through new buildings that mediate the high-rise development of the Corridor with the low-rise shophouses of the historic district. The fine-meshed street grid in the proposal, connecting to the paths of the neighbouring quarters, also provides easy access to the nearby green spaces, especially those along the upgraded Rochor Canal.

Diverse plot sizes and multiple plots per city block as driver for urban diversity

In addition to connectivity to the neighbouring areas of Kampong Glam, Little India, and the Bras Basah-Bugis area, a public space network that guides the densification in the new city blocks of the Ophir-Rochor Corridor and along the Rochor River development would further enhance the new development’s identity and urban qualities. The proposal thus recalibrates the new plot structures so they could facilitate public space provision and densification requirements, as well as enhance the urban diversity that has made the surrounding neighbourhoods culturally rich and
Open and flexible mixed-use structures

Compared to the insularity of typical contemporary shopping malls, traditional markets are open and organised by multi-directional pathways that lead to multiple points of entry. The scale of the individual units that can aggregate around pathways and public spaces results in the permeable character that promotes social interaction between the vendors and visitors (Fig. 08). The shophouses and the commercial podiums of early HDB structures are architectural types in Singapore that take on these characteristics of the traditional market by their orientation to pedestrian accessibility on the floors near the ground as well as by their functional adaptability. The arcaded ground floor spaces of traditional shophouses encourage an active street front, while the buildings themselves exemplify a mixed-use type. Similarly, the open podiums of the first generation HDB buildings, such as the Bras Basah Complex and the Waterloo Centre, are extroverted and freely accessible. Unlike these existing building types, many of the newly constructed shopping malls are spatially introverted and largely mono-functional (Fig. 08). Further, they are often introverted objects in the city, owing to their large footprints, few street-facing entries and an extended interiorised pedestrian network that turns the building inward, often to a climatised central atrium. Thus, the urban qualities of the traditional market and Singapore’s existing mixed-used types that could inform the guidelines for the commercial podiums on the Ophir-Rochor Corridor are as follows: First, the public commercial spaces in the redeveloped city centre areas, the urban blocks in the alternative proposal are subdivided into several plots (Fig. 04), to counter the homogenisation that ensues as a result of single-block developments. As outlined in the article Singapore’s Superplots, Impacts of Large-scale Plots and Strategies for a Diverse City in this issue, the division of the blocks into plots of different sizes supports a variety of functions, investment types, and thus, urban diversity. Together with a mandatory functional mix, such an urban framework is much more flexible and thus more resilient in the face of demographic and economic change. The urban development as a whole would thus be more adaptable, as the buildings could be changed individually should the risk of functional or structural incompatibility with changing market demand arise. At the same time, this strategy of individual and varying plots enables gradual rather than en-bloc transformation. While the diversity of plots on smaller blocks allows for adaptability, it also helps produce mixed-use buildings that more actively engage the street as an important part of the public space network. With urban design guidelines implemented for street-facing access and open, rather than closed, facades, the public spaces activated by pedestrian flow also intensify social interaction and create a vibrant urban hub.

Economically vital areas. Instead of the large ‘one block one development’ mode of plot structure, which has been prevalent in many of the developments in the redeveloped city centre areas, the urban blocks in the alternative proposal are subdivided into several plots (Fig. 04), to counter the homogenisation that ensues as a result of single-block developments. As outlined in the article Singapore’s Superplots, Impacts of Large-scale Plots and Strategies for a Diverse City in this issue, the division of the blocks into plots of different sizes supports a variety of functions, investment types, and thus, urban diversity. Together with a mandatory functional mix, such an urban framework is much more flexible and thus more resilient in the face of demographic and economic change. The urban development as a whole would thus be more adaptable, as the buildings could be changed individually should the risk of functional or structural incompatibility with changing market demand arise. At the same time, this strategy of individual and varying plots enables gradual rather than en-bloc transformation. While the diversity of plots on smaller blocks allows for adaptability, it also helps produce mixed-use buildings that more actively engage the street as an important part of the public space network. With urban design guidelines implemented for street-facing access and open, rather than closed, facades, the public spaces activated by pedestrian flow also intensify social interaction and create a vibrant urban hub.

Fig. 08 Spatial organisation of traditional markets and contemporary mall spaces

Fig. 09 Small shop units promote more diversity and offer spaces for different price categories. Units can be joined to bigger compartments. The ground floor plan demonstrates a fragmented structure with shops and public space areas.

Fig. 10 Mixed use typologies with a variety of public spaces and high pedestrian porosity

Overhead passes activate the first floor and build a network through the building.

Setbacks terraces of the buildings are used as outdoor space for office workers and residents.

The outdoor plaza is the core of the new COMMERCE typology, from where the shops on the ground floor and upper levels can be accessed. It is a public meeting place.

Smaller plazas (or widened areas) along the network, shaded and with possibilities to sit, provide additional space for the people to have a break or to meet.

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structures’ adaptability to programmatic or spatial transformations, which enables continuous periods of use, and therefore increases the lifespan of buildings. Third, a variety of units, with different sizes and locations, should be designed, benefiting socio-economic diversity. The resulting co-existence of price classes would allow small, local vendors to compete on more equal footing with large conglomerates in the same central, and thus price-sensitive, location. Fourth, through vertical stacking of functions, the building structures could also become dense, mixed-use building types. While the commercial units in the lower floors could be used for retail, services, and small workspaces, the upper floors could serve for housing, offices, or a hybrid of both. Unit types that could be more interchangeable rather than programatically deterministic would support the functional flexibility. Last, a hierarchy of circulation between multiple levels of the podium would also make the vertically stacked units more attractive and extend the public space across three dimensions at crucial locations. The entrances of the buildings directly link to exterior overpasses that cross the big streets and access balconies in the upper floors. On the ground floor, they directly connect to green spaces, small local streets or the central plaza, and together form a multidirectional system of public space.

**Dynamic urban rules adapt to developers and users**

Together with stipulations for diverse plots on each block and for porosity within each building, a set of overarching guidelines serves as a steering instrument in the alternative proposal that mediates diverse interests. The design guidelines represent restricted freedom within which investors and architects can produce innovative and adapted typologies according to their individual needs (Fig. 11). Urban rules that could ensure active street life, allow negotiable, flexible plot sizes and promote a pedestrian penetration for the Ophir Rochor Corridor include:

(a) The three lowest floors should house shops with direct access to the street, overpasses, or any kind of pedestrian spaces.

(b) The plot boundaries can be negotiable between the developers, and adjusted to their individual needs. The size of the plots should not exceed 40% of the block size and the building footprints have to follow at least 70% of the plot border.

(c) Each block needs to be accessible via at least three paths with entrances on a minimum of three sides.

The design strategy proposed on the Ophir Rochor Corridor and along the Rochor Canal sites show that the redevelopment of the area has the potential to make it a vibrant and multifunctional node in the city by integrating a central hub in the diverse neighbourhood of Rochor into a central hub. The building types shown are representative of those that could be built with a robust framework of urban design guidelines, with a reconfigured flexible plot structure, an integrative system of public spaces, and better pedestrian connectivity.
The publicly accessible space evolves three-dimensionally. It integrates pedestrian overpasses, set back terraces, building interiors, and offers attractive open spaces for public uses.
Non-Straightforward Fortresses
The development of an exquisite corpse of contiguous castles

Over the course of 30 years, a group of American architects, beginning in the late-1960s with I.M. Pei and later including John Portman, Kevin Roche, and Philip Johnson, designed and built four large, contiguous chunks of urban matter on and along a sandy plot of reclaimed land in Singapore. Perhaps it is the lack of a legible civic structure (grid/spine), but it is not immediately clear how to describe what they placed on this beach. The resultant forms look ‘urban’ in elevation, yet tend to resist classification according to traditional part-whole morphologies of the city (that is building-plot-block). As the following text explains, the overall structural ambiguity can be attributed to a history of successive consolidations, each dissolving legible architectural parts in favour of an integrated, expansionist whole. This began in the 1970s with two adjacent masterplans for the Raffles International Centre and Marina Centre, each initially envisioning dozens of individually developed parcels. Through the 1980s and 1990s, the masterplans were reinterpreted, condensed, and constructed as four independent complexes. Each of these masterplans-turned-buildings was separately promoted as an autonomous, self-contained city-within-the-city. Yet, today, after the later additions of under- and above-ground connections as well as two additional Mass Rapid Transit (MRT) stations, these projects have been stitched together, creating a belated – and previously unimagined – ‘exquisite corpse’ of the four Pritzker Family-approved architects.
Fortress Cities: Hamburgs & Schaumburgs

This is a city within a city. If you’re in a city that you don’t get lost in, that’s a null city. This is a city. You shouldn’t think of it as Plaza Singapura.

L.M. Pei on the newly-opened Raffles City (Alshoors, 1986)

‘Note how, once again, Philip Johnson had blown the gaff by saying that there would be megastructure when management was ready, before he said a thing about the people being ready.’

Reyner Banham (1976)

In 1984, a debate staged as a kopit (coffee) conversation between two prominent Singaporean architects, Tay Kheng Soon and Richard Ho, spilled over into a letter in The Straits Times titled ‘Singapore, the Fortress City’, where Ho writes: “Our city is fast becoming one huge highway domi- nated by urban fortresses – massive hermetically sealed complexes that neither contribute to street life nor to the enjoyment of the city by its people” (Ho 1984: Fig. 01). While the fortress + highway diagram Ho identifies could roughly apply to Singapore’s 1971 Concept Plan (Fig. 02), it is fair to assume (Fig. 03) that he might have been referring to several upcoming projects which were, at that time, still holes in and along the newly-reclaimed plinth of sand at Marina Centre. L.M. Pei’s Raffles City, John Portman’s Marina Square, Anthony Lumonden’s never-to-be-realised Rahardja Centre, and the later Suntec City by Pei with Tsoa & McKown and Kevin Roche/Philip Johnson’s Millenia Singapore, each set out to be a fortress of sorts, each separately identifying themselves as a self-contained ‘city within a city’. 2, 3

And yet, this emerging arrangement of ‘a highway dominated by for- tresses’ was not a ‘fortress city’, as The Straits Times headline indicated, so much as it was a ‘city of fortresses’, as Ho describes (Ho, 1984). One could say the difference between a fortress city and city of fortresses is that which separates a Hamburg from a Schaumburg (Fig. 07-08). These divergent ‘burgs’ or fortress typologies of Hamburg and Schaumburg demonstrate that an ‘urban fortress’ is not limited to a single scale or configuration. A fortress city, like medieval Hamburg, would actually seem to be the urban typology that Mr Ho is searching for in his Straits Times letter: a bounded city of mass for which the ground is a civic network of lively streets or pla- zas. Whereas the medieval Hamburg was a walled urban island surround- ed by an agrarian sea, a contemporary Hamburg might be any urban entity where a civic structure (grid or spine) serves to define a legible collective figure or space at a scale exceeding the individual plot or block. The for- tress-ground of shophouses and narrow alleys in the neighbouring Rothenburg district in Singapore could be said to be a local morphology analogous to a Hamburg. Yet, Mr. Ho is disenchanted with the burg emerging in 1984 Singapore, which seems to be much more Schaumburg than Ham. 2

In contrast to the city of collective mass, a Schaumburg is a city of collective (albeit individualised) movement. A Schaumburg, like Marina Centre in the mid-80s, can be understood as a city of self-contained for- tresses connected by highways.3 Yet neither Raffles City nor the complexes of Marina Centre originated as these singular, autonomous citadels, nor would they retain this status with the decades-later construction of the Circle Line MRT and numerous pedestrian corridors, including the under- ground CityLink Mall. These recent developments, it will be argued, produce a third typology of urban fortress, one that synthesizes the fortress typologies represented by Hamburg and Schaumburg.

Masterplans stuffed inside building envelopes

‘I have nothing against urbanisation.’

L.M. Pei in The Straits Times (Tan 1976)

Raffles City and the individual complexes at Marina Centre – Marina Square, Suntec City, and Millenia Singapore – emerged out of separate, yet adjacent, masterplans which were devised over the course of the 1970s. Marina Square, Suntec City, the ill-fated Rahardja Centre and Millenia Singapore all emerged out of the Urban Redevelopment Authority (URA)’s Concept Plan for the reclaimed land along Nicoll Highway. Raffles City has its origins in a larger masterplan project by L.M. Pei for a Raffles International Centre. The early versions of Pei’s masterplan for Raffles International Centre dated to the late 1960s and envisioned a series of buildings on individual parcels along the Bras Basah and Stamford Road corridors, extending from Dhoby Ghaut to Beach Road (Fig. 12). In a meet- ing with the World Bank in 1971, Singapore’s Minister of Finance, Mr. Hon Sui Sen disclosed that, to fund the development of the Raffles International Centre, the Development Bank of Singapore (DBS) was seeking US$100 million, largely for infrastructure, and that the rights to construct individ- ual buildings would be sold to private developers (World Bank Archives 1972). The separately-developed building complexes would then be linked by pedestrian bridges and underground tunnels, creating a larger, multi- block complex. Initial press releases referred to Pei’s first plan as a $200- 400 million, multi-block ‘heart of the city’, styled after Rockefeller Centre (‘New $200 million “heart” for city’ 1969). Others described it as an ‘office- and-funland’, which would house a casino, swimming pools, round-the- clock nightclubs, and theatres (Yeo 1969).

Yet, considerable uncertainty accompanied the decade-long design process that would eventually see the multi-block masterplan condense into the single-plot superblock scheme that exists today. The early master- plans for the Raffles International Centre were sponsored by DBS in con- junction with the Urban Renewal Department (precursor to the URA) and government officials, but the funding, land acquisition, scale, and phasing of the project remained uncertain. Much of this was later attributed to a lack of cheap labour during the 1970s construction boom, and inopportune conditions for investment – particularly in the hotel sector – for the large- scale project (Yeo 1988). Some individual projects, such as the 27-storey mixed-use Gemini House, were proposed for the Raffles International Centre corridor as early as 1971 but failed to receive the government’s of- ficial go-ahead. Gemini Chit Fund Chairman V.K.S. Narayanan noted that the government ‘is constantly changing and modifying its plans’, and em- phasised that Gemini is willing to adapt to the government’s overall plan:
The Gemini House proposal essentially condensed the overall masterplan of the Raffles International Centre into a single building envelope with a single owner on a single plot. The rationale was that it would be a ‘one-stop shop’ for tourists. While the proposal for the Gemini House was short-lived, its notion of a ‘tourism condenser’ would foreshadow the later development of the Marina Centre. Indeed, by 1975, the ambition of the multi-block masterplan for the Raffles International Centre would itself be channelled into the design of a single 70-storey mixed-use complex on the recently vacated block of the Raffles Institution (Fig. 09). This single-building scheme, jointly funded by DBS Land and Temasek Holdings, would later emerge as Raffles Centre (its name changed from Raffles International Centre), a rotated 16-square grid superblock comprised of a retail and convention podium and four tower extrusions containing hotel and office space.

Three hundred meters from Pei’s Raffles City, Singapore’s Urban Redevelopment Authority (URA) prepared a concept design for Marina Centre, the first of three large parcels of reclaimed land surrounding Singapore’s Marina Bay. The URA’s 1978 Concept Plan positioned Marina Centre as the anchor of the Orchard Road ‘tourist belt’ and called for an aquatic complex, swimming beach, school, and sports/cultural centres (Tao 1979). In the 1978-79 URA Annual Report, chairman Koh Cher Siang emphasised the ‘unprecedented opportunity for the creation of a new city’ (URA 1979). This plan was more or less in line with the original masterplan proposal for the Raffles International Centre; a collection of individually-developed buildings and complexes that aggregate to create a new urban district. Here again, the intent was to use the masterplan as a tool to aggregate individual architectural parts – on separately owned plots – into a legible urban whole.

In November 1978, the URA announced its seventh Sale of Sites and requested tender proposals for several plots on Marina Centre, three of which were designated for hotels and one for a shopping and entertainment complex. When tenders closed six months later, the architects associated with the submitted tenders included: John Portman, Paul Rudolph, Y.H. Peng, and Skidmore, Owings & Merrill. The URA’s concept plan originally envisioned each plot being designed and developed separately, but John Portman’s Portman Properties with S.P. Tao of Singapore Land won the bid by proposing to develop all three hotels and the commercial/entertainment component as a ‘colossal hotels-cum-shopping complex’ (Tao 1979). The single-phase design, to become known as Marina Square, featured three of Portman’s atrium hotels connected by a cruciform retail podium bridging over Raffles Avenue. Thus, as the Raffles International Centre masterplan was largely condensed into a single building, the first phase of Marina Centre as the anchor of the Orchard Road ‘tourist belt’ and called for modern hotels, offices, retail, entertainment, and conference facilities as well as an aquatic complex, swimming beach, school, and sports/cultural centres (Tao 1979). In 1978-79 URA Annual Report, chairman Koh Cher Siang emphasised the ‘unprecedented opportunity for the creation of a new city’ (URA 1979). This plan was more or less in line with the original masterplan proposal for the Raffles International Centre; a collection of individually-developed buildings and complexes that aggregate to create a new urban district. Here again, the intent was to use the masterplan as a tool to aggregate individual architectural parts – on separately owned plots – into a legible urban whole.

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Centre’s concept plan also saw four plots and four projects stuffed into a single building enclosure on a single plot, Marina Square. While both the Raffles International Centre and Marina Centre masterplans had proposed an urban whole assembled out of individual architectural parts, the neighbouring Raffles City and Marina Square complexes, instead, distilled an urban whole into a single architecture.

The emerging redundancy of the neighbouring billion-dollar, $365,000 square metre, single developer, hotel-retail, city-within-a-city projects did not go unnoticed. Shortly after the plans for Marina Centre were released in 1978, it was reported that the plans for Raffles International Centre may be revised due to the duplication of programmes and the amount of investment required for each project. The Straits Times announced: ‘The design concept of the Raffles International Centre [soon to be re-named Raffles City], conceived in the mid-1960s is essentially that of ‘a city within a city’ – similar to that of Marina City’ (Design of $540m Raffles Centre may be reviewed 1979). Seven months later, DBS Land and Temasek announced that Raffles City would move forward as previously planned, which led to subsequent reports that the URA may reconsider its own plan for Marina Square (‘Life in centre of Marina City’ 1979). Yet, in the end, each master-plan-turned-building went forward exactly as planned. This is somewhat surprising, given that the 2,053 hotel rooms at Raffles City alone were enough to rank the Westin Hotels as the five largest in the world and were, in themselves, capable of accommodating one in four visitors to Singapore.

Marina Square committed to adding another 1,880 rooms, enabling Raffles City and Marina Square to host almost half of Singapore’s mid-1980s tourist population. And this was just before Singapore’s reigning ‘Hotel King’, Hendra Rahardja (aka Indonesia’s ‘Mr Yamaha’) rode into town and proposed to drop another 2,700 hotel rooms on Marina Centre. Rahardja’s Superland Pte Ltd, a subsidiary of his Harapan Group (in Bahasa ‘Harapan’ means ‘Hope’) won the rights to develop a hotel, conference, and exhibition complex adjacent to Marina Square in the URA’s ninth Sale of Sites in 1981 (‘Towering Centrepiece’ 1981). Even with the eventual 78% growth in tourist arrivals during 1985-1990, the Rahardja Centre, Marina Square, and Raffles City would be able to accommodate nearly half of all visitors in 1990. It was later determined that Rahardja relied on the optimistic hotel room forecasts of the Singapore Tourism Promotion Board (STPB). The STPB chairman later clarified that their hotel room projections did not include proposed projects or hotels with less than 50 rooms (STPB explains difference in hotel room forecasts 1989). By some estimates, the generous STPB hotel forecasts left several thousand existing or proposed rooms uncounted. This looming oversupply of hotel rooms along with a mid-1980s depression and cash-flow problems combined to sink the Rahardja Centre. The project went on hold in 1984, leaving a large pit next to Marina Square. Marina Square officials suggested filling the excavated site with water and making it into a lake for swimming, windsurfing, and sailing. The Harapan Group, however, came up with a far more clever idea and re-reclaimed the excavated land with (free) soil excavated from the construction of the City Hall MRT Station at Raffles City.
A city without citizens

‘Plans are now being finalised and when completed, the Raffles Centre will be the tourist mecca of Singapore.’

IM Pei (Tan, 1976)

It would not be entirely accurate to conclude that the inflated hotel projections were a mistake or even dishonest. The STPB, retailers, and airlines would all benefit from an ample supply of affordable hotel rooms and, therefore, had some incentive to saturate the market. Yet, the extreme quantities of hotel, office, and retail spaces being condensed into these individual building complexes was not simply a localised game of supply and demand. As alluded to with the Gemini House proposal, these bloated buildings were part of a larger, long-standing ambition by Singapore’s leading public and private actors to produce a parallel city that sought to materialise a yet-to-exist population of tourists.

Singapore’s STPB officials had a sophisticated notion of tourism; so-sophisticated in the sense that it de-mystified global trade and finance, and simply referred to everything as tourism. Foreign bankers, CEOs, and convention attendees were nothing more than a certain class of tourists and would be planned for as such – by creating a draw and providing accommodation. In 1976, STPB chairman Lye Khay Fong explained that the STPB’s agenda would be to attempt to attract ‘quality’ tourists rather than quantities of tourists (‘The lure of ‘quality’ in tourism’ 1976). The optimal tourist would be the one who both knew and could spend the most while occupying as little space as possible. A critical mass of hotel rooms, office space, convention facilities, retail, entertainment, and leisure amenities would be the tools to ‘naturally select’ and ensure a consistent supply of these high-yield visitors. In these terms, the collapse of a masterplan into a single-plot complex can be understood as an attempt to literally construct a tourist package – a single plot developed as an integrated business resort. Here, the tourist’s requirements for convenience and comfort are at least partly responsible for the consolidation of both the physical form as well as the management and control of these complexes. If a medieval Hamburg is a city of collective mass and a megalopolitan Schaumburg a city of collective movement, Marina Centre and Raffles City could perhaps be understood as a city of collective comfort, a third typology of urban fortress which synthesiscs permanence and transition.

The integrated formulas of Raffles City and Marina Square were repeated in the 1990s with the designs for I.M. Pei’s Suntec City and Kevin Roche/Philip Johnson’s Millenia Singapore. The added convention, exhibition and office space from these complexes served to reinforce Marina Centre as a destination for a growing influx of high-yield visitors. The largest floor plates in the city, luxury hotels, retail, spas, and even some nightlife gradually turned Marina Centre into a finance capital, attracting some of the world’s highest-yielding tourists. Notable visitors have included: Lehman Brothers, Goldman Sachs, Citibank, Salomon Smith Barney, Westdeutsche Landesbank, Credit Lyonnais, UBS AG, Visa, and Credit Suisse (Kashiwala 1999).

Integrating integration: Buildings becoming corridors, everywhere

‘We were honoured by Mr Lee’s invitation, or we would not have combined in this way. What we did is rather rare in Asia because so many empire builders, each with his own strong convictions and styles are involved.’

Tan Sri Frank Tsao, Investor and Chairman of Suntec City Development (‘Tycoons Futuristic Vision’, 1992)

Suntec City and Millenia Singapore were largely designed as self-contained, stand-alone developments and, each with large retail, office and hotel components, which sought to compete with Raffles City and Marina Square. Yet, the completion of these projects in the mid-1990s also saw the first of many formal integrations that served to physically unite these individual fortresses by a means other than high-volume traffic arterials. A simple illustration is the construction of a second-level bridge connecting the Suntec International Convention and Exhibition Centre (SICEC) with the Metro department store in Marina Square. After a few months, the
Metro store manager explained that the tremendous increase in foot traffic from the neighbouring convention centre, accompanied by a 20% increase in sales, had forced them to repair their swing doors three times since the bridge opened (Lee 1995). Millenia Singapore also made a second-floor connection to the eastern edge of Marina Square, creating a shared bridge over the five-lane Raffles Avenue. The scale of these projects and Singapore’s humid climate largely ruled out street-level circulation. Thus, these attachments represented the first possibility of an inter-building pedestrian network, one that was dissimilar only in scale to the early masterplans for the Raffles International Centre. These mechanical connections began to stitch together the individual complexes into what this text might term a superfortress, uniting several discrete building complexes. With the integration of an inter-building circulation network, the identity and performance of these complexes began changing from destinations or end-points of a vehicular journey to (pedestrian) thoroughfares. The retail malls specifically were reconstituted as places to go through rather than to.

In 1997, the owners of Suntec City, Millenia Singapore and the shop-houses-turned-mall at Bugis Junction attempted to accelerate the emerging entropic identity of these fortresses by proposing to self-finance a private monorail system that would connect the complexes at Marina Centre with the MRT Station at Bugis Junction (Rashivala 1997). Up to this point, Marina Centre was still largely ‘fed’ by the East Coast Parkway and functioned as an extension of Changi Airport. The monorail sought to tap into the mass transit system and attract a new retail audience. The plan for this people-mover, however, was eventually set aside when the Land Transit Authority got the hint and proposed its own light-rail system running along the same route (‘End of the line for Marina monorail plan’ 1997). Around the same time, the URA further aided the expansionist tendency of the Marina Centre trio with the sale of a submersed site for an underground mall that was to link Marina Centre with the City Hall MRT station and Suntec City. The underground CityLink mall, developed by Hong Kong Land, would be realized in 2000, along with a seven-storey office building featuring the largest column-free floor plates in Singapore (‘Singapore’s first underground shopping mall opens…’) 2000). The LTA’s light-rail track would finally emerge in 2010 as the sub-surface Circle Line MRT with two stations flanking Millenia Tower and Suntec City’s convention centre (‘Circle Line MRT’ 2015).

These recent mergers, while largely invisible, have substantially altered the urban performance of this supercomplex. The closed, hermetically-sealed envelopes that Richard Ho questioned in his 1984 letter to The Straits Times have, at a performative level, become open, public and extroverted, actively looking to proselytize and link the remainder of the Bras Basah and Ophir/Rochor corridors. No longer an urban exception, the complexes began changing from destinations or end-points of a vehicular journey to (pedestrian) thoroughfares. The retail malls specifically were reconstituted as places to go through rather than to.

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Endnotes

1 Ieoh Ming Pei, Kevin Roche and Philip Johnson all received architecture’s prestigious Pritzker Prize. In turn, John Portman’s Hyatt Regency in Atlanta is the project that sparked the Pritzker family’s interest in architecture.

2 Tay Kheng Soon chaired the Singapore Planning and Urban Research (SPUR) Group and co-founded Design Partnership (now DP Architects). Richard Ho had recently graduated at this time and would go on to work with Aldo Rossi in Europe, returning to Singapore to establish an award-winning architectural practice.

3 The architects and developers of Raffles City, Marina Square, Rahardja Centre and Suntec City routinely promoted their projects in The Straits Times and Business Times as a ‘City within a City’, echoing the phrase revived by late-70s projects of Leon Krier, OM Ungers and Rem Koolhaas.

4 ‘Burg’ refers to the original Germanic word, burh, which was a defensive wall or fortification. The ‘burg’ or fortress wall is the form in which the medieval city finds its origins. It was the walled fortress that, over time, developed mercantile activity and eventually received municipal autonomy from the King. Thus, the term ‘burg’ came to refer not only to a defensive wall, but to the town or city itself. Rather than being anti-urban, the fortress typology is properly ur-urban.

5 The comparison between Marina Centre and Schaumburg, Illinois (US) is not entirely arbitrary. Each is a 20-minute drive from a major international airport (Changi/O’Hare) and functions as an alternate finance/hotel/retail centre to the primary business CBD (Raffles Place / Chicago’s Loop). Each hosts numerous MNCs and contains high concentrations of shopping and entertainment facilities. Most importantly, each can boast of having a John Portman-designed hotel.

6 Gemini Chit Fund, the largest of Singapore’s ‘chit funds’ (a dubious lending scheme popular with low/middle income persons) and developer of the Gemini House, was dissolved in 1972, following a criminal investigation that found that the volume of the fund’s business exceeded its paid-up capital by a factor of 20 (among other financial irregularities). The judge presiding over the Gemini Chit Fund case described it as ‘the swindle of the century’.

7 Temasek Holdings Pte Ltd is an investment company owned by the government of Singapore. DBS Land was a subsidiary of the government-linked DBS Bank. DBS Land merged with Princo Land in November of 2000 to become CapitaLand, one of Asia’s largest real estate companies.

8 The designation Marine City referred to Marine Centre, Marina South and Marina East; three areas of reclaimed land which, together, delimit Marina Bay. This report may be using the name Marine City synonymously with the name Marine Centre, as the land for the entirety of Marine City had not yet been fully reclaimed.

9 It was estimated that 8,000 rooms were uncounted in the 1988 hotel room forecast.

10 The failure of the Rahardja Centre did not spell the end of Hendra Rahardja. Rahardja returned to Jakarta where he ran three banks and several hotels from the 26th floor penthouse of his Gaja Mada Tower designed by Anthony Lumsden of DMJM (to become AECOM). Rahardja was later sentenced to life imprisonment for misusing $374 million in central bank bailout funds. To avoid prosecution, Rahardja fled to Australia where he was accused of faking his own death to avoid prosecution.

11 The URA underground masterplan, for example, incentivizes developers of new or renovated projects to connect to the existing underground infrastructure in areas such as Marine Centre.

Image Credits

Fig. 01: “Singapore, the Fortress City” (1984). The Straits Times, May 6, p. 19.


Fig. 03: The Straits Times (1986). October 7, p. 23.

Fig. 04-05, 12, 15, 22: Matthew van der Ploeg

Fig. 06: Matthäus Merian (1641). Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Hamburg-1641-Merian.jpg

Fig. 07: Google Maps, 2015

Fig. 08: Edited, Original: http://www.nas.gov.sg/archivesonline/photographs/record-details/a7fcc214-1162-11e3-83d5-0050568939ad

Fig. 09: URA Annual Report 1988-89

Fig. 10-11: URA Annual Report 1978-79

Fig. 13: URA Annual Report 1987-88

Fig. 14: “Monorail link mooted for four shopping centres” (1997). The Straits Times, February 13, p. 36.

Fig. 16: The Straits Times (1995). March 31, p. 8.

Fig. 18: Michael Portman. http://www.portmanholdings.com/ projects/marine-square
Little India’s New Face
A case study revealing how temporary migration is transforming Little India

Building on a case study of Singapore’s inner city neighbourhood, Little India, this article shows how the ‘settlement and incorporation’ process of transient migrants induces economic and spatial impact on the neighbourhood. The outlined neighbourhood transformation is guided by global as well as local influences; its instigators are globally operating transient migrants, while its guiding frameworks are local, including migration policies, the businesses serving the migrants, and the vernacular urban context. The analysis of the neighbourhood transformation concentrates on ethnic-focused businesses, as they not only play an important role in the transformation process (for example, by creatively responding to the needs of the migrants), but they also render the transformation process visible. These transformations highlight the strength of the shophouse neighbourhood, one of the most original urban fabrics in Southeast Asia.

Recently, scholars have formulated concepts explaining the relationship between migration and cities in new and often more positive ways than they have in the past, pointing out the need to acknowledge migrants’ influence on cities. Saskia Sassen (1991), for example, described the need to understand migrants as part of the global flow of goods, services, and people, and as a key component of the global city (1991). Nina Glick-Schiller and Ayse Çağlar demonstrated how migrants can be understood as actors of urban scaling processes, explaining how migrants become active agents of neoliberal transformation processes of cities (2011). Other scholars, focusing their research predominantly on migrants’ settlement patterns, have changed their understanding of migrants, seeing them as actors within urban regeneration processes. Descriptions of ghettos and declining inner city neighbourhoods are no longer en vogue; rather than rendering migrants responsible for inner city neighbourhood decline, recent European and American studies have started to explore and theorise how migrants’ settlements can spur urban regeneration processes.
Winnick 1990, Cameron 1997, Hou 2013, Wood and Landry 2008, Tonkiss 2013). While the potential of migrants as agents in urban transformation is acknowledged in scholarly research, governmental policies, especially in many Asian countries, have been, in contrast, specifically designed to prevent such processes from taking place. Even though the process of settlement is discouraged, for example, by offering primarily temporary employment for migrants, the pathways of incorporation can be traced in many Asian cities, for example, in Hong Kong, Kuala Lumpur, or Singapore.

Around Bangla Square in Little India

Little India is a focal point of the predominately Bangladeshi South-Asian foreign worker community. This is one of the largest transient migrant communities in Singapore, with a local newspaper estimating their population at over 100,000 in December 2012 (Tai 2012). The heart of the transient migrant community pulsates at Bangla Square, a gravel square formally known as Lembu Road Open Space. The first Bangladeshi restaurant at Bangla Square is said to have opened in the early 1990s, when the square was still a green vacant plot. Local business owners around the square explained that large numbers of Bangladeshi foreign workers started to frequent the area around the mid-2000s. Initial changes to the neighbourhood took place when Bangladeshi provision shops, selling familiar groceries and ingredients to the Bangladeshi foreign workers, began to replace transsexual sex businesses. With the growing number of foreign workers, the vacant plot became ‘rather mucky,’ in the words of a local business owner, and finally was resurfaced by the Urban Redevelopment Authority (URA). The migrant gatherings have a strong spatial and economic influence on the neighbourhood, which can be described on two levels: on the one hand, they changed the neighbourhood directly through the appearance of large crowds of foreign workers; and on the other hand, and more indirectly, through the growth of the businesses catering to these foreign workers. Today, one can find about 40-60 small shops specifically addressing the needs of the growing number of male Bangladeshi foreign workers (Fig. 02). These shops offer a wide selection of goods and services, from betel nut, or atta, to religious books in Bengali, and Singapore’s only locally published Bengali newspaper, Bangla Kantha (Voice of Bengal). In addition to the shops selling ethnic goods directly catering to the foreign workers, the area also houses many businesses related to the industries that employ these foreign workers. These businesses include, for example, stores selling boots and clothing for construction workers and construction machinery. Together, all these businesses have significantly increased the mix of retail choices for migrant workers in the neighbourhood. Furthermore, a variety of specialised services can be found around Bangla Square. These include doctors who perform medical examinations as well as mass catering services. With a few men cooking over an open fire, the mass catering service produces around 1,400 meals a day for the workers on remote sites. Tailors set up sewing machines, often in front of garment shops, offering on-the-spot clothing alteration services. These examples show that catering to the needs of foreign workers, new and often very low-key business concepts have emerged. Most of the ethnic-focused businesses are small, limited to the footprint of the ground floor of a shop-house. In the process of maximising space, the primary renter, sometimes also the owner, subdivides the space so that various services can be offered in one place (Fig. 03). As many of the foreign workers gather specifically in the evenings or on Sundays, the neighbourhood attracts many temporary businesses, often opening up after regular business hours on sidewalks or...
in front of otherwise closed stores. Thus, business hours in the area have been drawn out, leading to extended economic activity. Not by coincidence, Singapore’s only 24-hour department store is also located in this neighbourhood and night shopping is a popular leisure activity in the area.

These temporary businesses operate in different types of facility, ranging from informal sidewalk to full-fledged market stalls set up in empty car parks (Fig. 01). While some stall owners are local entrepreneurs running shops on normal weekdays, other stalls are run by subcontractors for larger Singaporean companies; for example, by SingTel, the largest telecommunications company in Singapore, which subcontracts roughly 12 stalls in Little India alone. The smallest businesses involve peddlers with foldable tables or blankets selling fruits or newspapers. (Fig. 04). Slightly larger stands often find space within the five-foot way of a shophouse and are rented individually by the shop owner. The largest stalls often utilise car parks or privately-owned squares rented from shopping mall operators, or in some cases, from the Little India Shopkeepers and Heritage Association (LISHA), which is managed by the Singapore Tourism Board. Additionally, nearly every second store in the neighbourhood adapts its range of products on weekends to cater to the foreign workers. Around midday on Sundays, shop owners fill the front row of their shops with large plastic boxes, filled with ice for selling drinks or fruits to the foreign workers, in addition to their usual goods. Space in the neighbourhood is exceptionally well used. On the one hand, spaces that are normally not used for commerce (for example, the sidewalks and carparks) are utilised in the early evening and on Sundays as market places. On the other hand, space is utilised differently over the day and week, according to changing clientele and requirements. Furthermore, the presence of migrant workers in the area adds a very low-income group to the area, which is reflected in the generally low food and retail prices of the neighbourhood. The lower food and retail prices also attract other low-income groups to the neighbourhood.

The influx of foreign workers can be said to have indirectly helped to sustain a low-income neighbourhood within central Singapore.

Socio-economic heterogeneity in cities that support dynamic labour and retail markets, described in the Little India case study, has been acknowledged to lead to limited price and wage inflation. Socio-economic heterogeneity is also praised for promoting enterprise and market opportunities and helping to avoid problems of spatial mismatch between housing and employment demand (Tonkiss 2013). While the migrant gatherings have in the past attracted negative press, the case study shows that not only has much of the local economy adapted to the gatherings, but the gatherings have also allowed the neighbourhood to flourish. The ethnically-focused businesses and the foreign workers themselves have increased the economic vitality of the area by initiating a diversification of the business types, concepts, products, services, opening hours, and spaces. The case study also shows the strength of the urban shophouse fabric with its small-scale units, narrow streetscape and squares to flexibly adapt to contemporary demands.

References


Endnotes

1 The URA is the governmental urban planning agency in Singapore. Through all-encompassing master plans, planning guidelines, and through a government-led land sales programme, the URA is able to steer nearly all urban developments in Singapore.

2 A specific whole ground wheat flour used for making Luchi, Porota, or Pitta in the Bangladeshi cuisine.

Image Credits

Fig. 01: Carlina Teteris

Fig. 02-04: Edda Ostertag
Alternative Public Spaces
Space for community activity and participatory Urban Design

Vast vacant land plots, under-used car parks, narrow backlanes,1 overflowing ‘Five-foot Ways,’2 open facades, postmodern shopping mall forecourts, atriums, and galleries within commercial complexes are the spatial foundations for alternative public space creation. Ethnic Tamil or Hindi Singaporeans, old ‘aunty’s’ and ‘uncles,’3 young urbanites, and ‘foreign workers’4 are the actors who are reinventing these spaces, making them meaningful community spaces that build and enrich the social and cultural capital of an inner city neighbourhood in Singapore. Processes of temporary alteration, adaptation, and annexation convert these sites to alternative forms of public space. Driven by requirements that are otherwise not catered for, these processes represent the need for flexible public spaces for niche activities to unfold.

In the past, various scholars, who have analysed the public spaces of Singapore, have stressed the close connection between the provision and various types of public spaces on the one hand, and the governmental political agenda on the other (Hee and Ooi 2012; Pomeroy 2015; J. K. Chan 2001; Chua and Edwards 1992; Kiang and Liang 2009). Public spaces have been regularly described as constructions of the ruling party and its planning regime (Hee and Ooi 2012, 79), reflecting ‘Asian statehood’ and representing primarily the contemporary global aspiration from the state (Kiang and Liang 2009, 234) rather than everyday activities. But can this be all? Where are the spaces that serve the more mundane needs of a society’s everyday life? What spaces do the poor, the migrants, the rebellious, the religious or the traditionalists claim? Can the spatial needs and desires of a growing, diverse society such as Singapore be planned and managed primarily by the government?
Public space and community formation

Assessing community spirit is complex; recurring elements that are known to encourage a sense of community are residence homogeneity (Mumford 1970; Gans 1967), length of residency (McMillan and Chavis 1986; Buckner 1988), and homeownership (McMillan and Chavis 1986). While the Rochor district is not very homogenous, the district does have a relatively high number of homeowners as well as long standing communities. The ethnic Indian community, for example, has been known to reside in the area since the 1800s, and the community of hardware shop owners have settled down in other parts of the neighbourhood since the mid-1900s. Furthermore, it has been discussed that public spaces have the ability to strengthen community bonding. Scholars, such as, for example, Watson (2006b), Sennett (2007), and Peters (2010), have argued that public space increases the chance of encounter, and consequently, the amount of social interaction in a neighbourhood. Social interaction is seen to stimulate a feeling of belonging, which is described as the basis for community affiliation (Cochrun 1994). In the greater Rochor (Rochor+) area, it can be argued that the meaning of public space extends far beyond merely providing spaces of encounter, but also offering space for intensive social contacts and participatory urban planning activities. This is only possible because the type of spaces found in the Rochor+ district differ quite substantially from what is commonly described as public space in Singapore.

Farrer Park Fields - ethnic festivities and events

The temporary vacant land plots around the Farrer Park MRT station house regular ethnic and religious festivities. Big temporary tents are erected, and lights and music attract, especially in the early evening, large crowds of ethnic clientele – people from the neighbourhood, tourists, and foreign workers. The website of the Little India Shopkeepers and Heritage Association (LISHA) reveals a busy schedule of festivities taking place on the vacant plots. Many of the festivals work in close collaboration with the various religious temples of the neighbourhood and often extend to the adjacent streets. The festivals are organised either by LISHA or by religious and cultural Institutions, for example, by the Hindi Endowments Board, the Bangladesh Universal Society, or by private interest groups such as the Indian Restaurant Association (LISHA 2002). While it seems bizarre that important cultural events would take place on vacant land that is predestined to be developed into commercial property, it may be explained by the fact that, already historically, the organisation of cultural festivities was undertaken by community groups of various ethnic backgrounds rather than by the state. In the 1990s, this fact was already identified as a threat to the continuation of ethnic practices (Ho and Chua 1990).

Sturdee Road Field - bodhi meditation and dog walking

Another example is a vacant land plot, adjacent to small- and large-scale condominiums, which has been used for meditation purposes and by the dog walking community. Early every morning, around 7:30, members from the nearby Bodhi meditation centre would exercise on the field adjacent to Sturdee Road. Approximately 12 students, mainly older women who are residents from the vicinity, would circle mature Angsana trees to spiritual music, passing by a large URA ‘For Sale’ sign on each round (Fig. 02). Participation is free to anybody and does not require any payment. While participants come from different ethnic backgrounds, the group has developed community spirit over time. Normally the Bodhi meditation group would try to lease park space from the National Park Board for their exercises, but in the Rochor+ area, due to the lack of park space, they have occupied the vacant land plot. While the Bodhi meditation group uses the space around the trees, residents walking their dogs also frequent the

![Fig. 02 Bodhi meditation group adopting vacant land plot](image)

![Fig. 03 Rochors vacant lands](image)
same space every morning. The dog owners are a mixed group of locals and expats. Despite not having much in common, the two groups have learnt to share the space without infringing each other’s ‘territory’. Since then, the government has sold the plot, fences have been put up, and construction is due to start in April 2016.

City Square Mall – the family-based community mall

Opening up to its surroundings, the mall has two squares teeming with activities. Line dancing events take place Friday evenings, every third Saturday, and every fourth Sunday of the month. Energised by beats coming from a ghetto blaster and animated by a dance instructor, locals and foreigners sway happily to their public square dance, otherwise locally known as line dance (Fig. 01). The dance sessions are hosted by the mall and organised by community groups. They are free of charge and anyone can participate. The lower ground square holds regular community events, such as a charity flea market called ‘Flea for Good’, free Disney movie screenings for kids, and small-scale sports competitions, such as rock wall climbing competitions. Additionally, the mall hosts public mall walking sessions and mall workout sessions every Sunday, organised by Singapore’s Health Promotion Board. Similar to the previously described cases, the rights to use the squares within the shopping complex are ambiguous. On the one hand, the squares are clearly designed as part of the mall. Some activities are chargeable and the mall personnel manages the maintenance. On the other hand, the squares are marked by signage, are designated within the masterplan as public green spaces, and attract many community activities, which are traditionally hosted in public institutions, squares, or sports grounds.

The ethnographic study of the activities in alternative public spaces in the Rochor+ area brings to light that there is a gap in the perception and understanding of public space in Singapore, in that user-initiated activities are not acknowledged and endorsed. The research exposes specific user involvement from minority groups, often by marginalised populations – often the old and poor, non-residents, foreign workers, and people of specific ethnic backgrounds. The case studies reveal social and cultural needs that would otherwise not be addressed, but also furnishes evidence of participatory urban space creation processes taking place in the inner city district of Rochor+. There is a threat that many communities will lose their spaces when these are not recognised and integrated in planning processes in the near future. As an incentive, the research at the Future Cities Laboratory has developed proposals to integrate community spaces within an overall public space framework for the Rochor+ neighbourhood (Fig. 04).
References


Endnotes

1 Backlanes are small, narrow alleys, which were introduced to Singapore’s shophouse neighbourhoods as part of a sanitation scheme. For more details, refer to the article “Re-imagining Backlanes” in this issue.

2 ‘Five-foot Ways’ are traditional arcade structures attached to the front of shophouses, acting as five-foot-wide thresholds between the public and the private domain.

3 ‘Aunties’ and ‘uncles’ are terms used across Southeast Asia to address more senior men or women in a respectful manner.

4 Foreign workers are labourers coming from neighbouring countries such as China, Bangladesh, India, and Thailand to Singapore on temporary work permits, living in Singapore under the conditions of limited human and labour rights.

5 LISHA is an organisation set up by the Serangoon Merchant’s Association, the Little India Restaurant Association, the Hindu Endowments Board, and the Singapore Tourism Board. Along with its role of addressing the concerns and needs of the various communities in Little India, LISHA’s main objective is the betterment of Little India as a multi-cultural and multi-ethnic tourist destination in Singapore (LISHA, 2012).

6 A minority group is a subordinate group whose members have significantly less control or power over their lives than members of a dominant or majority group.

Image Credits

Fig. 01, 05, 06: Carlina Teteris

Fig. 02-04: Edda Ostertag

Fig. 05-06: Thaipusam festival in the streets of Little India
A Proposal for a Multi-Ethnic Quarter

Mediating divergent social groups in the Farrer Park Area

The area around the Farrer Park Mass Rapid Transit (MRT) station is a bustling multi-ethnic neighbourhood in the greater Rochor area (Rochor+). It harbours vital street life and is made up of a mix of historic shophouses and contemporary high rises. Various ethnic communities have been using many of the vacant sites in the area informally as festival or meeting spaces. Most notable of these are the weekly influx of 'foreign workers' on Sundays, their large numbers creating a semi-permanent ethnic hub in the area. At the same time, developers are building large-scale investment projects on some of the open sites, targeting a wealthier clientele in the centrally located neighbourhood. The opening of the Connexion, an integrated hospital-hotel complex for medical tourism, for example, is catalysing the growing number of new, short-term rental types, called suites, which accommodate transnational consumers from the surrounding region. The ensuing process of gentrification threatens the cultural diversity. The following design project sees the socially divergent yet physically intersecting populations as a potential for future urban strategies. It deploys a public space system to accommodate the informal activities of existing migrant groups. It also, importantly, introduces a high-density, mid-rise 'new shophouse' type for the neighbourhood. Through a combination of densification, upgrades and strategic addition of social amenities, the proposal paves the coexistence of divergent user groups.

Fig. 01 Foreign workers meeting on Sunday on the open field next to the new Connexion building.
Farrer Park and its adjacent neighbourhoods have a long history in integrating migrant communities in Singapore. With a diverse social composition and many small-scale economies, the neighbourhood’s surrounding commercial and institutional spaces testify to the diversity that remains attractive to both a growing segment of the local population as well as tourists to the area. Specifically interesting in this regard is the fact that also marginal ethnic groups – for instance, the migrant workers or smaller religious communities – use the open public spaces. They mainly use the vacant plots, which have been cleared for future development and construction, and have remained empty in the interim, allowing their informal occupancy by the ethnic groups. Exactly this temporary change of the physical urban environment shows the socio-ethnic diversity of Singapore, which the formalized spaces do not accommodate. In most cases, these vacant sites, which are endogenously produced by the socio-ethnically marginalized of Singapore, are sooner or later taken away for redevelopment. While some vacant plots are inaccessible to the public, others are nearly established as popular public spaces that are ‘informally’ used for temporary events and gatherings. There are whole calendars of festive events by different ethnic communities. The celebration for the Hindu holiday Deepavali on Serangoon Road, the Bangla New Year on the open field bounded by Birch road, or the Chinese Mid-autumn Festival on the open field at Race Course Road are a few examples of the temporary use of the vacant spaces. The neighbourhood also most notably experiences the weekly influx of ‘foreign workers’ on Sundays. There are few other spaces created that allow the ‘foreign workers’ access. Thus, during their only day off from work, the ‘foreign workers’, largely of South Asian origins, gather on one of the many vacant plots, meeting their compatriots and friends (Fig. 01). The large vacant site next to the Farrer Park MRT is accessible for the foreign workers, many of whom have been bussed in from often peripheral places on the island nation. Specialised amenities, such as food stalls or specialised shops selling goods of South Asian origin, at the same time, cater to the demand created by the foreign workers. The popularity of the temporary festival structures, which are set up on lawns and streets, shows that there is demand for flexible open spaces in the city. The presence of large crowds of foreign workers on Sundays also confirms the necessity of such spaces. If these kinds of temporary spaces are removed in the future, then even formally designed gathering places for foreign workers in the urban periphery would not be able to offer the proximity to ethnic amenities and spatial flexibility that the current spaces offer. The state has been leasing the centrally-located development sites to developers, and seeks to redevelop them at market price, while accepting the use by the migrant
workers as a temporary solution. These spaces, used by the ethnic communities and migrant workers, will gradually disappear without adequate replacement. Not only the meeting space of the ethnic groups will be taken away but it will also have a negative effect on the current, diverse cultural life and local business in the neighbourhood and lead to a homogenous high-end city quarter.

Since the 2010s, private developers have completed projects such as the City Square Mall, the Farrer Park Hotel, and the Connexion (Fig. 06), an integrated hospital-hotel complex for medical tourism, on some of the formerly vacant sites. The Connexion, for instance, is aimed at serving some of the almost one million medical tourists from the surrounding region seeking high-quality care in Singapore. Especially the upper middle classes of Indonesians, Malaysians, or Indians come to Singapore for its reputation of quality, but also because their own health systems are so socially polarized that it is worth the trip for them to come to Singapore. The foreign clientele from the neighbouring countries who patronise the medical facilities in Singapore are often not solo travellers who fly in and out of Singapore purely for outpatient procedures. They often bring their entourage of extended families, who also take the occasion to patronise the shopping and recreation facilities in Singapore. Thus, the socio-cultural habits created by Singapore's economic niche in the region has resulted in the peculiar types of spatial pressures that manifest in the areas pivoted by hubs such as the Connexion. Small, private developers quickly respond to the influx of regional medical tourists by creating small-scale, short-term, luxury rental residential types called ‘suites’ (Fig. 03-05). A value chain of additional amenities, ranging from commercial to cultural, has also followed in the neighbourhood. It is foreseeable that the introduction of new functions, while overlooking the realities on the ground in the area, would create growing tensions; namely, between the incoming users and the local and migrant communities that have settled in the neighbourhood.

In view of the inevitable urban transition, a set of development strategies is crucial to ensure ethnic diversity of the area, which could be seen as a unique urban resource. The mixed-use functions, diverse building types, and the coexistence of locals, migrants, and global tourists present potential for the coming development of the area, which is already a mature, diverse and attractive neighbourhood. The interaction between the ethnically, socially, and culturally diverse communities has made the area a centre of creative and vibrant cultural life. Strategic preservation of the functioning and attractive public spaces and the support of temporal events would help sustain this urban diversity, which has given the neighbourhood an identity that is attractive to many visitors. The recognition of these otherwise informal spaces does not imply that no transformation should take place. Rather, it is a challenge that can contribute to an integrative urban design.
Strategically located and openly designed public spaces strengthen the coexistence of divergent cultural groups

The proposed design includes a new, mixed-use community centre adjacent to the Connexion and the improvement of Race Course Road. The large plot between Serangoon Road and the Connexion building has a key position due to its central location and its close proximity to the MRT station. The case study proposes a social meeting and festival space (Fig. 07), which serves as a replacement for other, open fields in the area that might soon be developed. The building combines collective spaces on vertically-stacked platforms that can accommodate diverse and temporary alterations for gatherings and festivals. It is freely accessible from all sides and offers spaces for commercial activities in the lower floors. In addition to hosting public programmes and realising a minimum density, the platforms forming the podium of higher towers would include housing, offices, or a hotel that offers more usable square meters and certain financial revenue.

A second aspect of the public network improvement represents the alteration of the street profile and the completion of a building front along Race Course Road. The main entrance of Connexion – housing Farrer Park Hospital, Farrer Park Medical Centre, and One Farrer Hotel & Spa – faces this street, which means that the street will be more frequented by pedestrians. This proposal suggests a new development in the southwest of the hospital that seeks to integrate direct access to the street and forms a continuous building front together with the existing buildings. By providing comfortable and wide sidewalks, planting trees for shade, and limiting car traffic, the new and old buildings along Race Course Road will subsequently open up their ground floors for commercial and common uses and partly appropriate the street space. The centre for different social groups and diverse uses permits different user groups to converge, and encourages them to share the public space. As a third strategy next to stacked functions, strategic open sites along a linear street front are elements of an open space framework that links the permanent focal public spaces with each other. An activated pedestrian-friendly street encourages the use of common space in a similar way, and the street can also be temporally transformed for special events.

Middle-scale building types with an active ground floor and work-life mix for a new, dense urban neighbourhood

This design project proposes a viable strategy to use other current vacant spaces as densification locations. The already mentioned buildings along Race Course Road together with new buildings on the large, open field northwest of it would realise the plot ratio of 3.5 that is stipulated by the URA. The proposed new, middle-scale houses would mediate between the small-scale building grain in Little India and larger complexes in the west (Fig. 08). The current gentrification process and planned population growth of the country increases demand in housing by non-Singaporean residents who are not eligible for HDB units. Instead of constructing gated condominiums, the middle-scale housing units contribute to a vibrant city life due to their functional adaptability. The individual building developments vary in plot size, number of floors (between 3 and 10), design, and
type of property, and thus trigger a social, functional, and cultural mix. Similar to the traditional shophouses, the structures can be adapted for different uses within one building. On the two lower floors are mainly retail shops, restaurants, workshops, food stalls, or offices; while on the upper floors, there can be studio spaces, ateliers, or bigger apartments. There is not only a gradient of different uses within one building, but also transitional spaces between public, collective, and private uses in the outdoor spaces. The buildings face on their front side a public street with sidewalks, street parking, and local car traffic. The back of the buildings are also publically accessible but will mainly be used by the local community as a semi-private recreational green space (Fig. 09–10). Next to common amenities, the proposed building types comprise smaller, private spaces on the ground or on the upper levels of the houses.

Following detailed fieldwork surveys, the coexistence of the divergent yet intersecting populations of locals, migrants, and wealthier tourists are seen as a potential for future urban strategies. The design proposal would establish a new framework of open spaces that includes a new community centre adjacent to Farrer Park MRT. It would reconfigure the streetscape and introduce a new, high-density mid-rise building type. All together, this would guide a careful urban transformation that respects cultural, architectural, and ethnic qualities and stabilizes their coexistence.
References


Endnotes
1 ‘Foreign workers’, in Singapore, is a term specifically designated for migrant workers in the low-end labour-intensive industries such as construction and shipbuilding. The term is distinguished notably from ‘foreign talents (?)’ used to designate expatriate labour in the service, or knowledge-based sectors such as IT, banking, and more. The distinctions are clear in the conditions of employment, duration of permissible stay, and more. For more detailed analysis, see source.

2 The term ‘gentrification’ is used to denote the pushing out of lower-end social groups by higher-end ones.

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A Proposal for Re-Imagining Backlanes
Invigorating the backlanes of shophouse neighbourhoods as attractive common spaces

Increasingly, shophouse clusters are becoming a subject of urban regeneration. By extending the dialogue between heritage conservation, urban design, and building technology beyond the physical mass of shophouses, their backlanes offer a remarkable prospect to act as strategic urban attractors. By acknowledging and integrating backlanes into the official common space system, extension and intensification of street activities are able to unfold. The upgrade of these specific urban spaces contributes to urban diversity, increases available active street fronts, and also increases real estate value. The design vision, proposed in the following article, is a combination of typological and technological adaptations of the existing urban fabric.

Reclaiming backlanes

The project, ‘Reclaiming Backlanes’, is a culmination of a synergetic design approach derived from research into energy efficiency, walkability, urban design, and building stock analysis. The multi-pronged approach not only reconciles the discrepancies between historic and contemporary uses of backlanes as disputed urban spaces; it has also prompted further inquiry into the potential of transforming backlanes into dynamic urban spaces. On a broader urban scale, the project aims to supplement the quality and usability of backlanes in the 8.9 hectare large greater Rochor (Rochor+) area, since these spaces are frequently used and pedestrianised routes within the neighbourhood (Bruelisauer et al. 2013). The proposed vision emphasises the potential improvement in visual and commercial viability of the backlanes by enhancing climate conditions and connectivity through the area. The project investigates the introduction of neighbourhood-scale cooling systems – district cooling or the novel heat bus system – to not only
increase energy efficiency for air-conditioning, but also to liberate façades from technical installations and to enhance thermal comfort in the backlanes. Parallel to technological integration, the team proposes a range of urban interventions that will enable the activation of the backlanes, namely: improved connectivity, strategic landscaping, and the placement of urban furniture.

The urban context of shophouses and the formation of backlanes

Shophouses in Singapore were terrace developments conceived from the combination of commercial programmes and residential functions within a single plot of land. Specifically, shophouses in Singapore and the neighbouring regions were architectural imports from southern China; their origins traced back to the vernacular courtyard house, as evidenced by their long and narrow plans (Davinson, 2010). The shophouse type is localised in Singapore, in the form of expansive ceilings, light wells, and ventilation outlets. These were important adaptations in the context of the hot and humid climate of Singapore. Furthermore, the five-foot walkway was introduced, as a continuous covered walkway on the street-facing front of the shophouse, protecting the residents and visitors against heavy rain and strong sun. Backlanes, at the rear of shophouses, are the products of an on-site urban upgrade conceived by the municipal authority, predominantly as a solution for a sanitation upgrade from carrying human and other waste through the front hall of the shophouse (Chua and Edwards, 1992).

Prior to the implementation of the backlanes, shophouses were developed as back-to-back structures, with no space between them. The construction of the backlane, thus, was an exercise in subtraction, with many of the back-to-back spaces demolished and widened to make space for the new passageway. In spite of its original intent of necessitating sanitation and surveillance, backlanes were soon also activated as spaces of activity, such as for hairdressing services and where the peripatetic hawker peddled his goods (Yeoh, 2003). Today, backlanes are utilised for support service activities, such as for waste disposal, deliveries, and as interim spaces for workers of adjacent businesses. Stepping into the backlanes, one cannot help but notice the sheer density of split-type air conditioning (AC) units on the rear façades of the shophouses. These air-cooled condensers of the split-type AC units are energy inefficient while creating a hot and noisy environment in the backlanes, rendering the space uncomfortable for pedestrians and for other activities. While the service functions in the backlane spaces today are reminiscent of their origins of yesteryears, it is ironic that, over time, the spaces have transformed from a deliberately planned space of service to one of neglect – a space where service, infrastructure and informal activity are all too often relegated.
Proposals for a neighbourhood-scale cooling system

Today’s prevalence of air-cooled split type AC units, the least efficient cooling equipment available, represents a failure to address issues of energy efficiency for low-rise neighbourhoods. While shophouses were originally designed for passive climate control, reverting to these practices becomes increasingly unlikely, especially considering the existence of macro- and microclimatic effects that have increased the temperature in these neighbourhoods. The expectation of contemporary users for thermal comfort has led to a sharp increase in the use of air-conditioning. We suggest a systems approach to building climatisation at the neighbourhood scale, either a district cooling system or a more novel heat bus system. The heat bus system is based on the Low Exergy design paradigm, a systems approach, which considers the influence of temperatures on the efficiency of the cooling system. It combines decentralised water-cooled condensing units with central evaporative cooling towers, connected through a hydronic network. The centralised heat rejection in the cooling tower will not only increase energy efficiency but also free backlanes of excess heat, noise, and bulky installations on the façades. The suggested design variation is a prototypical example developed with industry partners. It is a new approach to climatisation in the tropics, setting a new benchmark in a developed country like Singapore.

Fig. 06 Existing condition of the façades in a typical backlane

Fig. 07 Elements of infrastructure and services in the backlane
Visions for backlanes

In harnessing the synergies between urban design and engineering, it is proposed that the reclamation of backlanes manifests through a series of visions that explore potential scenarios of the backlane spaces. With space on the rear façades freed by removing the numerous split-unit type AC units, the auditory and thermal comfort in the space of the backlane is immediately improved. Analogous infrastructure transformations, such as a pneumatic waste collection system and the decluttering of redundant elements, such as empty gas canisters, would set the basis for the transformation of the backlane. Our preconceived notions regarding backlanes suggest that, in one sense, they are already spaces with ever-changing activities. Embedded in neighbourhood contexts, backlanes are often already programmed in unprecedented ways. For example, in the Little India neighbourhood of Singapore, commerce takes the form of makeshift hawkers. In Kampong Glam, another neighbourhood of Singapore, many shophouses host office spaces that are accessed from the backlane. In recognizing this contextual diversity, our position for the transformation of backlanes is to emphasize their functional flexibility. The forthcoming scenarios are diverse and non-static, ranging from a permeable public street market to an inclusive secret garden. The shift in focus, from a fixed dichotomy of public and private to one that is an open common canvas, is a strategy that recalls the informal usage of backlanes of yesteryear. Ultimately, the space can be as privately or commonly used as it needs to be.
The current condition of Boat Quay portrays visual density in the form of waste, air conditioning units, and general untidiness makes the backlane an unwelcoming place. Through the integration of a heat bus system and de-cluttering of the backlane, it can be activated for a variety of programs. During off peak periods, the backlane has potential to support commerce, in the form of a physical marketplace. External vendors are able to set up stores under temporary tents. This creates mutual economic benefit for both the external vendors and tenants with the expected increase in visitor traffic through the cluster of Boat Quay. In this scenario, the backlane becomes an urban economic attractor within the clusters.

The transformation of backlanes can be conceived through a strategy of diverse specificity. By having an assortment of generic urban interventions, these elements can form a specific scenario. We believe that Reclaiming Backlanes should be an exercise that goes beyond the spatial ideals of activating a generic void. The backlane has to cater to contextual specificities, such as deliveries, waste collection, and services. The strategy allows specific scenarios to occur over specific timelines.

With the integration of a central cooling tower supporting cooling demands of the cluster, previous condensing units can be decommissioned. As a result, temperature in the backlanes decreases. The activation that follows can potentially increase the cluster’s economic viability, offer enhanced pedestrian connectivity, and provide a local commons for users within the cluster.
Beyond Rochor+, the strategy of reclaiming backlanes can be applied to shophouse developments on various sites in Singapore and the neighbouring region, where the shophouse still constitutes an important part of the urban fabric. In the course of our research, we have extrapolated the scheme into areas such as Boat Quay and Emerald Hill in Singapore, both with unique qualities. Boat Quay’s cluster of shophouses, for example, makes up a predominantly commercial aspect, while Emerald Hill’s aspect is a residential one. In the case of these two sites, the scenarios that are suggested are a result of direct influence from the context of their surrounding neighbourhoods.

Contemporary discussions about the role of shophouses often tend towards the theme of preservation rather than of regeneration. Backlanes are a part of a shophouse neighbourhood in Singapore and they are integral to the city’s urban fabric. Nevertheless, the spaces of the backlanes are often left out of the discourse of urban design, and their immense spatial potentials are often overlooked by local planning authorities. Given the medley of activities within the area, as outlined in the articles in this issue of the FCL magazine, Rochor+ shows itself to be the exemplary incubator for urban regeneration. We believe that through multi-faceted planning discussions with a variety of stakeholders, our strategy for backlanes can manifest as an extension of this agenda of urban regeneration, and perhaps, the creation of diversity within a greater urban scale. Finally, the slew of black lane activity once so familiar in yesteryear could exist once again.

References

Image Credits
Fig. 01-02, 04-15: FCL Singapore
Fig. 03: Urban Redevelopment Authority
Fig. 05: Carlina Teteris

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Prof. Kees Christiaanse, Prof. Dr. Arno Schlüter, Dr. Matthias Mast, Lai Ya Wong, Cheng Kui Wang, Christian Ribbeck

Fig. 15 One major observation of the current situation in Emerald Hill – a residential shophouse neighbourhood – is the density and continued proliferation of greenery and informal potted plants in the backlanes. One resident in the area has even initiated a green canopy in his and the opposite neighbour’s share of the backlane. Taking the cue from the current situation, we propose to fully furnish the backlane with green, to transform it into a secret garden of sorts. Dedicated planting areas enhance preceding locations of informal potted plants in the backlane. A seamless green turf surface and canopy stitches the various pockets of space marked by current planters, resulting in a single intimate space that extends from both ends of the backlane.
Rejuvenating Crawford through a densification and reuse strategy

The residential neighbourhood to the southeast of the Lavender Mass Rapid Transit (MRT) station is home to an ageing building stock and a mature demographic. The following design project investigates the upgrade potential of one of Singapore’s modernist public housing estates that is also a centrally located, socially-diverse, mixed-use neighbourhood. Rather than referring to the prevalent renewal strategy of estate-scale demolition and densification, the project proposes a strategy that upgrades the existing buildings, reorganises the public space, and introduces new programmes that cater not only to the rapidly growing creative economy, but could also attract a younger demographic to the centrally located area – all while keeping intact the existing community that has occupied one of the earliest city-centre public housing developments in Singapore. Careful on-the-ground analysis of the existing typologies, the pedestrian and vehicular connectivity, and the neighbourhood’s potential as a new centrality in Singapore led to a multi-layered proposal.
Crawford is a largely residential neighbourhood that lies between the mixed-use areas of Lavender, Kampong Glam, and the impending development of the Kallang Peninsula. While the adjacent areas of Kampong Glam and Little India still consist of traditional shophouses and fine-grained street grids, the Crawford area was completely demolished as part of the first urban renewal programme in the 1960s, and cleared of its small-scaled buildings as well as its fine-grained street grids (Fig. 01-03). The neighbourhood became a test ground for the then new, high-density building types and has become one of the oldest inner-city public housing estates built by Singapore’s Housing Development Board (HDB). The high-rise residential slab buildings along Beach Road, in fact, belong to the first batch of HDB flats in Singapore’s central area. Built as the pilot project ‘Precinct N1’ in 1969 – ‘N’ standing for ‘north’ in the central area – the residential slab buildings combine modularised commercial ground floor layouts in the podium with standardised residential slabs above the podium (Fig. 04).1

Just opposite of the N1 is another prominent mixed-use building, the Golden Mile Complex (Fig. 05). The Golden Mile Complex, originally the Wish-Hup Complex, was one of the early products of the first ‘Sale of Site’ programme in 1967 by the then newly formed Urban Renewal Department of the HDB, which would later be enlarged to become the Urban Redevelopment Authority (URA) in 1974. Designed by DP Architects in 1973 as a megastructure, it was planned with offices, shopping, entertainment, and apartments and was conceived as part of a ‘metabolist mile’. Due to an on-site bus terminal with connections to Thailand, the Golden Mile has also transformed into an informal hub for Thai culture in Singapore today. The Golden Mile Complex’s mix of vertical programmes stands in contrast to the functionalist planned city layout, where functional zoning constrains functional flexibility and consequently, urban vibrancy. By reevaluating and deploying these spatially mixed-use approaches at the scale of the neighbourhood, Crawford could once again become exemplary for bold urban ideas for the rapidly changing and growing Singapore.

The threat presented to ageing buildings in Singapore posed by the prevalent mode of redevelopment via demolition would not only displace the original residents and disintegrate the local community, but also clear away some of the seminal ‘pioneer’ building stock constructed after the founding of Singapore – physical representatives of the optimism and idealism of the era of nation-building. To reconcile the need to densify and modernise ageing building stock, the following design project investigates a densification and reuse strategy that combines the incremental upgrading of the existing building stock, the strategic infill and densification with new programmes, and the reorganisation of the ground spaces.
Upgrading and reusing HDBs

The diversity of old and new buildings promotes urban and vibrant neighbourhoods in cities. Rather than en-bloc demolition and redevelopment, the proposed strategy of upgrading the existing building stock as a means of urban rejuvenation would not only preserve a continuity in time-cultivated local identity, but also help to keep some of the affordable space in central areas, buffering against rapid social segregation.

The functionally planned HDB flats in Crawford were often built with standardised flat sizes. They are largely small in size, thus difficult to adapt for upgraded uses, and most are also without private outdoor space (Fig. 09). Anchoring the communities where first-generation Singaporeans lived and built their lives, the residential demographic is ageing and largely homogenous. Many units are currently subsidised and rented to the poor and the elderly. To accommodate a more diverse demographic and to adapt to changing demands, the proposal to upgrade the residential units would make a select number of them larger, less constrained in function by their layouts, and complemented by attractive private open spaces, while preserving the proportion of units that are subsidised and low-rent. Incremental upgrade of the existing HDB estates over time, rather than rapid, sweeping changes, is recommended, along with ground floor reorganisation.

Both unit upgrades and ground floor reorganisation help create spaces that could accommodate the changing demands of the city state and its aspiration for a growing creative economy. International studies have shown
that young creatives need to be located in well located central areas but also need spaces with low rent. Crawford’s central location, next to the rapidly gentrified Kampong Glam area, together with its affordability, compels strategies for it to adapt to the spatial demands in the city centre for the future. By incrementally upgrading units that are also financially feasible for creatives, a younger demographic that appreciates living and working in the convenience of the city centre could be accommodated without having to abruptly displace the existing residents.

An exemplary study of the upgrade of the ‘NI’ HDB block illustrates the spatial possibilities of the proposed strategy. It proposes to transform the existing structure and to implement different-sized units to accommodate new programmes and attract a diverse clientele (Fig. 10). Using the existing column grid as a framework around which to expand, flexible units that can accommodate multi-generational or shared flats could be implemented. Reusing the already built structure of the NI allows for a ‘soft’ upgrade, reducing construction and material costs, while allowing most of the existing residents to remain. Additionally, the ground floor could also be restructured into several generous courtyards, with commercial programmes that allow for easy orientation and access (Fig. II).

**Densification through selective infill**

Different plot sizes support a diverse neighbourhood and allow the implementation of additional commercial programmes. Therefore, a careful densification on vacant reserve sites and the spaces that are currently assigned for ground-level parking is proposed to satisfy the density requirements for future developments (Fig. 13-14). The new buildings that would occupy these sites could accommodate additional programmes for living and working, as well as public amenities and community activities. In addition to upgraded spaces in the HDBs, the neighbourhood would also need larger and more modern spaces for new programmes. Many of these additional spaces could make it affordable for young people to start their own businesses close to the city and could act as a breeding ground for creative economies and shared workspaces.

Two types of spatial infills are proposed. For empty plots at the edge of the Crawford area, medium-scaled en-bloc developments with mixed-uses are recommended. They would be built by a single actor and generate a new, distinct skyline towards the waterfront. Furthermore, they could cross-finance the reorganisation of the public space. In addition, the strategy recommends small-scale gradual developments for plots within which to expand, flexible units that can accommodate multi-generational or shared flats could be implemented. Reusing the already built structure of the NI allows for a ‘soft’ upgrade, reducing construction and material costs, while allowing most of the existing residents to remain. Additionally, the ground floor could also be restructured into several generous courtyards, with commercial programmes that allow for easy orientation and access (Fig. II).

**Reorganisation of the ground public spaces**

Like many functionally planned neighbourhoods in Singapore, Crawford was designed with a car-oriented public space network and a high percentage of surfaces dedicated to ground-level parking. In contrast to the fine-meshed street grid of older neighbourhoods, such as the adjacent Kampong Glam or Little India, the individual city blocks at Crawford are disproportionally large. Green belts or parking lots line the streets and the blocks are separated by wide and car-oriented streets that are difficult to cross, devaluing the pedestrian experience even more. The extensive green areas that make up the public spaces within the large blocks often lack clear hierarchy and create maze-like passageways. While this inverted and secluded character renders them inaccessible for non-residents, it also creates sheltered semi-private spaces for the residents. A detailed mapping of the ground floor reveals the complex pedestrian networks and their high diversity in terms of programme and scale.

The proposal reorganises the public space and introduces a cohesive hierarchy for the pedestrian network. To counter the inularity of the singular large block, the larger blocks are subdivided by additional local streets that connect selected former dead-end parking lots. The inserted street next to the NI HDB block together with the North Bridge Road could accommodate street parking. The narrower streets would be more accommodating to pedestrians, countering the functionalist planning of separation of vehicular and pedestrian traffic. Most ground-level parking spaces, unsightly and anti-urban, are shifted into car parks, while other, former parking lots are integrated into a new pedestrian network. This introduction of a clearer pedestrian layer also complements better wayfinding and accessibility, both for residents and visitors (Fig. 12). At the same time, the attractive qualities of the existing public space, from the greenery to the diversity of spaces, are enhanced. Additionally, three clearly articulated sheltered pedestrian walkways are introduced in the neighbourhood. The first canopy starts at the Lavender MRT station and connects the neighbourhood to Beach Road and the Golden Mile Complex. (Fig. 15) These other walkways link to Kampong Glam and the Rochor River. This new path system provides better accessibility for public ground floor uses and opens the area to a new clientele.
Fig. 13 Public space network before the proposed redesign: most of the public space is allocated for parking, and the pedestrian network consists of an intricate system of open and covered walkways (brown and light gray).

Fig. 14 Public space network after the proposed redesign: a multilayered structure with new infill buildings, new covered walkways (dark gray) and shared spaces (light brown).
Fig. 15 New covered walkway connection in plan and section
In summary, the analysis of the Crawford area shows the dominance of spaces for cars in functionally planned HDB neighbourhoods and the convoluted structure of the public spaces. In response, the proposed vision for the area reorganises the ground spaces to produce higher quality and more attractive public spaces, by transforming the ground level parking into local streets and pedestrian spaces (Fig. 16). In addition, the introduction of new programmes through selective infill and densification, and the upgrading of existing buildings anticipate the need for redevelopment, without resorting to the en-bloc demolition and redevelopment tactics that are prevalent in Singapore. Through the nuanced combination of urban strategies, such incremental and targeted transformations could also become lessons for other mature neighbourhoods in the rapidly transforming city state.

References

Endnotes
1 It is notable that S1, the other early central area HDB development, has already been demolished.

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Fig. 01-03, 05-08: Arpad Hetey
Fig. 04: Carlina Teteris
Fig. 09-16: Students of the Urban Design Studio 2013

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A Proposal for Urban Manufacturing
Reconciling industrial production and new urban programmes in Kallang Bahru

Arpad Hetey, Vera Schmidt, Ying Zhou

The inner-city neighbourhood of Kallang Bahru is home to traditional businesses and hardware traders as well as large-scale production facilities, light industry, and social housing precincts. It is under growing development pressure due to spill-over effects from the surrounding neighbourhoods and an upcoming Mass Rapid Transit (MRT) station. Thanks to its central location and the mix of different actors, Kallang Bahru bears the potential to reconcile industrial production with an urban neighbourhood. The ensuing design project, therefore, proposes new forms of coexistence between industrial, residential, and public programmes. The transformation strategy, based on the analysis of the production chains and the building stock, upgrades the neighbourhood into a mixed-use urban quarter, while underscoring its unique industrial focus.

Kallang Bahru is one of Singapore’s most centrally-located industrial estates and is situated at the eastern fringe of the greater Rochor (Rochor+) area. It lies between the traditional shophouses of Little India to its west and the public housing estates of Boon Keng to its east. The neighbourhood is a patchwork of typically Singaporean building types, where small-scale shophouses coexist with residential high-rises, large industrial buildings, and unused reserve sites. This patchwork is a result of the strict land zoning policy and land reclamation projects from the 1960s. While the urban tissue to the west of Lavender Road consists of traditional shophouses, the eastern part is built on reclaimed land and features post-independence residential and industrial buildings. The large, inaccessible plots and the fragmented street grid of the industrial estate have resulted in an unattractive public space. The area also lacks pedestrian connections and recreational or communal programmes.

Fig. 01 New industrial buildings in Kallang Bahru
While the area is still experienced as a peripheral industrial estate, it is surrounded by neighbourhoods that are either scheduled for redevelopment or are undergoing rapid transformations and often gentrification. Formerly empty plots in the neighbouring areas of Little India and Lavender are allocated for dense hotel and condominium projects. The Kallang peninsula to the south of Kallang Bahru is slated for an extensive residential development, as described in the article A Proposal for an Integrated Island. Furthermore, the new Downtown MRT line will link the area to the CBD and improve its accessibility, which will also likely trigger new developments. At the same time, due to the construction of the North-South Expressway (NSE) in the Ophir-Rochor corridor, commercial and residential programmes are also being relocated to Kallang Bahru. The relocation of entire housing estates pushes low-income businesses into the area while its affordable property prices and available land are also attracting a new clientele (Fig. 02). These regional push- and-pull effects result in a mounting densification pressure and highlight the need for a comprehensive development strategy.

In addition, Kallang Bahru’s central location also holds great potential. The area’s proximity to Little India, its industrial reputation, and the low rents make the neighbourhood attractive for creative entrepreneurs who prefer well-connected yet affordable inner city areas (Fig. 03). These central and devalued locations offer havens for creative entrepreneurs in increasingly expensive cities, where such locations are threatened precisely by the anomaly of their assets. To foster Singapore’s emerging creative sector, such spaces should not only be allowed to remain intact, but also be nurtured. At the same time, creative entrepreneurs, through their preference for such neighbourhoods, often affect the property values and replace the traditional urban manufacturers that they favoured, catalysing gentrification. Therefore, the introduction of new programmes needs to be balanced with the needs of the existing users to avoid an overly rapid transformation and erosion of the neighbourhood’s assets.

The proposed vision for Kallang Bahru is, thus, a reconciliation of the existing industrial programmes and the shift to a mixed-use urban quarter. Instead of being redeveloped as monofunctional estates like many of the neighbouring developments, Kallang Bahru could become a complement to and extension of the diverse Rochor+ area. In order to keep the unique inner-city production sites while also anticipating future developments and transformations, a robust framework that sustains the different plot sizes, typologies, and programmes is recommended. Therefore, the proposed strategy reprogrammes and frames the fringes as well as alters the street grid and the plot structure.
Creating a diverse plot structure and reorganizing the road network

New production processes and the growth of service industries that rely on value chains in proximity to production sites challenge the conventional separation of industrial estates from other neighbourhoods. Therefore, varying block sizes are introduced, which can accommodate different programmes and offer options for diverse businesses and entrepreneurs. In addition, the restructuring of vacant plots also offers high densification and diversification potentials. The public ownership of many vacant sites in Kallang Bahru allows for a controlled transformation and the integration of new functions.

Presently, the plots in Kallang Bahru are generally large and monofunctionally zoned, regardless of their location within a block (Fig. 06). In contrast, the plot structure of the shophouses in the neighbouring...
Lavender area features small commercial and industrial programmes along the streets, and larger residential plots in the back. This block hierarchy enables a diverse mix of building types as well as spatial functions. Adapting such a plot structure for Kallang Bahru, thus, creates different plot sizes that allow large functions to remain and at the same time enable smaller programmes also to take place along the street. An inversion of the functional layout in the Little India area, the plots along the street can consequently accommodate residential and commercial programmes, and the existing large-scale industrial programmes are kept in the rear (Fig. 05).

Additionally, Kallang Bahru Road and Kallang Avenue are proposed to be developed as regional connectors that would accommodate most of the new programmes. The two main axes, or primary roads, converge at the new Bendemeer MRT station, which would become the new centre of the neighbourhood. Moreover, the fragmented access roads along the Kallang River are joined together to form a more cohesive street network, also aligned with different block sizes. By keeping the small access roads for industrial traffic and adding street parking and car parks along the main roads, the proposed road network accommodates a hierarchy of commercial as well as residential traffic.

**Adaptive reuse of the industrial building stock and fostering creative industries**

While the reorganisation of the road network and the introduction of diverse plot structures facilitate the introduction of new programmes into the area, the existing heterogeneous industrial buildings, in themselves, also have a high transformation potential. Their different life cycles make the Kallang Bahru area more flexible and lead to a gradual redevelopment. Transforming or preserving selected buildings and reusing some of them not only helps to utilise the industrial context of the area, but would also create a distinct identity for the area, with possibilities for interesting and innovative spaces. For example, unused industrial buildings, with their expansive interior spaces, high ceilings, flexible floor layouts, and distinct atmosphere, could be transformed into shared workspaces or lofts. These types of spaces, although unconventional for most offices, are often preferred by creative workers in the design, innovation, and knowledge industries. The area’s proximity to the city centre and its relatively affordable rents make it even more attractive to selected creative enterprises (Fig. 09).

Furthermore, their locations adjacent to production clusters and traditional workshops in Lavender and Little India facilitate the new economy’s value chains, where often traditional and creative entrepreneurs collaborate. Not only can creative start-ups build up a network with other creative entrepreneurs in the vicinity, but also easily connect with the local craftsmen and manufacturers in the different trades to work together to develop new products. With the right kind of steering and planning, the neighbourhood could foster and nurture the creative and knowledge-based value chains and become a creative breeding ground, as elaborated on in the Introduction to Rochor+. 
Spatial guidelines for urban quality and activating selected public programmes

Using smaller buildings to create an attractive street front and an urban layer along the main axes in front of larger, adaptable production buildings is a strategy that was elaborated on in the previous paragraph, and results from the reorganisation of plot structures. These small-scale infill structures and convertible building types could accommodate a wide range of residential and commercial programmes and allow for different development scenarios (Fig. 12). They would offer industrial spaces for traditional manufacturers or traders as well as workplaces and residential programmes to incoming residents.

To generate a diverse milieu, in addition to diversity in the building stock, new developments are proposed to also follow a set of urban rules. First, the building footprints have to follow the given plot outline in at least 80% of their length, and the buildings must be linked by a covered pedestrian network. The pedestrian access for buildings would be required from the street side, while the delivery and industrial access are from a backlane. Furthermore, the buildings lining the main axes, or main roads, must have...
commercial or public programmes. To allow for flexibility of programmes, buildings along the street should not exceed 16m in depth on the upper floors (Fig. 10).

A proposal for new public programmes in selected large-scale building types complements the strategies for enhancing urban qualities and accommodating densification. A new community centre at the waterfront promenade could offer a platform for the changing community in the neighbourhood and also serve the entrepreneurial needs of the creative start-ups. It could be the place where they could hold markets and exhibitions as well as events to promote products and exchange knowhow. In addition, spatial allocation for educational institutions and museums that complement and support the existing creative value chain could help disseminate the knowledge-sectors’ products and help train future knowledge workers. This new framework for public programmes would create a hierarchy of public spaces with an integrated waterfront park, a framed public streetscape, and semi-private green spaces in the backyards (Fig. 13). The introduction of appropriable spaces and an interlinked network of public, residential, and industrial spaces all lead to an attractive and unique urban-industrial neighbourhood (Fig. 11).

In conclusion, the proposed transformation strategy for Kallang Bahru serves as a prototype to reconcile existing production with new urban programmes, and to connect a monofunctional industrial estate with its rapidly developing adjacent neighbourhoods. While the proposed dense street grid and the introduction of residential programmes coincide with the Master Plan 2014 by Singapore’s Urban Redevelopment Authority (URA), the proposed design strategies emphasise a flexible programme mix and a diverse plot structure. This not only allows existing functions, which have the potential to give the area a unique identity, to stay, but also facilitates the introduction of new programmes into the neighbourhood.

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Fig. 01, 07-08, 14: Arpad Hetey
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A Proposal for an Integrated Island
Designing an alternative master plan for Kallang Peninsula

The Kallang Peninsula is prominently located to the east of Rochor+, at the confluence of the Rochor and Kallang Rivers. The site is spatially perceived as an island because it is not embedded in the urban context and is surrounded by the waterbodies and large infrastructure. On the Kallang peninsula, like in many other places in Singapore, a former shipyard and a kampong were removed in the 1970s, as part of the land reclamation and slum clearance programme. Since then, the cleared site has been a post-industrial brownfield, and remains one of the last of the larger unbuilt land reserves in the central region of Singapore. Due to its central location and beautiful green waterfront, the peninsula has informally become a popular green space for recreation. At the same time, it is one of the focal areas for future densification and has been slated for redevelopment. The current plan envisages conventional, largely monofunctional high-end and insular high-rise estates with over 4,000 residential units that will evenly occupy the entire peninsula. The following design project, on the other hand, proposes an alternative strategy for densification that not only preserves, but also complements the existing green space as a precious resource and attractive public space in the area. This proposal, moreover, better embeds the new development into the surrounding urban context.

Fig. 01 The target perimeter of the Kallang Peninsula is part of a green corridor along the Kallang River.
The large vacant area of 20 hectares on the Kallang Peninsula is situated south of Kallang Road, which connects the lively neighbourhoods of greater Rochor (Rochor+) to the west, with Geylang to the east. The waterfront surrounding the peninsula to its south is shaped by the convergence of the Kallang River – Singapore’s largest river – with the Rochor Canal, both of which flow into the Kallang Basin. These water bodies are important parts of the Marina Bay Reservoir, and together contribute to Singapore’s largest source of potable water. While the Kallang Basin serves an important infrastructural function, the waterfront has become an attractive recreational space for residents who live nearby. The peninsula is located next to the new Singapore Sports Hub, Singapore’s rebranded National Stadium, which attracts people from all over the island. Yet, most visitors approach from the Crawford area to the west, a Modernist HDB precinct with the Golden Mile Complex, a prominent hub for Thai commerce and culture (which is further described in the article A Proposal for a Modernist Neighbourhood). Further on, the Kallang peninsula is surrounded by places of transition. The Kallang Bahru industrial estate to the north, as elaborated on in the article A Proposal for Urban Manufacturing in this issue, has a new Mass Rapid Transit (MRT) station under construction and many new developments are expected in the future, as the area has great potential for small-scale economies, light industry firms, and entrepreneurs. There is also a planned development for a large-scale commercial quarter on the grounds of the former Kallang Airport, north of the Singapore Sports Hub. This dense development will have a large impact on the Kallang Peninsula and the region. With this proximity to diverse but important urban nodes, the Kallang Peninsula has great potential to become an anchor point for future developments in the surrounding areas. Its unique location along the waterfront could also offer an attractive public space that connects the surrounding neighbourhoods. However, the current plan for the site largely overlooks these inherent potentials. Instead, the Kallang Peninsula is seen as an extension of the Greater Marina Bay Area and envisioned as a high-end condominium enclave. Despite technological innovations, such as integrated water management, the plan nevertheless reiterates the prevalent mode of developing urban islands. This usually leads to introverted high-rise residential compounds built along cul-de-sac access roads. The even distribution of new buildings (Fig. 05 middle) with in-between external green space that the current plan suggests seems to echo the City in a Garden concept, which Singapore has
The proposed high-rises (dark) are arranged in such a way that every unit has attractive views of the park or the urban surrounding.
followed since the 1960s. Yet, given that most of the developments will be private gated residential compounds, the seeming accessibility of greenery in the plan is only an illusion. In contrast, up until today, the large-scale green space that has blossomed in the interim period between clearance and redevelopment offers a public space that is not only accessible but also attractive. The alternative design proposal elaborated on in this article shows an urban planning strategy that not only highlights the irreplaceable spatial qualities of this unique site, but also accommodates the densification requirements of Singapore, while offering a site-responsive vision for a new urban neighbourhood.

Fig. 07 Environmental water management purifies and retains storm water.

Highlighting the green network regionally and locally

In the larger context of green public spaces and water bodies in Singapore, the Kallang River connects many different places in Singapore. Starting at the Central Catchment Nature Reserve, the water ends in the iconic Marina Bay area, which is one of Singapore’s most famous landmarks. Along the way, it flows through the recently re-naturalised riverbed in Bishan Park, an upgraded catchment area with lush greenery, which also serves as a publicly-accessible recreation area. Most of the other areas through which the water flows are lined with HDBs and industrial estates (Fig. 01). However, they do not utilise the water body as a resource for recreation or nature, and seem to be overlooked potential for public space. The alternative strategy for the Kallang Peninsula also integrates the improvement of the larger-scale green corridor along the Kallang River and the extension of the partially existing path system of ‘Park Connectors Network’ (PCN). In addition to offering new recreational spaces to residents, the refurbished green corridor would continue to be crucial to water management and help to maintain biodiversity in the urban context. Integrated in a cohesive network of green open spaces, the alternative redevelopment of Kallang Peninsula, including a publicly-accessible waterfront park, thus, would be a culmination of the green network, offering green amenity in the city centre. An expanded Kallang Riverside Park would connect the refurbished Rochor River Promenade with the existing fragments of the refurbished green corridor would continue to be crucial to water management and help to maintain biodiversity in the urban context. Integrated in a cohesive network of green open spaces, the alternative redevelopment of Kallang Peninsula, including a publicly-accessible waterfront park, thus, would be a culmination of the green network, offering green amenity in the city centre. An expanded Kallang Riverside Park would connect the refurbished Rochor River Promenade with the existing fragments of the refurbished green corridor would continue to be crucial to water management and help to maintain biodiversity in the urban context. Integrated in a cohesive network of green open spaces, the alternative redevelopment of Kallang Peninsula, including a publicly-accessible waterfront park, thus, would be a culmination of the green network, offering green amenity in the city centre. An expanded Kallang Riverside Park would connect the refurbished Rochor River Promenade with the existing fragments of the refurbished green corridor would continue to be crucial to water management and help to maintain biodiversity in the urban context. Integrated in a cohesive network of green open spaces, the alternative redevelopment of Kallang Peninsula, including a publicly-accessible waterfront park, thus, would be a culmination of the green network, offering green amenity in the city centre. An expanded Kallang Riverside Park would connect

Connectors to the new urban neighbourhood as impetus for development

While the alternative proposal keeps a large part of the Kallang Peninsula as a publicly-accessible green space that also serves important hydrological functions, it concentrates the required building volumes on a compact urban strip on the northern side of the peninsula (Fig. 05 and 06). We propose the building up process of this high-density urban strip to span over a period of 20 to 30 years. The condominium currently under construction in the centre of the peninsula is omitted in this plan to clarify the alternative design concept. In particular, this isolated high-rise tower, which limits most options for a compact and regionally effective planning strategy, highlights the importance of long-term integrative planning. Instead of the currently planned insular development, the alternative project uses pivotal plots at the periphery of the Kallang Peninsula as anchor points that spatially and programmatically integrate the site into the network of regional attractions. Current vacant plots at the edges of the Peninsula would be leased to developers with strict guidelines as to their crucial functions and position. As a first step of this phased development (Fig. 09), infrastructural developments are proposed to make the central green space more accessible to the neighbouring areas and better connected to the green network along Singapore’s water bodies. A new pedestrian and bicycle bridge is proposed across the Kallang Basin towards the Sports Hub. Another pedestrian and bicycle path from the north would bridge
the wide Kallang Road, lead along the waterfront of the Kallang Peninsula and provide routes either towards the Sports Hub or the Marina Bay (Fig. 08). The Kallang Road, at the same time, is also incrementally developed as an axis that creates a continuous urban front along the street between Rochor to the west and Geylang to the east. In addition to the east-west main axis created by the existing Kallang Road, Kallang Avenue would be redeveloped as a secondary north-south connector in a second phase of infrastructural development. The extended road would connect the newly proposed neighbourhood with residential and industrial areas in the north and southwest. It would begin at the soon-to-open Bendemeer MRT station to the north and traverse the Kallang Bahru industrial estate, where new developments are expected in the next years. The new axis would then cross the Kallang Road, continue south through the green zone of the Kallang Peninsula, and traverse the water to the Crawford area to the southwest. While the east-west and north-south connectors are developing, the plots along the Kallang Road could be incrementally filled-in until the compact urban strip is completed. All buildings are to be developed independently, which means a lower financial development risk for segmented development; and that they can also be replaced separately at a later stage. At the same time, the alternative design proposes an access street parallel to the Kallang Road, which would enable the local residents to access their houses and enable delivery of goods to the commercial and public functions on the ground floor. Between the main Kallang Road and the parallel service street, a proposed sequence of public pedestrian spaces links the different plots and connects to the Lavender MRT stations to the west and Kallang station to the east.

A system of public and collective spaces for diverse users

The alternative new neighbourhood, lining Kallang Road, is conceived for a multiplicity of actors and functions. Every plot is required to be filled with a designated ratio of mixed-use or public functions. Privately-developed buildings would accommodate offices, lodging, private apartments or rental units. A few HDB public housing developments and several institutions, such as an art forum or a community centre next to the existing Hindu temple, are to be included (Fig. 08). In this way, it would ensure a social and cultural mix that could enhance the vibrancy and urbanity of the neighbourhood, rather than the homogeneity of high-end residences. Instead of separated and often gated residential compounds, which will most likely further detract from an active streetscape and urban vibrancy of the neighbourhood, a sequence of pedestrian passages and view corridors are proposed. These pedestrian passages would link the individual plots and their developments at the ground level, and also provide visual connectivity between the individual buildings and towards the park. This pedestrian link is spatially differentiated, and opens onto courtyards, green areas, open ground floors of buildings, interior public spaces, and covered plazas. While the ground floor is open to the public, a semi-private set of collective spaces for residents or employees that live or work in the upper floors of the buildings is proposed for the above-ground levels (marked light beige in Fig. 10). As an additional layer to the publicly-accessible pedestrian level on the ground, these collective spaces

Fig. 09 Gradual building process: Current status (top left); 5 years (top right) - Park and buildings near vacant plots at the fringes; 10 years (bottom left) - Extension and densification along local street, Kallang Avenue; 20 years (bottom right) - Completion of the urban strip along major city axis, Kallang Road.
**Fig. 11** Framework plans provide spatially fixed guidelines for the plots that will be developed independently.

**Tower Zones and Density**

Every plot should be able to offer good views. Therefore, the tower zones are predefined. In the middle of the island, there is no height limit for the towers as long they have green foot area before the density limitation.

**Public Pedestrian Spaces**

The developers must comply with the results of the pedestrian-based public spaces on the plots. They can be covered, uncovered, indoor, or outdoor. At least 30% of the gross surface has to be realized.

**Plots and Ownership**

Except for a few plots, the land on Kallang is publicly owned. Only the property owner gets the right to develop another plot to build on. The new plots for buildings are either public or private and have different sizes. The private plots can be given to developers as a 99-year lease agreement. In the ensemble, buildings can safely be transformed or exchanged.

**Fig. 12** A set of rules restricts each development but also allows individual freedom in the architectural design.
could be created on commercial podiums, terraces, void decks, or roof tops. To guarantee spatial quality and an interconnected public space network, all developments of the alternative design are to follow a set of proposed framework plans and urban rules. While setting certain parameters, the rules allow the individual developers a certain level of freedom. First, a framework plan (Fig. 11) defines high-rise zones and building footprints to generate a framed streetscape and visual porosity towards the park (Fig. 06). Without defining the precise location, shape, or height of the towers, there would remain ample architectural freedom for each building. Second, a set of rules ensures that all developments connect to the proposed chain of interrelated public spaces and guarantee accessible public space (Fig. 12). Moreover, the urban rules are used as a vehicle to encourage sustainable tropical architecture, whereby natural building ventilation, sky greenery, and integrated water management strategies would be rewarded.

An integrated peninsula

The proposal of a design strategy, as elaborated in this article, highlights the importance of long-term planning and the consideration of the network of open public spaces as the basis for urban master plans. The design not only shows the Kallang Peninsula’s potential for future development, but also its contribution to the quality of life in Singapore. It also tackles the challenges of expedited urbanisation and densification processes in rapidly-growing and transforming cities, with an alternative strategy that accommodates density but also accentuates the specific urban resources that could enhance urban quality of life. The unique location at the confluence of the Kallang and Rochor Rivers of Singapore also emphasises the double role that landscape and hydrology could play. As a planning alternative, the project presents a nuanced and site-specific strategy for an integrative redevelopment of the urban waterfront.

References


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