SHAPING SINGAPORE THROUGH URBAN DESIGN

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ABOUT THE CENTRE FOR LIVEABLE CITIES

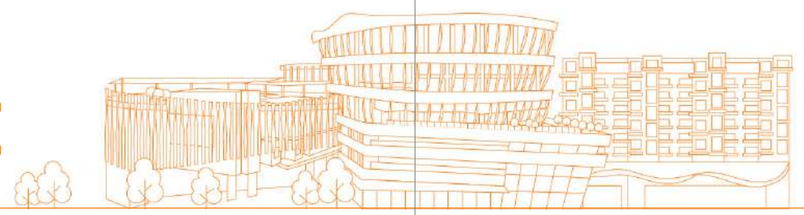
Set up in 2008 by the Ministry of National Development and the then-Ministry of the Environment and Water Resources, the Centre for Liveable Cities (CLC) has its mission to distil, create and share knowledge on liveable and sustainable cities. The CLC's work spans four main areas—Research, Capability Development, Knowledge Platforms, and Advisory. Through these activities, the CLC hopes to provide urban leaders and practitioners with the knowledge and support needed to make our cities better.

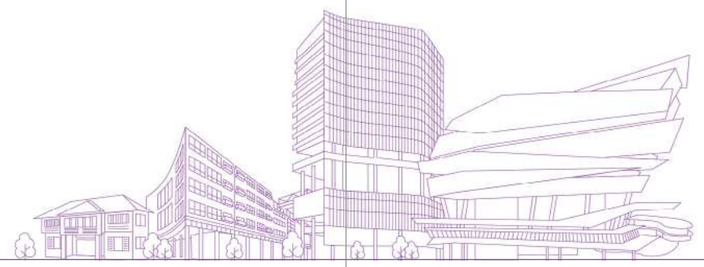
CLC is a division of

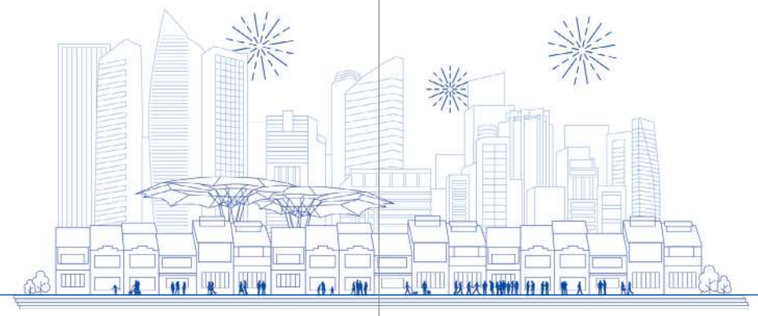
ABOUT THE URBAN REDEVELOPMENT AUTHORITY

The Urban Redevelopment Authority (URA) is Singapore's land use planning and consertion agency. URA's mission is `to make Singapore a great city to live, work and play'. URA strives to create an endearing home and a vibrant city through long-term planning and innovation, in partnership with the community. As the main government land sales agent, URA manages the sale and development of State land to support planning, economic and social objectives. In shaping a distinctive city, URA also promotes architecture and urban design excellence.

To make Singapore a great city to live, work and play







FOREWORD I

Hugh Lim

Executive Director,
Centre for Liveable Cities

Since its inception, the Centre for Liveable Cities' (CLC) research in urban systems have unpacked the systematic components that make up the city of Singapore, capturing knowledge not only within each of these systems, but also the threads that link these systems and how they make sense as a whole. The Centre's Urban Systems Studies (USS) series have been and continue to be scoped to venture deep into the key domains identified under the Singapore Liveability Framework, and attempt to answer two key questions: how Singapore transformed itself into a highly liveable city over the last five decades, and how Singapore can build on our urban development experience to create knowledge and urban solutions for current and future challenges relevant to Singapore and other cities through applied research.

In addressing these questions, the Centre recognises that while public policy and urban planning decisions have been critical in shaping Singapore's urban development, the physical manifestation of these in the built environment have also been guided by the conscientious practice of urban design.

Shaping Singapore through Urban Design aims to touch on urban design in Singapore, through three case studies of various scales and in areas of varying functions. These include Bedok Town Centre, one-north and Singapore River.

With the Centre's mission to distil, create and share knowledge on liveable and sustainable cities, this publication hopes to also make the development story of urban design in Singapore synthesised and available to other cities. I wish you an enjoyable read.

FOREWORD II

Koh-Lim Wen Gin

Chief Planner & Deputy Chief Executive Officer
(Physical Planning and Conservation & Urban Design),
Urban Redevelopment Authority
(2001-2008)

Globally, urban design is a very young discipline. While often coupled with urban planning and undertaken by planning departments, the formal practice of urban design only emerged in the 1950s. This stands in stark contrast to the urban planning discipline which was practised as early as the 1800s and can be traced back even earlier to historic town planning. Singapore's early adoption and clear dedication to urban design is particularly advanced for a nation that had been equally focused on its post-independence development.

I responded to the Urban Redevelopment Authority's call for young architects when it was first established in 1974, and in some way, my journey with the URA runs parallel alongside the growth of urban design in Singapore. During my time at the Design & Development division, we developed urban design plans for the city centre, and worked closely with a Consultant Urban Designer who had formerly been attached to the United Nations' State and City Planning team posted to Singapore.

Looking back now, 1982 and 1990 were milestone years for urban design in this island nation. The year 1982 marked the first year that locals were given urban design designations. This established the permanence of the urban design discipline in Singapore while we were still under the Design & Development division, and showed clear recognition of the need to develop local expertise in this area through experience. In 1990, the landmark decision to create a Conservation and Urban Design division wholly dedicated to the field further demonstrated Singapore's commitment to the urban design of our island. In the early 1990s, Development Guide Plans (DGPs) for the 55 planning areas were crafted and shared with the public, a significant step in engaging Singaporeans and creating awareness to the thought processes that shaping their environment. The advent of the DGPs served as a basis for the subsequent detailed urban design plans implemented in strategic areas such as the Central Area. Since then, urban design and conservation have grown steadily—as closely tied areas of interest—to also include urban design guidelines for 11 planning areas in the Central Area and four growth areas in Singapore, amongst other efforts.

My colleagues and I are honoured to have been a part of Singapore's urban design journey and to witness some of our early plans turn into reality. Given Singapore's forerunning and ever-growing urban design initiatives, we are delighted to see our urban design stories recorded in this publication. The stories share the motivations and thought processes behind the plans, as well as some of the challenges faced. It reminds us of the many URA officers who, in collaboration with our service partners and the private sector, passionately devoted much time to the process over the decades. The making of this publication has brought back many fond memories, and I hope that it will be an insightful read for you.

PREFACE

Michael Koh

Executive Fellow,
Centre for Liveable Cities

Fun Siew Leng

Chief Urban Designer,
Urban Redevelopment Authority

The Centre for Liveable Cities (CLC) seeks to distil, create and share knowledge on liveable and sustainable cities. Thus far, the Centre's research has delved into various urban systems to unpack the systemic components that make up the city of Singapore.

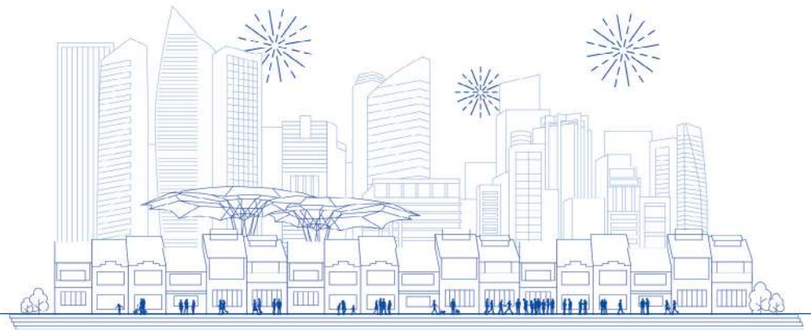
In recognising the benefits of sound urban design, processes and implementation on Singapore's built environment, this publication marks the Centre's first foray into documenting the urban design stories of select areas in Singapore. The launch of this series could not be timelier—2021 saw the 65th anniversary of the first urban design conference held in 1956. This publication highlights urban design stories of Singapore's Central Business District, Singapore River as a conservation area, Bedok Town Centre as a rejuvenated old HDB town centre and one-north as an experimental work-in-progress. The hope is to document the evolution of ideas over time, as well as notable urban design decisions and projects of various generations that have contributed to Singapore's distinct urban environment.

Initiating what may become a series of case studies, the Centre has collaborated with the Urban Redevelopment Authority (URA) to produce the chapter on the Singapore River, which could well be one of the areas with the longest history of urban development in Singapore. This chapter describes the foundational ideas that show the potential impact of urban design and demonstrate how it is, has been and can be implemented across the rest of the island.

The Centre and the Authority would like to thank the Housing and Development Board (HDB) and JTC Corporation (JTC) for their contributions to the chapters regarding Bedok Town Centre and one-north respectively.

The chapter on Bedok Town Centre elaborates on the recent rejuvenation of Bedok and exemplifies how urban design strategies used on the ground have enlivened the mature residential town. The chapter on one-north documents the ongoing planning ideas and performance-based urban design guidelines applied in this dynamic district. This experimental approach emulates its aspirations of being a leading innovation district and will continue to shape its future development.

In all, these chapters exemplify the various ways that urban design has been harnessed as a tool to create unique districts and areas on our small island. The Centre and the Authority would also like to extend our gratitude to all who have contributed their knowledge, expertise and time to make this publication possible. We wish you an enjoyable read.



Skyline of Singapore around the Marina Bay.
Source: Wesley Pribadi/ Unsplash

URBAN DESIGN FRAMEWORK: AN INTRODUCTION TO URBAN DESIGN IN SINGAPORE

What is urban design? Often described as the bridge between planning and architecture, yet it encompasses so much more than that. While it is a well-established discipline, some might wonder why it is not easy to define what urban design is.

First, urban design operates on many different scales. At the macro scale, it is concerned with the urban structure of the city—planning, transport, land use zoning, development intensity and infrastructure networks. At the meso scale, it focuses on the form of developments, building heights, open spaces, streetscape and roofscape. And at the micro scale, urban designers consider elements that most immediately impact people, such as pavement design, tree planting, signage, street furniture and lighting.

Second, urban design encompasses many different disciplines including urban planning, development control, architecture, landscape architecture, engineering, land economics, law and finance, environmental engineering and placemaking. These disciplines provide critical inputs at different stages of urban design planning and policy formulation.

Third, urban design is both about the process and the outcome. Since urban design involves a process of envisioning desired outcomes, this requires understanding the unique characteristics of a place and its inhabitants, as well as what might be needed to create a better environment for people to live, work and play in.

Fourth, there is no prescribed formula for a "successful" urban design plan. Urban design is highly contextual and urban design interventions can only be successful when they address the specific local needs. Furthermore, urban design is a long term and iterative process which evolves over time; what is successful now may be not so as time goes by.

So, why urban design?

Urban design seeks to influence the economic, environmental, social and cultural sustainability outcomes of a particular place. By determining the physical form, scale and ambience of a space through optimising its natural resources, human capital, heritage and cultural assets, urban design creates memorable places for people that instill civic pride and ownership, and ultimately, a place to call their own.

A highly contextual practice, this Urban Design Framework seeks to capture Singapore's approach to the implementation of urban design ideas that have been formative in shaping the city to what it is today.[1]

Fun Siew Leng
Chief Urban Designer, Urban Redevelopment Authority (URA)

GENESIS OF THE URBAN DESIGN FRAMEWORK

Urban Design globally and locally

The contemporary use of the term "urban design" began to gain momentum after a series of conferences, entitled *Urban Design Conference* hosted by Harvard Graduate School of Design from 1956 to 1970, from which Harvard's Urban Design programme and many other urban design university programmes grew out of. The significance of the conference and programme was less in initiating a new area of study, but rather in its recognition and formalisation of an emerging discourse supported by the existing writing and opinions of leading international urban planning thinkers including Josep Lluis Sert, Sigfried Giedion, Lewis Mumford and Edmund Bacon.[2]

Subsequent publications including Kevin Lynch's *The Image of the City* (1960) and Gordon Cullen's *The Concise Townscape* (1961), Jane Jacob's *The Death and Life of Great American Cities* (1961) and Christopher Alexander's *A Pattern Language: Towns, Building, Construction* (1977), were deemed to be seminal literature for the emerging discipline of urban design. Largely based on observational and mapping studies, the urban design literature theorised the perception of space and related ideas such as legibility, wayfinding and security in response to the acceleration of urbanisation or urban renewal of well-established cities.[3] Drawing upon historical precedents and urban renewal projects, these experts introduced vocabulary and techniques for understanding qualities of space in dense urban environments. Over time, these techniques have been adopted as a means to pre-emptively shape the spatial experience of a city.

"Urban design was a very new phenomenon at that time that was just introduced at the conference in Harvard. It is interesting how its concepts travelled so quickly to Singapore via the pioneer generation of architects trained overseas such as Alan Choe, Liu Thai Kher and Goh Hup Chor (not exhaustive)."

— Fun Siew Leng, Chief Urban Designer, URA

For this reason, it might come as a surprise that a young nation like Singapore, that had only just received its Independence in 1965, was not far behind in the implementation of these early ideas. While these observational and analytical books were written in response to well established cities, its learning points on the spatial grammar of urban environments were surprisingly timely for Singapore's redevelopment efforts. Perhaps first-hand experiences of urban squalor and a collective determination to rebuild the city had led to the early recognition and embrace that urban design and urban planning were two parts to the same whole in achieving the vision for Singapore's built environment. The process of its implementation was thus at times open and experimental but also localised to the urban-renewal circumstances and conserved urban fabric.

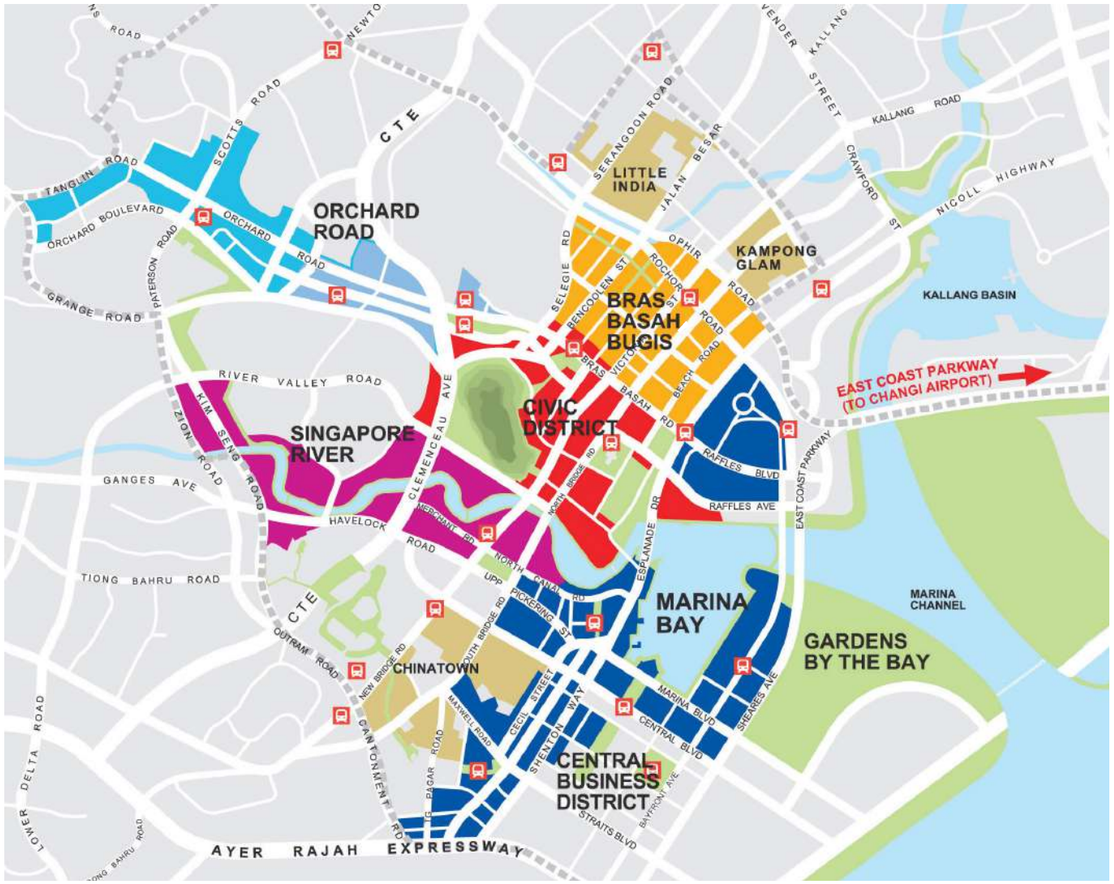
Methodology for the Urban Design Framework

The urban design case studies featured in this publication review historic information on early urban design ideas in Singapore and track the evolution to its current practice and implementation. This was corroborated with the memories of urban planners and urban designers, and work of architects to distil the Urban Design Framework specific to the practice of urban design in Singapore. This framework comprises a series of city-scale urban design plans and nine urban design elements which form the toolkit of urban designers in Singapore. At the same time, this publication recognises that the realisation of urban design in the built environment is made possible only with its stakeholders, and has practical influence that contributes to Singapore achieving the liveability outcomes of the Singapore Liveability Framework.[4] The case studies that follow demonstrate how these components come together in different contexts to harness urban design as a tool for achieving desired outcomes in the urban built environment.

COMPONENTS OF THE URBAN DESIGN FRAMEWORK

City-Scale Urban Design Plans

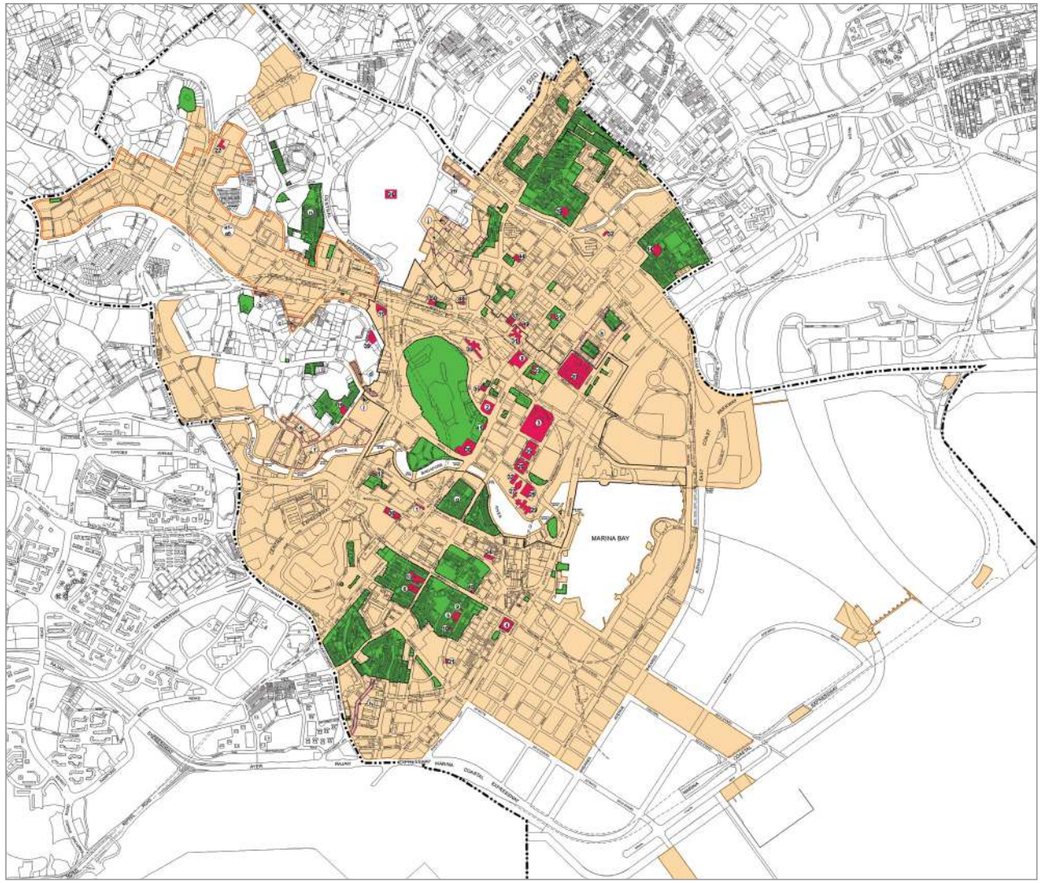
Singapore's urban design is guided by its aspirations to be a Distinctive, Dynamic and Delightful city. This can be illustrated through the URA's key city-scale urban design plans which have been developed over the years and have served as the guiding framework for the URA's urban design work. These plans highlight how each district in the city can have its own distinctive character based on its geographic, natural and heritage assets. Even so, these districts can act in harmony to create a city centre that is rich in diversity and at the same time is legible, connected, accessible and inclusive.



The District Character Plan delineates various districts in the Central Area based on their predominant land use, positioning and geographical context.
Source: URA, 2019

District Character Plan

The District Character Plan broadly defines the various districts in the Central Area based on their predominant land use, positioning and geographical context. Given that the urban development of Singapore started in the city, urban planners and designers do not work on their plans and design from *tabula rasa*. This plan helps to identify and guide the development of suitable districts within the city based on their existing characteristics and future considerations. Visions based on these districts further inform other urban design plans or guidelines. To illustrate, the urban design plans and guidelines for Singapore River leveraged the presence of the river and the low-rise conserved buildings flanking it.



The Conservation Plan marks out the conserved buildings within the Central Area as well as the relevant urban design guidelines to ensure that buildings complement the conserved ones. *Source: URA, 2019*

- Central Area Boundary
- Area with Urban Design Guidelines by the URA
- Urban Design Plans & Guidelines for Orchard Planning Area
- Street Block Plan
- Conservation Area
- Monument
- Civic District Boundary

Conservation Plan

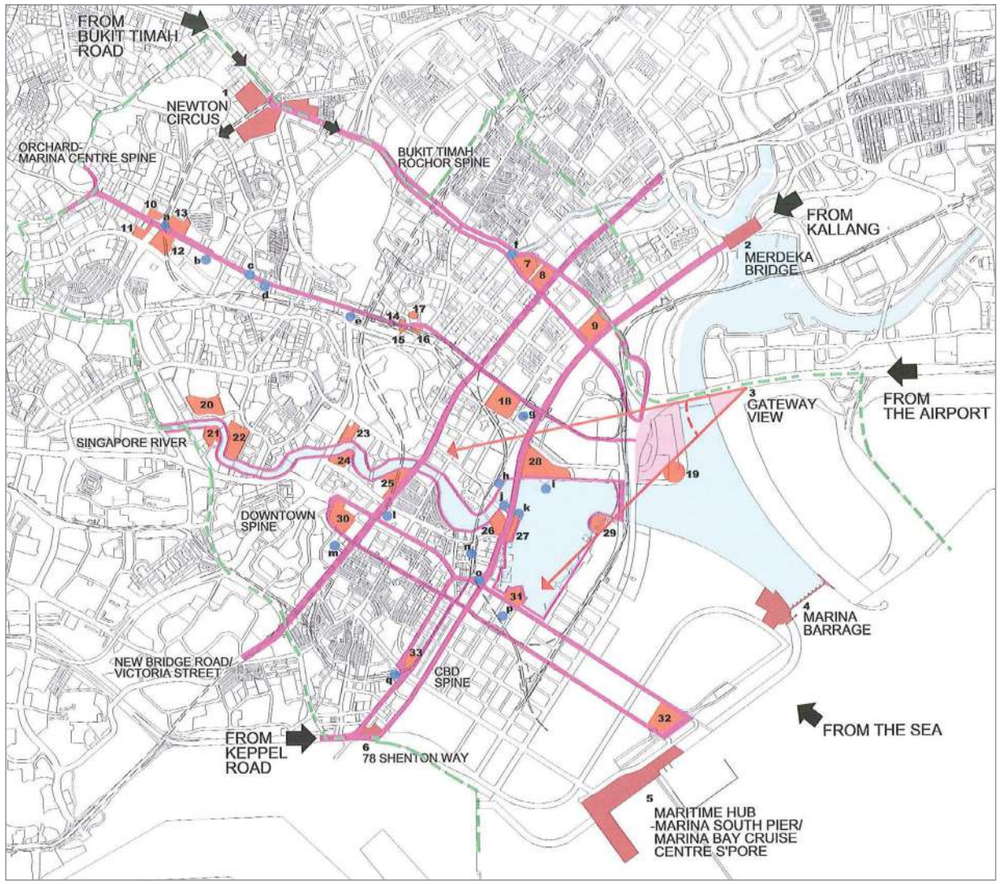
The Conservation Plan identifies the historic and conserved buildings in the city centre. Consolidating these geographically on a plan helps to demonstrate the need for special urban design considerations for developments in their vicinity.

The Identity Plan recognises areas in Singapore with endearing identities and ambience. *Source: URA, 2014*

- Hillside Villages
- Old World Charm
- Rustic Coast
- Urban Villages
- New Identity Nodes

Identity Plan

Beyond the city centre, the Identity Plan marks out endearing places in Singapore whose built environment has contributed to how people associate with the place. The Identity Plan ensures that these areas are recognised and that attention is paid to contextualise their urban design guidelines for these areas even if they may not contain heritage buildings within them.



The Landmark and Gateway Plan leverages urban form to serve as markers in the city centre and establishes key vistas. *Source: URA, 2014*

- Central Area Boundary
- Approaches
- Key corridors
- 20 Landmarks
- a Gateways
- View cone

Landmark and Gateway Plan

The Landmark and Gateway Plan identifies key approaches into the city centre and key sites as markers. Establishing sight lines and vistas assists in curating activity spines, scenic views and skylines.

The Building Height Plan assigns building height limits to land parcels within the Central Area to retain an optimum fabric while meeting land use needs. *Source: URA, 2019*

- Central Area Boundary
- 20 Building Height (Number of storeys)
- 250m Building Height (Metres SHD)
- ★ Subject to Detailed Control
- Parks, Open Space, Reserve Sites or Residential Sites subject to standard residential Gross Plot Ratio (GPR)/storey height typology
- Conservation Area/Monument
- Areas where the relaxation of residential building heights apply

Building Height Plan

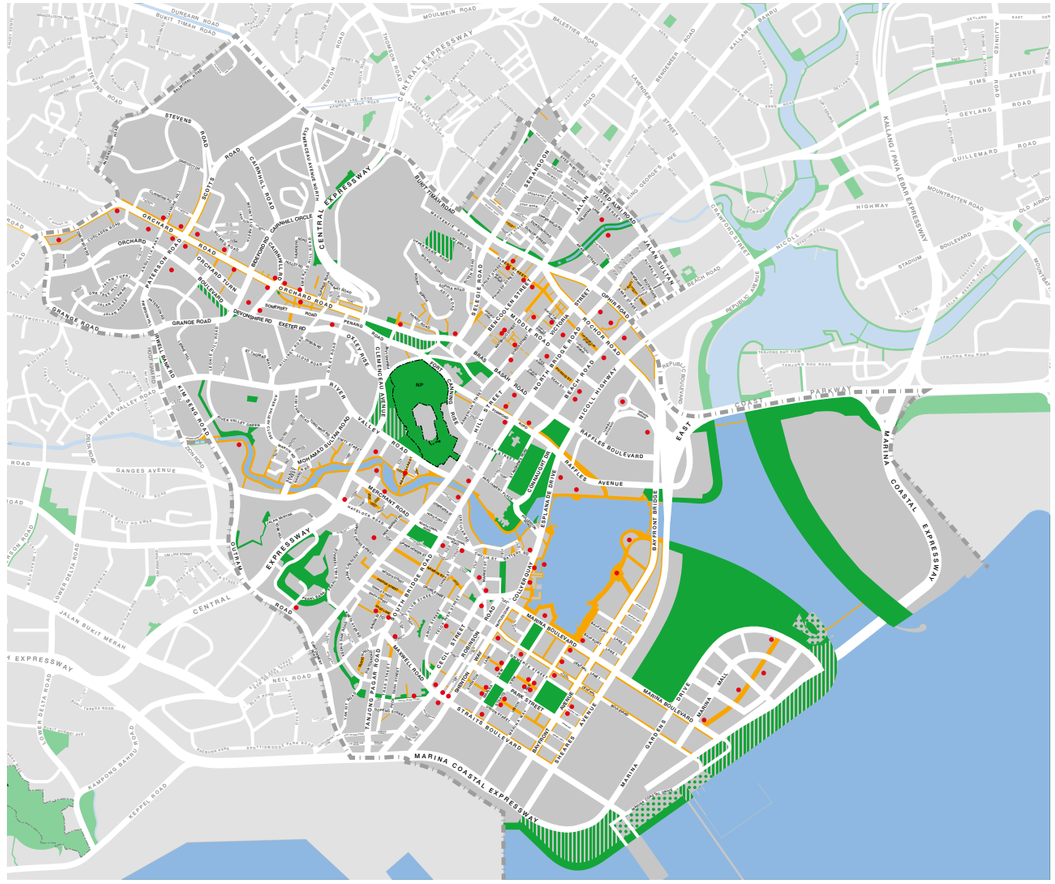
The Building Height Plan consolidates the building height controls of the various districts and street blocks in the city centre. While there are urban planning considerations in determining the building heights of parcels including planning needs, the building heights are also crafted to complement the surrounding context and give prominence to landmarks. For example, lower building heights around a natural feature could help to create prominence for it and thus a sense of orientation within the city. Collectively, the building heights shape the skyline of the city.

The Activity Generating Use Plan guides the locations of activity generating uses in the Central Area. *Source: URA, 2019*

- Central Area Boundary Line
- Activity generating uses at 1st storey

Activity Generating Use Plan

The Activity Generating Use Plan identifies the types of streetscape to be created through activity generating uses such as retail, food and beverage, along key commercial streets, pedestrian malls and waterfront promenades in the Central Area. These build on the activity spines identified in the District Character Plan and the Landmark and Gateway Plan.

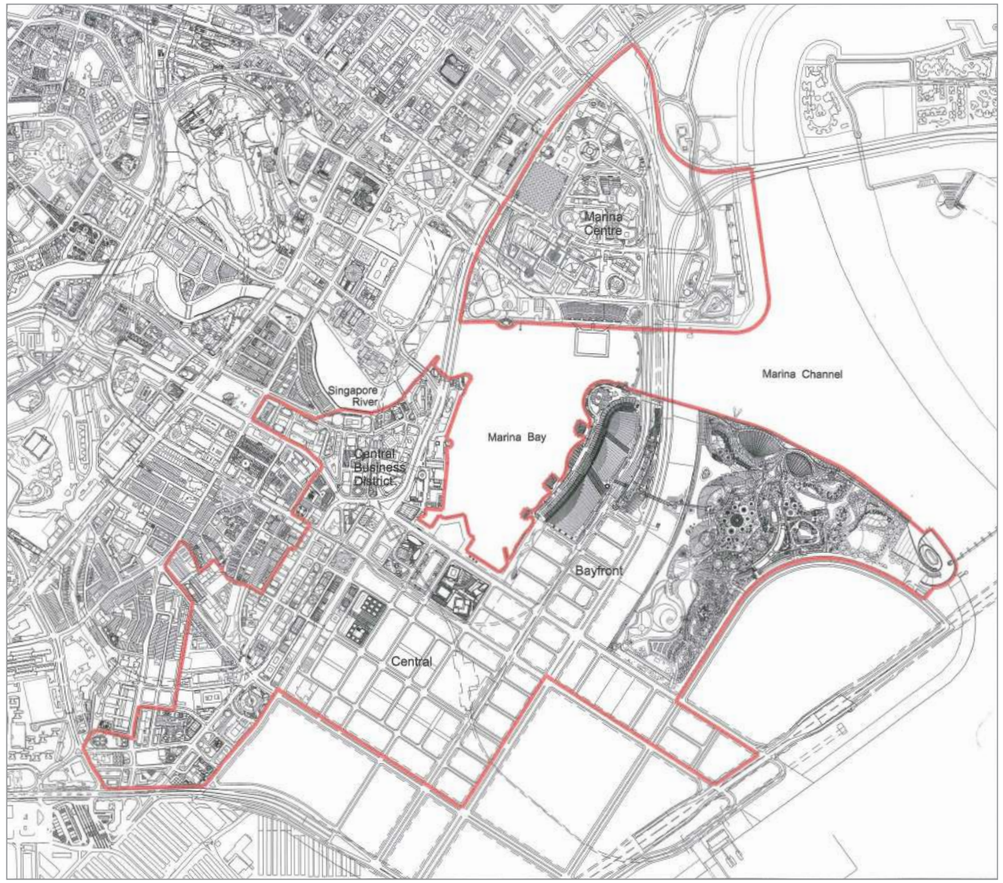


The Parks & Waterbodies Plan marks the aspirational locations of blue, green and open spaces within the Central Area. *Source: URA, 2014*

- Central Area Boundary Line
- Park/Open Space
- Interim Green
- Landscaped Rooftop Public Space
- Mall/Promenade/ Through-Block-Link
- Waterbody
- Open/Covered Public Space
- National Park

Parks & Waterbodies Plan

The Parks & Waterbodies Plan maps out existing and future blue, green and open spaces in the city. The plan aims to locate and connect the parks, open spaces and promenades to form an interconnected network to ensure good accessibility to these spaces. It also helps to create focal points and provide a sense of orientation and identity for the districts. By complementing the activity corridors in the city, these parks and waterbodies can become places where people recharge and engage in recreation amid nature.



The Night Lighting Plan identifies the districts within the Central Area for which district night lighting design strategies have been adopted to complement its identity. *Source: URA, 2013*

Boundary of Night Lighting Master Plan

Night Lighting Plan

The Night Lighting Plan recognises the ability of lighting to enhance the architecture and ambience of an area. Differentiated night lighting guidelines are introduced for different districts to enhance their district character. For example, in the Civic District, the monuments and conserved buildings are lit to emphasise their historic building features in warm tones while the contemporary skyscrapers of the Central Business District and Marina Bay are lit in cooler tones to emphasise the building crowns, street level public spaces and the landscaped sky terraces.

Urban Design elements

Unique to the practice of urban design is the understanding and ability to translate urban planning ideas into tangible forms to shape the urban environment. Hence, this set of urban design elements serves as a toolkit for the urban designer to allow them to marry all the various considerations, such as use and intensity, contextual relationship and technical codes compliance, and to translate them into three-dimensional form.

Initially, the urban design framework started with seven elements in Singapore. However, over time it has expanded to include “greenery” and “night lighting” as these have become increasingly important in the pursuit of higher aspirations in the greening of our city as well as supporting a night time economy within the city. While there are other elements that could been included, these are the urban design elements that have been prioritised as being core to Singapore’s urban design efforts and subsequently formalised through its urban design guidelines provided by the relevant agencies. Specific to Singapore, the following nine urban design elements are therefore essential in navigating the profession:

1. Urban pattern
2. Open space
3. Pedestrian network
4. Vehicular access
5. Building form
6. Streetscape
7. Roofscape
8. Greenery
9. Night lighting

List of Liveability Outcomes

As a contextual discipline, the nine urban design elements represent the identification of components of the built environment for a better understanding of the potential for intervention to enhance them visually and physically. Their value can be understood in relation to the outcomes that they help to achieve in the city, namely a more competitive economy, sustainable environment and higher quality of life, as detailed in the Singapore Liveability Framework.

Competitive Economy

The emphases on perception of space and aesthetic qualities of the city in urban design could have economic implications. Careful planning of the profile of the skyline and the resultant allowable plot ratio and building height can influence the real estate valuation of an undeveloped plot or a high-level office or residential unit. For example, tower placement studies were conducted for Shenton Way in the early years of Singapore's Independence to ensure that views towards the coast could be maximised for developments located further inland. In recent years, scenic views have also been leveraged for luxury lifestyle experiences, such as rooftop bars and skyrise dining. Night lighting is an important component in promoting an exciting and vibrant night-time economy.

Sustainable Environment

The continued greening of Singapore has been enabled by landscaped open spaces and planted streetscapes, such as the pocket parks, urban design concept in one-north. Across scales, urban design simultaneously helps to preserve broad strokes of green corridors and guides the implementation of detailed regulations required to support it. For example, the segment of the Rail Corridor across the upcoming Biopolis 6 in one-north is a strategic recognition of the potential for the sites to be developed while retaining the biodiversity along that transect.

High Quality of Life

Urban design enables interest in public space and walkability even in a densely built city. Urban design elements, such as open spaces, provide the balance in a built-up area for public and communal uses contributing to a richer and more granular urban grain of the city. Well-planned pedestrian networks, well-managed vehicular access and convivial streetscapes also contribute to a walkable city. Corresponding urban design guidelines on the streetscape elements and active frontages, exemplify the detailed attention paid to ensure its successful execution and usability.

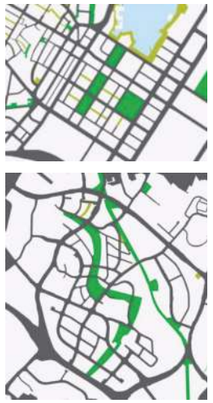
There is no doubt that a city can develop organically, without prior consideration of these elements, but the hallmark of a city shaped by the invisible hand of urban design is the quality experiences of everyday spaces that it offers.

URBAN DESIGN ELEMENTS

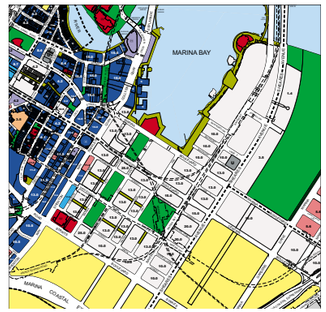
Urban Pattern

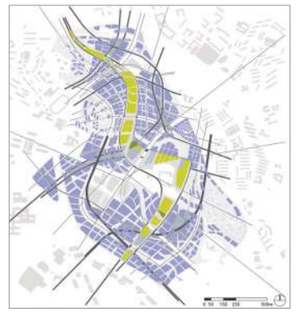
Types of urban pattern:
[1] Grid in New York City's Midtown Manhattan
[2] Radial in Paris' Place Charles de Gaule
[3] Organic in Barcelona's Gothic Quarter
Source: Snazzy Maps

Urban pattern refers to the way of organising and structuring an urban area. It seeks to organise the city in a legible and identifiable way by providing a skeleton for the allocation of land use, the placement of buildings, the location of open spaces and the alignment of infrastructure works. Carved by circulation networks, the resultant urban blocks influence the size and geometry of the building footprint and how buildings are clustered in relation to one another. It thus provides analytical cues of the city's development over time and strategic considerations regarding land use, land parcellation, and infrastructure provisions, and consequently exemplifies the texture of the urban fabric. Common urban patterns include the grid, radial, linear and organic forms, which may be adopted holistically or in combination.



Top: Grid urban pattern at the Marina Bay. *Source: URA, 2014*
Bottom: Bent-grid pattern at one-north. *Source: Victoria See*
Right & Extreme right: These patterns help to form the basis for inserting parcels and greenery into the plans for these area. *Source: URA, 2023 (right), JTC (extreme right)*



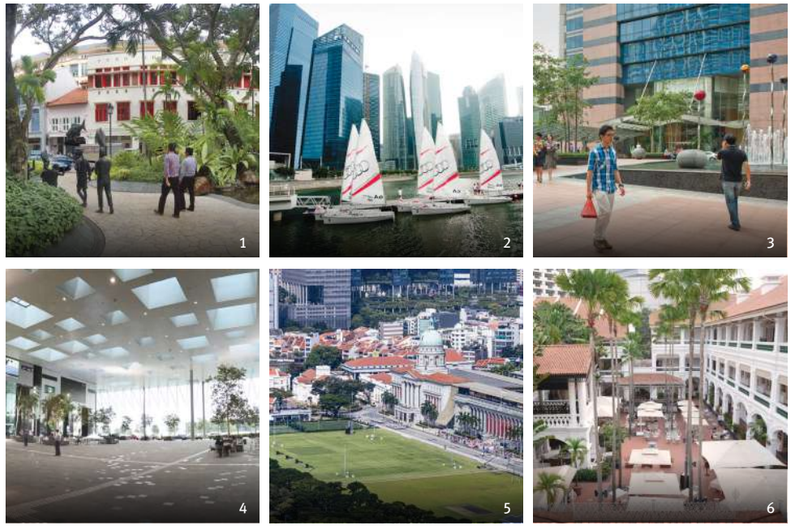


Singapore comprises many different urban patterns. Some of the urban patterns in Singapore have been influenced by its historic urban fabric such as the mixture of fine-grained linear and organic urban patterns in Telok Ayer. Others have been implemented in response to climatic considerations to optimise building orientation with respect to the sun direction and wind paths. Advancements in digital technology and simulation has enabled these studies to be conducted during the planning process and has been helpful for newly implemented urban patterns in Marina Bay and one-north.

While existing and new areas might have different urban patterns, the continuation and connection of key axes within both can create seamless transitions and gradual changes to urban grain from the historic parts of the city to the newer areas. For example, the key axes of the grid continue from the existing network in the Central Business District such that Marina Bay is experienced as a seamless extension.

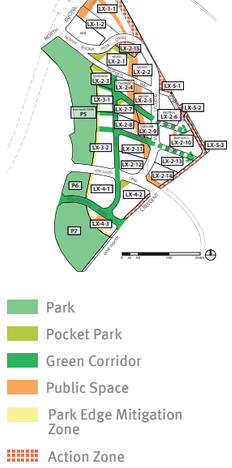
The urban grid pattern also allows for flexibility in accommodating developments of various scales. This is particularly suitable for Marina Bay given the *tabula rasa* nature of its reclaimed land. With the grid as its foundation, linear parks and open spaces can be easily introduced through mid-block green spines or adjacent blocks zoned for parks akin to a checkerboard. In contrast, the vision for one-north to be a pedestrian-friendly area with intimate streetscape experiences influenced the grid pattern of the overall development. The result is a "bent-grid" that has taken advantage of curvilinear roads as a means to curate street-level spatial experiences while benefitting from adjacent blocks that may be linked up to incorporate the existing greenery into one-north Park. This exemplifies the potential for urban patterns to respond to existing site conditions, in this case, the undulating terrain, park and heritage.

Open Space



Types of open spaces:
[1] Park at Telok Ayer Green
[2] Waterbody at Marina Bay
[3] Urban plaza or square in front of Capital Tower
[4] City room at Asia Square
[5] Ceremonial green at Padang
[6] Courtyard at Raffles Hotel
Source: URA (1, 2, 3, 4, 6), Bing Hui Yau/Unsplash (5)

Left: Landscape open space in one-north. *Source: Victoria See*
Right: Activated open space like Bedok Town Square. *Source: HDB*
Bottom: At times, these contribute to an open space network such as in one-north. *Source: JTC*



Open space is the intentional absence of built form or the presence of a void in the urban pattern to provide spatial relief from urban density. Open spaces are usually comprehensively planned as a network of spaces in conjunction with pedestrian networks, through city-scale urban design plans such as the Parks and Waterbodies Plan. This helps to provide a sense of orientation at the street level. They can be landscaped to become the focal points and backdrops for social interaction and programming. Open spaces include parks, water bodies, urban plazas, courtyards, city rooms and ceremonial greens.

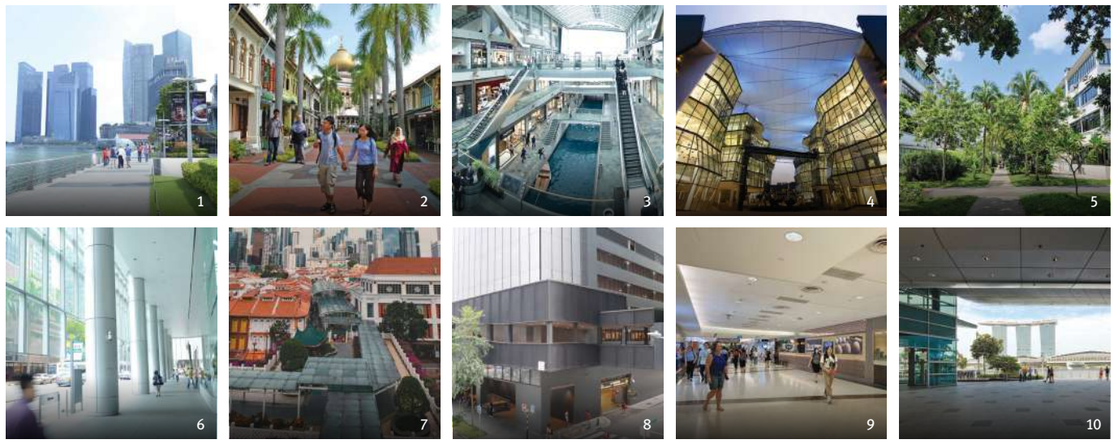
The urban planning and design of one-north as a new development took the provision of open spaces into account for the development of its master plan. For this reason, it has various typologies of open spaces, including the linear one-north Park and green corridor as well as specific locational pocket parks within the urban blocks. Landscaping these open spaces helps in incorporating greenery into the urban fabric and makes for a more attractive environment, well-suited to lunch crowds and chance encounters between office workers in the area. In contrast, the Bedok Town Square was designed to host community events for the resident population. Its high ceiling and porous design, together with the urban furniture and light greenery, ensures that this sheltered and lightly shaded urban plaza provides the opportunity for both spatial relief and activation, creating a focal point for the community to come together. The riverfront promenade at Singapore River that connects across the three quays through underpasses and pedestrian bridges provide a continuous seamless riverside experience for pedestrians and cyclists. View corridors through buildings and pedestrianised malls perpendicular to the river were introduced to make the riverfront visually and physically accessible from the adjacent roads.

Pedestrian Network

Pedestrian network refers to the series of pedestrian paths which influence the walkability of an urban area. Its extent, completeness and accessibility from surrounding developments facilitate pedestrian circulation in the vicinity and ensure that the convenience of pedestrians is accounted for. A comprehensive pedestrian network encourages seamless movement of people and is well connected to transportation nodes, open spaces and points of interest. It is critical for pedestrian paths to observe universal design guidelines to ensure that the city is traversable and comfortable for all.

In addition to standard pavements and footpaths, the pedestrian network includes dedicated pedestrianised spaces such as promenades, pedestrian malls, gallerias, through-block links, view corridors, covered walkways and linkways, as well as pedestrian links at levels other than at street level, such as second-storey pedestrian links, pedestrian overhead bridges, and underground pedestrian walkways and underpasses. These pedestrian paths can be lined with retail, commerce, street furniture and programming to weave lines of activity into the urban fabric to make walking enjoyable and to make it a destination as well. Having more people on the street would mean more “eyes on the street” which would in turn make for a safer city.[5]

Types of pedestrian networks:
1 Promenade along Marina Bay
2 Pedestrian mall in Kampong Glam
3 Galleria in The Shoppes at Marina Bay Sands
4 Through-block link in LASALLE College of the Arts
5 Open walkway in Tiong Bahru estate
6 Covered walkway around the perimeter of 71 Robinson Road
7 Covered linkway in Chinatown
8 Elevated linkway connecting OUE Downtown with the adjacent buildlings
9 Underground network as seen in Marina Bay Link Mall
10 View corridor through One Fullerton
Source: URA (1, 2, 3, 6, 10) LASALLE College of the Arts (4), ZR Lin / Unsplash (5), Joshua Tsu / Unsplash (7), Victoria See (8, 9)



Areas that might need to accommodate a sudden influx of pedestrians throughout the day may benefit from multi-storey pedestrian networks much like in Shenton Way. Complementing street-level pedestrian networks with underground and second-storey pedestrian links, not only builds up the pedestrian capacity of the area to accommodate peak hour buzz, it also provides uninterrupted sheltered connectivity amid inclement weather. However, such a strategy needs to be carefully considered as typically only areas with high pedestrian traffic warrant it. Otherwise, two levels of pedestrian network might run the risk of detracting vibrancy from the street level.

On the other hand, the centralised nature of Bedok Town Centre as a catchall for the commercial and recreation needs of the residents works well with its hub-and-spoke pedestrian network. In this way, walkable streets lined with activities act as spokes that extend out from Bedok Town Centre and help to direct residents toward it as a main commercial centre. This is complemented by walkways and linkways between HDB blocks that make the otherwise large urban block more traversable and walkable, and encourage more fluid pedestrian movement on the ground.

Vehicular Access

Drop-off point at Intercontinental Singapore. *Source: URA*

Vehicular access is the management of vehicular ingress or egress and drop-off points and service access of developments which can have an impact on pedestrian network, building form and streetscape. Well-considered location and a reduction in the number of vehicular access can minimise disruption to pedestrian movement and manage pedestrian-vehicular conflict. Prioritising preferred frontages of developments can aid in deciding on the location of vehicular access to buildings while fostering an uninterrupted and welcoming pedestrian experience. That said, existing traffic circulation and transport options in the vicinity are considerations that need to be balanced when planning for vehicular access. Vehicular access may include lay-bys, passenger pick-up and drop-off (PUDO) points, and parking or service access. The various functions of these vehicular access help to articulate the vested transport mode and duration of use so that guidelines on their placement can be considered more carefully.

Top: Consolidated service access along Boon Tat Link, and away from adjacent main roads like Robinson Road and Shenton Way. *Source: Victoria See*
Middle & Bottom: Separated vehicular access for residents and buses along Bedok North Drive, and for mall-goers along New Upper Changi Road. *Source: Victoria See*

Even though the same factors might be taken into consideration, the site context and its existing vehicular network may result in different approaches to the vehicular access for different developments. For example, the high vehicular volume anticipated in Shenton Way, coupled with the need for separated vehicular accesses, justifies the placement of vehicular access points along the rear of the developments off a series of “service roads” such as Boon Tat Link and Maxwell Link.

On the other hand, while the Bedok Integrated Development similarly foresaw high vehicular traffic on the road, it also had to account for its steady stream of bus traffic and private vehicles due to the bus interchange and private residents accessing the development. It thus adopted three distinct categories and approaches to segregate the bus, residential car-parking and mall car-parking, and separated the former two from the latter. The mall carpark is thus accessed via the main New Upper Changi Road, which is unconventional for retail developments. This was done in recognition that consolidating all three vehicular access might overload Bedok North Drive. Furthermore, given that most pedestrians would be arriving to the area from the existing pedestrianised town centre, the elevated MRT station or the integrated bus terminal, having a separate vehicular access for mall customers, would not negatively affect the street-level experience.

Building Form

Types of vehicular access:
[1] Tower block at Pinnacle@Duxton
[2] Slab block at Tanjong Pagar Plaza
[3] Groundscaper as seen in the cluster of low-rise buildings at the Singapore Management University
[4] Courtyard block within Raffles Hotel
[5] Partywall buildings along Robinson Road
[6] Landmark building at the intersection of Keong Siak Road and Teck Lim Road.
Source: Isaac Matthew/Unsplash (1), URA (2, 3, 4, 5), David Kubovsky/ Unsplash (6)

one-north’s roofscape considers the relationship of building forms in relation to their surroundings.
Source: JTC

Building form is the three-dimensional expression of the building that gives a development shape and identity. It is informed by plot ratio, building height restrictions, building envelope control and building typology of individual buildings. Detailed urban design guidelines on setbacks, building-height and roof design contribute to the building form of developments. Not only will this influence the design of spaces and uses within the building, it also safeguards the public realm surrounding each building. Some common typologies are slab block, groundscraper, tower block, podium-tower block and courtyard block.

At a macro scale, it is important to consider building forms as a collection of buildings to ensure that building forms complement their neighbours, emphasise landmarks, or are strategically placed to orchestrate distinct skylines and suit climatic considerations. City-scale urban design plans like the Landmark and Gateway Plan are critical for identifying land parcels that might require more unique considerations to allow for unique and distinctive building forms. As identified in the Landmark and Gateway Plan, the ArtScience Museum, with its unique lotus flower building form, creates interest, and gives a sense of identity, place and orientation within the bay.

Detailed control plans may be done at a district level such as the control of roofscape and building heights in one-north to create an undulating roofscape that promote the legibility and collective identity of the development. At a localised scale, building height restrictions may be adapted to ensure that the building can achieve its allowable gross floor area while respecting the scale of the existing buildings around it. Such is the case with the tiered building form of Heartbeat@Bedok, which takes reference from the height of the old HDB town centre buildings around it at its lowest and most outer rim.

Marina Bay's distinctive silhouettes (left in image) differs from Shenton Way's stepped skyline profile (right in image). At the same time, both have low-rise buildings along the bay. *Source: URA*

The overall profile of building form in an area in turn contributes to the skyline and identity of the urban environment. The skyline often comprises a series of skyscrapers and unique architectural projects, to emphasise the identity of the city and district.

In part determined by the location of the viewer, the city can thus have multiple skylines that may be associated with it. Skyline profiles can also give clues to other elements of the city. For example, when viewed from the coast in the south, the CBD skyline is defined by two peaks at either end—one at Raffles Place and the other at Tanjong Pagar. These peaks coincide with the locations of the MRT stations, reflecting the concentration and higher development intensity around these transport hubs.

On the other hand, the skyline of the CBD, as seen from either Civic District or Marina Bay, has a stepped and layered profile with the historic low-rise colonial buildings in the foreground and the towering skyscrapers behind as a backdrop. A similar approach is adopted at Marina Bay, with a low- to medium-rise layer in the foreground, comprising the Shoppes at Marina Bay Sands, the ArtScience Museum and Esplanade Theatres, as well as the historic maritime edge at Collyer Quay (including the Customs Harbour Branch, Clifford Pier and One Fullerton) with the high-rise office, residential and hotel towers behind them.

Streetscape

Streetscape encompasses the spatial experience at the street level, which can be defined by building edges, façade treatment, street fronting uses including outdoor dining, public art, landscaping, lighting, and street furniture. More than just residual space between buildings and vehicular roads, well-designed streetscapes have the potential to contribute to the vibrancy and walkability of urban areas. A successful streetscape is defined by the buildings acting in concert over the length of the street, has active building fronts inviting people to window shop and to enter the buildings, and is characterised by attractive landscaping and street furniture encouraging people to linger.

Inspired by the canyon-like streetscapes along Wall Street in New York, the podium-tower typology became prominent in Singapore's CBD during the 1960s and 1970s. Correspondingly, urban design guidelines to control the podium heights were put in place to ensure that the streetscape benefitted from the reinforced and continuous street edge while maintaining a human scale for pedestrians at the street level. This is complemented by the street-level streetscape of the covered walkways inserted into podiums at the street level, which in turn provides continuous shade for pedestrians in the area.

Types of elements in the streetscape:
[1] Building edge
[2] Façade treatment
[3] Use fronting street
[4] Art along Singapore River
[5] Lighting on the façade of Orchard Central
[6] Advertisement signs and decorations integrated into the Mandarin Gallery's building design
Source: Victoria See (1), URA (2, 3, 5, 6), STB (4)

On the other hand, as a commercial centre for the residential HDB town, the buildings within Bedok Town Centre were carefully proportioned such that the width of the pedestrian mall is equal to or wider than the height of the buildings demarcating it. This ensures that the space does not feel constricted and pedestrians have a sense of "openness" while going about their daily activities. Furthermore, the adjacent covered walkways fronting the mall which are lined with shops, together with the generous provision of street furniture, add to the vibrancy of the streetscape.

Top: Shenton Way's streetscape emphasises the Wall Street-like atmostphere through its proportions. *Source: Victoria See*
Bottom: In Bedok Town Centre, buildings that are shorter than the width of the pedestrian mall create a convivial atmosphere fitting for a residential town. *Source: Victoria See*

Roofscape of UOB Plaza (left in image) and OCBC Centre (right in image). *Source: Nikhil Soni/Pexel*

Left: Roofscapes of South Beach Tower and Millenia Tower emphasise their building crowns. *Source: Joshua Delica/Unsplash*
Right: Pitched tiled roofs line the Singapore River. *Source: URA*

Roofscape

Roofscape is related to the visual appearance of the roof area of buildings. This is of particular concern in tropical climates, where there might be a higher dependence on air-conditioning which in turn requires extensive areas for plant rooms and cooling towers. These are often placed on roof tops since they are the least commercially valuable area of the building. Without roofscape guidelines, this may lead to building forms with flat roofs and exposed mechanical equipment which could be unsightly, especially when viewed from taller buildings in the vicinity.

The roof form, material and colour of individual buildings can have an overall impact on the roofscape. At a macro scale, roofscapes can help to unify the overall character of an area, and at times, form the basis for introducing buildings with distinctive roofscapes for interest and orientation. Viewed from above, coherence in roofscape can create interesting scenic views. Viewed from afar, well-designed roofscapes collectively form an attractive skyline. It is thus especially important for a dense city with many high-rise buildings like Singapore, to pay close attention to roofscapes. Increasingly, roofs have also become programmable spaces for high-rise dining and activities and sky gardens.

The roof areas of buildings along the Singapore River are guided to include clay tiled pitched roofs to relate to the roofs of the conserved shophouses and warehouses to create a distinct identity for Singapore River. Given the low-rise character of Singapore River, its roofscape, when viewed from surrounding high-rises, provides a distinctive and recognisable urbanscape.

Types of greenery:
Top: Bedok Town Centre. *Source: HDB*
Bottom: Sky terraces of PARKROYAL COLLECTION Pickering. *Source: WOHA*
Right: Green roof of Marina Barrage. *Source: URA*

Greenery

Greening has been a key strategy adopted in Singapore to ensure that natural elements were incorporated as the city underwent redevelopment and urbanisation. Today, the vision of Singapore becoming a City in Nature demonstrates how crucial greenery is to our urban environment. Married into streetscape, open spaces and even building form, greenery helps to make spaces more comfortable and attractive for people. Landscape replacement schemes to replace greenery lost at ground level due to development and incentive schemes have amplified greening efforts and biophilic architecture of late, which has unsuspectingly become a recognisable characteristic of Singapore's urban environment to the global community. These schemes and updated architectural ideas and technologies have allowed greenery to be integrated into building forms through skyrise planters, sky terraces and green roofs.

Where mature trees have survived the test of time, tree conservation guidelines come into play to protect them as "heritage trees". This also helps to preserve the existing natural assets of the city. For example, new developments in one-north are required to observe guidelines for building around the heritage trees. The design review panel and JTC guard the interest of greenery by ensuring that in-depth assessments are done to justify the felling of existing trees. Where it is unavoidable, urban design guidance for the replacement of plants lost ensures that softscape is integrated into the urban environment. This has also been the case in other new developments that may encroach into the canopies or root system of "heritage trees" throughout the island.

Types of night lighting:
[1] Lighting in the Central Business District, with increase illumination along the bay
[2] Lighting to highlight the Elgin Bridge
[3] Close-up and soft lighting to accentuate the building features of the National Museum of Singapore
Source: URA

Night Lighting

Night lighting is the management of the amount and quality of night lighting of buildings to bring out their form and architectural features as well as those of the streetscape. This is especially relevant to commercial or civic areas, where coordinated lighting strategies applied on the building form and architectural features help to enhance the night experience of the area.

For example, the exterior lighting of the buildings in the CBD are guided by intensity and colour rendering to ensure a consistent and coherent nighttime rendition of the city. The historical buildings in the vicinity are accentuated by a warmer colour rendering which brings out the intricate details of façades like the colonnaded walkways, the columns and capitals, and carvings on these buildings. In other areas, the light from lamp posts are used to highlight the tree canopies along the Singapore River, and create subtle reflections in the water. The riverwalls are also illuminated to bring out the presence of water.

PROCESS AND STAKEHOLDERS' PARTICIPATION

Process

With plans and guidelines in place, the urban design process might appear to be largely government led in Singapore. That said, there are many other intermediate reviews such as market consultation with developers and professionals, public exhibitions and public engagement exercises that happen behind the scenes which allow feedback from the various stakeholders to be considered before plans are formalised as the guidelines.

The URA also actively seeks ideas from professionals, students and institutes of higher learning as well as through competitions and design consultancies. Research and academia also contribute to the urban design discipline through qualitative urban design studies of certain areas to identify strengths and weaknesses of existing urban fabrics and to provide recommendations for improving them or to guide future urban design intentions.

The translation of guidelines into the respective architectural designs adds another layer of interpretation, or at times, even negotiation if the land parcel has been marked with additional considerations in plans such as the Landmark and Gateway Plan. For proposed developments in strategic areas or sites, the URA set up the Design Advisory Panel to provide design development guidance via a peer review process. The panel is chaired by the URA and comprises members of public and private sector consultants.

Consequently, the urban design of a city is always a work in progress since it is realised in bits and pieces through the development of individual buildings and different land parcels. The long periods required for its realisation is a reason why it should be treasured and the collective thoughts and effort that went into its making recognised.

STAKEHOLDER PARTICIPATION IS KEY TO SUCCESSFUL IMPLEMENTATION

From urban design concept to urban design reality

Even though the URA prepares the urban design plans, guidelines and policies for the city, and sets precedence for other parts of the island, these urban design visions can only be realised with the participation of the building, real estate and construction industry stakeholders.

The government of Singapore continues to own large tracts of land which it releases through the Government Land Sale Programme for the private sector to develop. As one of the key land sales agent for the government, the URA has been able to ensure that these sites are developed according to the planning and urban design vision through planning and urban design conditions imposed through the land tender.

From urban design reality to a sense of place

Placemaking has increasingly taken root in Singapore. Social and civil organisations that get involved in placemaking activities ensure that individuals are not just passive beneficiaries of urban design but rather, active participants by facilitating ground-up feedback on their personal takes and experiences of the spatial environment. In the private sector, place-managers also work with business stakeholders and residents to bring their energy, passion, ideas and resources to make their districts socially and economically vibrant. Places and spaces can only be successful when people take ownership to tend to and care for their surroundings, and to make their district distinctive for them.

[1] Urban Design, "Creating Places for People", https://urbandesign.org.au/

[2] Ricard Marshall, "Josep Lluis Sert's Urban Design Legacy" in The Urban Design Reader, ed. Michael Larice and Elizabeth Macdonald (New York: Routledge, 2013).

[3] William H. Whyte, "Introduction" in The Urban Design Reader, ed. Michael Larice and Elizabeth Macdonald (New York: Routledge, 2013).

[4] The Singapore Liveability Framework guides the Centre of Liveable Cities' research focus and development of its knowledge products. It also provides city leaders a lens through which they can analyse their cities and generate strategies for high liveability and sustainability. It has identified desired outcomes (i.e. Competitive Economy, Sustainable Environment, High Quality of Life), and urban systems (i.e. Integrated Master Planning & Development, Dynamic Urban Governance) as key components for liveable city.

[5] Jane Jacobs, *The Death and Life of Great American Cities*, (New York: Random House, 1961).

“It starts with good planning alongside urban design, which serves to bridge the gap between land-use planning at the broader level and the design of individual developments. This helps to enhance a town’s identity and character.”

— Dr Cheong Koon Hean, CEO of HDB (2010 - 2020)

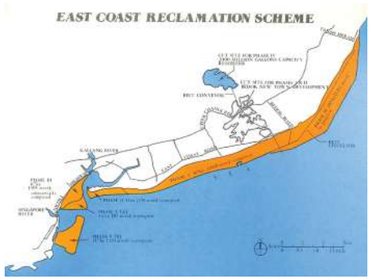
Adventure Park in Bedok Town Centre in the 1980s, on the site of the current Heartbeat@Bedok. *Source: HDB*

1

BEDOK TOWN CENTRE: REJUVENATING AN OLDER HEARTLAND TOWN CENTRE

The recent rejuvenation of the Bedok Town Centre (BTC) builds upon the foundations of the Housing and Development Board’s (HDB) first generation of urban planning and design, thereby retaining the locality’s unique character while being updated with new urban interventions. This makes BTC relevant to today’s needs while maintaining a continued sense of place and identity within the hearts and minds of its residents. The evolution of BTC is documented through interviews with the HDB and the urban solutions professionals involved, and includes observations made by the writers. It not only illustrates the importance of planning and urban design working hand in hand, but offers many valuable lessons and serves as an inspiration for the rejuvenation of town centres in Singapore and around the world.

PRE 1970S | PREPARING THE LAND

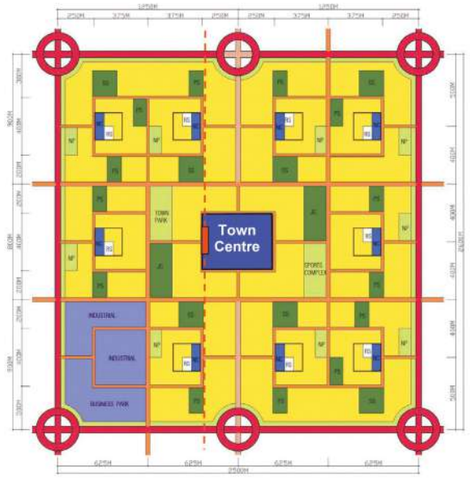


Map of the East Coast Reclamation Scheme. *Source: HDB*

The Bedok New Town is situated just northeast of the East Coast Reclamation Scheme. During Phases I and II of the reclamation project from 1966 to 1971, the undulating terrain of the Bedok area was removed to be used as sand to extend the coastline along East Coast Road. The first phase contributed to the reclamation of 405 hectares of land from Bedok to Singapore Swimming Club, while the second phase added another 53 hectares from Singapore Swimming Club to the tip of Tanjong Rhu. The resulting levelled land became the site of Singapore's fifth new public housing estate, Bedok New Town. Subsequently, at various points until 1976, continued removal of land from the Bedok area was carried out concurrently with the construction of the Bedok New Town. In particular, the hills beside the then-defunct Bedok Reservoir served as the cut site for Phase IV of the reclamation project, resulting in a 9,000-million-litre capacity reservoir that has transformed it into what is now Bedok Reservoir.[1]

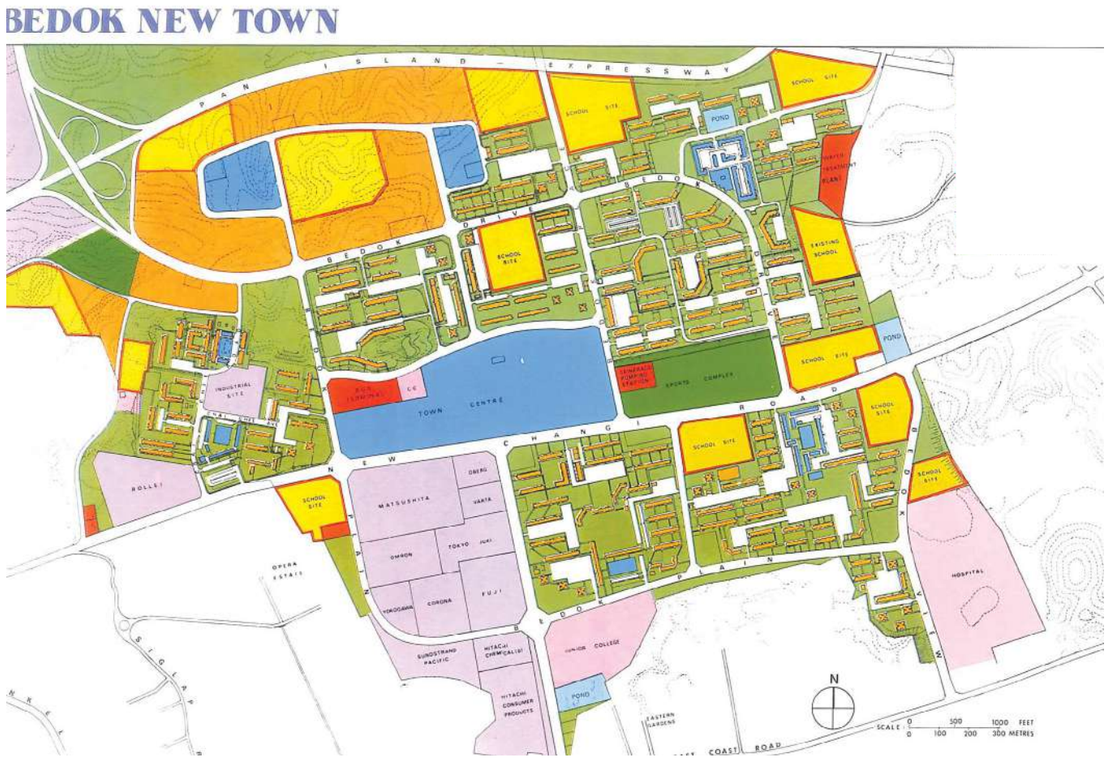
1972–1980S | FIRST GENERATION OF HDB NEW TOWNS

Following the 120,669 units of public housing built during the First and Second Five-Year Building Programmes from 1960 to 1970, HDB launched the Third Five-Year Building Programme in 1970 that was set to build 100,000 units of flats. During this period, the first two new towns, Queenstown and Toa Payoh, were to be completed and the construction of three other new towns in Telok Blangah, Woodlands and Bedok were to begin.[2] This initial target was exceeded by the end of 1975, with a total of about 113,819 units of flats and shops built.[3]



HDB's New Town Structural Model.
Source: Cheong Koon Hean

NC: Neighbourhood Centre
JC: Junior College
SS: Secondary School
NP: Neighbourhood Park
RS: Reserved Site



Bedok New Town Town Plan.
Source: HDB

- Public Housing
- Commercial
- Industrial
- Open Space
- Schools
- Institutional
- Public Utilities
- Sports & Recreational

Laying the Town Structure

As an improved and measured progression from the two pioneering new towns, the New Town Structural Model instituted rules on hierarchy and distribution of the town centre and neighbourhood centres. Its main goal was to establish self-sufficient towns that would be well-equipped with facilities for everyday life, thereby saving residents the need to travel daily to the downtown city centre. Based on this new model, each town was designed with a central town centre which would serve as a hub for the neighbourhoods around it. Within each neighbourhood, neighbourhood centres would differentiate themselves by catering to the socio-communal needs of the community through the likes of kindergartens, shops and eateries.

Establishing the Urban Pattern

Specifically, Bedok adopts a "loop" urban pattern, which becomes increasingly articulated towards the town centre. It spatialises the "neighbourhood principle" of the New Town Structural Model by situating the town centre at the geographical centre of the new town, while the six neighbourhoods encircle it. The neighbourhood centres are cleverly situated close to the town centre itself, adding to the gradual build-up of activity and buzz towards the town centre. An overall checkerboard pattern of low-rise, low-density land use is juxtaposed against high-rise, high-density residential developments to provide spatial relief and a more varied skyline. Hierarchy between the various centres is introduced by locating shopping complexes, hawker centres and sports facilities at the town centre; and, in the same vein, light and clean industries are situated at the southwestern fringes of Bedok New Town.[4]

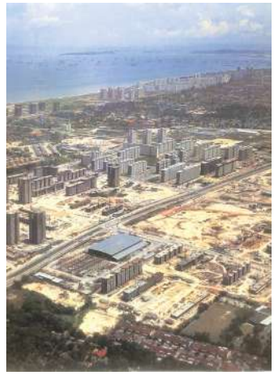
Connecting to the Larger Vehicular Network

Road network within and around Bedok. *Source: OneMap*

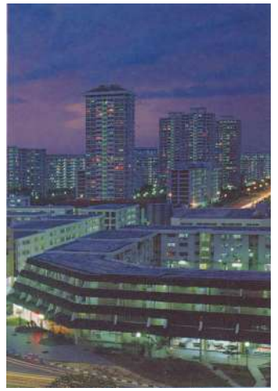
The physical development of Bedok New Town began in 1972, starting first from Neighbourhood I with a concurrent planning process for the new town.[5] In response to government policies requiring progressive refinement of housing standards, HDB worked towards improving the road systems and land-use patterns in Bedok New Town.[6] This resulted in the replacement of the existing, winding Upper Changi Road with a New Upper Changi Road to improve connectivity to the overall island road network.

While this direct plug into the road network contributed to the accessibility of Bedok town on a broader scale, this likely diminished, to some degree, the sense of arrival into Bedok from the main road network. Contrary to broad town planning principles of that time, Bedok North Road and Bedok South Road wrap tightly around the six neighbourhoods and serve as both major arterial roads and estate roads around and through the Bedok new town respectively.[7] Without much meandering of local roads, this quickly merges the estate's road network to the wider island-wide road network with little hierarchy, blurring the boundaries of the town and, inevitably, its imageability. Unintentionally, the higher-speed traffic inevitably promotes transient vehicular circulation across Bedok Town without fully recognising its presence as a destination.

In 1976, subsequent studies were done to assess the feasibility of providing an extensive network of footpaths for pedestrians and cyclists to travel between neighbourhood centres and recreational nodes in Bedok New Town.[8] These localised, alternative urban mobility connections form the social paths between neighbourhoods that residents use daily.



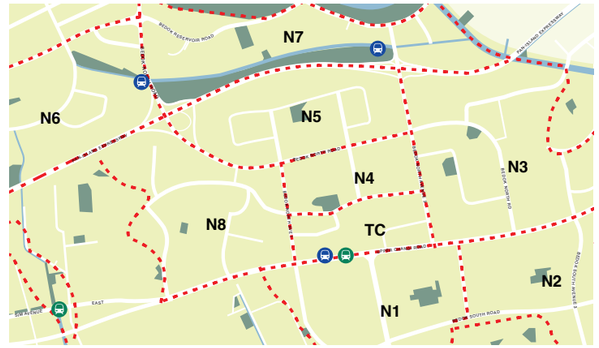
Top: Bedok New Town under construction. *Source: HDB*
Right: Neighbourhoods of Bedok New Town. *Source: HDB*



Top: The low-rise buildings in Bedok Town Centre in the evenings in the late 1970s. *Source: HDB*
Bottom: The low-rise buildings also contribute to a more human-scale streetscape. *Source: NLB*

Determining the Activity Nodes

It was only as works on Neighbourhoods I and II were progressing smoothly in 1976 that planning for Neighbourhood IV and the town centre began. The town centre was initially planned to be the major retail and recreational centre for the eastern end of the East Coast corridor. These plans were finalised in 1976 as Neighbourhood I was completed and construction works moved to Neighbourhoods II, III, IV and V as part of the accelerated building programme that year. The town centre was planned to be the focal point of the residents' daily lives, comprising shopping malls, market and hawker centres, a bus terminal, a library, cinemas, a supermarket, banks, offices, a department store, showrooms and a polyclinic.[9]



Integrating Planning and Urban Design

Creating Human-Scale Streetscapes

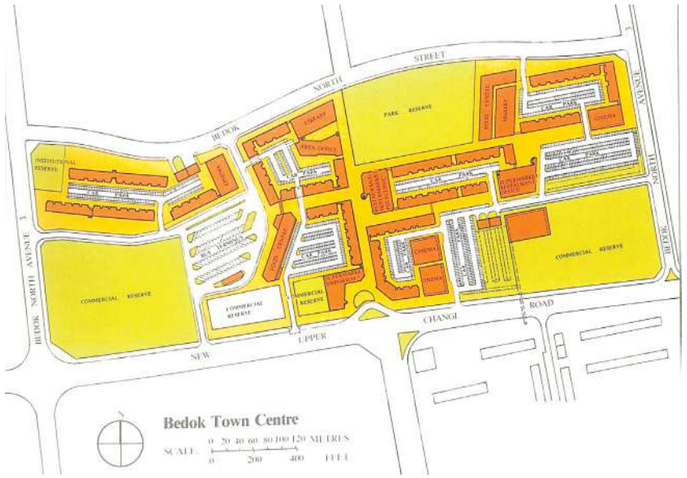
The completed town centre consists of 3- to 4-storey slab blocks with long front façades along the main pedestrian circulation, forming a continuous building edge. This is complemented by the consolidation of service roads and car parks which provide sufficient vehicular access while creating a safe, pedestrian-friendly environment. With active frontages along the pedestrian mall, the slab blocks also help to conceal the surface car parks by wrapping around them with their rear façades facing them. The height of this building edge is kept approximately equal to the width of the well-proportioned pedestrian mall, or substantially less than the width of open spaces along it. This scale and proportion make the streetscape along pedestrian mall akin to an outdoor room filled with the vibrancy of daily life. Aside from the split-in levels dividing the pedestrian mall longitudinally into two parallel strips due to the existing terrain, this slab building typology serves as the foundation for future rejuvenation and improvements to the streetscape.

Providing Pedestrian Connectivity

The land use zoning of Bedok Town Centre based on Master Plan 2019, with neighbourhood shops (pink) and green and open spaces (green). *Source: URA, 2023*

The main pedestrian mall runs perpendicularly from the southern edge to the northern edge of the town centre site, providing connection between Bedok South Avenue 1 and Bedok North Avenue 2. Several east-west pedestrian paths have also been delineated by slab blocks orientated in that direction. In retrospect, short of a few gaps in activities between Block 410 and 411, these walkways are layered with rows of neighbourhood shops. From Block 136, there is a gradual build-up of activities along the pedestrian paths leading to town centre. Together with the planned open space network of nature, these are reminders of integrated urban planning and urban design visions and strategies from the early days.

Balancing the Needs of Pedestrian Networks and Vehicular Access



A site plan of the Bedok Town Centre from the early 1980s showing the location of pedestrianised areas (light orange) in relation to the internal service roads within the plot. *Source: HDB*

As one of the earliest new towns in the east, the BTC was planned to be a central core of activity to serve the residents around it. This necessitated improved connectivity options via road and rail to the rest of Singapore. With the increased capacity at the bus interchange in the early 1980s, 2-lane service roads fragmented the town centre, resulting in many pedestrian crossings required within the town centre itself despite it being a largely pedestrianised area. More significantly, the 6-lane New Upper Changi Road had reduced the walkability to the town centre from the light industrial park south of it. That said, this was a justified trade-off as the bus interchange was the foremost public transit infrastructure in Bedok Town during that time, contributing to its bustling nature today.

Using Landmarks to Anchor Activities

Left: Artist's impression of the entrance plaza of Bedok Town Centre. *Source: HDB*
Right: The entrance plaza in the late 1970s. *Source: HDB*

The entrance plaza to this pedestrian network was situated at the intersection of New Upper Changi Road and Bedok South Avenue 1 along the southern edge of the site. It was emphasised with the L-shaped emporium building to the west and the chamfered building footprint to the east. This also responded to the chamfered corners of the plots across the street and helped direct pedestrians into the pedestrian mall of the town centre. Additionally, the warm terracotta tiles on the chamfered building form and façade contribute to the landmark quality of the BTC entrance plaza. This was mirrored by the former Bedok Community Library that was located at the northern end of the pedestrian mall. Together, these two landmarks served as anchors for the main spine of the pedestrian mall, supplemented by a perpendicular pedestrian mall in the east-west direction that was lined with commercial activity, markets and former cinemas.

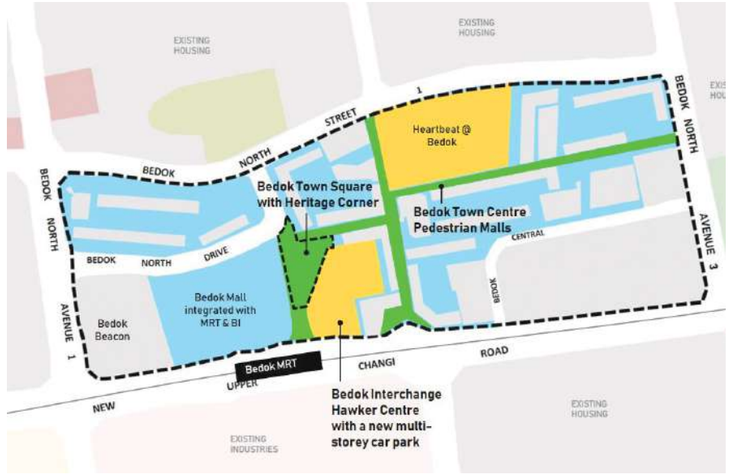
Strengthening Nodes: Adventure Park and Bedok MRT Station

Adventure Park, circa 1980. *Source: HDB*

Around the 1980s, HDB built up on its anchors by introducing an adventure park opposite the then-library building. With changes in lifestyles and tastes, it gradually became less relevant and became the site of one of the key projects of the recent rejuvenation. Its redevelopment into an integrated, mixed-use, co-located community hub came to be called Heartbeat@Bedok.

The Bedok MRT station was opened in 1989 at the southern edge of the town centre in close proximity to the existing bus interchange. Together, they contributed to the high traffic movement within and around the town centre, quickly establishing it as a significant transport node in the East Coast.[10]

Situated at opposite sides of the pedestrian mall, these two recreational and transport nodes reinforced the activity at the ends of the pedestrian mall to amplify the pedestrian activity between them. This also helped to normalise the everyday circulation of residents within the town centre, which was foundational for the subsequent rejuvenation efforts.



A comprehensive site plan of the rejuvenated town centre and its peripheral streets. *Source: HDB*

2011–2020 | REMAKING OUR HEARTLAND 2

Under the second phase of the Remaking Our Heartland (ROH) programme, Bedok, which falls in the East Coast ROH area, underwent a series of improvements and relocation of facilities linked to and within the town centre. The four key themes of ROH2 new towns are "Rejuvenation of Town Centre", "Outdoor Recreational Choices", "Improved Connectivity" and "Heartland Heritage". With respect to the town centre, these themes were eventually translated into three conceptual objectives.

The first objective was to tackle the walkability within the town centre itself and throughout the rest of Bedok town. More than just a means of convenience and safety, the various projects leveraged on the extensiveness of these pedestrian and cycling webs to bind the town centre with the town to create a coherent sense of identity and place.

The second objective was to rejuvenate the town centre in response to the increased resident population of Bedok New Town and its changing demographics. There was a strategic opportunity to upgrade public amenities and improve the urban design of the town centre.

The third objective was to transform the town centre into a lively environment with a unique identity relating to Bedok's history and surrounding context, with the hope of creating a relatable living environment and cultivating a sense of belonging for its residents.

"Bedok Town Centre's rejuvenation will include new mixed developments, expanded outdoor recreational spaces, and spaces for heritage."[11]

— Mah Bow Tan, Minister for National Development (1999 - 2011)

To achieve these objectives, the HDB developed an overall plan and a set of urban design guidelines for the various consultants of the redevelopment projects—the pedestrian mall, Bedok Town Square and Interchange Hawker Centre, Bedok Integrated Development and Heartbeat@Bedok. Some of these urban design guidelines were inserted into the tender briefs for the Government Land Sales (GLS) site, while other synergistic urban design ideas and opportunities were leveraged on during the concurrent development timelines of the various projects. This helped to ensure that the disparate upgrading projects could be brought together in a coherent and holistic way.

An exhibition was held to showcase the plans for the Remaking Our Heartland (ROH2) programme in 2011. *Source: HDB*

Active Community Engagement

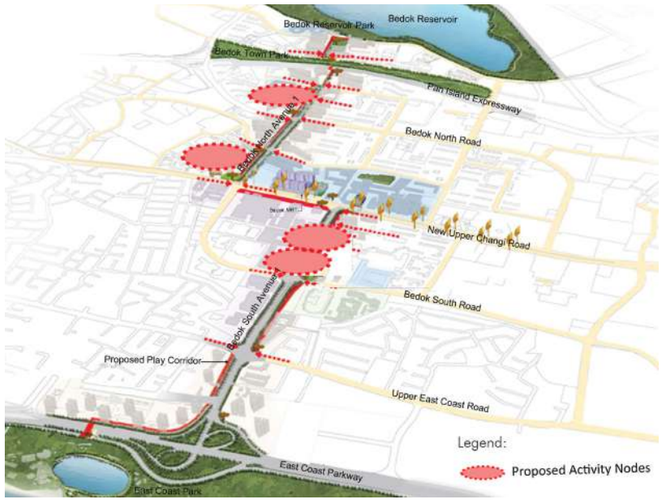
The vision for the ROH2 programme at BTC and the Heartbeat@Bedok had been to ensure that a comprehensive range of activities and services were provided to meet diverse and changing needs of the residents from the present to up to 30 years into the future. Grassroots Advisors and their team challenged themselves to be creative by thinking across organisational boundaries on the possibilities of integrating services to better serve the residents. Together with grassroots volunteers, they embarked on a parallel series of consultation exercises to complement HDB's launch of the ROH2 plan for the East Coast area. More than 11,000 ideas and views from the community were received and contributed to BTC and Heartbeat@Bedok that we see today.[12]

Leading up to the launch of the ROH2 programme, 13,000 people in the targeted areas, including Hougang, East Coast and Jurong Lake, were polled in a survey. The launch exhibition in January 2011, which featured the plans that the HDB had for each rejuvenated town, attracted about 77,000 visitors. Through these events, the public's feedback was collected, and the residents made aware of the various plans to rejuvenate the BTC as well as to anticipate temporary disruptions in the area.

Given the mixed ownership and development methods for the various plots within the town centre, the success of its rejuvenation can be attributed to the close collaboration between the HDB and the various stakeholders that enabled a better translation of urban design intentions into reality. Even with its internal planning and urban design team, the HDB needed coordination and buy-in from the various projects' stakeholders to implement well-integrated interfacing and details. Throughout the renovation from 2011 to 2018, the HDB held exhibitions to consult with advisors, grassroot leaders and the public to obtain ground-up survey feedback. Timely mini exhibitions were also rolled out to update residents on the progress of the rejuvenation projects. In addition, the HDB adopted additional measures to reduce disruption to the daily life of the town centre, such as redirecting visitors to alternative car parks in the vicinity and alleviating pest issues.[13]

Beyond the Town Centre

Establishing the Outdoor Play Corridor



The East Coast Play Corridor connects Bedok Reservoir to East Coast Park, and passes by the western and southern edge of Bedok Town Centre. *Source: HDB*

The Wind Valley node along the Play Corridor. *Source: Victoria See*

In line with the themes "Outdoor Recreational Choices" and "Improved Connectivity", one of the main selling points of the East Coast ROH is a dedicated walking and cycling path that connects two destination parks—Bedok Reservoir Park north of the town centre, and East Coast Park to the south. Spearheaded by the National Parks Board (NParks) and the Land Transport Authority (LTA), it was completed in 2018 and shows how public agencies coordinated and implemented their projects together with the HDB-led rejuvenation of the town centre. A portion of the Outdoor Play Corridor skirts along the western edge of the town centre and the eastern edge of the industrial park, and consists of four nodal points where planting, seating and play facilities are located as rest stops and markers for users. One of the nodal points, The Wind Valley, is strategically located at the intersection of Bedok North Avenue 1 and New Upper Changi Road, across from the town centre site. It serves as a clear landmark to indicate to pedestrians walking along this extended walking trail where the town centre is located.

Extending Pedestrian and Cycling Networks into Neighbourhoods

A bicycle crossing introduced in the vicinity. *Source: LTA*

Notably, 13 kilometres of dedicated red-painted cycling paths have been introduced in Bedok since 2018, with a significant proportion concentrated around the BTC, Bedok North and Bedok South, covering approximately 70% of the town centre's perimeter. This Outdoor Play Corridor also links to the cycling network in the Bedok area and helps to facilitate cycling connections to Bedok Reservoir Park and East Coast Park. These cycling paths and park connectors are part of the government's island-wide cycling network plan slated for completion by 2030. A new dedicated pedestrian cum bicycle crossing was also introduced to improve safety by segregating pedestrians and cyclists, as well as to facilitate high movements of pedestrian and cycling traffic into BTC and Heartbeat@Bedok.

The cycling map of Bedok Cycling Network that was released in 2017. *Source: LTA*

- New Cycling Path
- Existing Park Connector
- Future Cycling Path (to be completed beyond 2020)
- Play Corridor (NParks)
- MRT Line
- Schools/Colleges/Polytechnic/ University
- Park Space
- Amenities

"As it was, Bedok Town benefitted from a keenly planned pedestrian network that has supported its vibrancy by connecting its town centre, neighbourhood centres and activity streets. The recent rejuvenation efforts use detailed urban design guidelines to ensure better synergy and integration between the old and the new."[14]

— Dr Cheong Koon Hean, CEO of HDB (2010 - 2020)

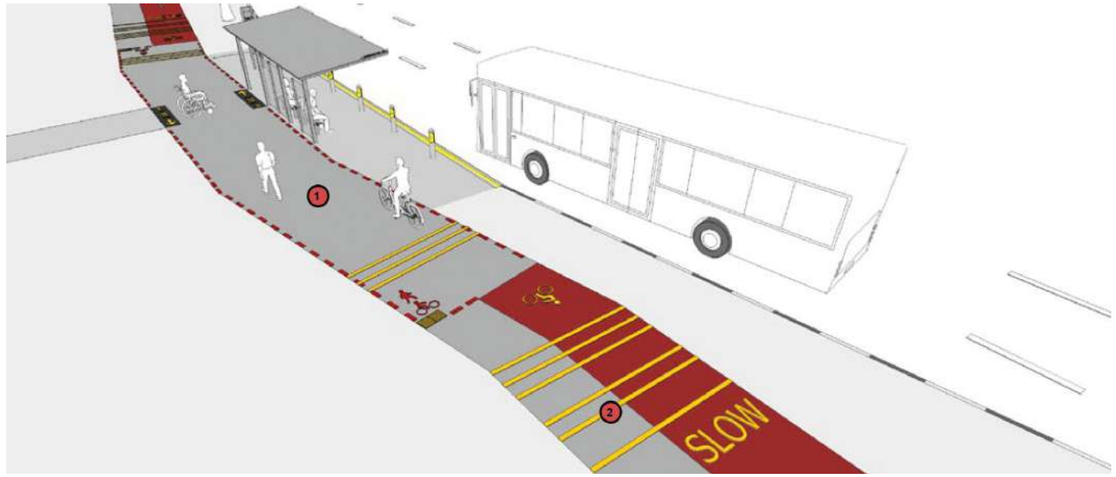
Situated right beside pedestrian footpaths that span the town, these 2-metre-wide, bi-directional, intra-town red cycling paths reduce conflict between pedestrians and bicycles, allowing for simultaneous pedestrian and bicycle flows. Wise decisions from the early days to set aside enough road reserve for pavements have allowed the new initiative to be incorporated into the existing pedestrian network with ease. Where space falls short, shared paths between cyclists and pedestrians are adopted instead to provide wider spaces for both pedestrians and cyclists to commute on the same path. Paired with the existing through-block links and covered walkways in the HDB blocks around the town centre, these urban design strategies contribute to an extensive pedestrian and cycling network leading to the town centre.

Top & Bottom: Examples of a segregated red cycling path and shared cycling path in Bedok. *Source: LTA*

Top & Middle: Silver Zone Gateway and traffic-calming markings. *Source: LTA*
Bottom: A kerb-less crossing complemented by channelisation (i.e. greenery and railings) and traffic-calming measured (i.e. bus-friendly hump). *Source: LTA*

To complement the above pedestrian and cyclist provisions for a safer road environment, the Silver Zone initiative was introduced in Bedok North Street 1. As the zone is situated within one of the mature estates in the country, and with many amenities nearby that attract senior pedestrians, various road-safety measures were implemented to keep road users, especially the seniors, safe. The speed limit of the street was reduced with traffic-calming measures put in place to keep travelling speeds low within the zone. Pedestrian-crossing activity was carefully consolidated into key points where it is easier for motorists and pedestrians to look out for each other. The use of greenery subtly prevents pedestrians from crossing at hazardous points, while simultaneously reinforcing a green landscape.

Agencies have also worked together to come up with the Walking and Cycling Design Guide, which is a set of guidelines showing the best-design practices for walking and cycling infrastructure. The cycling network in Bedok town, while exemplary amongst other HDB towns with existing cycling paths, continues to be enhanced as more aspects of the Walking and Cycling Design Guide, such as the allocation of Pedestrian Priority Zone at bus stops and high traffic areas, are implemented. Indeed, these guidelines are designed to drive long-term improvements in the pedestrian and cycling network of not just Bedok town but also other townships in Singapore.



Pedestrian Priority Zone guidelines released in 2019 by the URA. *Source: URA*

The two anchors as part of the concept for the East Coast Remaking Our Heartland. *Source: HDB*

Rejuvenated Pedestrian Mall as the Key Connector

The two new mid- to high-rise developments at Bedok Town Centre act as anchors at the two ends of the area. The first consists of the Bedok Mall, Bedok Residence and Integrated Transport Hub integrated at the southwest end of the pedestrian mall, while the second consists of Heartbeat@Bedok at the northeast end of the pedestrian mall. They provide a contrast and balance to the scale of the town centre's built form, injecting new uses that reinforce BTC as an commercial and community hub. Less than a 5-minute walk apart, these two anchor nodes help to extend the liveliness along the pedestrian mall that connect them.

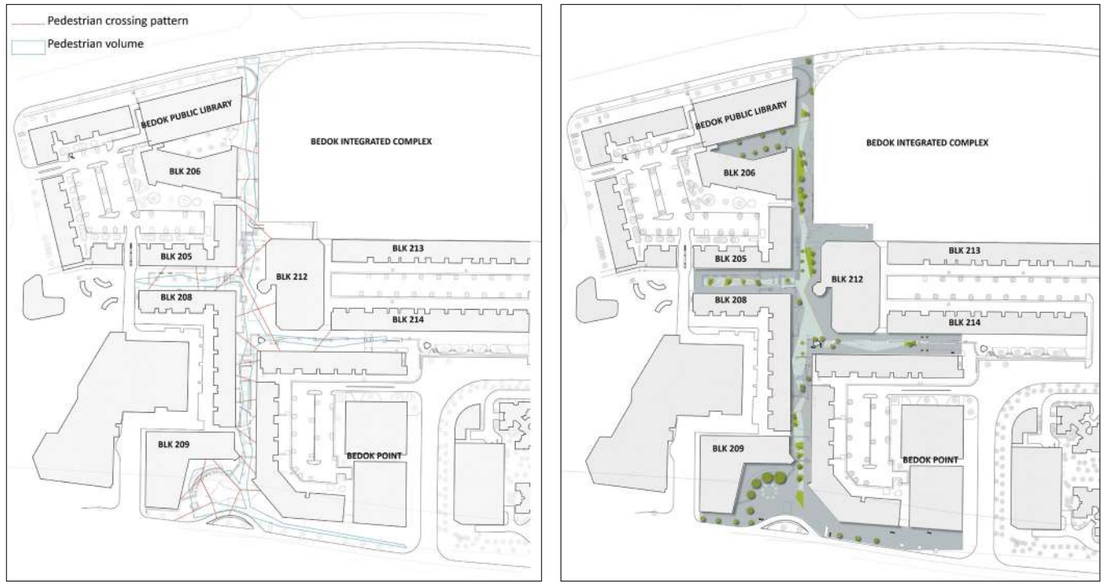
"As a President's Design Award designer, we applied for this grant of money to use on this project. We were very ambitious, especially with this interesting but challenging site, and wanted to use this to contribute back to the society in this in-between, interstitial space that was previously lacking."[15]

– Look Boon Gee, Founding Director, LOOK Architects

Unifying Streetscape Design

To improve on the existing pedestrian-mall design, LOOK Architects first introduced an overall tiling pattern throughout the projects' sites. They also added interest to the ground by introducing diagonal material variations to the consistent pattern, which reflect the natural pedestrian circulation, which were worked out through mapping pedestrian traffic. The architects took on the meticulous endeavour to preserve the quotidian routines of existing users of the pedestrian mall and the town centre. This cost-effective way to create a binding identity was later adopted by the Town Council and extended to the rest of the BTC.

Left & Right: The floorscape was designed based on studying the movement and volume of pedestrians across the pedestrian mall. *Source: LOOK Architects*



Top: The open space prior to renovation. *Source: HDB*
Bottom: The renovation has transformed the open space along the pedestrian mall and encouraged people to linger in the space. *Source: HDB*

Top left and top right: The transformation of the pedestrian mall resulted in more integrated designs for the planter boxes, ramps and steps along the pedestrian mall. *Source: LOOK Architects*
Bottom left & bottom right: A sectional drawing of the pedestrian mall shows the gradual slope across the site and the thoughtful provision of seating and railings at suitable junctures. *Source: LOOK Architects*

An improvement from the past cacophony of colours, the revisions to the mall design helped to lend visual consistency and fluidity of space to the open space in front of Block 212, which approximately marks the intersection of the two perpendicular pedestrian malls. Termed the Central Plaza today, it is surrounded by commercial facilities on the ground floor of the blocks along its perimeter, and enhanced with planters and seats to create a convivial open space where residents can gather.

Making the Pedestrian Mall Inclusive for All

The continuous low-rise building edge of the old town centre buildings and the suitably proportioned width of the existing pedestrian mall proved to be a conducive backdrop for a human-scale outdoor walking environment. To improve on the previous centrally located planters and numerous steps, the HDB worked closely with LOOK Architects to integrate wheelchair-friendly gradients into the mall design, to provide a pleasant and inclusive walk across the otherwise 3-metre level difference from the northern edge and southern edge of the town centre site.

Top & Bottom: Transformation of the steps to integrate them with planters and seats to become more pedestrian-friendly. *Source: HDB, LOOK Architects*

Top: Previously, the steps and ramps circumscribed the planters. Pedestrians had to meander as they walked along the pedestrian mall. *Source: HDB*
Bottom: These steps and ramps were relocated to facilitate more strategic planting that would create direct pedestrian paths and increase the greenery. *Source: LOOK Architects*

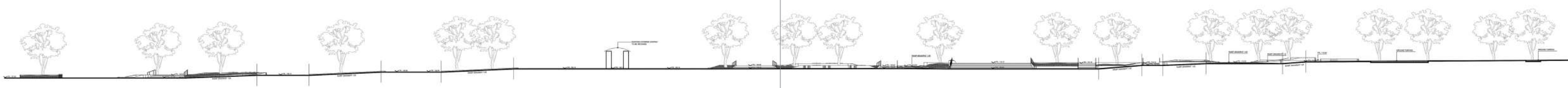
Notably, one of the key design strategies was to use 1:25 gradient ramps throughout the pedestrian mall to eliminate the need for handrails, which had previously contributed to the jarring and obstructive walking experience, as a result of years of accumulated alterations along that stretch. As an integral space connecting the entire site, the upgrading of the pedestrian mall was carried out in phases and facilitated by a Project Working Committee (PWC). Comprising representatives from the Grassroots Organisations and local Merchants' Association, the PWC also scheduled the phases carefully to ensure that festive events could still continue uninterrupted.

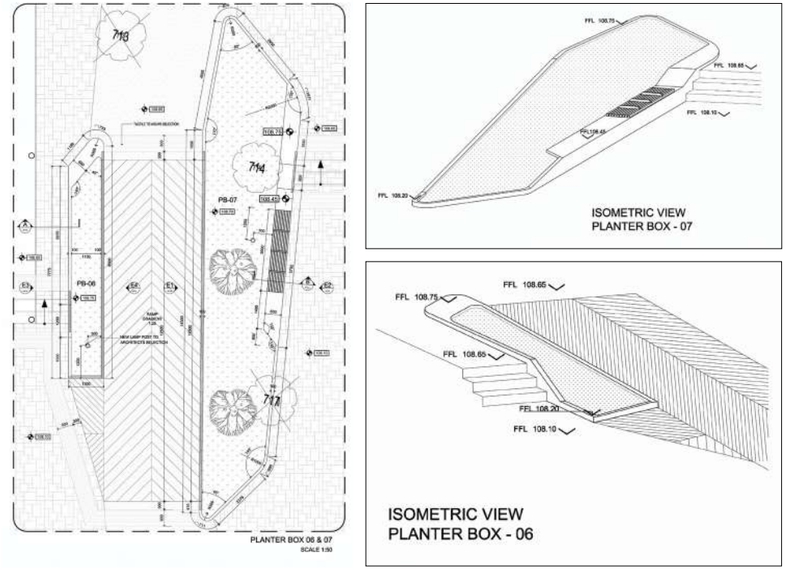
Increasing the Greenscape

Conserving the existing trees on site, strategically-placed landscaping line the edges of the pedestrian mall to facilitate smoother pedestrian flows while negotiating the various degrees of publicness from the pedestrian mall to the 5-foot corridor and finally the commercial shops fronting it.

"They wanted to chop down all the trees if possible, but our intervention was to keep existing trees as much as possible and put in some trees to complement and reinforce the greenery into clusters to provide much-needed shade. There were many meetings with up 100 to 200 shop owners as some said that it might block their shop frontage. Eventually, we calibrated all our planters in such a way that they did not block smaller shop fronts and maintained access to the larger shop fronts even when the planters were introduced."[16]

– Look Boon Gee, Founding Director, LOOK Architects





Plans and isometric drawings of the planter boxes and ramps demonstrate the level of detail considered for its design. *Source: LOOK Architects*

Another of the architects' key design strategy, these multifunctional planters leverage on the hardscape of the planter boxes to abut higher levels while using the mounding of the low shrubs to gently slope to the level below. The multi-hued, leopard-hide-like bark and lightly distributed crown of the selected Brazilian Ironwood trees (Libidibia ferrea) further contribute a calming backdrop, turning what was once deemed a hindrance into a crucial ingredient to this interstitial space.

Given Bedok's elderly population, urban furniture such as seats and shady trees were placed at regular intervals and integrated into the planter design. This creates a more conducive walking environment and encourages seniors to traverse the town centre, with plenty of rest points in between.

At certain locations, where the pedestrian mall is narrow, the seats are orientated towards the shops along the façade of the slab blocks; while at wider portions of the pedestrian mall, such as the central plaza, seats face the open space instead to provide views of the daily buzz and movement across the open space. Level differences are also used to introduce different designs of seats, such as those with back support, which also acts as a retaining wall for the planters behind. The raised landscaping on the high level provides a sense of enclosure to these seating nooks while benefiting the raised development with more greenery. Rounded corners for these seats also makes them conducive for both young and old.

The neutral material palette of the pedestrian mall complements the buildings in the town centre. *Source: LOOK Architects*

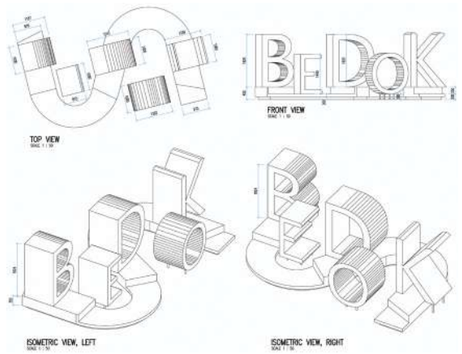
Top, Middle, Bottom: Urban furniture and seating arrangements of similar designs have since been replicated along other sections of the pedestrian mall for coherence. *Source: Victoria See*

Additional material considerations to ensure that the urban furniture are vandal-proof, weather-resistant while visually calming resulted in a combination of dark timbre and light coloured porous pebble surface. The contrast in colours provide sufficient interest without being too jarring to the eyes.

Interestingly, similar urban-design guidelines were implemented for the new developments that were linked to the pedestrian mall, such as at Heartbeat@Bedok, where the level difference of the site was mitigated through a slight levelling of the ground and the inclusion of ramps and seating that are consistent with the visual style set by *LOOK Architects*. These design details reflect the most intricate level of urban design detail that was taken into consideration, demonstrating the care taken to recognise the spectrum of users and social engagements in its space.

This stands as a testament to the pedestrian mall in successfully adopting urban design strategies to improve on past planning and design within the town centre, from the larger town scale to the minute, detailed design. It exemplifies the clever recognition of the latent potential of former design decisions by playing up on its strengths and ameliorating its weakness to create a better streetscape experience for pedestrians.

Top: The north landmark uses one of the nodes, Heartbeat@Bedok, as its backdrop. *Source: Victoria See*
Bottom: An axometric drawing of the north landmark.
Source: LOOK Architects



Reinforcing Existing Landmarks

The HDB added four landmarks with welcoming signage and differentiated tiling to mark out the ends of the north-south axis and east-west paths of the pedestrian mall, each designed by different architects based on the proximity to their projects. The landmarks include the north entrance marker along Bedok North Street 1, the east entrance, which is the open space opposite Djitsun Mall, the south entrance, which is the entrance plaza along New Upper Changi Road, and the west entrance, which is the open space adjacent to the heritage corner. Notably, the north entrance marker was designed by LOOK Architects, the design consultants of the pedestrian mall.[17] As visual cues, these markers highlight the pedestrian mall as the key passage through the town centre.

Top: Bedok Interchange Hawker Centre prior to renovation. *Source: HDB*
Bottom: With the construction of the Bedok Interchange Hawker Centre, the Bedok Town Square has become more welcoming to the public and better suited for community events. *Source: CLC*

Complementing Open Space with Activities

"This project started out with the Bedok Interchange Hawker Centre and multi-storey carpark but eventually, the HDB expanded the extents of the project to include space for the town square and heritage corner. In hindsight, this has helped to create strong synergies between the various components within and beyond this project."[18]

– Chow Mun Kwan Christopher,
Senior Principal Architect, ADDP Architects LLP

While the original brief called for a redesign of the Bedok Interchange Hawker Centre and a multi-storey carpark, it gradually evolved along the way to include the Bedok Town Square and heritage corner when it was completed in 2016; in essence a recognition of the need to activate open space. This was in line with the HDB's new approach in its Roadmap to Better Living, launched in 2011, to design community-centric towns. A key feature of this roadmap was to plan and design town plazas, which would be partially covered, and have power points available. This would facilitate the organisation of community activities to promote more interaction and raise the buzz factor.

The former hawker centre at Block 207 was moved slightly south to its current location at Block 208B along New Upper Changi Road, and given increased capacity. The hawker centre is also carefully shaped to provide a slight sense of enclosure to the spill-over open space leading up to the Bedok Town Square.

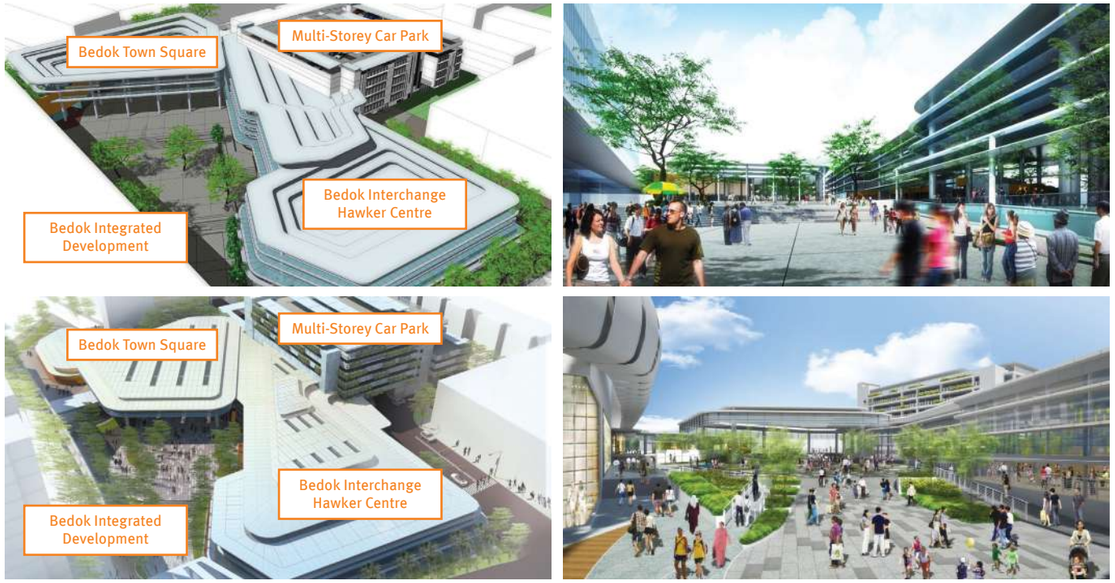
Considering Topography in Designing Walkable Streetscapes and Convivial Open Spaces

Recognising that the 0.4–0.5 hectare Bedok Town Square was to function like a scaled-up precinct pavilion, ADDP took into consideration the ventilation, lighting and likely activities in the space for their design. The result is a new-generation town square that features a sheltered plaza with double volume space, clerestories to provide light, industrial fans to create wind flow, seats and power outlets, which has since also been implemented in Punggol and Yishun under HDB's "Town Centre with a Town Plaza" concept.

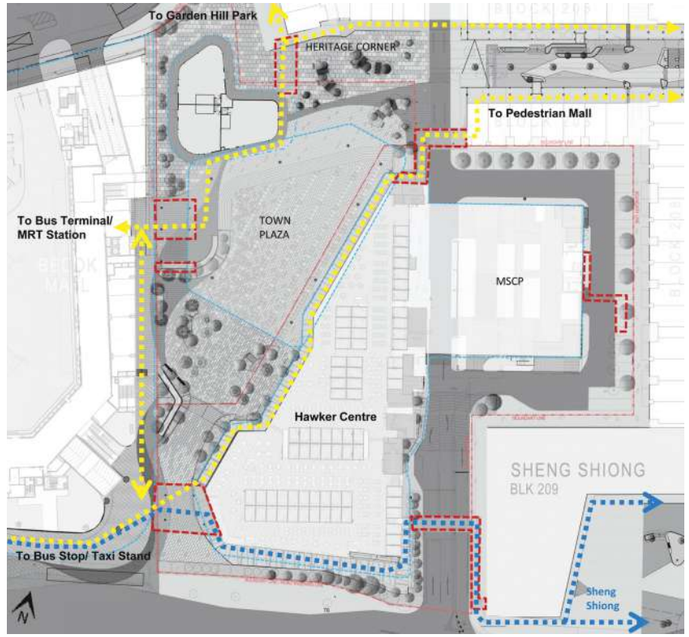
With about 3.6- to 4-metre difference in the ground level from New Upper Changi Road to the pedestrian mall, ADDP inverted the design of the roof to step upwards towards the centre of each node rather than to the rim. This lends the Bedok Town Square and Bedok Interchange Hawker Centre a less imposing stature, and proportions the streetscape more relatable. Added to this were detailed design considerations such as elongated tiles running parallel to the main pedestrian circulation to lengthen perspectives and strategically-spaced stair landings to further widen the perception of space.

The porous design of Bedok Town Square and Bedok Interchange Hawker Centre maintain clear sightlines to the commercial activity along the edge of Bedok Mall that it faces, as well as from New Upper Changi Road, thus encouraging synergies and an uninterrupted integration of activities.

Process (top) and final designs (bottom) of the project demonstrating the considerations taken to ensure that the building form suited the proportions of the streetscape and open space. *Source: ADDP*



Top: The covered linkway connecting the Bedok bus terminal with the Bedok Town Square. *Source: Victoria See*
Right: A connectivity and linkage plan ensure that sheltered pathways are provided from the bus terminal which sits within the Bedok Integrated Development to the rest of the town centre. *Source: ADDP*



Addressing Gaps in Pedestrian Network

The ramp located between Bedok Interchange Hawker Centre and the open plaza ensures universal accessibility to both places. *Source: ADDP*

The decision to place Bedok Town Square at its present location was supported by pedestrian flow studies of BTC in the 2000s. By mapping the activity levels at various times of the day, the HDB identified the main entrance of the old bus interchange as an area of high-traffic volume that had developed over time.[19] Key sheltered connections that were required of this project were the southwestern link to Block 209, the southern link to the bus stop, and the western link to the bus terminal in the Bedok Integrated Development. To further integrate with the existing HDB blocks along the pedestrian mall, ADDP also proposed additional links to provide shelter from the Bedok Town Square to the covered corridors of Block 205 and Block 208.

At a smaller scale, ADDP tucked a ramp neatly between the open space and the Bedok Interchange Hawker Centre to simultaneously address barrier-free access and shelter from the elements for both pedestrians and hawker centre goers. With the popularity of the Bedok Interchange Hawker Centre, this has pre-empted otherwise amplified crowd levels and overloaded pedestrian circulation, especially in the event of wet weather.

Top, Middle, Bottom: Carefully placed planter boxes help to curate sightlines to the shop frontages of the Bedok Integrated Development. "Floating" standalone benches reduces bulk in the open space and a sense of openness. *Source: Victoria See (Top, Bottom), ADDP (Middle)*

Top: Heritage boards at the Bedok Town Centre heritage corner make reference to the history of the area. *Source: ADDP*
Bottom: Kolek races used to be held in the Bedok area in the past. *Source: NAS/MCI (Courtesy of National Archives of Singapore, Collection of Ministry of Information and the Arts)*

Integrating Street Furniture and Landscaping

"We had coordinated with our neighbouring developer, m/s Bedok Mall, facilitated by the HDB, to integrate the designs together. They shared with us their finishes, landscaping and precise location of the Bedok Bus Terminal entrance. Their feedback was also essential in the placement of the planter boxes to ensure clear sightlines to the facing shops even amidst the lush landscaping that we had hoped to achieve. Such integration between neighbouring developments would have otherwise been difficult for private developments."[20]

– Chow Mun Kwan Christopher, Senior Principal Architect, ADDP Architects LLP

To integrate the project with the adjacent Bedok Integrated Development, ADDP worked with DCA Architects to ascertain suitable placement of planter boxes to curate sightlines toward the shop frontages from the open space while mitigating level differences between plots and to strategically obscure blank and service sections of the eastern façade of the Bedok Integrated Development. With the objective of further minimising clutter, ADDP also designed multi-purpose planter boxes with seating, as well as a combination of on-grade tree species with light crowns such as Spiny Black Olive (Bucida molineti) and low-lying plants like Bird's Nest Fern (Asplenium nidus) and Osmoxylon Geelvinkianum. Strategically positioned, stand-alone benches also complement the overall street furniture to ensure that there is sufficient provision of shaded street furniture for lingering and enjoying the space.

To tie the rejuvenated town centre in with the rest of the East Coast ROH, a heritage corner located adjacent to the Bedok Town Square features several heritage boards with information on the history of the Bedok-East Coast area. Drawing links to Bedok's past as a coastal area,[21] these heritage boards are modelled after the Malay *perahu* boat structure and mark the start of the Bedok Heritage Trail, which was jointly storyboarded by the National Heritage Board (NHB) and the HDB. In addition, as an open space north of Bedok Town Square, the heritage corner also absorbs the spill-over of activity in the town square during popular events.

Left & Right: Bedok Residences stacked atop the Integrated Transport Hub and Bedok Mall. *Source: DCA Architects*

Bedok Integrated Development

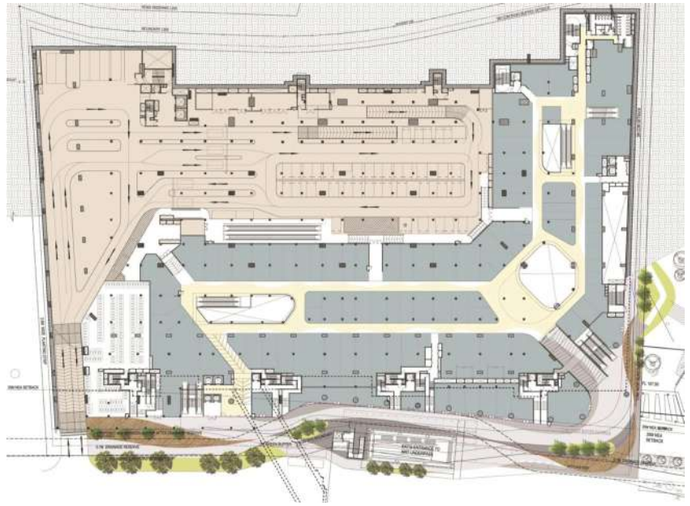
Completed in 2013, the Bedok Mall and Bedok Residence is partially situated on the southwestern Mixed Commercial and Residential zoning of the town centre site and the bus interchange, where it acts as an anchor to some of the town centre's dominant activities. Along with the Bedok Integrated Transport Hub, which was officially opened in late 2014, this fully integrated commercial-residential-infrastructure development, as designed by DCA Architects Pte Ltd, stacks three floors of retail with an air-conditioned transport hub and eight blocks of 15-storey residences.

Weaving Pedestrian Paths and Identity into the Town Centre

"One of the most important outcomes that we got out from here was that we worked quite closely with our stakeholders who gave great support. Even though the HDB had planning and urban design intentions upfront, we still needed to coordinate with the consultants of each project closely, in terms of details and interfacing. This aspect made the rejuvenation quite challenging, but even more rewarding."[22]

– Wong Li Eng, Director (Urban Design Department 1), HDB

Top: The main corridor along the front façade of Bedok Mall has been designed to accommodate a higher pedestrian footfall and to be visible for mall-goers. *Source: CapitaLand*
Right: The ground-storey plan of Bedok Integrated Development. *Source: DCA Architects*



Taking advantage of its proximity to the Bedok MRT station entrance along New Upper Changi Road, the HDB expressed their desire for the design of the integrated development to maintain a physical and visual corridor through Bedok Mall from the bus interchange to Bedok Town Square, which had been planned to its east. Working collaboratively with consultants, the HDB negotiated the location of commercial activities on the ground floor fronting the Town Square, guiding the Bedok Mall developer and architect to locate activity-generating uses to front the Town Square. This was to ensure the creation of visual interest and to enhance the vibrancy of the Town Plaza, while shielding the Bedok Town Square from the car-park ramps and bus interchange.

Today, this has proven to be beneficial for both, encouraging synergies with the open space while increasing footfall for the shops along that façade. With such a challenging site to work with, a programmatic brief to integrate, and various codes to comply with, it is no wonder that the developer and architects decided to concentrate the commercial uses along the public-facing façades by reserving the back two façades for services and residents' privacy.

To emphasise its activity and enhance its visual appeal, this corridor has been celebrated by CapitaLand, an advocate for public art, through the commissioning of Kim Gyung Min, a Korean pop artist, to make *Shopping with the Family*, a crowd-pleasing sculpture of an enlarged family of five walking at its intersection with the MRT station entrance. Visible from the main road, this has become an identity marker for people arriving by bus and contributes to a sense of place.

Top: Street-level entrance to Bedok bus interchange. *Source: DCA Architects*
Middle: Design idea for the ramp and stairs to meet the needs of Bedok Integrated Development and Bedok Town Square. *Source: DCA Architects*
Bottom: Actual implementation of the design. *Source: Victoria See*

Overlaying Pedestrian Networks onto High-Traffic Areas

This is topped off with the careful placement of pedestrian crossings across the 4-lane Bedok North Drive, notably from DjitSun Mall to the west entrance of the refurbished pedestrian mall. Shaped to complement the curvature of Bedok North Drive, a series of elongated planter boxes are spaced out along the edge of the road to shield people in the pedestrian mall from the vehicular traffic while allowing incoming pedestrians to filter into the pedestrianised town centre. It also helps to contribute to a sense of enclosure at the west-entrance plaza and creates a continuity of softscape from the older Block 204 to the newer Bedok Mall along Bedok North Drive.

Perhaps due to the design of the existing MRT station infrastructure, the integration of the new bus interchange to the MRT station itself is rather circuitous, especially for passengers switching between the MRT and the bus at this Integrated Transport Hub. As it was, passengers previously already had to descend from the aboveground train platform into an underground tunnel to cross the major arterial New Upper Chang Road before emerging at street level via the MRT station exit. Those who wished to switch to an alternative mode of public transport would therefore have to counter-intuitively ascend upwards again to reach the bus interchange concourse. The existing level difference across the site to match the level of Bedok North Drive resulted in the bus interchange concourse being elevated approximately 3 metres higher than the ground level of the pedestrian path along New Upper Changi Road. As such, the developers, CapitaLand, purchased the subterranean lot to facilitate an underground connection from the basement level of the mall to the MRT underpass. This enabled public transit users to transfer between the MRT and the buses more smoothly and within the stipulated transfer time.

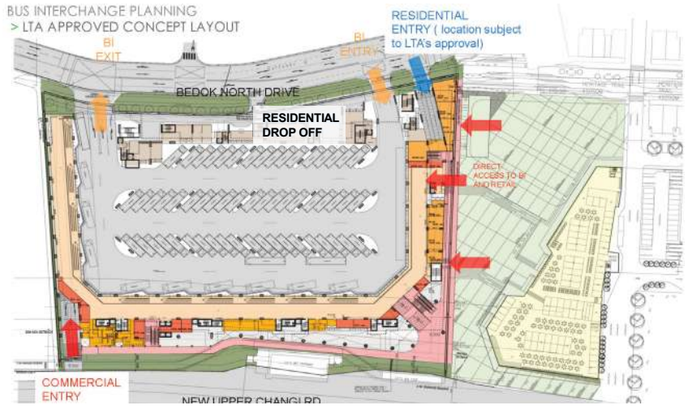
"This is another interesting story because the bus interchange footprint was so extensive that we were only left with a tiny sliver of land next to the HDB town plaza. After accommodating the HDB's suggestion to have activity-generating uses and a sheltered walkway, we did not have enough width for the barrier-free ramp to mitigate the level difference between New Upper Changi Road and Bedok North Drive. We had to engage our friendly HDB neighbour, who allowed us to build the accessible ramps on their town plaza side."[23]

– Khoo Poh Bin, Deputy Managing Director, DCA Architects

To further support the accessibility of the transport hub, DCA Architects negotiated with the HDB to incorporate a barrier-free ramp that would wind beyond the plot boundaries into the next plot of land designated for the Town Square. Rather than being bounded by stringent regulations, DCA Architects worked closely with HDB and agencies to address building and development requirements, such as compulsory green buffers between developments. As a result, waivers were granted to blur the boundaries between the Bedok Integrated Development and the town square, as it was clear that it would not only bring the various projects together but, more importantly, benefit the public.

Managing Vehicular Access

To facilitate the construction, the old bus interchange was temporarily relocated to the western part of the town centre site to free up space for the development. Bedok North Drive, which was not a through-road previously, was also widened and traffic-calmed with the help of the LTA to facilitate the expected multi-modal traffic along Bedok North Street 1.



First-storey plan of the Bedok Integrated Development showing the planning of the bus interchange. *Source: DCA Architects*

Counter to the tender conditions regarding vehicular access, which had requested for bus ingress from New Upper Changi Road with bus egress onto Bedok North Drive, DCA Architects proposed that the public entrance for mall-goers be located along New Upper Changi Road instead, to circumvent the anticipated increase in resident, pedestrian and vehicular traffic. Supported by the traffic study commissioned by the architects, this strategy paired the bus interchange vehicular entry with that of the resident carpark entry to take advantage of the bus drivers' routine familiarity with the town-centre roads to minimise disruption to the residents of the new residential block and the surrounding areas.

"In the conditions of tender, bus ingress and egress were from opposite sides and the commercial vehicular entry indicated at the current bus ingress. But when we did the traffic study, we found that it was very congested and the level of service could not meet with the criteria. Furthermore, the 3-metre level difference (between New Upper Changi Road and Bedok North Drive) would have required a very long ramp for buses. As such, we proposed to the LTA to swap the commercial ingress/egress to New Upper Changi Road and the bus ingress via Bedok North Drive."[24]

– Khoo Poh Bin, Deputy Managing Director, DCA Architects

Top: To replace the trees removed during this construction, the architects designed planters within the development and atop the bus stop. *Source: Victoria See*
Right: The connection between the MRT exit and bus stop has become more seamless after the renovation. *Source: DCA Architects*

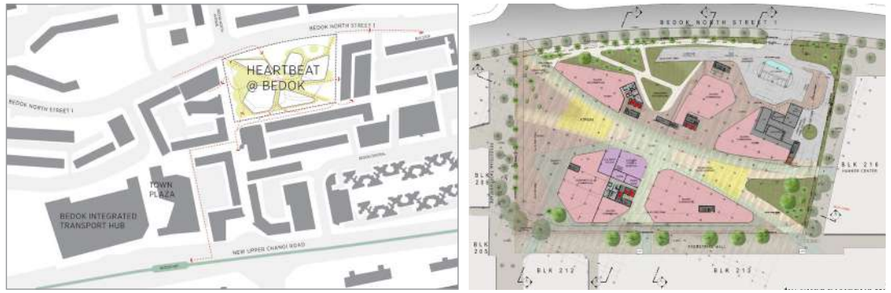
In light of these complex intersections of multi-modal transport, trade-offs such as having two façades predominantly for vehicular access to accommodate heavy vehicular circulation and ramp requirements are understandable. To compensate for the loss of mature trees along New Upper Changi Road, DCA Architects went the extra mile by introducing landscaping above the newly designed shelter over the integrated MRT entrance and bus stop.[25]

Heartbeat@Bedok has become a key node in Bedok Town Centre. *Source: ONG&ONG*

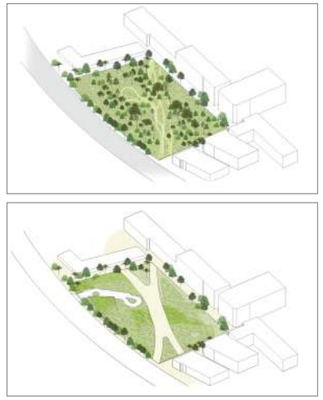
Heartbeat@Bedok Co-Located Community Hub

Sited at the former adventure park, Heartbeat@Bedok is the second principle activity node within the town centre. As a 7-storey, co-located community hub comprising a sports complex, a polyclinic, a library and eldercare amenities, it freed up many other plots within and beyond the town centre for future development.

Plugging into Pedestrian Networks



Site plan and first-storey plans of Heartbeat@Bedok. *Source: ONG&ONG*



Top: Informal pedestrian circulation on the site prior to construction. *Source: ONG&ONG*
Bottom: The main pedestrian paths into Heartbeat@Bedok formalises these former informal circulation. *Source: ONG&ONG*

As Heartbeat@Bedok was to be a co-located community hub, the HDB expressed their urban design intentions through a conceptual plan and building section that would feature a clear pedestrian space on the ground floor with facilities housed on the eastern side of the plot. This was in line with the mantra "Residents first; Good public space" during their planning phase, to free up the ground floor space for residents to gather and build community bonds.[26] The catchphrase and the sectional urban design intent were subsequently re-interpreted and angled diagonally to create intersecting linkages through the site, building on the past and current pedestrian circulations while creating porosity at street level and a seamless pedestrian experience. Taking a leaf from the activity-lined pedestrian mall, these internal linkages are lined with activity-generating uses such as food outlets, a pharmacy and Sport Singapore (SportSG) amenities. At the same time, it distinguishes itself by contrasting the formal and orthogonal pedestrian mall with its more angular and informal shortcuts for pedestrians walking to and from the pedestrian crossings along Bedok North Street 1.

Ultimately, the architects achieved 58-62% pedestrian porosity, exceeding the goal of 50%, which justified doing away with focusing the pedestrian connectivity through the atrium. The architects also addressed security concerns by locating the security post along the main linkage, between the atriums, and making sure that the curvature of the walls allowed for a clear 180° view of the open space. Coupling this with the open-ground floor plane and intersecting pedestrian connections through the building, the visual porosity of the site has been preserved.

"In the traditional stacking approach, you have the biggest programme or massing at the podium, and then you have smaller towers at the top. But to look at that in terms of creating porosity and creating shaded areas for activities, usage and ventilation, we inverted that. And therefore, that is how we started achieving this massing approach."[27]

– Ahsvinkumar Kantilal, Group Chief Executive Officer, ONG&ONG

Viewing Heartbeat@Bedok as an inextricable part of the pedestrian network in BTC, the architects even took on the grey colour and materiality of the paving from the redesigned pedestrian mall which had been completed before it. This has created a seamless transition into Heartbeat@Bedok, complemented by 1:26 railing-free ramps to negotiate level differences along the interfacing edges between this development and the pedestrian mall.

Incorporating Sheltered Open Space

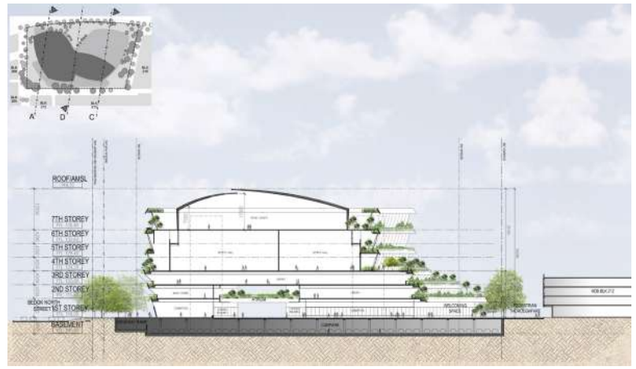
Top: The atrium of Heartbeat@Bedok being used for a Silat showcase.
Source: Heartbeat@Bedok Management Office, People's Association
Right: An artist's impression of how the Heartbeat@Bedok atrium could be used.
Source: ONG&ONG

The main diagonal thoroughfare from the southeast corner to the northwest corner of the site widens at the ends to create two community spaces at both ends of the compound. This has helped pedestrian activity from the pedestrian mall and the Bedok North Hawker Centre flow more naturally into Heartbeat@Bedok. While dim at times due to its elongated proportions, the 3-storey-high atrium spaces fronting the pedestrian mall are ideal for community activities that benefit from additional standing capacity on the upper levels. Its size and proportions are justified by community activities such as line dancing that had been test-fitted into the space during the design phase of the project.[28] Since its opening, the various types of activity in the space has gone beyond what had been imagined including hosting events such as badminton tournaments.

Top: The building form of Heartbeat@Bedok has been designed to be comparable to the heights of the surrounding blocks.
Source: Victoria See
Right: The urban design guidelines for this plot informed the sloping overall building envelope of Heartbeat@Bedok.
Source: ONG&ONG

Human-Scale Green Building Form

Noting that it would be the only new development directly facing the extant town centre buildings, the HDB underwent a series of sectional studies and massing models to test out the scale of the development prior to writing the urban design guidelines for this plot. The result was a tiered built form with the upper floorplates kept to the middle of the plot, cascading gradually downwards to the outer fringes, where 4-storey restrictions had been imposed. This helped to ensure that the overall built form of Heartbeat@Bedok sat nicely into the existing low-rise town centre context without compromising on its development capacity. The green façade facing these blocks also responded to the HDB's concerns about the need to design attractive façades that face the residential blocks.



"The only step that you see is at the back, facing the existing commercial strip, because of the difference of level. Apart from that, we even changed the colour palette of the level one floor finishes at the last minute so that the grey and the black that Boon Gee (of LOOK Architects who were undertaking the Bedok Mall project) was using was subsequently used and it flowed into the first storey of the Heartbeat, so that the whole thing looks as one, rather than having a very clear line that divides two architects' work."[29]

– Ashvinkumar Kantilal, Group CEO, ONG&ONG

Coupling this with the HDB's planning guideline for 50% pedestrian porosity on the ground level and SportSG's request for a total of four swimming pools, ONG&ONG ideated an overall "inverted podium-and-block" massing strategy to cater to the swimming pools' large footprint, while facilitating pedestrian connectivity. The landscape architects from the firm's landscape division also built on this regulation to introduce low-maintenance landscaping along the tiered façades of the complex, softening the edges, breaking down the scale of the development further and replacing the greenery from the site's past life as an adventure park.

Well-Planned Vehicular Access

With regard to vehicular access, the HDB also proposed that the vehicular access points be kept close to the main road—Bedok North Street 1—in the early stages of the project to ensure that the western and southern façades of the complex would remain pedestrian friendly and barrier-free. During the design process, when the consultants' designs pulled the internal-service driveway too far into the development, the HDB stepped in to negotiate to maintain seamless connections to the pedestrian mall on the two highlighted façades.[30] Eventually, a consensus was reached to allow for a polyclinic emergency pick-up point midway into the east edge of the development while concentrating most vehicular access to the northeast corner of the plot. Thanks to the foresight of the architects, this kept emergency circulation separate from the regular vehicular traffic, and also made the polyclinic suitable for use as an isolation facility, as offered by the then-Minister of Parliament (MP) Lee Yi Shyan to the Ministry of Health (MOH) at the start of the COVID-19 pandemic.

Right: The first-storey vehicular access plan and concept design for Heartbeat@Bedok to accommodate vehicular separation. *Source: ONG&ONG*

The 45°-sloping window detail reduces the glare from Heartbeat@Bedok's internal lighting onto the surrounding blocks at night. *Source: ONG&ONG*

Sensitive Night Lighting

While lighting considerations were not required of the architects' design, ONG&ONG went the extra mile to introduce 45°-sloping windows along their façade, both as a passive-design detail for shading and to reduce glare from the lighted spaces in the evening, taking into consideration the late closing hours of the library. Simulation studies were also carried out to ensure that its immediate neighbours in the residential block located approximately 12 to 16 metres away would not experience excessive amounts of glare and light pollution.[31]

A seniors' event at Bedok Town Square during HDB Community Week in 2019. *Source: HDB*

Placemaking

Even with intentionally-designed public spaces such as these, it is important to ensure its use and activation through "software". As the first of this new generation of town squares, the HDB pioneered a local Town Plaza Activation Team comprising of HDB, People's Association (PA) officers, grassroot leaders, schools and the National Arts Council. The team was tasked specifically to seek out activities and events, including community-led events, that could be held in the town square. As such, the Bedok Town Square has since been enlivened with activities including community job fairs, appreciation events and even mass yoga sessions.[32] In fact, going beyond integration through urban design, a unified multi-agency place management strategy for the various open spaces can help to amplify the vitality of the disparate activities planned across the BTC. This can include a rotation of informal buskers or a series of multi-location health and wellness events.

THE JOURNEY OF REJUVENATION CONTINUES

In retrospect, the row of shops at the foot of the residential blocks along Bedok North Avenue 2 and at Block 136 acts as activity spines that build up the buzz and anticipation towards the lively town centre. Apart from a few gaps in activity-generating uses along these pedestrian pathways, possibly due to the orientation of the slab blocks, such urban typologies emulate the high-street effect which make the town-centre pedestrian mall even more suited as both a passage and a destination. Recent traffic-calming efforts along Bedok North Street 1 and Bedok North Drive, like the intentional insertion of pedestrian crossings paired with the strategic placement of open spaces, also demonstrate the potential for urban design to create walkable streetscapes in environments with high vehicular traffic.

Recent Improvements

As BTC continues to evolve and adapt to the needs of its residents, the community has been experimenting with new initiatives. For example, there were concerns about cyclists riding through the busy town centre that is frequented by the elderly. This was especially at places where many pedestrians congregate. To give priority to pedestrians, a Pedestrian-only Zone (POZ) trial was implemented in the BTC in 2020. The LTA had worked collaboratively with the Town Council and the community to demarcate the most sensitive areas for the trial. More bicycle racks were provided just outside the POZ to encourage riders to park their bicycles instead of cycling in the Zone. These commendable synergies that have evolved overtime serve as reminders that the potential of urban design can truly be maximised if planned in advance, alongside meticulous urban planning.

Pedestrian-only Zone (POZ) with bicycle parking outside the zone and POZ markings. *Source: LTA*

- Pedestrian Only Zone
- Bicycle Parking Areas

POZ markings along the pedestrian mall. *Source: LTA*

Hopes for the Future

Given that the urban planning discipline is inherently contingent on the evolving needs of the community and the market, the strength of urban design stands out in its ability to improve the built environment. Just as the light industrial park to the south of the town centre had previously been the workplace of many of the squatters resettled in Bedok new town in the early years, it would be ideal if the current and future working community there could similarly feel a sense of belonging to the town centre and the town.[33] No doubt its transfer of ownership from the HDB, the 6-lane major arterial road and overhead MRT line might pose as challenges to this connection, but the rejuvenated town centre stands as a testimony to the benefits of inter-agency, public-private collaborations and thoughtful urban design.

While the existing sports complex remains in use, there are plans to redevelop the western side of the plot as a stadium at a later time, in line with its sports and recreation zoning. Separated from the town centre by Bedok North Avenue 3, it will be interesting to see how the HDB may take advantage of the extensive pedestrian network branching out of BTC to facilitate synergies between the town centre and the new sports complex.

With its past successes, it will be crucial for the HDB to exercise its keen coordination to stitch together that interface through new urban-design strategies. Urban design guidelines have been issued for the upcoming Build-To-Order (BTO) HDB flats west of the Bedok Integrated Development to be connected to the Bedok Integrated Development. Together with the residential development planned to eventually be built on the site existing sport complex, Bedok Town itself will soon experience an increase in a younger resident population. It is hoped that future planning and urban design efforts for those developments, along with continued improvements within the town centre, will bring together the community of existing and new incoming residents together, and win the hearts and minds of the people.

At a macro scale, it will be interesting to see agencies build further on the reputation of BTC as a walkable and lively activity node, and a transport hub in the east, to plan future developments that cover different time scales. This can entail rethinking the potential of older spaces such as the heavy vehicle park, while considering new uses that can engage the community more to ensure sustained vibrancy in the town centre in the long run.

1 *HDB Annual Report 1974/75,* (Singapore: Housing & Development Board, 1975).

2 *HDB Annual Report 1970,* (Singapore: Housing & Development Board, 1970).

3 *HDB Annual Report 1975/76,* (Singapore: Housing & Development Board, 1976).

4 Cheong Koon Hean, "The Evolution of HDB Towns", in 50 Years of Urban Planning in Singapore, ed. Heng Chye Kiang (Singapore: NUS Press, 2016).

5 *HDB Annual Report 1972,* (Singapore: Housing & Development Board, 1972).

6 *HDB Annual Report 1974/75.*

7 Liu Thai Ker, Lau Woh Cheong and Loh Choon Tong, "New Towns in Singapore", in A Place to Live: More Effective Low-Cost Housing in Asia, ed. Yeung Yue Man (Ottawa: International Development Research Centre, 1983).

8 *HDB Annual Report 1975/76.*

9 *HDB Annual Report 1976/77,* (Singapore: Housing & Development Board, 1977).

10 Wong Li Eng, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 14 August 2020, transcript, accession number CLC/058/2020/002.

11 Ministry of National Development, "Speech by Mr Mah Bow Tan, Minister for National Development, at Committee of Supply Debate", National Archives of Singapore, 6 February 2009, transcript, https://www.nas.gov.sg/archivesonline/speeches/record-details/7ffb8ec4-115d-11e3-83d5-0050568939ad

12 People's Association, "Heartbeat@Bedok serves residents' needs better with integrated programmes and services under one roof", National Archives of Singapore, 2 February 2018, transcript, https://www.nas.gov.sg/archivesonline/speeches/record-details/72f67e3d-0bfe-11e8-a2a9-001a4a5ba61b

13 Wong, CLC Interview.

14 Cheong Koon Hean, "Singapore: Housing a Nation", Urban Solutions Issue 1, July 2012.

15 Look Boon Gee, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 28 September 2020, transcript, accession number CLC/058/2020/006.

16 Look, CLC Interview.

17 Look, CLC Interview.

18 Chow Mun Kwan Christopher, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 4 February 2021, transcript, accession number CLC/058/2021/016.

19 Chow, CLC Interview.

20 Chow, CLC Interview.

21 Wong, CLC Interview.

22 Wong, CLC Interview.

23 Khoo Poh Bin, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 5 October 2020, transcript, accession number CLC/058/2020/007.

24 Khoo, CLC Interview.

25 Khoo, CLC Interview.

26 Ashvinkumar Kantilal and Robert Brodeth, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 23 August 2020, transcript, accession number CLC/058/2020/005.

27 Kantilal and Brodeth, CLC Interview.

28 Kantilal and Brodeth, CLC Interview.

29 Kantilal and Brodeth, CLC Interview.

30 Wong, CLC Interview.

31 Kantilal and Brodeth, CLC Interview.

32 Joanna Tan, "Crafting and Activating New Civic Spaces", Urban Solution Issue 11, May 2017, 104-9, https://www.clc.gov.sg/docs/default-source/urban-solutions/urb-sol-iss-11-pdfs/case_study-sg-remaking-bedok.pdf

33 *HDB Annual Report 1972.*

Artist's impression of Bedok Town Square.
Source: ADDP

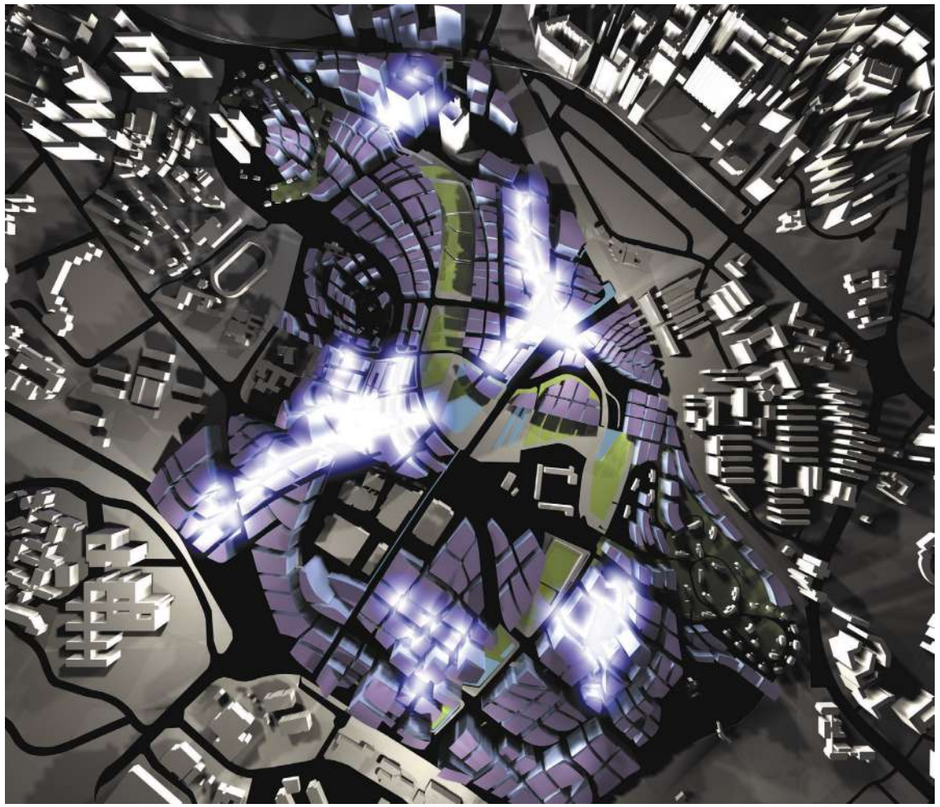
"JTC's one-north urban design guidelines were very different from the other urban design guidelines in Singapore. Some differences include fenceless streetscapes, reduced setbacks and cobblestone roads. Together, the guidelines were intended to drive several outcomes envisioned for one-north—dynamic mixed use, seamless connectivity, constant rejuvenation and a unique identity for the area. All of these come together into one important goal, which is to create an inclusive and vibrant community."[1]

— Chong Lit Cheong, former CEO, JTC

2 ONE-NORTH: EXPERIMENTING WITH NEW IDEAS

As a relatively young area, the urban design of one-north embodies a spirit of experimentation that strives to break new grounds in defining a unique pedestrian experience. This chapter tracks the evolving urban character of one-north's streets across the last two decades, using selected buildings as case studies to demonstrate how they were shaped by carefully crafted guidelines while responding to individual development needs and requirements, within a unique undulating topography and distinct context.

Instrumental Plot - Rochester Park, Ayer Rajah and Tanglin Halt, 1970. *Source: Singapore Land Authority, National Archives*



Location and site plan of one-north. *Source: JTC*

IDEATING AND SHAPING AN INNOVATION DISTRICT

Situating one-north

Unlike the typically centralised downtown locations of tertiary workplaces, one-north is located west of Singapore's Central Business District (CBD), in an area surrounded by public housing estates, educational institutions and business parks. Curiously, the agency which initially pushed for this idea was the Economic Development Board (EDB), not a built environment agency, as is usually the case. The impetus for creating this innovation district was due largely to Singapore's desire to nurture the tertiary research industry and nudge it from phase-based research towards applied research, with the eventual goal of commercialisation and market delivery.

In the early 2000s, development parcels such as the then newly reclaimed Marina Bay area of the CBD were larger than previously available sites. Concurrently, underground spaces were increasingly becoming a key part of urban design solutions to encourage the building of pedestrian networks at alternative levels, in response to the need for shelter from the hot and wet tropical climate. As emerging car-lite initiatives brought walkability back into focus, publicly accessible interior gardens and courtyards within large development plots began to sprout. The conceptualisation of one-north as a pedestrian-centric district came from the intersection of these ideas.

Strategic Decisions: A Lineage of Business Parks and Science Parks

"When it comes to the urban design for one-north, we need to set some context from the tertiary industrial parks before it. Science Park 1, International Business Park and Changi Business Park took reference from Silicon Valley to create a nice, pleasant business campus. But when one-north came about, we asked ourselves, 'Are we talking about more buildings or are we talking about innovation, community?'"[2]

– Arthur Aw, former Director (Land Planning Group) of JTC

In the 1980s and 1990s, science parks and business parks were the predominant tertiary industrial estate typology in Singapore, supporting high-tech industries and research and development (R&D) companies. Notably, the Singapore Science Park, located across the Ayer Rajah Expressway (AYE) south of one-north, was constructed in the 1980s and in operation by 1990. The urban design of the Singapore Science Park's well-connected pedestrian pathway systems and coordinated landscaping set the tone for the prototypical R&D workplace environment. This type of design distinguished itself from its predecessors—the local manufacturing industrial estates—as a lushly landscaped working environment. The Park attracted knowledge-based multinational corporations (MNCs), small and medium enterprises (SMEs), as well as local research institutions.

Similarly, in the 1990s, the 37-hectare International Business Park (IBP) and 71-hectare Changi Business Park (CBP) adopted a similar urban design strategy, albeit with tighter controls on the design of building edges and streetscapes. IBP and CBP were required to allocate 40% and 20% respectively of the development for greenery or landscaping. However, greenery in the development was limited to landscaping around each building, along roadside footpaths and in small park spaces. Only five surface carpark lots were permitted on the street level, with the rest of the parking lots housed in the basement. The strict development control guidelines at that time also did not permit white or commercial land to be housed within the business-park zoning. So, while the business parks had a rather pedestrian-friendly environment, there had been little pedestrian activity within the developments. Eventually in 2000, when the Urban Redevelopment Authority's (URA) development control guidelines allowed for a maximum of 15% white/commercial land quantum, new parcels of business-park land were able to utilise up to 15% of the white land for retail and food and beverage (F&B) purposes.

In hindsight, while the science parks and business parks marked a significant transition from the traditional industrial estate typology to the buildings in a green landscape in terms of the overall urban design strategy, their ground floor areas remained largely dedicated to surface car parking, with little allowance for pedestrian activity at street level.[3]

one-north thus signified a paradigm shift in thinking in that it explored the possibility of leveraging urban planning and design to create an attractive pedestrian-centric urban environment for the tenants of knowledge based industries. This urban design vision essentially pivoted the focus from buildings to community, and from infrastructure to its users. Spaces between buildings were designed to allow pedestrians to weave through the district seamlessly. Questions such as "What kind of spaces would the people of one-north prefer to inhabit and use?" became the impetus for its urban design. To introduce vibrancy to the estate and activate the ground, the masterplan had to be moved away from a single overarching type of zoning typical of industrial estates, in favour of a pixelated mixed-use zoning. For this reason, the architecture and urban design strategies became key tools in shaping this pioneering local tertiary industrial urban typology.

A Master Plan that Adapts to Changing Times

At present, one-north is about 20 years into its development and is barely at the halfway mark of its intended timeline for completion. Its gradual transition from masterplan to reality has also brought about a need to rebrand conceptual urban design ideas that had guided the creation of zones and placement of key nodes, into understandable and relatable names for the public. The change of working terms such as Xchanges to Precincts, and epicentres to Activity Nodes are examples of the shifts in nomenclature that JTC had adopted. For this reason, literature describing JTC's urban design guidelines and early concepts for one-north may still use these early terms, which might differ from the common understanding of them. For relatability, this chapter adopts the recent terms but nevertheless acknowledges the concepts and ideas that the earlier terms were intended to represent.

Covering approximately 200 hectares, one-north is divided into multiple Precincts, according to the site context including topography, existing greenery, presence of black-and-white bungalows, and the brownfield site of Ayer Rajah Industrial Estate. A mix of uses was curated for each Precinct, which would represent a particular industry in order to better foster the business ecosystem within the district. The development of each Precinct was then grouped into phases to prioritise the development of key precincts that would build an initial critical mass. one-north was envisaged to be a pioneer for a car-lite district, with an aggressive target to achieve a public transport mode share of 85%. The unique streetscapes in one-north were thus designed to fulfil this car-lite vision and to create a pedestrian-centric environment.

The multiple Precincts within one-north. *Source: JTC*

Seeding the Precinct

Tapping on its prime location, the one-north master plan draws upon the strengths of its existing neighbours, infrastructure, and assets—natural and heritage—to build distinct yet targeted identities for its Precincts.

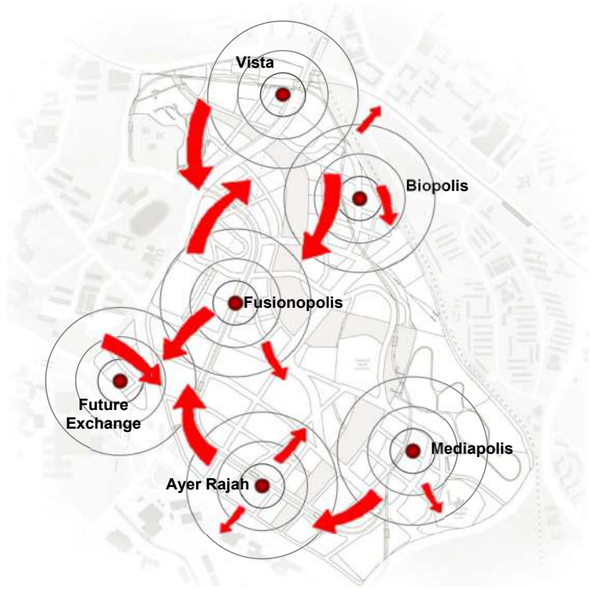
The Vista was designated to house corporate and business functions as well as lifestyle support, and built upon the ease of access rendered by the Buona Vista Mass Rapid Transport (MRT) interchange and the nearby bus interchange. The relatively smaller footprint of the development plot in Biopolis were planned for seeding bio-medical research industries, while the larger development plot of the Fusionopolis was dedicated for the info-communication industries. With the growing demand for a dedicated area to host the media industry, Mediapolis was planned subsequently as a dedicated Precinct to seed this industry.

Heritage areas or existing greens—Rochester Park, Nepal Hill, Wessex and the Rail Corridor—were marked out and the sites' features conserved to contribute to their respective Precinct's identities. For example, the colonial-style walk-up apartments and semi-detached houses at Wessex, located at the east of one-north, were planned to preserve the history of the site. Nestled amidst lush greenery off Portsdown Road, the 26 blocks of walk-up apartments and 58 semi-detached houses provide unique housing options for tenants. To further encourage those working nearby to take up residence in this estate, employees from the biomedical sciences, infocomm technology, media, physical sciences and engineering industries in one-north are given priority in their applications to stay in Wessex.

Right from the start, three Precincts were earmarked for the second phase of one-north's development, to cater for changes in the country's focus on economy, industry and technology. Created by renowned architect and urban designer, Zaha Hadid, the original master plan built in flexibility to support evolving needs that would be identified through the ongoing review of the master plan. This allows adjustments to be made to meet new needs while strategically securing connections between neighbours and building up infrastructure. For example, the future Precinct—north of the intersection of the AYE and North Buona Vista Road *(yellow in the figure on page 87)*—is intended to eventually integrate with the National University of Singapore's (NUS) Kent Ridge campus across the expressway, to facilitate more research collaboration between both parties.

Furthermore, the Ayer Rajah area, which consists of the former Ayer Rajah Industrial estate from 1970s, will be redeveloped over time through infill and potential adaptive re-use of existing buildings to house the growing demand for emerging industries with cutting-edge research and technology. Block 71, which is part of the Launchpad cluster, is one of the oldest light industrial buildings of the flatted factory typology in Singapore. In making this old light industrial area part of the Precinct in one-north, JTC gives recognition to Singapore's industrial history, while providing low-cost location options for start ups and SMEs involved in test-bedding technology. Historically, companies use Block 71 as interim premises until they have developed broader strategic planning goals and are ready to relocate to a larger venue.

Constant Rejuvenation



Plan of Constant Rejuvenation.
Source: JTC

One of the main development strategies for growing the critical mass of industries in one-north is seeding. Each Precinct is marked by an Activity Node that acts as the first in a series of developments for the district. Often strategically located close to existing or upcoming public transport or activity nodes, the intention is to prioritise development for the streets, buildings and key public spaces in the Activity Nodes. At one-north, the Biopolis for bio-medical institutions, Fusionopolis for info-communication industries and Mediapolis for the media hub are the Activity Nodes where seeding typically occurs.

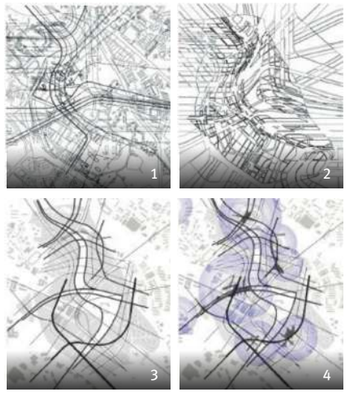
The strategy for seeding ensures that complete infrastructure and facilities are available for the tenants in their respective industry clusters—within Biopolis, Fusionopolis and Mediapolis—while the rest of one-north develops. However, this has led to an uneven realisation of the seamless pedestrian street connectivity envisioned throughout one-north during its interim development state. Coupled with the fact that there are some parcels of land with existing leases that have yet to expire, and are thus not due for redevelopment in the near future, enforcing a consistent pedestrian experience and fully realising the car-lite vision the developers had for one-north has been challenging.

KEY URBAN DESIGN STRATEGIES

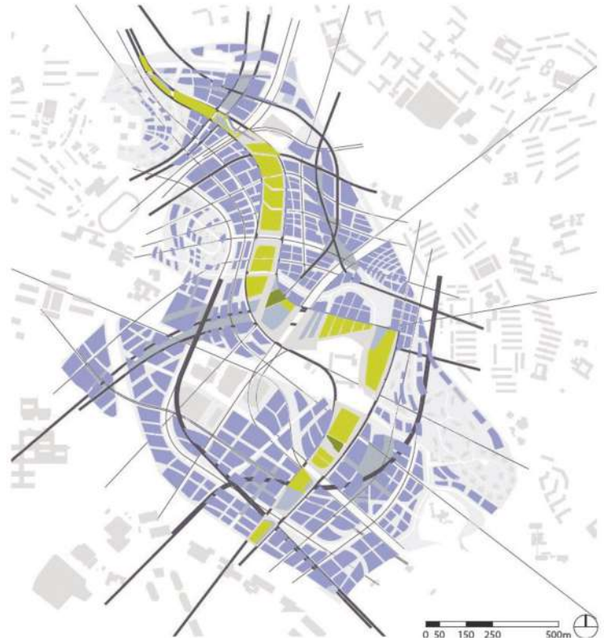
The Urban Design Guidelines (UDGs) developed by JTC ensure that the physical building form, especially the proposed activities and treatment for ground-floor public-facing areas of each development, are aligned with the overall vision for a pedestrian-centric district with a unique urban character at one-north. Broadly, there are key UDGs for the whole of one-north as part of the collective identity of the entire district, as well as specific guidelines for each Precinct that form the foundations for their distinct urban character.

The key UDGs also provide guidance for co-creation to achieve these objectives through the urban fabric (i.e., the "bent grid") which focuses on the streetscape, pedestrian network, public spaces; and the building form which is made up of three elements, i.e., the "ground-scape", which refers to the ground-floor, "middle-scape", meaning the mid-level massing and building façades, and the "roofscape", which refers to the apex of the building. Together, these elements create tightly-woven, intimate urban forms which promote connectivity and social interaction above the street level, and provide both physical and visual integration with adjacent developments.

Bent grid: Creating Unique Urban Pattern to Augment Pedestrian Network



Top:
[1] Forcefield Line
[2] Extensive figure ground
[3] Bent grid
[4] Seeding non-contiguous development. *Source: JTC*
Right: Bent grid concept. *Source: JTC*



The bent-grid concept influenced the urban design guidelines for the building forms in one-north. *Source: URA*

The "bent grid", consisting of a grid that was created taking into consideration the existing site topography and retained buildings, was a key feature in the winning master plan of one-north. The "bent grid" throughout one-north creates an atypical experience for pedestrians, with the hope of encouraging chance interactions and exchange of ideas among the people working and living there. This stemmed from the belief that the value of one-north would be its research community as much as its infrastructure. In essence, the curvilinear street network was to facilitate more than just vehicular traffic; it was designed as a web of walking experiences to stimulate ambling conversations, staying true to its identity as an innovation hub.

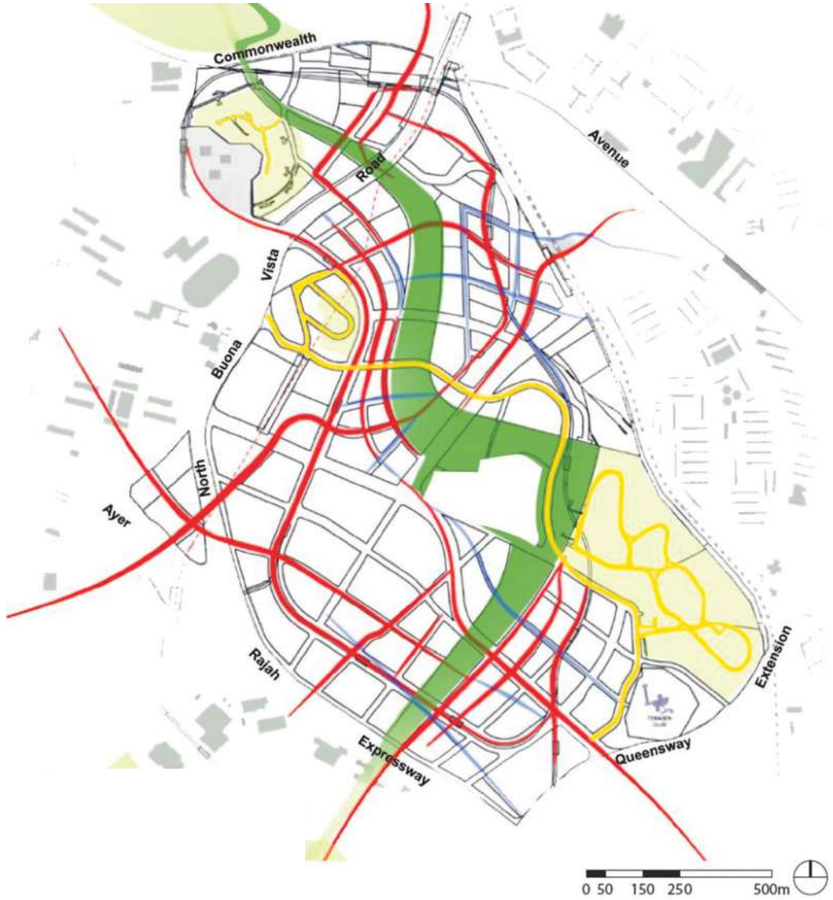
"We realised that the "bent grid" works the best. Not only does it manoeuvre around the undulating terrain, it also created curves that draw people into a sudden relief space where people can meet. We call it serendipity on the "bent grid", yet there is organisation in terms of orientation and legibility even on the ground."[4]

– Arthur Aw, former Director (Land Planning Group) of JTC

At times, the bent grid resulted in interstitial spaces that became pedestrianised areas for events and gatherings. *Source: Victoria See*

While most other urban patterns of new districts in Singapore adopt a rigid urban block design based on an efficient vehicular road network, the more fluid urban pattern of one-north is simultaneously represented in the building forms and open spaces. This urban pattern is even manifested in three-dimensional form, from ground to roof. To ensure that the urban form translates into the actual streetscape experience, the urban density was kept highly-concentrated—with buildings placed close together to frame the streets at a more intimate scale. This required a departure from conventional planning regulations such as setback controls which would have otherwise interfered with the high-density urban typology. To achieve this urban quality, JTC obtained waivers from the URA and National Parks Board (NParks) for one-north to have an overarching zero building-setback guideline. This in turn helped to create a more intimate streetscape and walkable area.

Today, the district bears some resemblance to the original "bent grid" conceived by Zaha Hadid, albeit with some smaller development plots accrued to become larger, more economically-viable parcels. In such instances, site planning of the development was crucial to ensure that the intended fine-grained pedestrian network could still be achieved alongside high ground-floor porosity through strategic placement of pedestrian paths, through-block links and public spaces.



Pedestrian network plan.
Source: JTC

- Main Pedestrian Thoroughfare
- Secondary Pedestrian Thoroughfare
- Heritage Road
- one-north Park
- Heritage Clusters

Redefining Streetscape for Pedestrian-Centric Environment

Creating a pedestrian-centric environment involved designing a network comprising covered walkways under buildings and external covered linkways to create a continuous and comprehensive sheltered pedestrian network. Coupled with the human-scale walkability of the urban pattern and the streetscape, the street-level interactions are not hindered by rain or heat. In addition, a series of pedestrian links cut perpendicularly across the one-north Park like a green spine, linking the developments from Fusionopolis to Biopolis.

Narrow streets and through-block link in Biopolis. *Source: Victoria See*

The buildings in one-north have through-block links as well as public spaces with landscaping and street furniture, and are often fronted by cafes and restaurants. The streets around the buildings in Biopolis are also generally narrower than a typical streetscape in Singapore, while still maintaining the functional width requirement for carriageways. Some of the carriageways are paved with cobblestone instead of asphalt, to suggest that the street is primarily meant for pedestrians; the cobbled roads are signals for vehicles to slow down and give way to pedestrians.

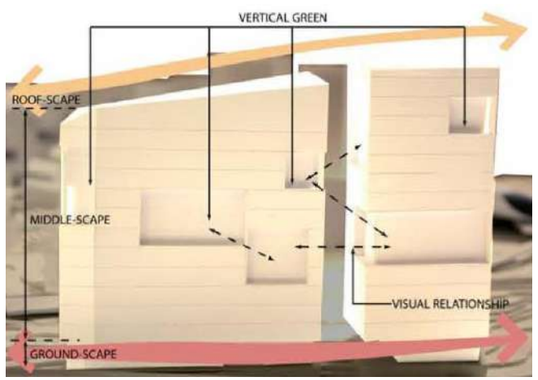
The boundaries between streets and pedestrian walkways in one-north are lined with custom bollards that integrate into the landscape and are less conspicuous than the standard ones seen around Singapore. Vehicular access and service and utility areas are limited to minor roads and secondary façades respectively, to protect the visual aesthetic of the main façades of the buildings along the street frontage and public spaces. To further promote a walkable environment, centralised basement hub-parking as well as interconnected basement car park of each development were designed to reduce vehicular traffic and volume on the streets.

Ground-scape: An Inclusive and Vibrant Pedestrian Environment

There is approximately 25 m between the highest points and the lowest lying areas of the undulating terrain of one-north. Without clear sightlines, the lack of a common ground plane can pose a wayfinding challenge, with varying ground levels for each building, and even multiple ground floors for larger development plots on steeper gradients. Yet, this also presented opportunities for bringing footfall into multiple levels of such developments. Buildings such as one-north Residences, the new mixed-use Biomedical Sciences development, and the upcoming Elementum (Biopolis Phase 6), have capitalised on the significant level differences across their parcels to their advantage, thanks to the ground-scape urban design strategy that creates an inclusive “urban living room” for each development through high ground-floor porosity including public spaces and main pedestrian thoroughfares. Keeping activity-generating uses on the ground floor, and linking them to the street and pedestrian network help foster social interaction and vibrancy. Aside from concentrating the network of activity-generating uses strategically, the master plan also taps on the existing greenery and aggregated the greenery provision from each development into the adjacent one-north Park. This linear park runs across and connects the various Precincts with its surrounding communities, NParks’ Park Connector Network (PCN) and the Rail Corridor.

Today, due to the lengthy multi-phased master plan, the one-north Park remains largely underutilised. It currently functions mainly as a landscaped open space rather than an activated “green living room”. However, NParks and JTC continue to enhance, improve and activate developments fringing the one-north Park to co-create programmes and placemaking activities. The park also provides the potential for the fringing developments to be activated through activity-generating uses or place making that leverage on the existing greenery.

Middle-scape: Shaping Building Form for Interaction and Unique District Identity



Left: Middle-scape controls helped to create pockets of spaces for vertical greenery in the middle sections of the building. *Source: JTC*
Right: A pocket of vertical green on the upper floors of the Metropolis. *Source: Victoria See*

The middle-scape is one of the main urban design strategies that makes one-north's overall urban character and identity unique. Middle-scape refers to the mid-level massing and façades of buildings in one-north, where their vertical surfaces define the shape and proportions of the spaces in between buildings, and is defined by guidelines for building envelopes and façade surfaces. The aim of the design of the middle-scape is to create a sense of place and relationship between buildings and communities above the street level, and to define the unique streetscape of each Precinct while also augmenting the "bent grid" urban fabric for pedestrian experience.

The building envelope guideline such as built-to-line essentially lists the proportion—as a percentage—that each building edge may deviate from the building line to ensure that each development mass will respond sensitively to the surrounding neighbours and natural assets such as the one-north Park and heritage areas. This guideline gives architects and developers room to propose and design different and interesting building envelopes as long as the quantitative percentage measure is met to ensure visual porosity.

In applying the façade surface-controls guideline, JTC also preserves the continuous street edge and resultant sense of enclosure, which are key features in one-north, to create the framed streetscape and urban living room effect as explained in the "bent grid" urban design strategy. As such, protrusions such as awnings or shelters are seldom allowed beyond the parcel boundary lines, as any columns used to support the awnings or shelters may disrupt the visual contiguity of the street edge. Where they are permitted, awnings and shelters are strategically placed, with clear objectives in mind.

Roofscape: An Undulating Skyline that Reflects the Site Context

Roof scape akin to a carpet height control. *Source: JTC*

Based on the original master plan concept, the undulating plane across the entire one-north does not only occur in the ground-scape but can also be found in the roofscape, which is made up of the apexes of the buildings. The roofscape of one-north is designed to reflect the existing topography while also weaving in with key green public spaces such as Rochester Park, Nepal Hill, Wessex, one-north Park and the Rail Corridor. Akin to a roof carpet, the roofscape is intended to be a series of subtle sweeping arcs formed by the building roofs' outlines. This in turn reinforces the collective visual identity of one-north, especially when viewed from the surrounding major roads, as well as its streets, main public spaces and parks.

The roofscape introduces an additional layer of communal spaces and programming in the sky. The mechanical service machinery that are usually placed atop buildings, are, in one-north, hidden behind high roof parapets and screens to keep them out of sight.

The options as to where to locate a building's roof vertices are determined by the maximum allowable height platform level of based on urban design intent of each development parcel in relation to the surrounding developments and site context. Working around this constraint, the architects of individual buildings within one-north were able to exercise their creativity in achieving the visual effect of a sweeping and continuous skyline across the roofscape, demonstrating that it is possible to design innovative buildings that respond to the site context in line with the design guidelines.

" The guiding principle of this roofscape is to augment the undulating terrain. We had to tie the developments together in order to project the undulating terrain to the roof level. So, if you walk along the one-north Park, you can see this undulating terrain actually work together with the profile of the park itself."[5]

– Aloysius Iwan Handono, Deputy Director, Urban Planning & Architecture Division, JTC

Facilitating Development through the Design Review Panel

As the majority of one-north was developed in collaboration with the private sector, it was critical to allow flexibility and adaptability to anticipate market changes and make well informed adjustments to meet new private sector demands without compromising the master plan concept or the urban design intent. To implement the one-north UDG, JTC took proactive and adaptive approaches to allow the co-creation of the vision with both the private sectors and community.

The key UDGs were translated into more refined guidelines at the Precinct level and were specifically tailored to individual land parcels, taking into consideration factors such as site context, nature of development, and business needs. These UDGs are issued as part of tender or lease conditions to developers and form the basis for decision making by a panel of experts known as the Design Review Panel (DRP).

As each development has a unique land use, building typology, business activity and operation requirement, site conditions, etc., this approach ensures that the UDGs will be relevant and adaptable to each development's needs. The key private sector companies that would be occupying the buildings were engaged throughout the process, from site selection, to design pre-consultation during the Design Review Process, all the way to the completion of the project. This active engagement marked another fundamental paradigm shift in the effort of shepherding and safeguarding the master plan vision as well as the implementation of strategic urban design intent to achieve the desired outcomes.

Throughout the process, JTC worked closely with the developers and the architects of each development throughout the various design stages to balance the tension between adhering to the UDGs, optimising business and operational requirements, and allowing flexibility and innovation in architectural design.

"The challenge is to create a robust design review process and also to enforce it. Because at the end of the day, whatever the architects put on the drawing board, it may not be the same as what they build on site. This design review process starts very early. When there is a company supported by economic agencies that wants to come into one-north, JTC starts by tailoring the UDGs more finely according to the business need. Supported by a deep knowledge of their operations and business needs, and the existing master plan and UDGs, JTC would be better able to tune the UDGs to accommodate their operational needs while safeguarding the urban design intent itself."[6]

– Aloysius Iwan Handono, Deputy Director, Urban Planning & Architecture Division, JTC

Applying both quantitative and qualitative approaches, the UDGs were broken down into primary and secondary guidelines. Primary guidelines are mandatory and must be strictly adhered to, while secondary guidelines prioritise planning and urban design intentions over the precise forms. This allows for potential solutions that may achieve the intended outcomes through alternative design means. As such, so long as the general intent of the guidelines is achieved, the architects and developers were given the liberty to experiment with the architectural design in collaboration with JTC's Planner, pending the DRP's approval. Each development plan had to undergo site inspections before obtaining the Building and Construction Authority's (BCA) Certificate of Statutory Completion (CSC), to ensure that compliance to the UDG as well as design improvements approved by the DRP had been successfully delivered.

The DRP therefore played a critical role in ensuring that the overall visions and strategic goals for one-north were upheld by reviewing the architectural design of each development. The panel played a critical role in facilitating the exchange of ideas between architect, developer and JTC, and to advise on ways to refine the UDGs and the one-north master plan, so that one-north would remain relevant over time.

PRECINCT LEVEL DETAILED URBAN DESIGN GUIDELINES

Just as each Precinct was planned to target a different industry, the UDGs were also tweaked to dovetail the existing and surrounding context to ensure that each Precinct retained some unique qualities of their own. The aforementioned urban design strategies thus serve a broad base for all the Precincts, with the differentiating characteristics for Biopolis, Fusionopolis, Vista, and Mediapolis detailed below.

Biopolis

Biopolis is an approximately 18.7-hectare area strategically located next to the Buona Vista MRT interchange. It benefits from the high footfall from Holland Village across its boundary along Commonwealth Avenue West. The Biopolis serves mainly the biomedical and life science industries and was envisioned to be a mid-rise urban-research campus enveloped by the Rail Corridor to its north and one-north Park to its south. For this reason, it sets itself apart from the other Precincts by drawing nature and greenery into its urban fabric and forms. Chiefly, the urban design strategy for Biopolis taps on its adjacency to the green spaces in creating a soft yet active network of public open spaces at the street level for pedestrians. Seeded by the business park buildings, Biopolis has successfully cemented its reputation as a well recognised biomedical hub.

Providing a High-Quality Work Environment

Biopolis land-use plan.
Source: JTC

- Business Park
- Residential with Commercial on 1st storey only
- Commercial
- White
- Park
- Open Space
- Proposed PMS Reserve

Landuse

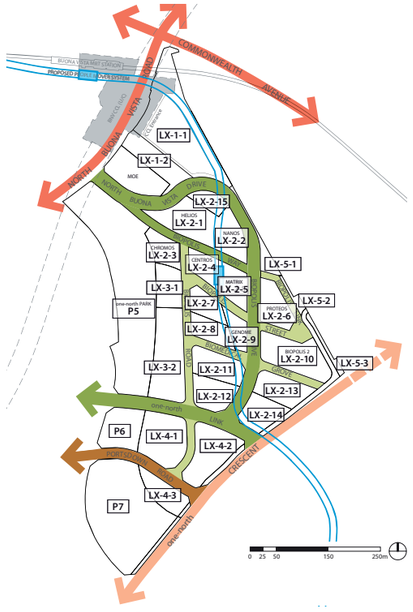
Biopolis was planned to be predominantly a work environment with a significant portion of the floor area dedicated to supporting high-quality business park spaces and wet laboratories for R&D institutions. Unlike Fusionopolis and Vista, Biopolis has no dedicated live-and-learn land uses. This is due to the nuisance buffer required for the biomedical related R&D activities. The workspaces were first seeded in the Epicentre which is made up of JTC's Biopolis Phase 1 development —a cluster of seven buildings integrated with public spaces, F&Bs, a basement hub-parking and running on a district cooling system. Today, the biomedical facilities in the Xchange have grown significantly up to Biopolis Phase 6.

This Precinct has been planned to include a corridor for Autonomous Vehicles to facilitate first/last mile pedestrian movements around one-north. All developments within the Biopolis are also connected to all the other developments within the Precinct as well as to the adjacent MRT stations. The current On-Demand bus service will also be replaced by an autonomous system in the near future.

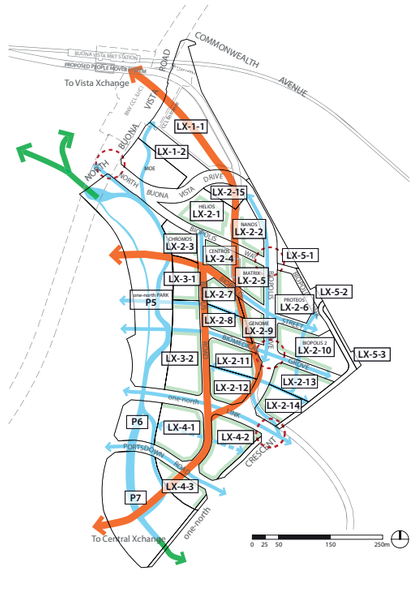
The northern part of the Precinct LX-1, right of the exit of the Buona Vista MRT interchange, has been designated for more high intensity mixed-use developments, with a large proportion set aside for commercial (office) use.

In contrast, the Business Park land use situated in LX-3, LX-4 along one-north Park, and LX-5 along the Rail Corridor stand to benefit from embracing and activating these expansive green space and heritage corridor. The easy access that these developments have to prime urban greenery can create conducive working environments and communal spaces that will attract talents and workers in the industries as well as draw the communities from the vicinity together.

Vehicular Access & Pedestrian Network: Creating Walkable Streets



Road Network



Pedestrian Network

Biopolis streets, public transport and pedestrian network plan. *Source: JTC*

Road Network

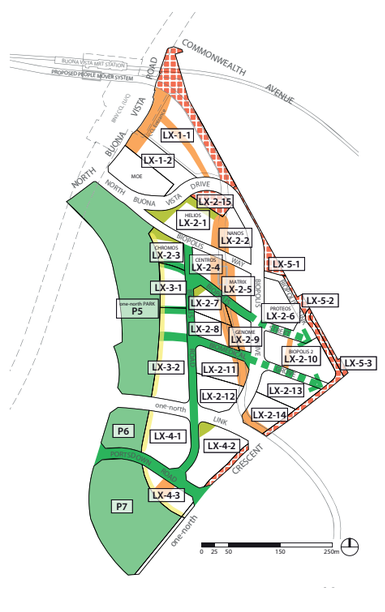
- Regional road network
- Main district thoroughfare
- Primary addressing road
- Secondary addressing road
- Existing historical road
- Proposed ingress/egress point
- Proposed PMS reserve

Pedestrian Network

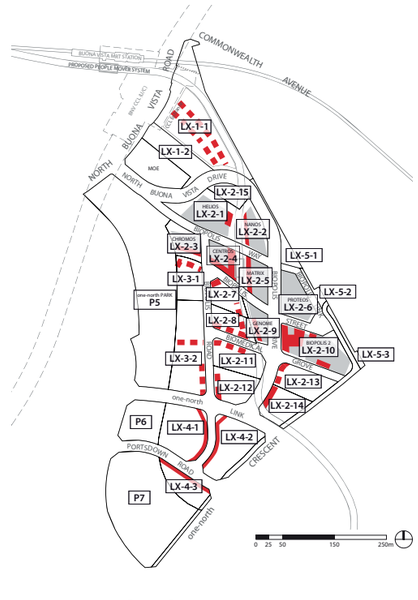
- Primary pedestrian flow
- Secondary pedestrian flow
- Tertiary pedestrian flow
- Bridge
- Covered walkway
- Pedestrian crossing

The public transport nodes at LX-1, Commonwealth Avenue and North Buona Vista Road help to bring vehicular traffic into Biopolis, and the two way North Buona Vista Drive and Biopolis Drive help to direct traffic to the various buildings within the Precinct. The secondary roads which are minor connections with narrower widths, coupled with the zero building setback, create a more walkable corridor in Biopolis. This primary pedestrian flow is then directed towards the green spine at one-north Park to encourage interaction with nature. More pedestrian crossings are placed where the streets are wide to facilitate pedestrian movement. Together, the careful planning of vehicular access and projected pedestrian flows help to reduce conflict between people and cars, which is especially important given Biopolis' prime location at the intersection of MRT lines and major roads.

Ground-Scape: Integrating with Nature



Open Space Network



Retail Distribution

Biopolis public space and greenery plan and retail distribution plan. *Source: JTC*

Open Space Network

- Park
- Pocket park
- Green corridor
- Public space
- Park edge mitigation zone
- Action zone

Retail Distribution

- Contiguous retail frontage
- Distributed retail frontage

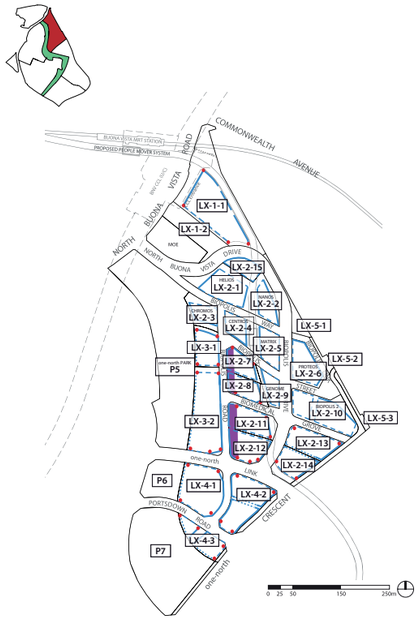
Similar to the open space and greenery urban design strategies in Fusionopolis and Vista, the Biopolis boasts an evenly distributed network of public spaces, green corridors and action zones, which ensure that almost every building in Biopolis has some element of public space on the ground level for pedestrians to enjoy.

At the district scale, green corridors along Biopolis Street, Biopolis Grove and Portsdown Road weave into Biopolis to connect one-north Park, the Rail Corridor and the local-access roads throughout the Precinct. This helps to provide convenient and direct pedestrian access to one-north Park and the Rail Corridor. A series of small and intimate pocket parks are placed at prominent corners of specific land parcels along the main pedestrian walkways; these act as intermediate nodes for pedestrians. Overlaying retail distribution onto such spaces create opportunities for alfresco dining or rest stops, such as the corner café at the Centros building (LX2-4). Retail or F&B shop frontages, outdoor refreshment areas (ORAs) and kiosks have also helped add activity in areas where distributed retail outlets are situated. The different retail frontages result in multiple combinations and synergies, which help add variety to the street-level experience, and differentiate it from other districts.

In view of the high volume of pedestrian traffic from the Buona Vista MRT interchange, the Metropolis—on parcel LX1-1—was designated as the urban lobby to absorb excess pedestrian volume and to usher the pedestrians into one-north. As such, clear guidance was given to ensure that ceiling heights of the Metropolis were kept sufficiently high to convey a generous sense of space and arrival before funnelling pedestrians towards the linear pedestrianised spaces created within Biopolis. This through-block link serves as a landscaped interstitial space for researchers and visitors to linger and share ideas.

Greenery integrated into Wilmar International's new Global Headquarters. *Source: Wilmar International*

A 5-metre wide park edge mitigation zone was instituted for developments fronting one-north Park. This zone required affected developments to adopt additional landscaping to subtly transition from the public one-north Park into the private green spaces along the development. Most importantly, it called for these developments to take reference from the ground levels of the park edge to create a physically and visually seamless ground-scape. The Wilmar HQ on parcel LX4-1 shows how a development augments and integrates seamlessly into the one-north Park: Fusionopolis North. In this case, the developer had voluntarily proposed ideas to enhance the one-north Park Fusionopolis North and worked closely with NParks on the concept and implementation.

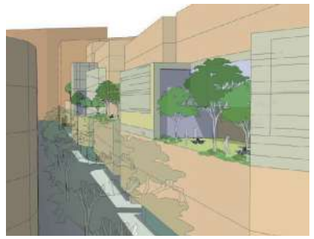


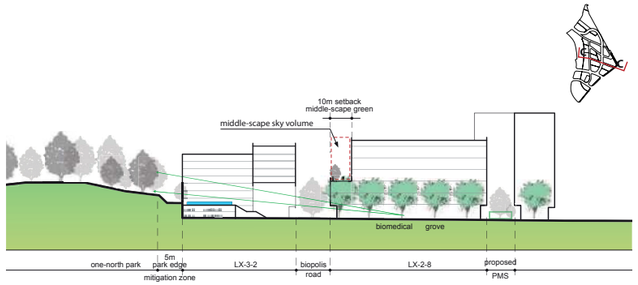
Building Envelope

Biopolis built-to-building line plan & middle-scape sky volumes. *Source: JTC*

- 100% Built-to-building Line
- 70% Built-to-building Line
- 50% Built-to-building Line
- Middle-scape Sky Volume
- Primary Building Height in metres AMSI

Middle-Scape: Curating Streetscapes, Sightlines and Scenic Views



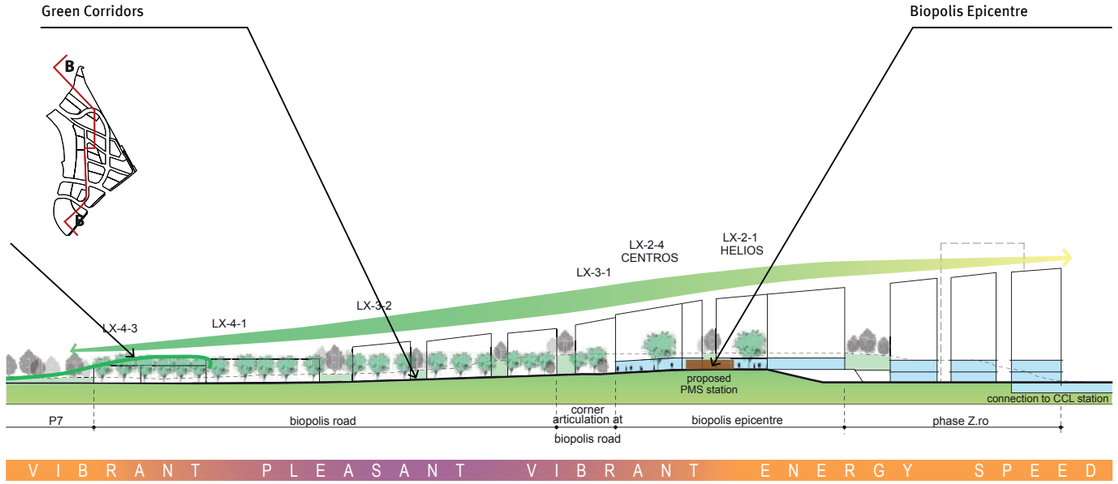


Conceptual Section C-C

To complement the high level of pedestrian activity anticipated on the ground, the buildings in Biopolis were required to adhere closely to built-to-line to provide a sense of enclosure for public activities at the street level. The closeness of the buildings and the completeness of the street edge created shared open spaces which were conducive for inhabiting and social interaction. For example, a 100% built-to-line applied to the building edges along primary pedestrian routes such as Biopolis Road, which was also built to face the Rail Corridor in anticipation of it being used as an activated pedestrian space. Recommendations were made for ›70% and ›50% built-to-line along other building edges to give sufficient room for designing unusual façades that can create interesting contrast in streetscapes for key pedestrian paths such as Biopolis Road.

In particular for Biopolis, sky volumes, which are akin to skyrise greenery and terraces, were introduced along the building edges facing one-north Park. This created sightlines framing scenic views of the park through urban windows to allow the lush landscape to be appreciated even from within the densely built Biopolis.

Roofscape: Defining the Skyline Profile of the District



Biopolis roof scape diagrammatically, in aerial view and from street level.
Source: JTC

With the anticipated low rise sports facilities at LX-4, the roofscape of Biopolis sets itself apart from the Precinct by bringing the skyline close to the ground at one end before gradually sloping upwards towards the perimeter along Commonwealth Avenue and North Buona Vista Road. Aside from providing spatial relief towards the centre of one-north, this design optimises the catchment around the Buona Vista MRT interchange as a major transport node by intensifying land-use at the northern and north eastern boundaries of one-north.

UDG in Action: Elementum (Biopolis Phase 6), Integrated with the Rail Corridor

An artist's impression of Biopolis 6.
Source: DCA Architects

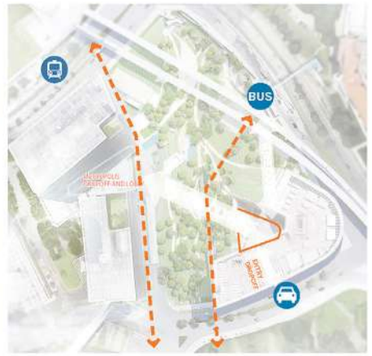
Elementum, which features a modular and flexible lab design, is the latest addition to the biomedical science community in one-north. It is located at the northern tip of Biopolis and is a new extension beyond the initial boundaries of Biopolis. At the point of writing, the project is still under development but is featured here to showcase the significance of nature in Biopolis' ground-scape.

"In this project, JTC envisaged the ground floor plane to be all communal, as will be all future plots. From the first phase of Biopolis, they learnt that there were not enough communal spaces based on the initial master plan. With this project, I suppose they are taking advantage of the rail corridor to make the whole area livelier through programming, so that there may be more people lingering in the space even during weekday lunches."[7]

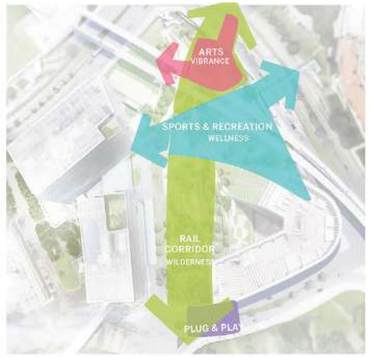
– Kenneth Kong, Director, DCA Architects

The architects for Elementum—DCA Architects in collaboration with SOM—applied JTC's UDGs by dedicating the majority of the street level to publicly accessible spaces. This reflects the lessons learnt from the success of the earlier Biopolis phases, where intimate, internal pedestrian thoroughfares helped to make the street level more vibrant and engaging. Biopolis Phase 6 was designed with the anticipation that the future rail corridor that will run along the northern edge will bring additional footfall. More than just a matter of people-centric urban design, this was to meet the increased commercial viability and vibrancy of the F&B spaces planned on the street level of this development.

Extension of Green Infrastructure



Gateway at Buona Vista Node and Connection to Metropolis Village



Village and Public Space Programming

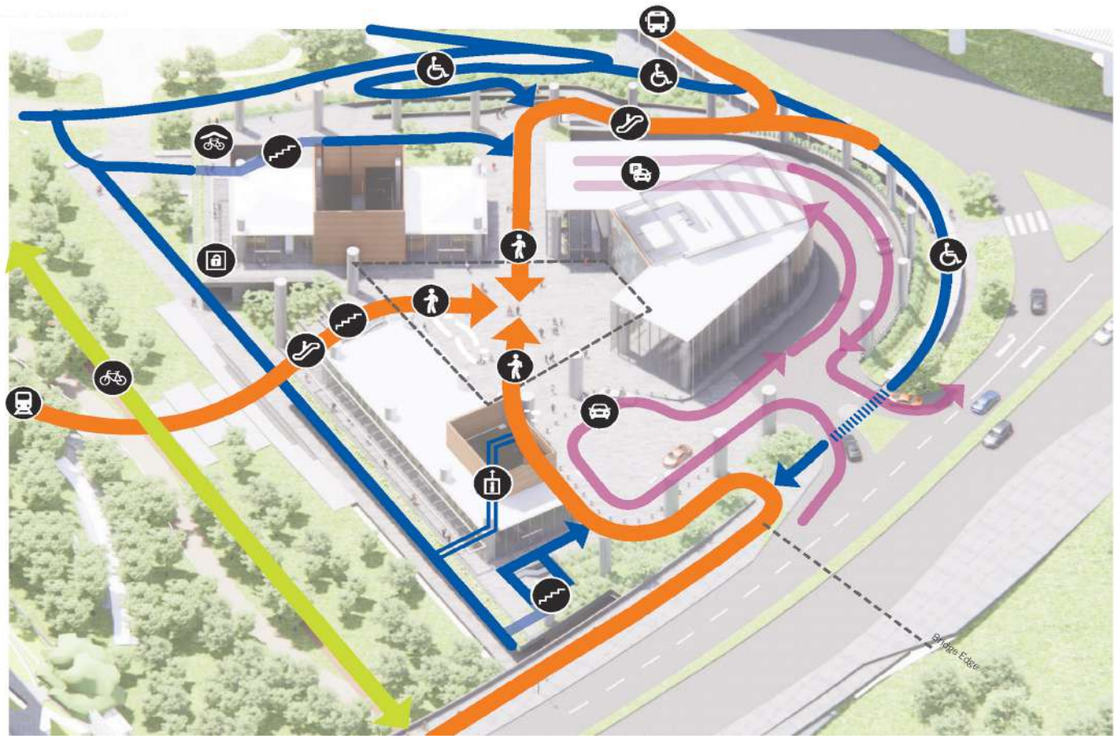
Top row: Artist's impressions of the view of Biopolis 6 from the rail corridor. *Source: SOM, ATCHAIN*
Bottom row: Urban design integration diagrams were used to conceptualise how Biopolis 6 could relate to the surrounding environment, transport infrastructure and programming. *Source: DCA Architects*

An action zone along the northern edge of Biopolis was planned so that it would integrate the ground-scape of the Precinct with rustic rail corridor as part of its urban design intent. The plan takes into consideration the progressive opening of the rail corridor to public with the removal of the old fence lines along the KTM line. DCA Architects have envisioned the rail corridor area to be lined with facilities and street furniture to encourage both activity and interaction with nature.

DCA Architects' illustration of the future space shows elevated cafes overlooking the future park connector, with the café level connecting to the raised terrain of the earlier phases of Metropolis and Biopolis southwest of the site. This is another example that illustrates how the concept of thickened ground is applied—through careful site planning to ensure that the buildings, when anchored into undulating terrain, would not alienate users from the surrounding area and key circulation routes in the district. Visual porosity, an elevated F&B and a spacious covered ground-floor plaza are all features that help to intensify the vibrancy of the Precinct.

Biopolis 6 vehicular access.
Source: DCA Architects

Primary pedestrian circulation
Secondary pedestrian circulation
Vehicular circulation
Rail corridor



"The way it's designed, the communal activities and spaces take precedence over the commercial programme. The lobby leading to the functional spaces is given only a small area, so we had to do a bit of design gymnastics with regards to the levels to allow trucks to get in, to follow the brief by JTC not to have service areas seen from the communal spaces. This means we have to put the substations and the bin centres into the basement."[8]

– Kenneth Kong, Director, DCA Architects

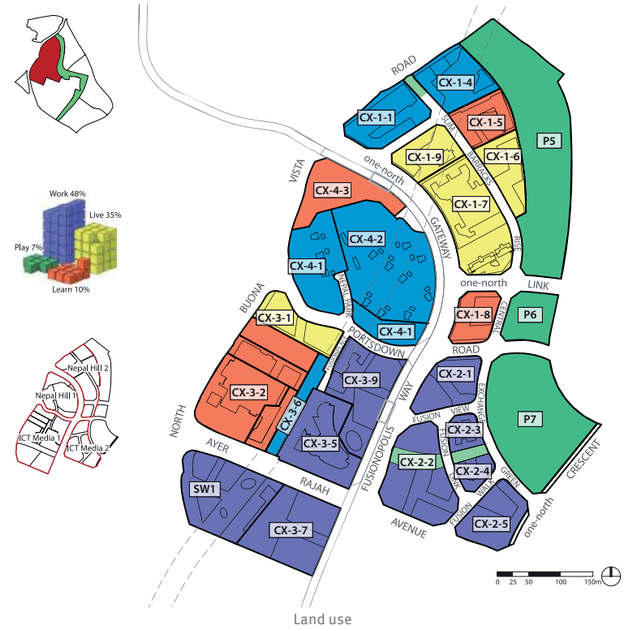
Much like a microcosm of Biopolis' complementary vehicular access and pedestrian network strategy, the pedestrian-friendly ground-scape of Biopolis Phase 6 is only possible with careful vehicular access planning. Thus, to ensure that vehicles are kept separated from main public spaces and to create a safe and seamless at-grade environment for pedestrians, basement parking was stipulated as a design requirement.

In the same vein, other first-storey ancillary functions like the bin centre and substations were also brought down to the basement to free up the first-floor frontage. This is typically more expensive to implement because delivery trucks require more headroom, which then requires the building of deeper basements. As evident in the rest of one-north, the price paid for such upfront costs brings rewards in the long term, as it allows the project to be better integrated with the activated pedestrian network.[9]

Fusionopolis

Extending across 30 hectares, Fusionopolis focuses on infocomm, science and engineering industries. Its activity node, Fusionopolis One, houses key research institutions in these disciplines and is directly connected to the one-north MRT station. The buildings in Fusionopolis then extend northwards by skirting around Nepal Hill and the existing alignment of historical Portsdown Road, further accentuating the curvilinear nature of the "bent grid" and its benefits in accommodating natural topography.

Strategic Direction: Providing a Work-Live Environment



Land use

Fusionopolis and Nepal Hill land use plan during the early stages of the one-north development. *Source: JTC*

- Business Park
- Hotel
- Residential with Retail
- Commercial
- Education
- Flexible Land use
- Park
- Open Space

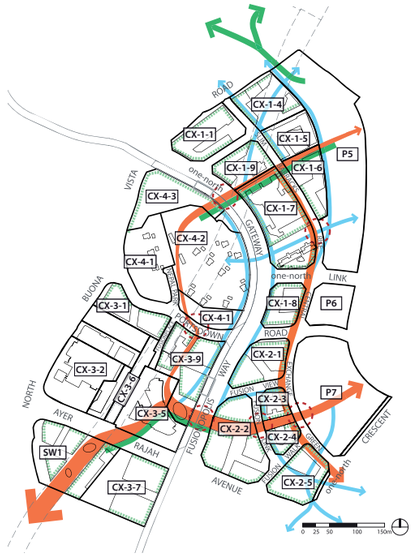
The land use in Fusionopolis is representative of one-north's fine-grained mixed-use of work, live, play and learn in one precinct, with a variety of uses including business parks, commercial offices, co-living spaces, a corporate university, retail and F&B. The business park and commercial offices are designated for the ICT, science and engineering industry cluster which are concentrated around the one-north MRT station and Corporate Universities at Nepal Hill.

Hotel, co-living and residential uses are distributed along the park's edge to provide easy access by the residents, while the land designated for education use includes a corporate university that has been strategically positioned to tap on a diverse range of synergies with its adjacent land uses.

Regarded as the jewel of Fusionopolis, the urban design intent for Nepal Hill was to remain partly hidden to preserve a calming and alluring quality. This also creates interest in the overall building form with the high-rise and densely built Fusionopolis area contrasting with the low-rise and sparsely built Nepal Hill. The conserved bungalows within Nepal Hill are currently used by Unilever Four Acres Singapore as part of their corporate university campus, the company's only global hub for the leadership development outside of London.

Vehicular Access and Pedestrian Network: Reducing Conflict between People and Cars

Road Network



Pedestrian Network

Top row: Central Xchange streets, public transport and pedestrian network plan. *Source: JTC*
Right: Pedestrian link between buildings help to complement the pedestrian movement above street level. *Source: Victoria See*

Road Network

- Regional Road Network
- Main District Thoroughfare
- Primary Access
- Secondary Access
- Drop-off Point
- Ingress/Egress

Pedestrian Network

- Primary Pedestrian Flow
- Secondary Pedestrian Flow
- Bridge
- Covered Walkway
- Pedestrian Crossing

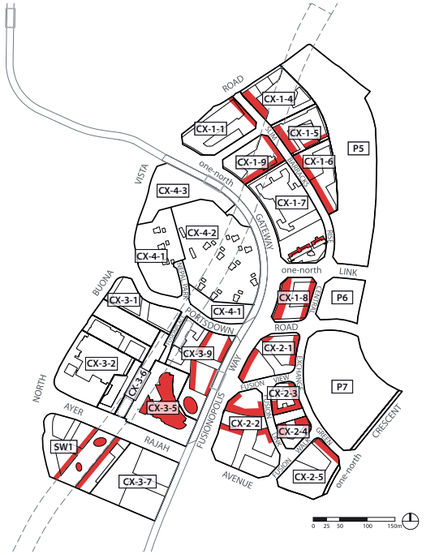
Unlike Biopolis, two main roads—Fusionopolis Way and one-north Gateway—run through Fusionopolis as the main thoroughfare to serve higher density developments. While this helps to provide easy access and arrival by car to the site, it poses a challenge to being a pedestrian-friendly environment. As with other areas within the district, the Precinct adopts the strategy of using through-block links, pedestrian overhead bridges, and dedicated access to basement car parks to minimise disruption by vehicular traffic and service access, while ensuring that the rest of local access roads are pedestrian-friendly.

Top: Car-centric road design for the five-lane one-north Gateway. *Source: Victoria See*
Bottom: Pedestrian friendly design for the two-lane Central Xchange Green. *Source: Victoria See*

Local access roads such as Slim Barracks Rise, Central Exchange Green, Fusionopolis Walk and Fusionopolis View serve as much needed primary pedestrian routes, contributing to a safe walking environment for pedestrians in area. Special cross-sections have also been designed to accommodate wider pedestrian paths, shady trees and a distinct absence of road dividers to facilitate pedestrian crossing and movement.

Ground-Scape: Activating Streets Leading to Open Spaces

Open Space Network



Retail Distribution

Fusionopolis public space and greenery plan and retail distribution plan. *Source: JTC*

Open Space Network and Action Zone

- Park
- Public space
- Action zones

Retail Distribution

- Retail

To achieve a sustained liveliness in Fusionopolis, two distinct strategies are used. The first is the almost-continuous line retail frontage along the primary pedestrian circulation along Slim Barracks Rise, Central Exchange Green and the main through-block links in CX-2. Shops, ORAs and kiosks that are intentionally situated along this route activate the space for a vibrant pedestrian experience, as it leads to the landscaped open space at one-north Park.

The second is a generous ground-floor porosity that allows for the consolidation of action zones and public spaces running in a north-south direction through Nepal Hill, as well as eastwards towards one-north Park: Biopolis (P5), Fusionopolis North (P6), Fusionopolis South (P7). The interstitial spaces between the heritage bungalows serve as potential sites for programming social and cultural activities in the low rise and naturally green areas.

In certain areas such as at one-north MRT station, the ground-scape is once again thickened through the creation of large amounts of human activity both on the street level and underground. This unique multi-level pedestrian activation exemplifies the strengths of an activity node in creating prominence for the Precinct.

UDG in Action: Fusionopolis One, Activity Node of Fusionopolis

Fusionopolis One. *Source: JTC*

As activity nodes for Fusionopolis, Fusionopolis One (CX3-5) and the Galaxis (CX3-6 and CX3-9) are located at the heart of the Precinct where the public space, action zone and pedestrian flow intersect. Galaxis features a generous curvilinear plaza shaped by its four iconic towers. Meanwhile, the curved profile of the Connexis and Symbiosis towers of Fusionopolis One, designed by the renowned Japanese architect, Kisho Kurokawa, demonstrate the built-to-line concept by bringing together two perpendicular pedestrian flows, creating a sense of enclosure for the pedestrian plaza.

The strong spatial cues from this curved plaza are also present in the subsequent neighbouring developments comprising the Innovis, Kinesis, Synthesis of Fusionopolis Two (CX2-2) and the Nexus@one-north (CX2-4). The pedestrian plaza continues from the epicentre and leads towards one-north Park (P7).

Together, the three public spaces, shaped by strong building edges, add to a collective sense of enclosure, and are lined up perfectly so that even though the 4-lane Fusionopolis Way cuts across this otherwise largely pedestrian space, the sightlines toward the main plaza at Fusionopolis are unbroken and still entice pedestrians to walk further towards one-north Park.

Public plaza is marked with a circular structure with a differentiated façade, and leading to more enclosed spaces of respite. *Source: Victoria See*

At the endpoint of the ground-scape, an ovoid retail space intended to be for full retail use was translated into a 2-storey F&B space to activate the plaza. Above this ovoid F&B space, a spherical shaped Genexis theatre sits at the heart of the three towers in Fusionopolis One, adding interest to its middle-scape.

Having embellished its ground-scape and middle-scape, Fusionopolis One is also one of the developments earmarked to have a series of sky gardens and pedestrian bridges to connect its various buildings with its neighbouring plots, to give it an equally rich roofscape. Perhaps given its location at the intersection of two major thoroughfares, Ayer Rajah Avenue and Fusionopolis Way, a proposal was made to have two bridges connect Fusionopolis One to the other parcel of land across these two roads. This would help ensure that the area remains pedestrian-friendly even in lieu of anticipated heavier vehicular traffic. To date, only the bridge across Fusionopolis Way has been built to connect the Fusionopolis One's buildings through the Galaxis to Fusionopolis Two's buildings. This bridge follows the curved profile of the pedestrian space below it and cleverly intersects with the ovoid retail space, to increase footfall and use.

The pedestrian bridge and pedestrianised public space at Fusionopolis One. *Source: Victoria See*

UDG in Action: one-north Residences, a Fenceless Residential Development

one-north Residences. *Source: P&T*

"We felt that the detailed urban design guidelines gave us support to implement a more interesting design, without which developers would generally prefer a standardised architectural solution due to cost and efficiency."[10]

– Kong Choong Kit, Group Director, P&T consultants

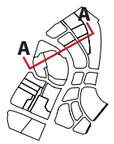
one-north Residences is the first fenceless private residential development in Singapore, with UDGs playing a key role in driving the design of the development. The architects, P&T Consultants, together with the developer, UOL, won the bid to build one-north Residences through a design competition. The competition had set a high weightage for design criteria, which ensured that the final scheme not only met the master-plan requirements, but adhered to rigorous design guidelines. Even so, the architects felt that the UDGs help to spur their creativity, as it stipulated that the architect had to be innovative in their proposed solution for the site.

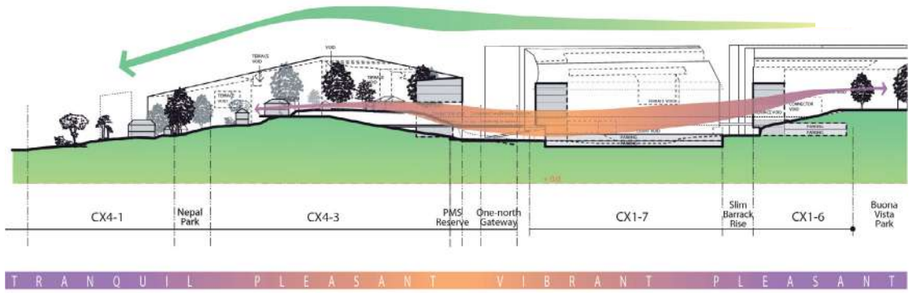
Top: one-north Residences as a fenceless development allows for wide public spaces and pedestrian paths. *Source: P&T*
Bottom: SoHo units in one-north Residences enjoy ground-floor frontages and access. *Source: P&T*

Unlike most other condominiums in Singapore, the detailed UDGS for this development required the condominium to not be fenced as the development would be alienated from the environment and cut off from the pedestrian network. As such, one-north Residences is embraced within porous street-level thoroughfare and its open ground level even widens the pedestrian area to enhance the walkability of the streetscape. This is a laudable prototype showing how a clever implementation of the UDGs can help to boost the street character for the district.

The plaza-like thoroughfare that traverses through one-north Residences serves as a link between one-north Park and Fusionopolis since its boundaries are fenceless. Fencing around one-north Residences would also have cut off several important pedestrian flows in one-north's pedestrian network. Instead, its porous grounds now connects Biopolis and Fusionopolis.

As with a number of other developments in one-north, basement parking with vehicular access is discretely sited at the edge of the site, reducing vehicular presence at the street level. This leaves room for access through multiple frontages, where people and mingle and interact in the public courtyards and adjacent park spaces. This unusual quality then gave rise to the sprouting of ground-floor SOHO units facing the public pedestrian thoroughfare, embodying the Precinct's work-live-play-learn strategic direction.





Fusionopolis roofscape across one-north Residences. *Source: JTC*

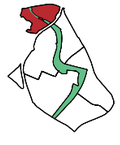
The sloped topography of one-north Residences has one side facing one-north Park, which is elevated on a higher terrain. The developers took advantage of this to create different levels of access to the residences thereby achieving a thickened ground, as encouraged in the master plan. The thickened ground helps to add interest and variation to the ground-scape for the immediate plots around. With the future bridge, one-north Residences will be connected to Nepal Park, providing another east-west connection perpendicular to one-north Park.[11]

Vista

Vista is located at the northern most end of one-north and spans approximately 18 hectares. Encompassing the Buona Vista MRT interchange within its bounds, it caters to the corporate, business and lifestyle needs of one-north. Vista is also strategically positioned as the Sub-Regional Centre of the Queenstown Planning Area.

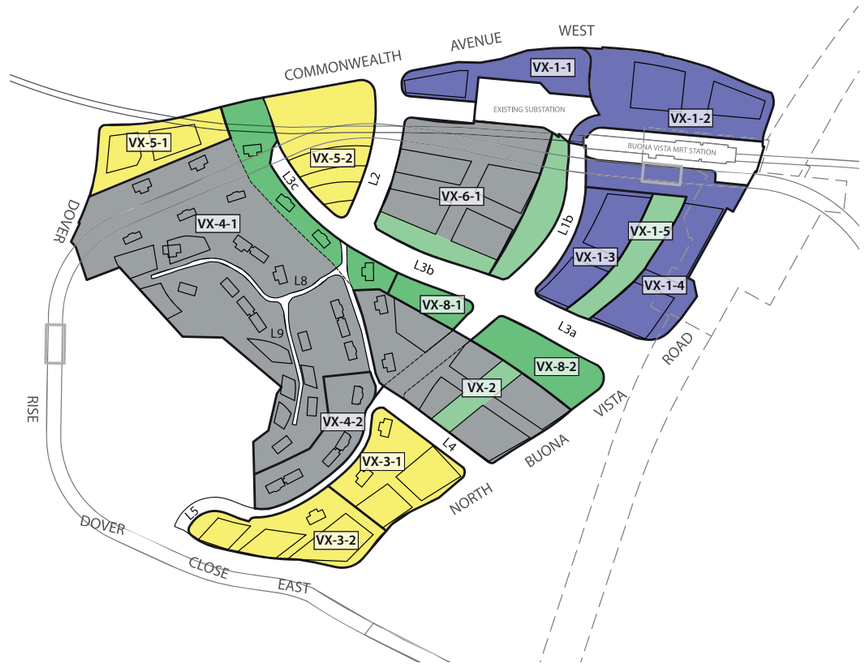
With its dominant public facing role, Vista differentiates itself from Biopolis and Fusionopolis through its strong emphasis on public spaces which encourage interaction with visitors to the area. Most notably, Vista is often associated with Star Vista and Rochester Mall, each of which represent a unique shopping-mall typology.

Sub-Regional Centre: Providing a Live-Work-Play Environment



Vista Xchange land use plan. *Source: JTC*

- Commercial and Retail
- Residential with Retail
- Flexible Land use
- Park
- Open Space



At the time of its conception, Vista was planned largely for white-land uses, and was to retain flexibility to adapt to changing needs, in view of its strategic proximity to the Buona Vista MRT interchange and its position as the Sub-Regional Centre. The Ministry of Education and the Metropolis, which are located in the Vista area, houses mainly administrative and corporate functions of MNCs. This cluster acts as a gateway for attracting visitors and workers alike into Biopolis and hence one-north.

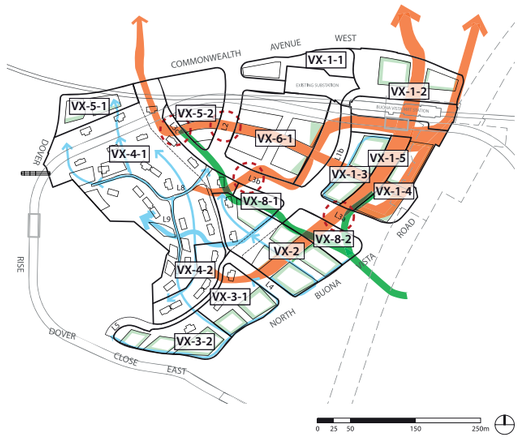
As sub-precincts, VX-1 was marked for commercial and retail uses, to build on the anticipated high foot traffic at the public transport node, VX-3 and VX-5 along North Buona Vista Road and Commonwealth Avenue were respectively earmarked for residential and retail use, as these are at a distance that would provide enough privacy for the residents, yet remain walkable to Buona Vista MRT interchange. The heritage bungalows located in Rochester Park (VX-4) were accorded flexible land use to ensure that the bungalows could be sustainability conserved and the ambience of the park and surrounding area maintained.

Developments constructed in VX to date are the GlaxoSmithKline Asia House on VX5-2, Star Vista on VX6-1, and Rochester Mall and Park Avenue Rochester on VX-2. These developments incorporate land uses that differ from the ones originally planned, testifying to the flexibility built into the master plan and UDGs meant to support one-north's evolving nature.

The land-use plan for VX incorporates transects of open space cutting through parcels such as VX1-5 and VX-2, and along the edges of parcels like VX6-1. The effect of this arrangement can be clearly felt on the ground, as these open spaces branch out from the park lands along Vista Exchange Green as it extends from one-north Park. In lieu of its adjacency to the public transport node, this has given it a more public-friendly nature, and shaped the public plaza in Star Vista, which is easily accessible from the intersection of Vista Exchange Green and Rochester Drive, thereby encouraging high footfall.

Vehicular Access and Pedestrian Network: Linking the District with a Regional Transport Hub

Road Network



Pedestrian Network

Vista Xchange streets, public transport and pedestrian network plan. *Source: JTC*

Road Network
- Regional road network
- Main district thoroughfare
- Primary access
- Secondary access
- Drop-off point
- Ingress/egress

Pedestrian Network
- Primary pedestrian flow
- Secondary pedestrian flow
- Bridge
- Covered walkway
- Pedestrian crossing

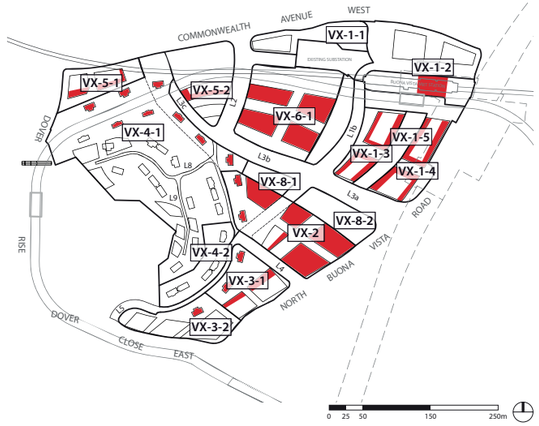
In anticipation of heavy vehicular and pedestrian traffic, there is a 4-lane main vehicular road at Vista Exchange Green that provides secondary access between the Commonwealth Avenue West and North Buona Vista Road. This helps to ease traffic on the other roads within the Precinct, making those roads more pedestrian friendly. The small street in Rochester Park has been left unchanged to preserve its quaint and walkable characteristic.

In this vein, the pedestrian network taps on a combination of strategies including the small street in Rochester Park, the landscaped path along Vista Exchange Green and the aforementioned open space parcels. Pedestrian crossings were also built along Vista Exchange Green to facilitate ease of movement between the pedestrian and vehicular network.

In future, there are plans for an iconic one-north Bridge which will span across North Buona Vista Road to facilitate pedestrian flows between Vista and Biopolis, and through one-north Park: Rochester East, Rochester West (P4 and P5).

Ground-Scape: Activating Spaces for Social Interaction

Open Space Network



Retail Distribution

Vista public space and greenery plan and retail distribution plan.
Source: JTC

Open Space Network and Action Zone

- Park
- Public space
- Urban lobby
- Action zones

Retail Distribution

- Retail

Vista mirrors the placement of the urban lobby in Biopolis being locating at the mouth of the Buona Vista MRT interchange. The generous reserve of public space built on open land helps to encourage a network of pedestrian activity, and thereby generate opportunities for engagement. A continuous line of retail shops located along these public spaces further encourage vibrancy evenly across Vista, distinguishing it from the more modest placement of retail units in the other Precincts. The interstitial spaces between the heritage bungalows also create variation in the spaces within the action zone.

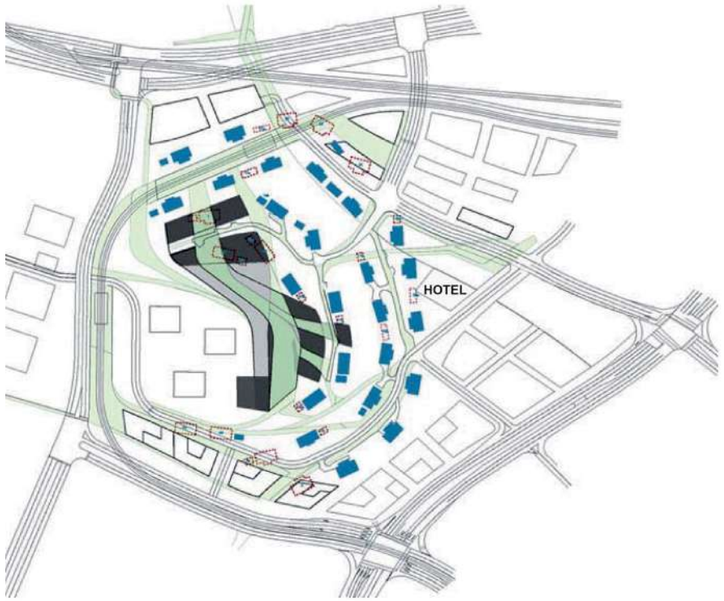
Middle-Scape: Shaping Dramatic Buildings

Vista built-to-building line plan.
Source: JTC

- Primary Built-to-building Line
- Secondary Built-to-building Line
- Protrusion allowed
- Primary Building Height in mAMSL

The UDGs for Vista explicitly allows for protrusions in its middle scape, especially for inward-facing façades. Coupled with the primary built-to-building line along the main roads such as North Buona Vista Road and the road along the MRT viaduct, this strategy has helped to suggest a holistic urban block for the entire Precinct while allowing for interesting forms within the block. For this reason, 10 storeys of residences extend from Rochester Mall across the Rochester Drive to create an unusual building form and a more interesting streetscape.

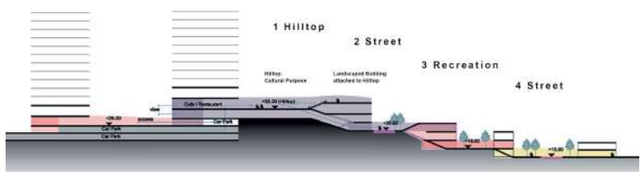
Secondary built-to-line suggests building lines within the parcel to further break the development down to deliver a more human scale experience on the ground and lower storeys. The naturally ventilated design of Star Vista, whose ground floor comprises a series of pedestrianised paths carved out of the overall building form is an application of this concept.



Vista Xchange built to building line plan. *Source: JTC*

- Retained bungalows
- Demolished bungalows
- New fabric in heritage
- Existing fabric
- New fabric in heritage/ Rochester district

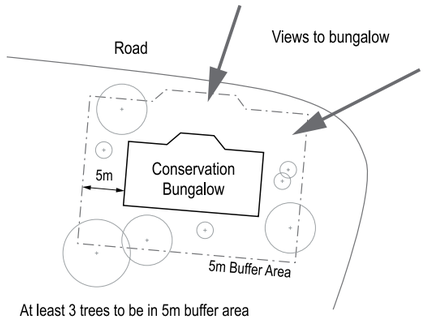
- Building line
- Direction of programmatic extension

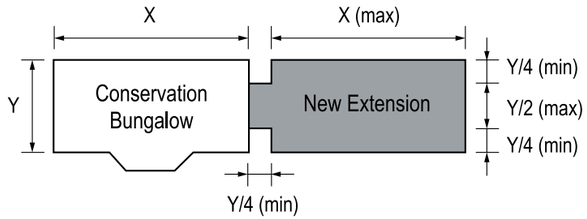


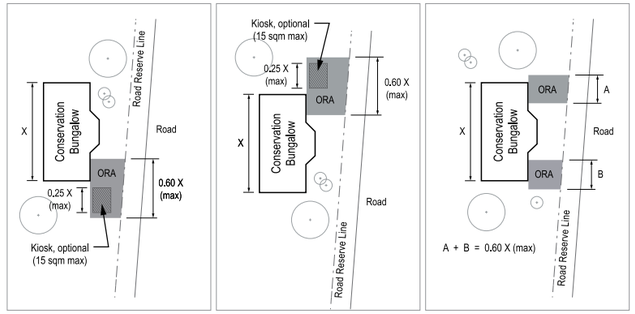
Terraced programmatic distribution

With VX-6 having one of highest ground levels in one-north, the terrain of Vista provides opportunities for a terraced programming. When viewed from the hilltop, amidst the heritage bungalows, the terraced terrain looks even more layered and nuanced. Over time, programming of the sightlines of each additional development can further enrich this view of Vista.

Conserving Heritage Buildings as Landmarks







Left: Urban design guidelines on the buffer of greenery to be introduced around conservation bungalows. *Source: JTC*
Right: Urban design guidelines on the proportions of new extensions in relation to the conservation bungalows. *Source: JTC*

Top & Bottom: Outdoor refreshment area at Rochester Park. *Source: JTC*

From the onset, JTC considered appending the conservation bungalows in Rochester Park with more ORAs. Applying the principles of maximum retention, sensitive restoration and careful rehabilitation of the site, these UDGs ensured that the conservation bungalows would not be outshone by its new extensions, while giving flexibility and space for adaptive reuse. A 5-metre buffer area around each bungalow also helped to maintain appropriate spacing from driveways for lush landscapes to grow around it.

UDG in Action: Rochester Commons, Combination of New and Old

Interestingly, some of these bungalows have since taken on a new form as an upcoming integrated development known as the Rochester Commons. This development combines parcels previously listed as VX3-1 with parts of VX-2 and VX4-2 into an old-new mixed-use development comprising offices, education, hotel and retail. This combination of land uses differs from the initially planned residential and retail uses—again reflecting the fluid nature of the master plan to adapt to changing needs.

Rochester Commons Campus.
Source: CapitaLand

As the first development within the VX-3 sub-precinct, the Rochester Commons set a precedence for its future neighbouring development in terms of ground-level design and location of public spaces. Working around the UDGs' requirement to provide vehicular access from Rochester Park Road as well as underground service areas, the project proposed for the public space to be located along North Buona Vista Road, abutting the boundary of the adjacent parcel. By doing so, the architects of the project—DCA Architects—saw the potential for the public space to double in size not only for Rochester Commons, but for its future neighbouring development, should that plot of land reciprocate and mirror their plans for their boundary. The proposed location, which is easily accessible from the existing bus stop, allowed the architects to leverage URA's Privately Owned Public Space scheme and obtain gross floor area exemptions for the development.

Top: Rochester Commons Driveway. *Source: CapitaLand*
Middle: Pedestrian and vehicular circulation plan for the ground floor of the Rochester commons demonstrating the intended arrival from the roads and bus stop. *Source: Hexacon*
Bottom: Knowledge Trail. *Source: CapitaLand*
Right: Site plan of the bungalows at Rochester Commons. *Source: DCA Architects*

At first glance, the project abides by the primary built-to-line by creating a continuous street edge to demarcate the perimeter of Vista along the main road, much like other projects in one-north. However, the flexible land-use parcels behind the tower and the allowance for protrusions stipulated for Vista, gave rise to the design of a Shared Executive Learning Centre, which will have a roof-top outdoor event space branching out onto a publicly accessible boardwalk leading to nearby heritage bungalows, known as a Knowledge Trail.

The first use of such a boardwalk design to connect new developments to conserved bungalows while touching the park has been supported by JTC. That said, in line with the intent to preserve the visibility of the bungalows, JTC suggested that the design and materials selected for the Knowledge Trail roof be such that pedestrians on the street could still have sightlines of the bungalows. Light fins and a curvilinear roof profile were thus proposed by the architect to achieve this, while allowing for light to filter into the Knowledge Trail.[12]

Mediapolis: Repositioning the Precinct

Mediapolis master plan and urban design strategies. *Source: Bernard Tschumi, JTC*

Beyond the issue of ensuring consistency in urban design, the developers of one-north saw the opportunity to seed the media industry into the heart of one-north. The industry was young and modest at the time of seeing and large scale media companies were yet to be active in Singapore. Compared to neighbouring countries in the region, Singapore's media industry lacked the necessary skillsets and infrastructure to compete at a world class level. But flexibility and robustness of the one-north master plan and urban design strategies were adaptable enough to accommodate a different industry profile that one-north was to host. Seeding select parcels for the media industry keeps the site ready for future evolution and growth. The lesson learnt is that the original visionary ideas are not set in stone and should not be implemented just for the sake of doing so.

Infinite Studios. *Source: DCA Architects*

The incompatibilities between the one-north's building requirements and the work-related requirements of the media companies began to surface when talks with a seeding media company—Infinite Studios—commenced. Planners had reviewed the land area needed to meet the needs of the company including soundstages and formulated the required parcellation accordingly. The need for large and flexible back-stages meant that ground-level services were necessary for the ease of transport and set up of media equipment. These requirements conflict with design guidelines that limited vehicular access and preferred basement services as are prevalent throughout the rest of one-north. Furthermore, filming environments require high and opaque fences around large plots of land to provide a high level of confidentiality demanded by studios. These factors contradicted the overall goal for open and publicly accessible streetscapes designed for pedestrians championed in one-north. JTC then worked with Infinite Studios to put in design mitigations to address these potential disamenities, while meeting the urban design intent for public facing areas within the development.

That said, the benefits of seeding developments in one-north have helped put some UDGs in action even before the rest of the Precincts were developed. Early buy-in regarding the buffer park was sought and given by the client and architects—Infinite Studios and DP Architects respectively. This helped to set the tone for the green spine that today sweeps across the northern edge of Mediapolis towards the historic Portsdown Road. In so doing, it helped lock in the idea for subsequent developments to follow suit, thereby ensuring that the legacy of ideas is passed down over time.

"All parties agreed that it was not right to have the trucks entering and exiting next to the buffer park. We felt that a better interface between the development and nature would be beneficial for the people. It was thus a conscious decision to keep the vehicular access away for a more people friendly edge."[13]

– Chin Thoe Chong, Director, DP Architects

MediaCorp, the key tenant of Mediapolis, has nevertheless benefitted from the generous allocation of space for the media industry. Most notably, its urban form comprises a platform which has potential to connect one-north Park across the Ayer Rajah Expressway, with the broader vision of facilitating dual use, as a public park and an event space for place making, with the one-north Park area adjacent to it.

A WORK IN PROGRESS

Building Community through Place-Making

one-north has been seeding unique F&B concepts to help shape its distinct look and feel. Timbre+, which is located along Ayer Rajah Crescent beside the Launchpad@one-north, marries the start up nature of its vibrant vicinity with the F&B and entertainment industry. Today, it is recognised for its unusual blend of food stalls and music performances in the local food scene. A bona fide part of one-north as an innovation district, it also has an F&B incubator programme that sets aside stalls for new food entrepreneurs to test out their culinary ideas.

Timbre+, a food hall catering to the working population in one-north, is known for its vibrant food and music scene. *Source: JTC*

In addition, one-north has been able to leverage its pedestrian-centric urban environment to step up car-lite initiatives. In 2019, about 60 metres of Fusionopolis Way were converted temporarily into pedestrian-only streets as a car-free weekend. Within two days of trial, community activities such as pop up installations and alfresco dining were also allowed to spill out onto the roads. This helped to seal one-north's reputation as a hub that is willing to experiment with new place-making ideas. JTC has also made plans for 6 km worth of 1.5-metre footpaths to be widened by one to two metres, to accommodate covered linkways and cycling paths.

Upcoming Projects

Increasing Residential Footfall

Beyond being an innovation district, one-north has also recently added a co-living development to the area to synergise alternative living models for potential residents. Lyf is a global provider of co-living spaces in Fukuoka and Singapore, with ongoing developments in major cities across other countries including Australia, China, Malaysia, Philippines and Thailand. The introduction of Lyf in one-north may attract young local professionals, expatriates and perhaps even short-term working travellers, thanks to its network of developments in the region. In so doing, one-north is essentially opening itself up to a cosmopolitan live-in population, who likely share the same forward thinking perspectives as this innovation district.

In the same vein, while the upcoming HDB Build-To-Order (BTO) estates are not situated within one-north itself, there are BTO estates around the nearby Alexandra area, suggesting a likely increase in young couples and families living in the vicinity. As this has the potential to bring higher footfalls into one-north, it might prove worthwhile to look at ways to rework the Mediapolis, Wessex and Ayer Rajah area to suit the lifestyle of the new residents living in the neighbourhood.

Shaping the Future

As custodian of one-north, JTC has set the tone for the urban design and development of the estate since the early stages of masterplan's life cycle. Today, the detailed UDGs set by JTC continue to steer and steward one-north towards its grand vision, while staying nimble and adaptable to changing circumstances.

The case studies and built examples listed here are proof that a strong set of UDGs, coupled with creative buy-in and a rigorous implementation processes, can turn site constraints into opportunities. One great example of this is the undulating terrain of one-north which was originally thought to be an impediment to pedestrian circulation, but has now been translated into valuable features stitched across multiple access levels for enhanced vibrancy.

While the vision evoked by the entire master plan has yet to be completely fleshed out, one-north in its present state already bears witness to a semblance of what the complete picture may look like when the entire development has come to fruition. In essence, the vision is of an innovation district with segments of beautiful vistas, pleasant walks and breezy thoroughfares. Intended as a business and work environment, the unhurried development timeline set in mature and modern Singapore could well be one of the few opportunities for this generation to witness such a comprehensively master-planned, urban-designed and architecturally-designed development as it unfolds. The UDGs are set to continue to evolve, drawing from past setbacks and successes, the experimental urban design ideas captured within will remain a treasured embodiment of this age of innovation, and a testament to the pay-offs that come from a willingness to try something new.

ANNEX: GLOSSARY OF EXPERIMENTAL URBAN DESIGN IDEAS

Term	Definition
Precinct	Precinct refers to the sub-districts of one-north, as defined in the key map (see page 87).
Activity Node	Activity node refers to the central location of social activity within a precinct.
Ground-scape	Ground-scape refers to the multi-levelled ground floor of one-north buildings due to height variations in its natural topography.
Middle-scape	Middle-scape refers to the mid-level massing and façades of buildings in one-north, where their vertical surfaces define the shape and proportions of the spaces in between buildings.
Roofscape	Roofscape refers to the apex of each building, which act like pieces of a larger puzzle—a continuous undulating surface across the district that can be appreciated from afar.
Urban lobby	Urban Lobby refers to the high volume public space embedded within building clusters. They contain amenities that generate activities and user engagement.
Mitigation Zone	Mitigation zone refers to the area between the outdoor and indoor public space of an individual parcel such as the covered walkway, lobby, public plaza with seamless integration between the buildings and its external surroundings.
Built-to-line	Built-to-line refers to building envelope guidelines which create a distinctive and continuous street wall.

[1] Chong Lit Cheong, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 18 July 2018, transcript, accession number CLC/047/2018/008.

[2] Arthur Aw, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 23 August 2020, transcript, accession number CLC/058/2020/005.

[3] Ibid.

[4] Ibid.

[5] Aloysius Iwan Handono and Tang Hsiao Ling, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 27 August 2020, transcript, accession number CLC/058/2020/003.

[6] Ibid.

[7] Kenneth Kong Yau Kwan, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 27 October 2020, transcript, accession number CLC/058/2020/011.

[8] Ibid.

[9] Ibid.

[10] Richard Soon and Kong Choong Kit, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 5 February 2021, transcript, accession number CLC/058/2021/017.

[11] Ibid.

[12] Sim Ming Howe, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 8 March 2021, transcript, accession number CLC/058/2021/018.

[13] Chin Thoe Chong, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 25 November 2020, transcript, accession number CLC/058/2020/014.

one-north. *Source: JTC*

"It should be a way of life to keep the water clean, to keep every stream, every culvert and every rivulet, free from unnecessary pollution. In 10 years let us have fishing in [the] Singapore River and fishing in the Kallang River. It can be done."[1]

— Lee Kuan Yew, Prime Minister of Singapore (1959 to 1990)

Fullerton Building and the Anderson Bridge across the Singapore River in the 1940s.
Source: NAS

3

SINGAPORE RIVER: DEVELOPING WITH A SENSE OF HISTORY

Today, the Singapore River is a vibrant activity corridor which capitalises on its riverfront location and unique historical character. It has a strong identity which has been built up over time, and its attractiveness as a place for leisure activities and quality waterfront housing did not come about by chance. The successful transformation from a working river to what it is today is a result of decades of planning with a clear vision and sensitive urban design on various scales. The Singapore River exemplifies Singapore's integrated planning, urban design and conservation approach to transform the city and serves as an inspiration for many precincts both locally and overseas.

CREATING A VISION

The Singapore River Clean-Up – Marking the Start of the Transformation

The transformation of the Singapore River started in 1977 when Singapore's then-Prime Minister, the late Lee Kuan Yew, threw down the challenge to clean up both the Singapore and Kallang Rivers. The Singapore River's close proximity to the fast-developing Central Business District and its loss of relevance as the centre for trade, since it could no longer cater to modern shipping activities, created both a need and opportunity to clean up the polluted waters.

Responding to this challenge, a campaign involving several government agencies was undertaken to remove sources of pollution.[2] Squatters and farmers were resettled, backyard trades and industries relocated and street hawkers re-sited. The clean-up took 10 years, spanning from 1977 to 1987.

The Central Area Structure Plan published in 1978.
Source: URA, 1978/79

The Need to Give New Economic Value

With the removal of polluting trades and industries, the Singapore River was successfully cleaned up. However, vibrance brought about by those activities were also removed. There was a pressing need to review the use of land adjacent to the Singapore River to give it a new lease on life.

As Singapore's population continued to increase, careful planning of the limited land resources was required—in particular, the planning and redevelopment of the strategic Central Area as the business and financial hub for Singapore to support economic growth.[3] This need drove the formulation of the Central Area Structure Plan in 1978, which showed the Singapore River as a mixed-use precinct with a commercial core of hotels at the upriver end. In addition to the positioning of key precincts, the plan also envisaged a system of major and minor open spaces supported by a comprehensive pedestrian network through the provision of pedestrian walkways, pedestrian malls, underpasses, and so on. Under this plan, the existing service roads and loading/unloading areas fronting the river were planned to be transformed into tree-lined promenades for strolling, boating and perhaps even fishing[4] as part of the pedestrian network.

The Urban Redevelopment Authority (URA) was tasked with planning the redevelopment of the Singapore River area with the aim of giving it a new identity and vitality ahead of the completion of the clean-up in 1987. The broad vision was to enhance its attractiveness to the residents and tourists, and to highlight the Singapore River as a valuable and unique feature of Singapore's cityscape.[5] At that time, there was a general thinking that even as Singapore develops into a cosmopolitan city, some existing precincts and historic buildings should be kept in order to retain its history for future generations. This tied in with the URA's plans for conserving select areas in parallel to preparing concept plans for development areas such as the Marina Centre and Orchard Road.

"Singapore's future urban redevelopment needs to envisage the transformation of Singapore into a modern metropolis with high standards in design, building and construction while retaining its unique and desirable local characteristics."[6]

– Koh Cher Siang, Acting Chairman, URA (1980)

The Conservation of Historic Districts as a Timely Approach for Singapore's Development

In the late 1970s, when Singapore's economy was experiencing some sluggishness, tourism was seen as a key driver to move the economy forward. However, there was a lack of suitable tourist attractions then. Pamelia Lee, who was with the Singapore Tourism Board at the time, helped to use tourism to make a strong case for conservation of historic districts so that visitors coming to Singapore could see the rich culture and heritage of the country through the conserved buildings. While tourism was a key driving factor, the benefit of providing Singaporeans with a sense of identity and history provided additional motivation for the conservation of historic buildings.

"That's why we were able to save all these buildings. That's why we have Singapore River with its buildings being conserved."[7]

– Goh Hup Chor, Deputy Chief Planner, URA (1989 - 1996)

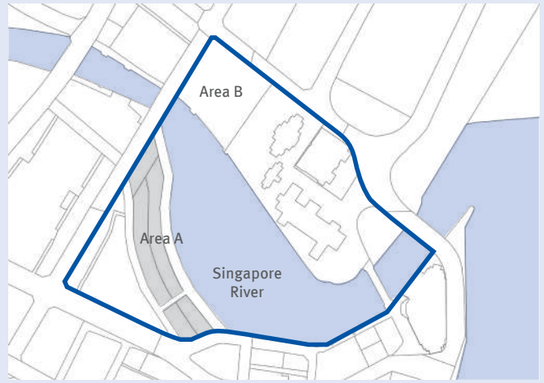
As aptly shared in Mrs Pamelia Lee's chapter "50 Years of Urban Planning & Tourism":

"Singapore's planners in the 1980s drew generous lines. Hence, today, Chinatown, Little India, and Kampong Glam are good-sized historic districts. In Singapore, visitors get to enjoy not only one street, but also a collection of streets and multiple rows of shophouses…we are also grateful that the stepping of building heights took place so our historic areas enjoy light and air and are not overwhelmed by surrounding high-rise buildings. We are so glad that familiar places still exist and are recognisable!"[8]

Public Competition: Ideas Wanted for the Conservation of the Singapore River in 1983

Given that the preliminary intent to retain the districts' historic character and the conservation of key buildings while creating a new identity was a relatively new concept then, a public competition, jointly organised by the URA and the Singapore Institute of Planners (SIP), was called in 1983 for the conservation and adaptive reuse of Boat Quay and Empress Place to "foster interest in the conservation of historical sites in Singapore".[9]

Right: Location plan for public competition in 1983. *Source: URA, 2022*



An artist's impression of a proposed Chinese Inn with internal courtyards introduced by demolishing the rear portions of two rows of back-to-back shophouses. The illustration was part of the BuYeTian proposal submitted in 1983. *Source: Bu Ye Tian Enterprises Pte Ltd (now dissolved) and William Lim Associates, 1983*

Given its strategic location, the competition attracted a lot of interest and gained the attention of several groups who were interested in the potential for adaptive reuse of the buildings at Boat Quay. On the same day as the launch of the public competition, a group of businessmen and professionals who called themselves "Bu Ye Tian Enterprises" made public a $52 million conservation proposal for Boat Quay.[10] The proposal "BuYeTian"—which literally means "without night and day"—aimed to turn two rows of shophouses and the surrounding area into a commercially feasible cultural centre.[11]

The public competition and the publicity generated by the BuYeTian proposal helped to acquaint the general public with the idea of conserving the old buildings at Boat Quay. The competition affirmed support for the conservation approach with The Straits Times proclaiming that "What the young ones want…[is a] modern city flavoured with the past" in the headline of a 1983 article.[12] The positive response and unexpected enthusiasm from the younger generation helped crystalise the approach and even catalysed efforts to feature the history of the districts as part of the Singapore River Concept Plan.

THE SINGAPORE RIVER CONCEPT PLAN AND ITS REALISATION

In 1984, the URA drew up the Functional Zone Plan which identified main development areas within the Central Area. Each area had a set of guidelines on land usage and the permittable form, size and height of buildings, or in other words, a building envelope, to strengthen the overall structure of the city.[13] This meant that the plan was not simply conceived with two-dimensional allocation of plots off a map, but sculpted according to a three-dimensional vision for the city.

"We tried to address the three-dimensional aspects of planning places, taking the land use into consideration and then giving it a three-dimensional form, focusing more on the external, focusing more on the public areas, focusing more on how people would see the city, rather than on controlling the individual plots."[14]

– William Ong, Director (Project Services), URA (1992 - 1994)

In 1985, building on the 1978 Central Area Structure Plan and the Functional Zone Plan from the year before, the URA further developed and crystalised the approach for the Central Area with high-density corridors along MRT routes, while retaining the low-rise fine-grained historic districts, as part of the Central Area Structure Plan.

The Functional Zone Plan published in 1984.
Source: URA, 1984

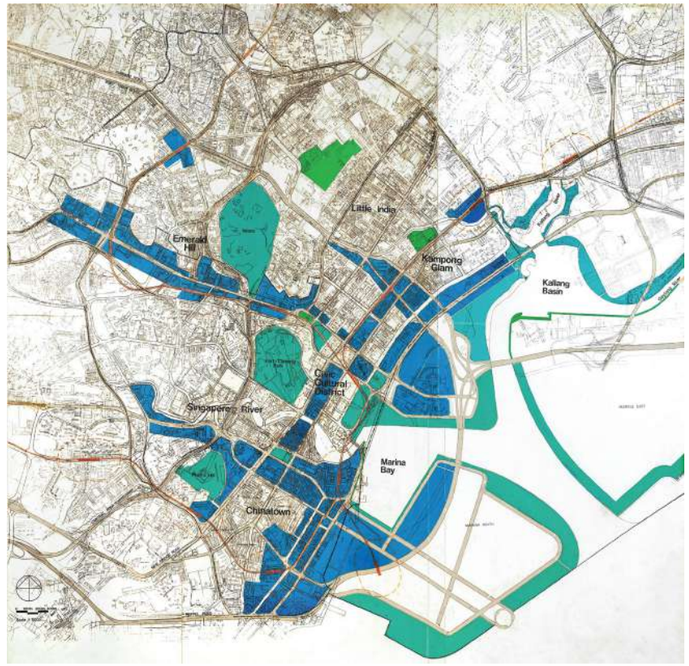
- Commercial (Office/Banking)
- Commercial (Office/Shopping/Hotel)
- Mixed Development (Commercial/Residential)
- Residential
- Institutional/Civic/ Cultural
- Open Space/Recreational
- Industrial/Warehouse
- MRT Station Development

"We set lofty but realistic visions. The goal is to do something good for the people and good for the land–for the people, make it liveable, prosperous, and happy; for the land, make it sustainable, with good ecology etc.... Every plan and every building must convey a message, so that when people come, they understand what this building is about and how it is organised. When you come to a city, you understand how the city is laid out, very easy to read the city and you don't get lost."[15]

– Dr Liu Thai Ker, Chief Executive Officer and Chief Planner, URA (1989 - 1992)

The Central Area Structure Plan 1985 showing the historic district blending harmoniously with intensively developed areas along the MRT routes.
Source: URA, 1985

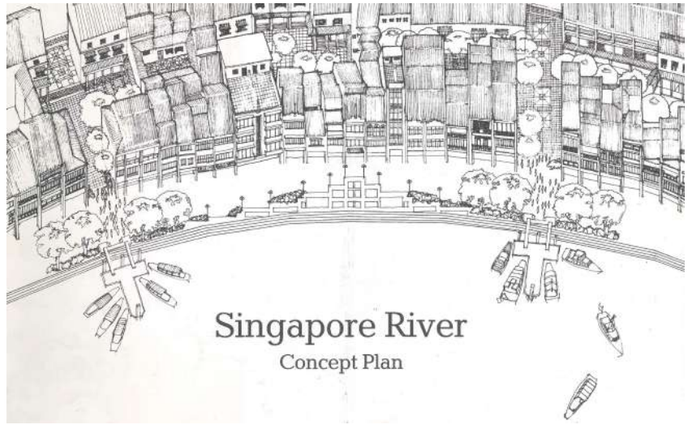
- Intensive Development Area
- Major Green Space
- Historic District
- Major Roads
- MRT Stations



At this point, the Singapore River was at its last stage of its physical transformation in terms of the clean-up. The URA's 10th anniversary annual report outlined an intention to reinvigorate the area by giving it a new lease of life with new developments, adaptive reuse of buildings that merit conservation, and carrying out environmental improvement along both of its banks to encourage recreational activities and a pedestrian-friendly environment.[16]

Singapore River Concept Plan

Guided by the 1985 Central Area Structure Plan, the URA formulated the Singapore River Concept Plan, which was unveiled to the public on 8 September 1985.[17] This plan included the positioning of the three quays, with the development approach customised for each quay that took into consideration the differences in land ownership between the areas, and worked into an overall vision for a network of pedestrian malls and promenades.



The Singapore River Concept Plan 1985. *Source: URA, 1985*

The objectives outlined in the 1985 Singapore River Concept Plan, were to:

a) Create a new identity and character for the Singapore River by retaining old buildings of architectural merit and historical importance, developing new buildings to carefully controlled scale and introducing river-oriented activities;

b) Make the best use of the land along the riverbanks such that all developments would enhance the character of this important natural asset of the city; and

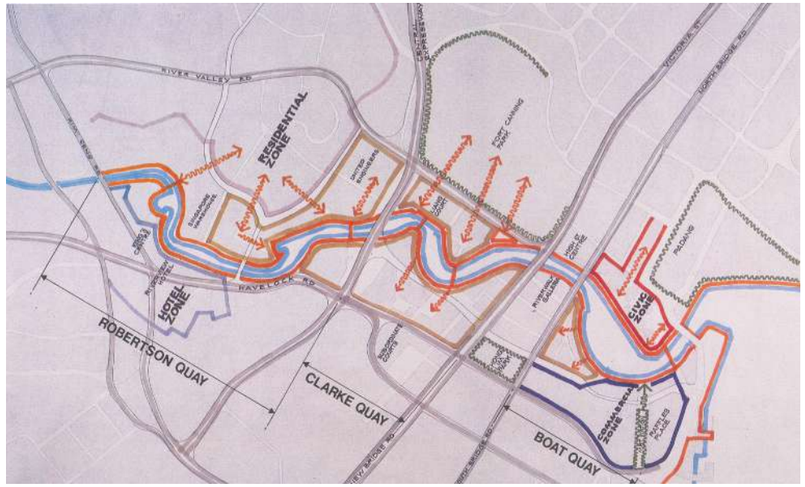
c) Give the river a new economic role by generating activities which will meet the recreational and leisure needs of both tourists and Singaporeans.

Under the plan, the Singapore River was divided into three quays with the existing character of each quay taken into consideration. The proposed strategic aim for each quay was:

- **Boat Quay**: to have small hotels, shops, restaurants and entertainment venues. The existing shophouses were to be retained to form a charming contrast to the high-rise towers of the Golden Shoe Business District. Food establishments and retail shops were to be located on the first storey of the shophouses.

- **Clarke Quay**: to retain the cluster of warehouses and shophouses to be used for restaurants, dance and music studios, health fitness clubs, commercial schools and showrooms.

- **Robertson Quay**: to have hotels, residential and entertainment areas. Some warehouses in this area would be retained and integrated in new development where possible.



Analysis plan showing the three quays in The Singapore River Concept Plan 1985. *Source: URA, 1985*

Pedestrian Mall
Pedestrian Link
Open Space

In addition, both banks of the river were envisaged to be converted to landscaped pedestrian malls. Under the Singapore River Concept Plan, the implementation strategy for a public-private partnership was outlined as well. The Singapore government's role was to provide the planning framework, infrastructural facilities or support and to oversee the actual implementation of the projects.

The approach to retain the historic character of the Singapore River helped set the tone for its urban renewal. Conservation and sensitive urban design worked together to weave the old and new into a strong identity, distinctive from the other precincts, which the Singapore River has today.

"Good urban design not only helps the city to function efficiently, but also shapes a distinct cityscape and improve the quality of the living environment."[18]

– Michael Koh, Group Director (Urban Planning & Design), URA (2003 - 2006)

Boat Quay in the 1950s. *Source: NAS, Courtesy of Arthur B. Reich*

Conserving and Developing at Compatible Scale

As the lifeline and centre of trade of Singapore's entrepôt port, merchants were quick to build offices, warehouses and jetties along the banks of Singapore River. Boat Quay was the first to have such buildings from as early as 1823, followed by Clarke Quay and subsequently Robertson Quay. While the architectural styles differed, these buildings were typically three to four storeys, with a pitched roof angled perpendicular to the Singapore River, creating the low-rise, fine-grained building forms that lined the Singapore River.

As laid out in Raffles' 1822 Town Plan of Singapore, also known as the Jackson Plan, buildings generally included 5-foot ways to protect pedestrians from the tropical sun and rain. The 5-foot way was a key feature of the shophouse and warehouse typology and gave rise to a network of sheltered walkways lining the streets and riverfront.

These building forms and the sheltered pedestrian network provided a basis and inspiration for the subsequent urban design strategies that were adopted for Singapore River under the Singapore River Concept Plan, which were in turn translated into the detailed Development Guide Plan (DGP).

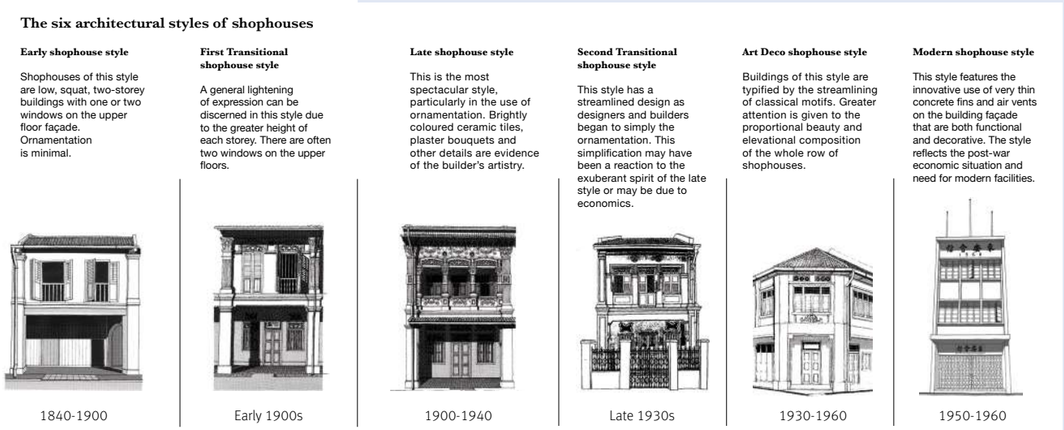
Shophouses—a Unique Typology in Southeast Asia

The shophouse is a unique typology that had been created by the British in Southeast Asia. As described in Singapore: A Pictorial History, 1819-2000:

"...the plan called for a network of roads and streets of specified widths laid out at right angles, for uniform plots of land to be divided and sold for a linear arrangement of commercial buildings and linked shophouses of specific width and uniform façades not exceeding three storeys. An arcade-like covered passage–the 5-foot way—was introduced for the sake of regularity, conformity and weather protection."[19]

– Gretchen Liu, journalist, author and editor

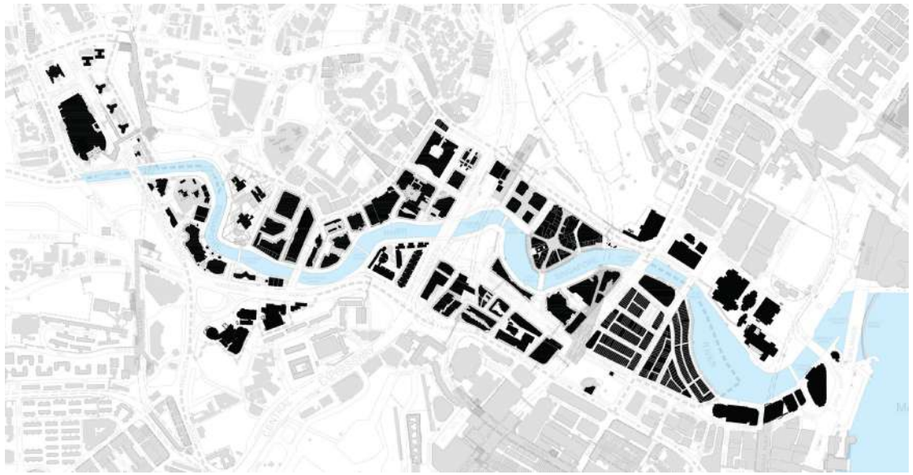
The 5-foot way was introduced in the Raffles Town Plan, and soon became an important feature of Singapore's unique shophouses. As the various communities evolved over time, six architectural styles for shophouses emerged, yet all retained the 5-foot way as a consistent design feature. In addition, the Plan also allocated land south of the Singapore River for the Chinese ethnic group and Boat Quay became a key trading area. Even today, Boat Quay has a mixture of early, transitional and art deco styles with a strong Chinese influence since many of these shophouses were owned by Chinese merchants.



The six architectural styles of shophouses in Singapore. *Source: URA, 2019*

Urban Pattern: Retaining the Historic Fabric

The development of Golden Shoe Area, which occurred in the 1970s to 1980s, saw the amalgamation of privately-owned land parcels that formed larger plots for redevelopment to cater to new office needs. This was in contrast to the approach taken for the Singapore River, which sought to retain the historic fabric of streets, and maintain the fine grain of smaller street blocks characteristic of the time when it was first developed, with the exception of Robertson Quay, where there had already been a mix of large and small plots. The narrow roads serving the shophouses and warehouses were retained and not widened according to more modern guidelines. Some streets were pedestrianised in order to retain their original scale.



A Nolli Map of Singapore River showing the street blocks of conserved bulidngs along the existing streets to retain the urban fabric. *Source: URA, 2022*

Boat Quay

Earmarked in the Singapore River Concept Plan as one of the three pilot areas in the first phase to kickstart the repositioning of Singapore River, the overall intention for Boat Quay was to restore its surrounding 3- and 4-storey shophouses and to inject new uses. In terms of the physical form, these shophouses were meant to form a charming contrast to the high-rise towers of the Golden Shoe area.

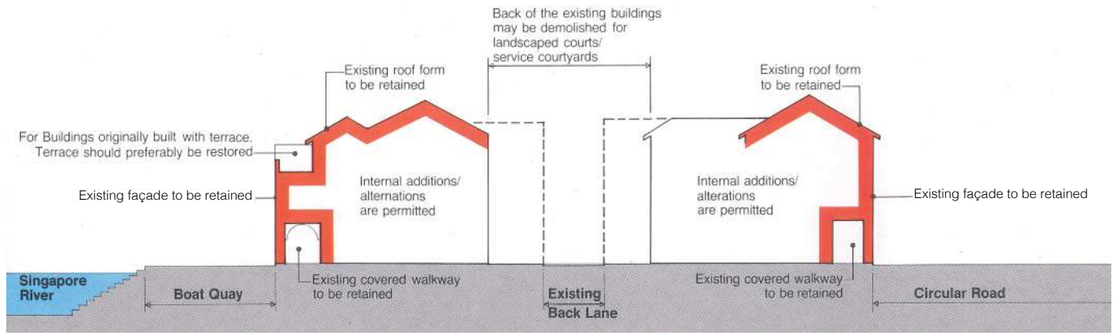
Even though the guidelines for Boat Quay were first released in 1985 and were soon followed by various engagements with the owners organised by the URA, most of the restoration works only started in 1989. The conservation and adaptive reuse was for the entire area at Boat Quay and involved several street blocks, ensuring that shophouses fronting Circular Road, Lorong Telok and North Canal Road were included, thereby retaining the historic character in both architecture and street layout.

"We got bolder by each day. At the start, we only identified the front row of Boat Quay to be conserved, but not the Circular Road side. As we worked further on it, our appetite got better and we decided we shall conserve the whole area to be more meaningful. But it was not easy, especially with the number of owners involved. We gave them deadlines to make planning submissions, start work and complete to get Temporary Occupation Permit (TOP). I had to personally hold many rounds of meetings with the owners and put pressure on them. We had a big plan to monitor the progress of every shophouse one by one to keep track of the progress."[20]

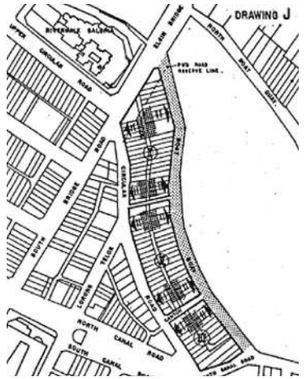
– Koh-Lim Wen Gin, Chief Planner and DCEO, URA (2001 - 2008)

To demonstrate the commitment to transform the area, a series of projects to improve the public amenities for the area and to support the adaptive reuse of these shophouses were undertaken. One of the works carried out was the restoration of the back lane between Circular Road and Boat Quay so that supporting underground infrastructure, including sewer pipes and electricity lines, could be brought into the area to serve these shophouses. The shophouse owners were given a deadline to demolish their own back-to-back rear extensions so that supporting infrastructure required for the new uses could be provided. Removing these extensions, which had been added and modified over many years, also helped to restore the buildings to their original design.

Schematic section showing the retention of the building envelope and the demolion of the rear extensions in the Planning and Development Guidelines for Boat Quay Conservation Area 1985. *Source: URA, 1985*



Earlier Plan for Boat Quay as One Comprehensive Development



Schematic plan showing the concept of creating courtyards for each block if shophouse owners agree to jointly develop as outlines in the Planning and Development Guidelines for Boat Quay Conservation Area 1985. *Source: URA, 1985*

- Landscaped open space
- Internal landscaped courtyard
- Internal covered link

The URA had initially planned for Boat Quay to be developed in an integrated manner despite the individual ownership of 117 shophouses as outlined in the Planning and Development Guidelines for Boat Quay Conservation Area of 1985. The intention was to have all the owners jointly submit proposals to restore their shophouses, with the works to start by September 1988. While the front façades were to be conserved, the initial concept for Boat Quay was to have large rear courtyards for each block of shophouses as shown in the schematic plan on the left.

The shophouse owners had the option to submit proposals in one of the following ways:

a) Three separate developments consisting of Parcels I, II and III;
b) Two separate developments consisting of either
   - Parcel I and II combined, Parcel III separate; or
   - Parcel II and III combined, Parcel I separate; or
c) One single development consisting of Parcel I, II and III combined.

However, given the number of owners involved, achieving a consensus proved challenging, and the middle-block owners broke away from the overall project. The URA was quick to adapt to the situation and revised their guidelines in July 1988 to allow for individual owners to make submissions to restore and rehabilitate their buildings.

Allowing for some flexibility enabled businesses to continue to function, while still achieving the planning goals, which were governed by clear development timelines and consequences for not complying. To ensure the revitalisation of the area, properties that did not comply with requirements faced being acquired.

"If buildings are not rehabilitated by 1991, the government may be compelled to take measures to help it achieve its objectives for the Singapore River area. One of the measures it may be compelled to consider is the acquisition of the properties."[21]

– Spokesman of the URA, in a press release dated 31 Mar 1989

Concurrently, the URA also successfully tendered out the buildings at Clarke Quay, with conditions on their conservation and injected them with new uses. This boosted the confidence of the neighbouring Boat Quay shophouse owners regarding the commercial value, viability of restoration and adaptive reuse of their properties.

"It was my belief that the Government should never acquire properties, carry out the restoration works and then sell back to businesses. My argument was that while we know how to restore the old buildings, we do not know how to use the buildings. Only the businessmen do. So we should leave the works to them so that the works would suit their business needs, with them observing the guidelines. We can give them a moratorium before we consider acquisition."[22]

– Goh Hup Chor, Deputy Chief Planner, URA (1989 - 1996)

Policies and Incentives to Facilitate the Boat Quay Restoration

As many buildings in Boat Quay were under the Rent Control Act, the tenants were paying rent at a much lower rate than market rates.[23] As a result, there was little incentive or means for the owners to upkeep their buildings given the low income they received from rental. With the lifting of rent control for conserved properties in October 1988, owners of rent-controlled properties began to repossess their properties and obtain approvals to carry out conservation and restoration works that enabled landlords to use their properties for more profitable and higher-value uses.[24]

In addition, the URA also worked with other agencies to encourage owners to restore their buildings through various incentives, which included:

- Waiver of Development Charges: Development Charge[25] is a tax that owners have to pay for the enhancement in land use. The waiver of this tax resulted in substantial savings for the owners;
- Elimination of carparking requirements: The deficiency charge for carpark lots at a one-time rate of $32,000 per lot was therefore not applicable, resulting in cost savings; and
- Provision of assistance to owners who needed to relocate their elderly single-person tenants through the Tenants' Compensation Board.

Together with the gazetting of the Conservation Master Plan in 1989, these efforts provided the impetus for the old shophouses to be rehabilitated and for conservation in general to proceed at a faster pace.

Empress Place. *Source: URA*

Empress Place

As highlighted in the Singapore River Concept Plan, North Boat Quay—now called Empress Place—had been the government and civic centre of the island. The historical buildings set within picturesque open spaces in this area captured the feel of old Singapore well, warranting its preservation. In 1986, the URA further developed and completed the master plan for the civic and cultural centre called the Heritage Link, which included the adaptive reuse of the cluster of buildings around the Empress Place Building, Asian Civilisation Museum (ACM), Victoria Concert Hall and Theatre, Old Parliament House, and The Arts House.[26] These buildings were eventually gazetted as National Monuments and were turned into arts and culture venues. Whilst these National Monuments were given a new lease of life, the surrounding open spaces were retained, to complement the buildings and provide a setting for them. Similarly, the new Parliament Complex, which was undergoing development in the early 1990s, followed the URA's urban design guidelines to ensure that it was compatible with the adjacent national monuments, to mirror their building envelop with a large forecourt fronting the building.

Clarke Quay

Prior to conversion, Clarke Quay consisted of predominantly low-rise warehouses. Since the buildings and land parcels were mostly owned by the Singapore government, the development approach for Clarke Quay was different from that of Boat Quay. These parcels were sold through the URA's Government Land Sales programme, with specific conditions to realise the plans for the area. While Clarke Quay's development approach was different, the intention to keep the historic fabric was clearly demonstrated even as government sold the land to a single developer to undertake the redevelopment.

A. Clarke Quay Festival Village

In 1989, the URA sold more than 50 units of warehouses and shophouses—located on the north bank of the Singapore River—under one tender package to redevelop the area. These buildings were located on five parcels of land with local access roads separating them. The intention was to "revitalise Clarke Quay into a bustling entertainment and commercial hub with developments thematically related to the river".[27] Old streets such as Clarke Street and Read Street, and the riverfront, were pedestrianised and the existing warehouses and shophouses restored, thus retaining the historic fabric. As part of the sale of the site, tender submissions were required to include a proposed design and business concept which would be taken into consideration in addition to the tender bid price. The site was eventually awarded to Real Estate Holdings Pte. Ltd., a subsidiary of DBS Land, whose proposal aimed to bring back the charm of the old days with design elements that complemented the conserved buildings, extending to public furniture such as seating and lighting to reflect the 1930s design sensibilities. These features would then support carefully curated activities to generate vitality for the area.[28] For example, the developer also docked several restored *tongkangs* at the quayside for use as dining venues, while also acting as a reminder of the river's past as a centre for trade and commerce and enhancing the historic character of the riverfront.

Aerial view of the warehouses and shophouses at Clarke Quay in 1984, before conservation. *Source: URA, 1984*

Clarke Quay Festival Village: Key Milestone in the Strategic Repositioning of Singapore River

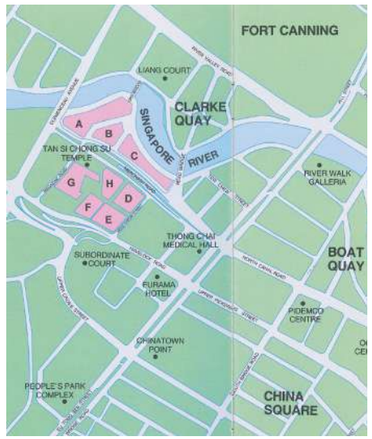
The sale of Clarke Quay attracted substantial interest from the private sector, with 126 tender packets sold. With a tendered price of $54 million in 1989 and a total development cost of $186 million committed, this project marked a key milestone for the repositioning of the river, as it demonstrated that these dilapidated old utilitarian buildings could be repurposed to have a greater visual appeal and new commercial uses. This helped to pave the way for future conservation and adaptive reuse of old buildings by showing that they had a potential commercial value proposition. The successful transformation of Clarke Quay highlighted the importance of public-private partnerships to the rejuvenation of the Singapore River.

Top: Restored warehouses along pedestrianised streets at Clarke Quay. *Source: URA, 1994*
Bottom: Revitalised warehouses and riverfront promenade at Clarke Quay Festival Village. *Source: URA, 1994*

"The government, through [the] URA as the conservation authority, draws up the master plan and the guidelines. It also provides some infrastructure and environmental improvements to the conservation areas. The private sector provides the enterprise and the creativity. Together, we produce refreshing designs for the adaptive reuse of the historic buildings. Rather than tearing down the historic buildings, we restore them and preserve their unique and architectural character. In the process, we also preserve the anchors and bearings that remind us of our roots and our sense of history."[29]

– Peter Sung, Minister of State for National Development (1988 - 1991)

B. Riverside Village



Top: View of a physical model of the Riverside Village, showing a juxtaposition of conserved and new developments on various parcels. *Source: URA*
Bottom: Various parcels released under the Government Land Sales programme at Riverside Village. *Source: URA, 1991*

On the south side of the Singapore River, a handful of buildings of architectural value were conserved. Taking an old-and-new development approach, the new buildings were guided to be low rise and specifically kept between four to seven storeys and integrated with the old conserved buildings. When the URA sold these land parcels at the Riverside Village in the early 1990s, they were sold as separate parcels rather than amalgamating them as a single large plot. The existing roads in the area, including Cumming Street, Angus Street and Fisher Street, were converted to pedestrian use. The integration of old and new buildings coupled with the pedestrianised streets helped to retain the historic fabric of the area and create a village-like atmosphere.

Robertson Quay

Retention of buildings as shown in the Planning and Development Guidelines for Robertson Quay. *Source: URA, 1985*

RETENTION OF BUILDING

- Existing building with good architectural value
- Extent of the façades/ building to be retained

Planned for hotel and residential use, with some shopping and institutional or cultural activities, Robertson Quay was envisaged to have a more relaxed and tranquil atmosphere than Boat Quay and Clarke Quay, especially since it was located upriver, farthest from the bustling, vibrant Raffles Place at the river mouth. The warehouses in the Robertson Quay area were mostly large and solidly built, and those determined to be of good architectural value were proposed for retention, with some to be integrated with new buildings. The warehouses earmarked for retention and adaptive reuse determined the parcel sizes, with some parcels amalgamated to make them suitable for redevelopment as residential or hotel developments.

Given that there were a substantial number of privately-owned plots at Robertson Quay, with many of them having long proportions, the approach taken was to retain the front grids of some of the warehouses without necessarily retaining the whole building. By doing this, property owners had more flexibility in redeveloping their plot for other purposes while keeping the envelope and some features of the original warehouses. The retained features provided stylistic continuity that maintained the unique character of the riverfront, and the flexible approach helped owners overcome the technical challenge of having a low platform level as the old warehouse buildings were adapted to support new uses.[30]

Parcellation plan of Robertson Quay as part of the Singapore River Concept Plan 1985. *Source: URA, 1985*

- Parcellation Boundary & Parcel Reference
- Private Land
- State Land
- URA Land
- PUB Land
- Recently Constructed Buildings

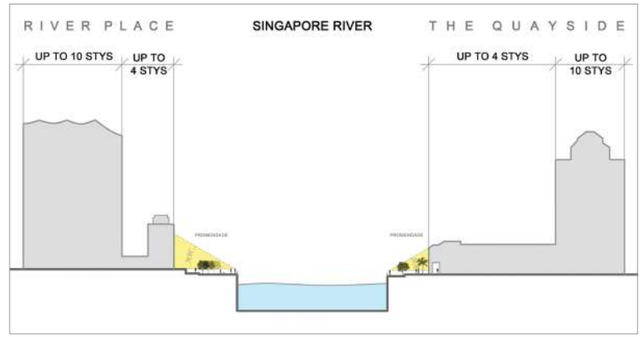
"It was an enlightened strategy of the URA to allow for partial redevelopment of the warehouse site after retaining a portion of the warehouse up to a depth of 16 m. This enabled the insertion of the communal facilities in the space between the warehouse on the riverfront and the new extension at the back. This adaptive reuse of the old and the new served to revitalise and conserve the ambience of the place."[31]

– Chan Sau Yan Sonny, Founder and Director, CSYA

Top: Redeveloped sites featuring this mixed height typology along the river include The Quayside and River Place. *Source: URA*
Right: Schematic section showing the maximum 4- and 10-storey building height typology at Robertson Quay. *Source: URA*

Some of the former warehouses which were retained in their entirety were gazetted for conservation in 2014. These included the Warehouse Hotel along Havelock Road and the Jiak Kim Street warehouses.

Since an old-and-new approach was adopted for Robertson Quay and with most of the land privately owned, the urban design guidelines allowed the owners to maximise the development potential of their plots while ensuring the new developments would keep the low-rise aesthetic for the riverfront which were characterised by the conserved buildings. The Robertson Quay Envelope Control guidelines addressed this by having mixed 4- and 10-storey building height typologies. The portion of the buildings fronting the river were limited to a maximum of 4 storeys and the remaining portions away from the riverfront were permitted to rise up to a maximum of 10 storeys. The benefit of these urban design guidelines on the building height was threefold. First, it ensured that new buildings were sympathetic to the shophouses and warehouses in scale so as to not overshadow them. Second, it kept developments along the riverfront at a human scale; and third, it enhanced the aesthetic appeal of the river by not crowding it with tall riverside structures.



Comparison with Buildings Prior to the Singapore River Concept Plan

Top: High Street Centre standing in contrast to the surrounding urban fabric in the early 1980s. *Source: URA*
Bottom: Liang Court in the 1980s. *Source: NAS, 1986*

The development of the Singapore River as laid out in the Singapore River Concept Plan took a more sympathetic approach to the existing fabric, and was a clear departure from the earlier sale of sites along the riverbanks, such as the Hill Street Centre, Liang Court and Riverwalk Galleria.

The Hill Street Centre and Liang Court were sold in 1968 and 1977 respectively, prior to the River clean-up. The Hill Street Centre in particular, was built as a resettlement centre to introduce a new modern way of high-rise, high-density living and working in the city. Both developments took up their entire street block and remain in contrast with the surrounding finer grain shophouses even today.

The Riverwalk

The Riverwalk, formerly known as the Riverwalk Galleria, was sold in 1979, after the start of the River Clean Up, as part of the eighth Sale of Site programme. While the development had a podium-tower topology, its design featured a terraced façade fronting the river for the shopping mall. Unlike Liang Court and High Street Centre, where a service access separated the building and the riverfront, the Riverwalk was guided to have active uses fronting the river with a promenade between the building and the river. The façade was articulated and terraced as part of the design requirements seeking to breakdown the scale of the development. This was an early example of the urban design response to reposition the river as an asset.

Left: Riverwalk Galleria's terraced façade fronting the River in the mid-1980s. *Source: URA, 1987*
Right: Riverwalk Galleria opposite the High Street Centre taken in 1995, showing the evolution of urban design ideas within a few years. *Source: NAS, 1995*

The stepped building height at UE Square, in response to the developments along the river. *Source: Victoria See, 2022*

UE Square: An Architect's Response to Proximity to the River

Although planning approval for the UE Square was given in the 1990s, there were some earlier commitments on the office quantum and overall gross plot ratio (GPR) prior to the Singapore River Concept Plan and the Robertson Quay planning and development guidelines. Height control for Robertson Quay, which was set to a maximum of 10 storeys, did not apply to UE Square site since it was one street block away from the river and fronted River Valley Road. Taking reference from the nearby Liang Court development, the site was allowed to have a maximum height of 96 m Singapore Height Datum (SHD), which is approximately 26 storeys.

While there was no specific urban design guideline to request for a stepped profile for the various towers, Professor Kenzo Tange, the architect of the development, devised a stepped profile for the residential towers, which were located closer to the river, and a taller office tower fronting River Valley Road. In addition, the proposed design responded well to the surrounding environment with its low-rise building edge which runs along Unity Street and Mohammed Sultan Road. The foresight of Tange ensured that the building profile would match well with its neighbouring sites, which are limited to a 4-storey building height since these sites were within the Robertson Quay Envelope Control area.

With some of these initial planned projects, the urban design principles and approaches were further developed and translated into the Development Guide Plan (DGP) for the Singapore River which was released in 1994 after a public exhibition and an extensive dialogue where feedback was sought from both the general public and industry professionals. The overall vision for the Singapore River was more clearly articulated as an exciting activity corridor that capitalises on the riverfront and reflects the unique historical character of the area. Various urban design guidelines such as the Robertson Quay Envelope Control Plan were put in place and public infrastructure planned with the release of the DGP to create a more holistic riverfront environment.

Streetscape: Shaping with the Building Edge and Activities

The historic setting around the Singapore River consisted of well-defined streetscapes with buildings neatly lined up along the road and bustling with activities at the street level. This aesthetic formed the basis for the urban design guidelines pertaining to how buildings should relate to the street.

Building Edge and Height

Taking reference from the typology of the 2- to 3-storey shophouses and the warehouses which were built up to their front property boundary and lined the river's edge, guidelines for new developments at the Singapore River are to abut the boundary line fronting the river with a minimum building height of two storeys and a maximum of four storeys to ensure a low-rise character along the waterfront and to be sympathetic to the adjacent buildings. Coupled with the tree-lined promenade fronting these developments, these low-rise buildings have given the streetscape a consistently well-defined, human-scale character.

Riverside Point and the Swissotel Merchant Court, sold in 1992 and 1993 respectively, were two of the earliest sites sold for new development fronting the river after the Singapore River Concept Plan. Both sites were required to have a low-rise building abutting its boundary line fronting the river, maintaining the tone and character of a well-defined streetscape, which would contribute to the river promenade.

This low-rise building height requirement has been consistently applied and realised through the URA's Government Land Sales programme, and has also guided the redevelopment of the privately owned parcels at Robertson Quay.

Top: Low-rise building frontage framed by shophouses at Boat Quay. *Source: URA, 2017*
Bottom: Retained warehouse façades lining the promenade. *Source: URA, 2015*

Low-rise building frontage of The Pier at Robertson Quay. *Source: URA, 2008*

Proposed locations of landscaped courtyards as shown in the Planning and Development Guidelines for Robertson Quay. *Source: URA, 1985*

Scale and Activities

To ensure that newer developments were moderately sized and to help them relate to the character of shophouses, covered walkways on the first storey were required to have colonnades. In addition, developers were encouraged to design their façade to work in harmony with the conserved buildings, particularly in terms of the scale, proportion and architectural treatment, to create a cohesive look at the street level.

In support of streetscapes characterised by the low-rise buildings along the promenade, internal courtyards were encouraged to meet open space requirements. In the Planning and Development Guidelines for the Robertson Quay area, some specified development plots were required to provide these courtyards.[32]

Well-defined streetscapes were not limited to developments with commercial components in the Robertson Quay Planning and Development Guidelines. Residential developments along the Singapore River were also required to conform to this aesthetic. The River Place development deviated from a typical pure residential development by including a building edge with the 4-storey residential block facing the promenade.

As the riverfront was envisaged as an active corridor, buildings were required to have activity-generating uses, including shops and F&B outlets, and to ensure that no service areas were on the promenade side. This helped direct activities and movement to the promenade area.

Coherent roofscape of clay-tiled pitched roofs which contributes to the character of Robertson Quay. *Source: URA, 2023*

Roofscape: Creating a Coherent Expression to Enhance the Identity

Top: The modern mono-pitched roof of River Place complements both the roofscape and its architecture. *Source: URA, 2003*
Bottom: The pitched roof of The Pier with its tensile structure helps to create a visual harmony with the rest of its building design. *Source: URA, 2012*

While walking along the riverside, a unique skyline of clay-tiled pitched roofs can be seen on the buildings by the river. This is one of most easily recognisable features of shophouses and warehouses in the area. Therefore, to preserve and build on the existing character of the area, all new developments along the river at Robertson Quay were also required to have clay-tiled pitched roofs. Echoing the past and keeping roofscape style consistent has contributed to creating a strong identity for the Singapore River, setting it apart from other precincts in Singapore.

While all new developments are required to have a clay-tiled pitched roof, sufficient flexibility is given to allow the roof design to blend with the overall architectural design and functional requirements of the development, including allowing flat roofs for rooftop gardens. For example, the River Place features a large mono-pitched roof of darker toned clay tiles, which complements the rest of its architectural design. The Pier, another development which took advantage of this design flexibility, features a set of tensile canopies stretched with pitched frames to provide shelter and allow air flow for the tennis court which is located on the roof-top. While the material differs, this roof design is still in harmony with the surrounding developments.

View Corridors: Connecting to the River Visually

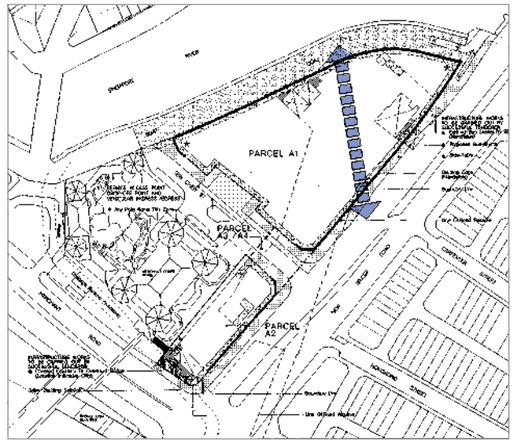
As the river is the key asset of the precinct, urban design guidelines were formulated to maintain views towards the river so that the Singapore River could be seen even from developments that were further away. Apart from maintaining the views of the river along the streets perpendicular to it, larger developments were required to have view corridors to provide this visual connection to the river, which also helps provide a sense of orientation.

The very first parcel of land sold along the riverfront at Clarke Quay was eventually developed into Riverside Point. For this site, the urban design guidelines specified that the structure on this elongated parcel should have a central gap to allow views towards, and access to, the river. This resulted in a central open-air plaza with a block on either side, linked by bridges, allowing views of the river from the road and street block behind Riverside Point. Many of the subsequent developments along the river, in particular the buildings with a larger frontage, including The Quayside, Grand Corpthorne Hotel and The Central, were also required to provide similar view corridors. These view corridors also serve as direct pedestrian connections to the riverfront through the developments.

As the Singapore River is in close proximity to the historically significant Fort Canning Park, a deliberate effort was made to maintain the view of Fort Canning from across the river. For instance, as part of the condition for sale of the site above the Clarke Quay MRT station, where The Central has since been constructed, a view corridor of at least 10-metre wide and three storeys high had to be provided. This presented a clear view of Fort Canning and the Singapore River through the shopping mall at the street level.

Left: The control plan showing the requirement for a view corridor of the River and Fort Canning Park. *Source: URA, 1999*
Right: The realised view corridor that provides visual connection from within the shopping mall. *Source: URA, 2014*

Preferred view corridor location and orientation



Good Urban Design with Large City Rooms Requires the Buy-In from Architects and Building Owners

Part of the UOB Plaza was developed in 1973, before the Singapore River Concept Plan was developed. It was a key development in the Golden Shoe as it fronted the Singapore River. When the owners submitted plans for UOB Plaza One in the 1980s, the URA required the taller tower, which would join to the existing UOB Plaza Two tower, to provide a double-volume void in the building to facilitate pedestrian movement, and provide views towards the river from Raffles Place and Battery Road. The architect for the development, Professor Kenzo Tange, understood the potential benefits of the URA's requirement and revised the design to accommodate it. While the change in design was initially not accepted by the owner, it was eventually adopted and the area has become a popular and recognised public space in the Central Business District today.

Left: View corridor which also serves as a through-block link at UOB Plaza that provides the visual connection to the River and Empress Place, across the river. *Source: URA, 2021*
Right: Activities at the UOB Plaza as part of St. Patrick's Day celebrations. *Source: Unteroffizier, Dreamstime, 2018*

"...there was at first strong resistance from the building owners for such a provision since they deemed this view corridor as losing prime ground floor space for its commercial activities. The owners eventually agreed with this provision after consulting a feng shui master on Tange's revised design with the view corridor. It was said that this void has good feng shui as it facilitates the flow of energy from the river and will benefit the owners."[33]

– Ole Johan Dale, Principle Architect, URA (1975 - 1988)

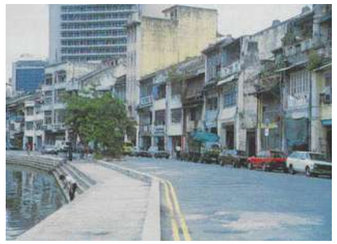
The pedestrian promenade along Robertson Quay, which is enjoyed by many today, used to be a service road. *Source: URA*

Creating a Pedestrian-Friendly Environment

With the Singapore River set to be an activity corridor for all, it was important to set it up as a safe and convenient destination that would provide an enjoyable experience for users. The idea to make the river banks a pedestrian-friendly environment had been laid out in the Singapore River Concept Plan and URA implemented the Boat Quay promenade as early as the 1980s. However, many of the public realm works were carried out only after the release of the Development Guide Plan 1994 where the idea was given more substance. The Singapore River Environmental Design Master Plan 1995 provided a greater level of detail to better guide the works that would improve the experience for pedestrians along the river banks.[34] Investing in such public infrastructure has been a key strategy in gaining the confidence and interest of the private sector in order to harness private funds in the river district's rejuvenation effort.

Improving Accessibility Towards the River

Vehicular Access: From Service Road to Promenade



Top: Service access road along the front of Boat Quay shophouses in the mid-1980s. *Source: URA, 1986*
Middle: The promenade in 1989 after the completion of Phase 1 works. *Source: URA, 1989*
Bottom: Completion of the promenade in Boat Quay in the early 1990s. *Source: URA*

Due to its origins as a working river and a centre for trade, the Singapore River had local access roads lined along its edge. These riverfront access roads facilitated the movement of goods from the lighters to the warehouses and other parts of Singapore. In turning the Singapore River into an active corridor for pedestrians, the Singapore River Concept Plan outlined the conversion of these roads on both banks of the river into vehicle-free, landscaped pedestrian promenades. This conversion, which provided convenient pedestrian access along the riverfront, took many years to realise as it was a complex initiative which required a lot of coordination.

The riverfront access road at Boat Quay was the first to be earmarked for conversion into a tree-lined pedestrian promenade as a demonstration to the individual owners of Boat Quay shophouses of the Singapore government's commitment to the transformation of the Singapore River. The conversion to the promenade started in May 1986 and was carefully orchestrated to comprise two phases. The first phase created a 6- to 7-metre-wide promenade along the river edge. This allowed vehicular access to continue to front the shophouses to cater for conserved shophouses which were going through restoration works at the same time. Upon completion of the first phase in October 1986, the built environment along Boat Quay was dramatically transformed from an utilitarian strip of land for cars to a promenade with distinct historical flavour. Phase 2 of the works started in 1992 after the shophouses had been restored. The full extent of the Boat Quay promenade was eventually realised in 1993. This was complemented by the promenade across the river as part of the Clarke Quay Festival Village, which opened in end 1993.

Continuous Promenade

With the completion of the Boat Quay promenade, the URA directed the UOB Plaza to implement a promenade as part of its redevelopment, and for successful tenderers for the Riverside Point and Merchant Court Hotel sites to construct the portions of the promenade fronting their developments as part of the conditions of sale. By 1993, substantial portions of the riverfront promenade had been completed. By this time, pedestrians were able to walk along the portions of promenade between Boat Quay and Clarke Quay as they were linked up with the underpasses below Coleman Bridge as part of the bridge's reconstruction in 1987. However, even though it was relatively straightforward to walk along the completed promenade, the walk from Boat Quay to Robertson Quay still took more than two

"Obstacle course awaits those who want to take a walk along the river. The trek includes trudging across fields in ankle-deep mud, tackling slippery slopes, ploughing through knee-high lalang and even climbing over some fencing...near the Singapore Warehouse, the bank was sloping and the path was only about a metre wide..."[35]

– Sharon Chin and Cheryl Tan, Reporters, The Straits Times (1993)

hours, as many sections had not yet been converted. Walking along the riverfront was an adventurous task even for active and able adults.

At that point, it would have been unthinkable for anyone to take a leisurely stroll along the riverfront. Noting this issue of an unsafe and unpleasant journey along the riverfront, the Development Guide Plan 1994 set out the vision that strolling along the riverbank will be a key part of this new atmosphere, with a peaceful and natural ambience. The Singapore government then embarked on the implementation of public works to achieve this.

In 1997, the government announced that it would be undertaking more infrastructure works to improve and rejuvenate the Singapore River for the public.[36] A continuous riverside promenade would help to develop the area into a unique and lively active corridor where people could stroll along or linger by the river, as envisioned in the Development Guide Plan. The approach for the promenade implementation, in particular at Robertson Quay, was similar to how the overall river has been developed through public-private partnerships. Where redevelopments have not yet occurred or where there were no private sites fronting the river, the URA and then Public Works Department (PWD) undertook the implementation of an interim promenade, which comprised a 2.5-metre walkway, tree planting and lighting. In addition, underpasses were provided under major vehicular bridges, including Elgin Bridge, Clemenceau Avenue Bridge and Saiboo Bridge, to facilitate undisrupted access along the entire length of river.

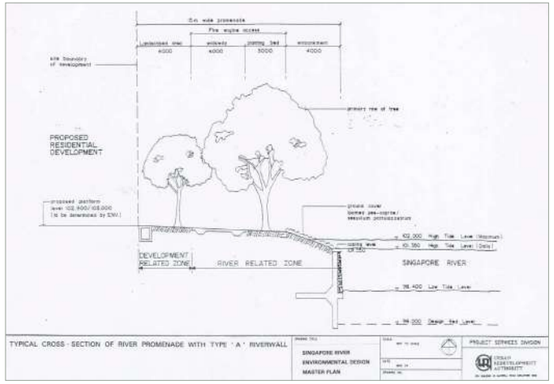
A. Design of the Promenade

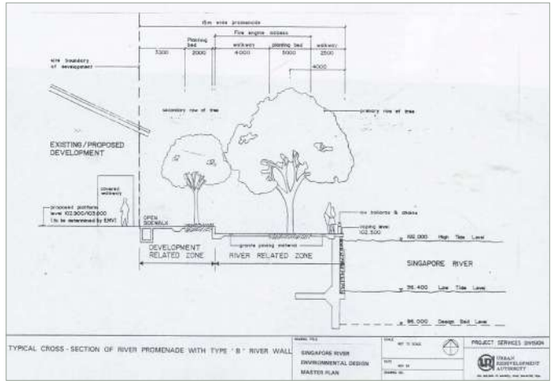
The design of the promenade took reference from the original river wall profile at different stretches of the river. Along the promenade's total length of 3 km on each bank, there are variations in the design of each subzone. Careful attention was given to the different designs along the promenade as well as to the overall design.

Boat Quay Promenade Design

The Chinese-inspired design for the promenade along Boat Quay took reference from shophouses which displayed various styles of Chinese architecture. One key characteristic of Chinese shophouse architecture was the solid edging of the 5-foot way which typically consists of 1-foot wide granite blocks. The material choice of solid granite slabs, which were imported from Fujian in China, related to the existing granite edging and the original granite riverbanks. The pattern took inspiration from traditional Chinese gardens, and a darker shade of granite was used for the river edge to give visual stability and to act as a psychological indication of the edge. The overall level was also raised continuously by three quay steps to prevent the flooding of the promenade in the event of an unusually high tide.

The Dalbergia Oliveri was selected as the primary tree species to be planted along this row. This local species was chosen to enhance the tropical identity of the riverfront, as its feathery crown softened the hardscape effectively without blocking the views toward the Empress Place area.





Left & Right: Sectional drawing, from the Design and Implementation Guidelines for Singapore River, showing the key elements of the promenade with the river-related zone and development-related zone based on the river profile of a sloped embankment and straight wall. *Source: URA, 1999*

Design Guidelines for Public and Private Partnership Projects

The completed promenade along Boat Quay and in front of UOB Plaza, Riverside Point and Merchant Court Hotel set an example for subsequent implementation to the other parts of the promenade. The general approach taken was that developments should be based on public-private partnerships and guided by the Singapore River Environmental Design Master Plan. The guidelines drawn up by the URA required that the private sector include the promenade along their riverfront edge as part of any future redevelopment of their sites.

The promenade was designed to have an upper tier and a lower tier—often regarded as the development-related zone and river-related zone respectively—to mitigate the differences in platform levels between developments and the riverfront. While the concept for a two-tiered promenade was consistent throughout the river, key elements, such as primary tree planting and public walkways, were varied in their location, based on the river wall profile. There was also a conscious effort to differentiate the characters of the different quays, with deliberate choices of paving materials and planting selections. For example, with all plants to be local species, the Tabebuia Rosea was selected as the primary plant for Robertson Quay and the Dalbergia Oliveri for Boat Quay and Clarke Quay. Tabebuia Rosea was chosen for its flowering properties to add hue and colour variation to Robertson Quay, which was more residential in nature.

Top & Bottom: Design of the bollards and chains, and railings, that were inspired by Singapore's maritime history. *Source: URA*

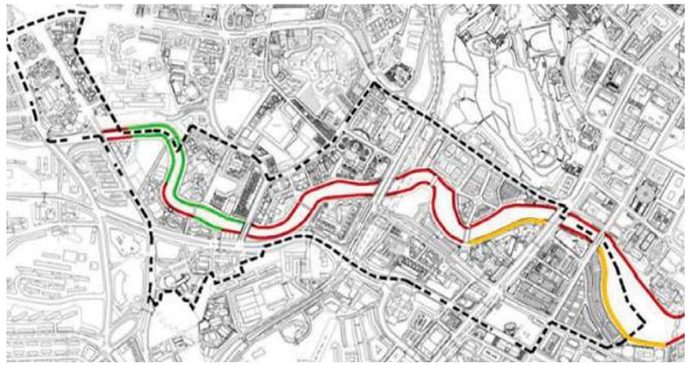
These design guidelines provided a framework for consistent key elements along the entire length of the promenade while allowing some flexibility in the design details so that different sections would relate to their adjacent developments. As portions of the promenade would be implemented by different parties, the URA also ensured that platform levels for the walkways were either consistent or that the differences were mitigated with ramps to ensure pedestrian friendliness.

Even the safety barriers along the river's edge were developed after careful consideration and were specifically designed for the Singapore River. These barriers consist of bollards linked with chains, and railings, with their design taking inspiration from the area's maritime history, helping to create an identity which reflects the Singapore River's heritage as a maritime hub. In some sections with river steps, railings were omitted to provide opportunities for the public to sit on the steps and get closer to the water.

River steps without safety barriers enable the public to sit closer to the waterfront. *Source: URA, 2015*

B. Restoration of the Riverwall

While the restoration of the river wall was first mooted in 1974, actual works did not start until 1992. When developing the plans for works to strengthen the river wall, a conscious effort was made to retain its character so that there would be a strong reference to its history. Today, the historic river steps along the crescent-shaped Boat Quay remain and harken to its past as the place where coolies loaded and unloaded goods from lighters. Similar steps are also present on the south bank of Clarke Quay. The other parts of the river wall have a vertical profile, apart from some upriver sections of Robertson Quay, where a sloped embankment profile was retained to feature more greenery and have a softer feel.[37] These different profiles of the river wall serve as a reminder of the past, and help to differentiate the characteristics of each quay. The design of the promenade and the location of outdoor refreshment areas (ORAs) also relate closely to the river wall profiles.



A plan with an overview of the various types of river wall profiles implemented along the river. *Source: URA, 2018*

- **Sloped**
  Upper stretch of Roberston Quay
- **Vertical**
  Clarke Quay and the lower stretch of Robertson Quay
- **Stepped**
  Upper stretch of Clarke Quay and Boat Quay

Right: The sloped, vertical and stepped embankment profiles that contribute to the different characters of the various river sections. *Source: URA, 2018*

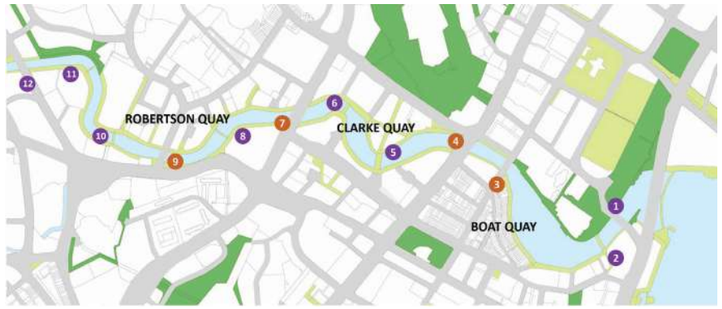
Bridges along Singapore River:
1. Anderson Bridge (1910)
2. Cavenagh Bridge (1868/69, refurbished 1987)
3. Elgin Bridge (1929)
4. Coleman Bridge (old 1886 bridge widened and rebuilt in 1990)
5. Read Bridge (1889, restored in 1990s)
6. Ord Bridge (1886, raised and restored 1999)
7. Clemenceau Bridge (1920)
8. Alkaff Bridge (1997)
9. Pulau Saigon Bridge (1997)
10. Robertson Bridge (1998)
11. Jiak Kim Bridge (1999)
12. Kim Seng Bridge (1951)

Sources: URA

- Pedestrian Bridge
- Pedestrian and Vehicular Bridge

Across the Two Banks

Complementing the continuous promenade along each bank, the accessibility across the two banks have also improved significantly with various works carried out over time. The Singapore River, being the centre of trade in the past, had enjoyed good accessibility with bridges built across it to facilitate the movement of goods. Today, there are 12 pedestrian and vehicular bridges between the mouth of the river at Empress Place and further upriver at Robertson Quay.



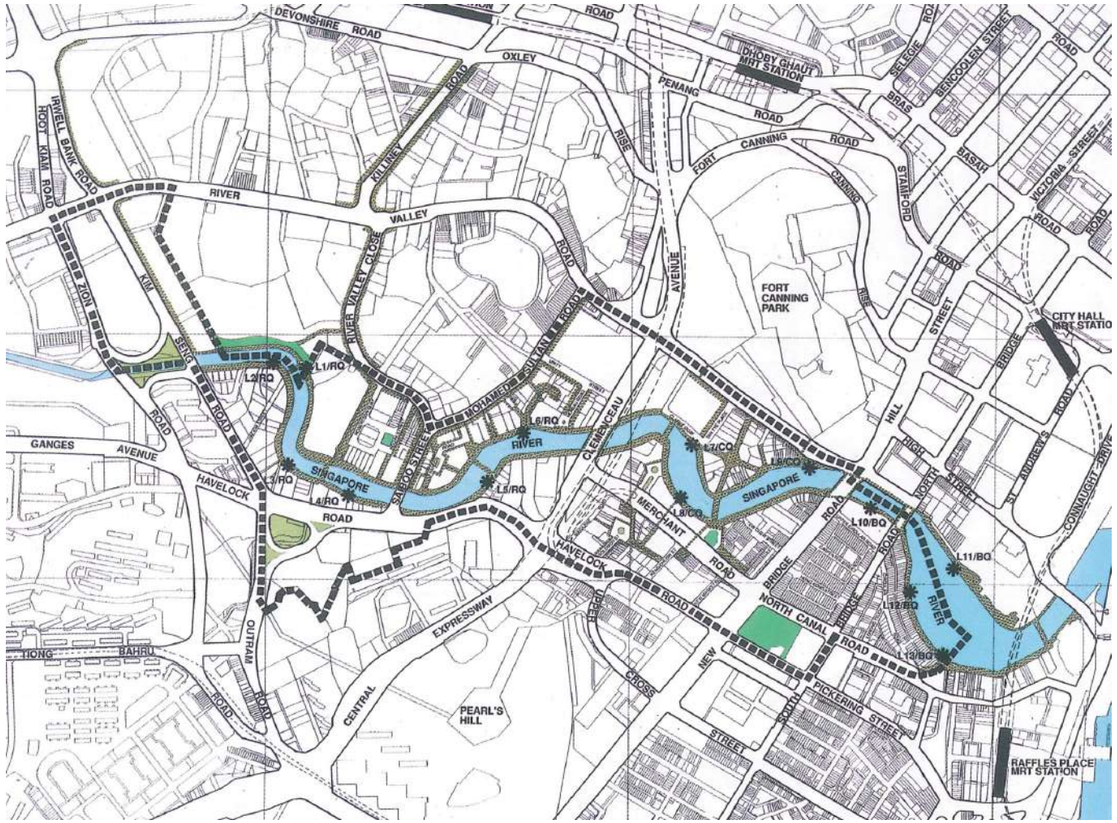
A. Restoration of the Old Bridges

As part of the approach to retain the history of the river, all but one of the old bridges were restored either during the River Clean Up or progressively in the 1990s. The restoration of the old bridges built connections to the past for future generations.[38] By late 1993, in addition to their restoration, some bridges were also illuminated as part of the Civic District Lighting Plan. This plan was conceptualised by renowned French lighting designer Louis Clair and commissioned by the Singapore Tourism Board (STB). The last phase of restoration and refurbishment was completed in 1998 with Ord Bridge and Read Bridge, and included the raising of the Ord Bridge by 1 m to allow boats to pass through. This, together with the dredging of the riverbed that was completed in end 1999, allowed for boats to travel upriver to the Robertson Quay area. The raising of Ord Bridge and dredging of the river were critical in facilitating the water activities along the entire river.

Top: Elgin Bridge is one of the bridges along the Singapore River that have been granted the status of a National Monument. *Source: Bing Hui Yau/Unsplash*
Bottom: Robertson Bridge is one of the new bridges that has been built to improve the pedestrian accessibility between the two banks. *Source: URA*

B. Building New Bridges

When the Development Guide Plan was being developed, it was recognised that accessibility across the two banks at the upriver stretch of the Singapore River was an issue. Hence, new bridges were proposed at Robertson Quay. These bridges were strategically positioned to serve the residents in the area and provide a convenient link to the key roads in the area. The new bridges were designed by the then PWD with a modern and simple design, to contrast with the restored old bridges. The bridges were completed in 1998, and also incorporated lighting to illuminate the superstructure.



The Green and Blue Plan, as shown in the Singapore River Development Guide Plan, outlines the locations of the pedestrian malls in relation to the river. *Source: URA, 1994*

- Promenade/Formal Pedestrian Mall/Walkway/Plaza
- Other Green Space
- Park and Garden
- Waterbody
- ★ Indicative Position of Boat Landing Point

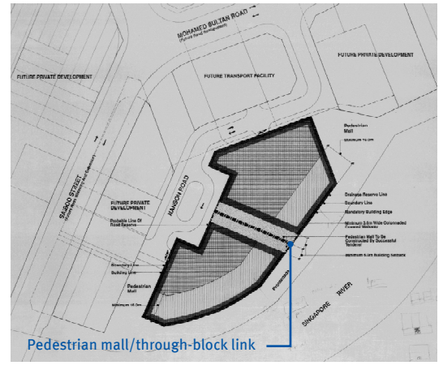
Bringing Pedestrians to the Promenade with Side Streets and Pedestrian Malls

A key urban design strategy was to provide easy pedestrian access to the promenade and riverfront. Hence, as outlined in the Development Guide Plan, a network of pedestrian malls and walkways connecting with the promenade was developed. This provided residents living further away with convenient and direct access to the river. As part of this effort to facilitate pedestrian access to the river, parts of the roads perpendicular to the river have been converted to pedestrian malls.

Top: The pedestrian mall at Rodyk Street, which was implemented when The Watermark was developed, provides convenient access to the riverfront for the residents in the vicinity. *Source: URA, 2021*
Bottom: The pedestrian mall at Teck Guan Street, which was implemented when The Pier was developed, provides convenient access to the riverfront and is a lively "side street" with ORAs today. *Source: URA, 2012*

For instance, part of Rodyk Road was converted into a pedestrian mall under the URA's guidance for the redevelopment of the adjacent site, whereas the entire Teck Guan Street, which is located between The Pier and Riverside View, has been pedestrainised with vehicular access now being sited away from this street. This pedestrian mall then connects to the courtyard of Robertson Walk. The strategy of having these pedestrianised streets and public spaces off the main riverfront promenade has created a more layered experience, making it more intriguing.

Beyond closing roads, space was also set aside for use as pedestrian malls within development plots. For example, for the land parcels at Nanson Road—presently The Quayside—one of the conditions for the sale of site was for the two parcels to set aside space for a pedestrian mall which would be connected to the riverfront. This space was eventually developed as a through-block link in The Quayside when the two parcels were developed as a single development. The pedestrian connection from the Martin Road and River Valley area was subsequently strengthened with the provision of a pedestrian mall by requiring a 16-metre-wide set-back as part of the sale of the site at Nanson Road, where Studio M stands today.

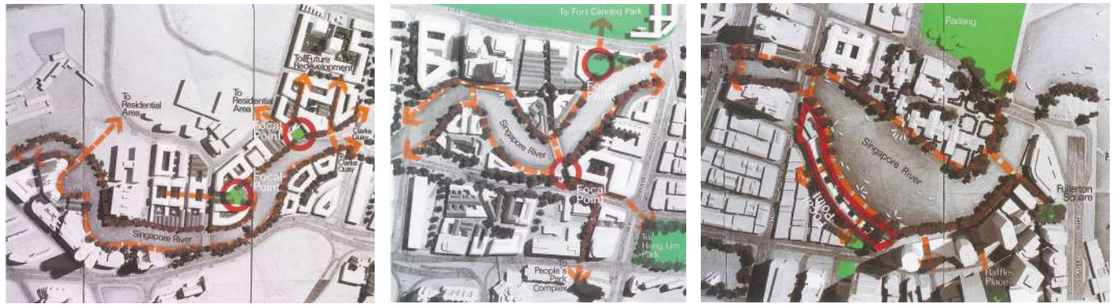


Left: The through-block link at The Quayside lined with activity generating uses, and framing a view towards the river. *Source: URA, 2021*
Right: A control plan showing the requirements for a pedestrian mall under the Sale of Site programme. *Source: URA, 1993*

Promenade as an Active Corridor

Open Spaces and Focal Points

A series of open spaces and focal points along the promenade were included in the Singapore River Concept Plan. Focal points were envisaged at each quay to help with orientation and as social spaces for the visitors and residents. These were eventually developed to take on different functions to bring activity to the riverside. Some have become boat-landing points and others have become small gathering spots or outdoor attractions.



Indicative locations for the focal points in relation to the promenade at each quay as shown in the Singapore River Concept Plan 1985. *Source: URA, 1985*

These focal points along the promenade are complemented by open spaces at the adjacent developments. As the designed streetscape requires a low-rise building at the edge fronting the river, the provision of open spaces within the development boundary generally takes the form of courtyards. This idea was described as part of the conditions of sale for the sites along the river and translated into courtyards at several developments in Robertson Quay including Robertson Walk, Robertson Blue and Riverview Village. Some of these have become attractive spaces that the public can enjoy.

Left: The open space near the Alkaff Bridge is one of the focal points identified, which serves as a social space for residents in Robertson Quay. *Source: URA, 2014*
Right: One of the focal points has also given rise to opportunities to introduce a small outdoor attraction. *Source: STB*

To complement these activity nodes, informative signs were placed at strategic locations to tell the story of the Singapore River, as part of the works completed in 1999. These signs highlighted the history of the Singapore River, the specific location, as well as places of interest in the vicinity, providing a sense of orientation along the promenade. Over time, the National Heritage Board (NHB) updated some of these signs as part of Singapore's Golden Jubilee (SG50) in 2015 to strengthen the storytelling for the Singapore River and to develop a walking trail.

A pedestrian mall leading to a courtyard at Robertson Walk. *Source: STB*

Top: Hawker stalls used to be set up along the Singapore River in the 1970s. *Source: NHB*
Bottom: Boat Quay promenade has become a popular dining destination for locals and tourists alike. *Source: URA, 1994*

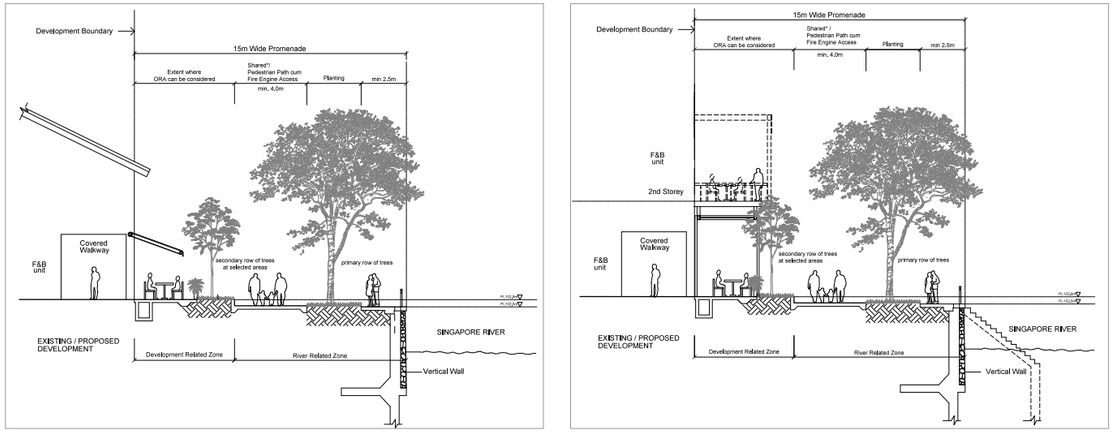
Outdoor Refreshment Areas (ORAs)

As part of the strategy to have an active corridor along the riverfront, ORAs were introduced to facilitate alfresco dining and take advantage of the attractive setting and encourage activity along the riverside. Alfresco dining has been part of the lifestyle in the tropics since the early colonial days with street vendors providing makeshift seats for their patrons to have a quick meal. These scenes of dining in the outdoors, coupled with people going about with their daily lives, were what made the streets vibrant and full of life in the past.

ORAs were conceptualised from the beginning when the URA planned the development of the promenade. Upon the completion of the Boat Quay promenade in 1993, the URA briefed owners on the use of the promenade for ORAs. Guidelines were drawn up to define the extent to which an ORA could be deployed and the scale of structures allowed. Light structures such as free-standing umbrellas were initially permitted. Agreements were worked out between various government agencies to facilitate the ORAs which were located on State land. The ORAs at Boat Quay became very popular and demonstrated that such uses were attractive to both visitors and businesses.

ORAs under awnings that complement the character of Robertson Quay.
Source: Victoria See

After the success of the ORAs along Boat Quay, more were introduced in a comprehensive manner along the Singapore River to enliven the riverfront. In 1999, the URA released guidelines to encourage ORAs along the Singapore River promenade. Guidelines were drawn up to guide the ORA uses based on their context, both in terms of the physical space available as well as the ambience of the area. As a result, there were some differences between the quays in terms of the extent and locations allowed in relation to the promenade design and especially if there were conserved buildings. In addition to technical requirements from agencies, considerations were also given to ensure that the design of the ORAs did not excessively block the views of the first-storey users, and to ensure easy public access between the development and the public walkway. The guidelines were regularly reviewed over time to stay relevant. For instance, in 2013, the guidelines were revised to further enhance the character of Robertson Quay by allowing only retractable awnings mounted from building façade, thereby differentiating the Robertson Quay ORAs from those at Clarke Quay and Boat Quay, where free-standing structures are allowed.

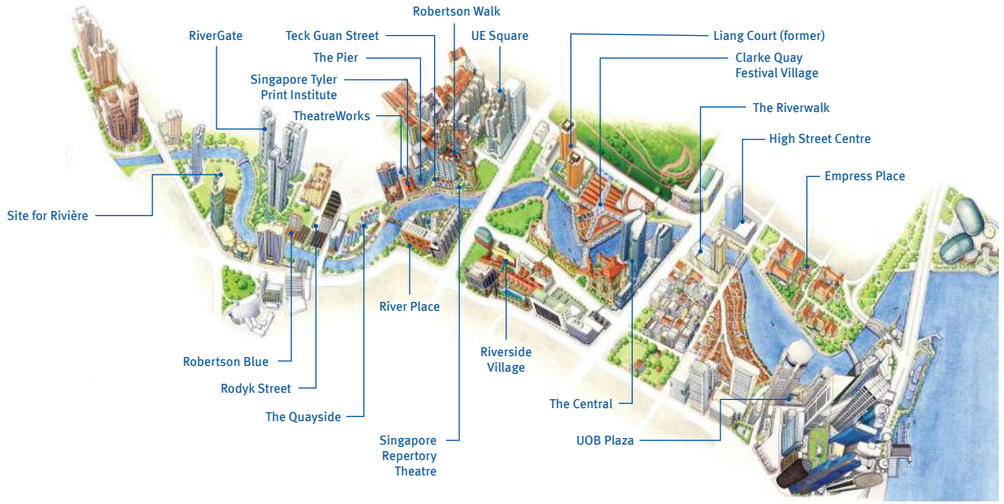


Guidelines showing the placement of an ORA and its structures in relation to promenade design at Robertson Quay (left) and Clarke Quay (right).
Source: URA, 2014

Top: People gathered at the Singapore River to enjoy the Million Dollar Duck Race.
Source: URA, 2000
Bottom: Singapore River Regatta dragon boat race held. *Source: URA, 2011*

An Attractive Venue for Major Events

1999 was an important year for the transformation of the Singapore River as it marked the year of completion of infrastructure works and the formation of an integrated network along the entire river, both along the promenade and in the water. It marked the beginning of the river's new life as an activity corridor. By the end of the 1990s, the Singapore River had become the venue of choice for some of the largest nationwide activities promoted by the STB. The Million-dollar Duck Race in 2000 created a tremendous buzz that people still remember today. The Singapore Buskers Festival, which took place annually from 1997 to 2004, also became increasingly popular over time, attracting 22 international acts and 150 local performers in its final year.



An artist's impression showing the Singapore River with its three quays developed in line with the vision set out in the Singapore River Concept Plan 1985. *Source: URA, 2010*

GREATER FOCUS ON DISTINCTIVENESS AND DELIGHT

By the end of the 1990s, with many of the redevelopments and government-led works completed, the URA's plan for the Singapore River as an active corridor was shaping up. In the larger context of Singapore at that time, there was a general call for greater distinctiveness and an emphasis on playing up the local identity, resulting in the significant evolution along Singapore River in the 2000s.

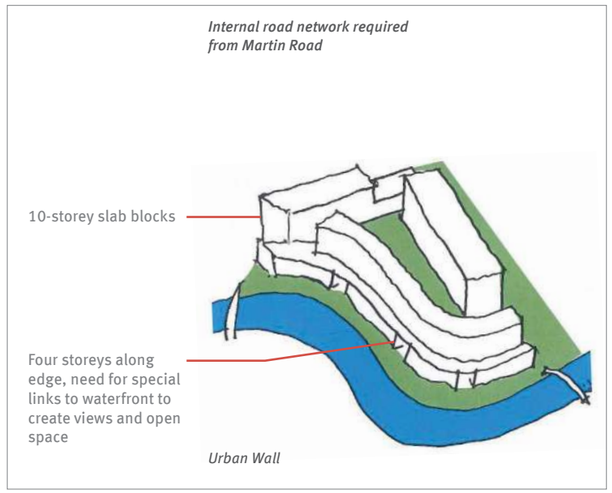
Encourage More Distinctiveness in Design

The Landmark and Gateway Plan was first released in 2001 and was subsequently incorporated into the Master Plan 2003. The Landmark and Gateway Plan identified key routes to create a curated experience of the city centre. Strategic sites were earmarked to orient the people upon their approach to the city, and create a heightened sense of arrival into the city centre. Landmarks were carefully curated to build up a sense of anticipation for the destination along the routes. The Singapore River had been identified as a key route in this plan, with several sites along the river identified as landmark sites, and owners of these sites were encouraged to create more distinctive buildings that would enhance the visual appeal of the river district.

In tandem with the formulation of the Landmark and Gateway Plan, the URA set up the Design Guidelines Waiver Committee (DGWC) to review proposals with innovative and creative designs which required waivers from prevailing design guidelines. Chaired by the URA, the DGWC comprised members from private architectural firms who would determine if there was sufficient merit in the proposed design to warrant a deviation from the prevailing guidelines.

Top: Trademart, the multi-storey warehouse, made way for the RiverGate condominium. *Source: URA, 1991*
Bottom: RiverGate features extensive landscaping and skyrise greenery. *Source: URA, 2009*

The typical 4- and 10-storey urban massing along Robertson Quay (left) in comparison to proposed urban massing by COX Architecture (right). The latter's design proposal opened up the ground plan for more landscaping which enhanced the public domain. *Source: COX Architecture, 2002*



Redevelopment as Rivergate: A Green Node

The proposal for the former Trademart site at the Robertson Quay and Kim Seng area successfully obtained approval to deviate from some of the urban design guidelines. The proposal was for the conversion of an existing warehouse site to a residential development with commercial use on the first storey—in line with the Master Plan. The proposed residential development, named RiverGate, features distinctive communal sky terraces throughout the tower blocks and vertical green façades. Such high-rise greenery was an innovative concept in the early 2000s, and the project was one of the first residential developments to include such extensive greenery in its design. The concept created by the Australian design consultant, Cox Architecture, was for the development to be a upriver green node that also extends upwards. To realise this concept, the developers required that certain urban design guidelines for Robertson Quay be waived—specifically on the 4- and 10-storey building-height control, and the requirement of a minimum 2-storey building height abutting the site boundary fronting the promenade. The concept sketches below illustrate the building forms originally required and how the final proposal deviated from the original guidelines.

In addition to the unique vertical greenery on the residential towers, the design also proposed seamless integration between the pedestrian promenade in the public domain, and the landscaping that was within the private boundary. The separation between the two domains would be unnoticeable as the development did not have any obvious boundary wall, unlike most private residential developments in Singapore. This way, not only could the private landscaping contribute to the public promenade with its extensive greenery, it would also widen the river promenade visually. These features would change the atmosphere of the area and complement Kim Seng Park which is located adjacent to the development. Considering these benefits, the DGWC found the proposal justifiable and supported the request for waivers from the urban design guidelines.

Left: Artist's impression of the seamless integration between the landscape of the private condominium and the public domain along the river promenade. *Source: COX Architecture, 2002*
Right: The publicly accessible river promenade, integrating seamlessly with the greenery within the boundary of the private condominium. *Source: URA*

Open space in front of the activity-generating use at the RiverGate has become a popular spot for residents. *Source: URA, 2011*

Having freed up the ground for more greenery, the maximum building height was changed from 10 storeys to 43 storeys. The innovative proposal for RiverGate created added value for the developer and provided increased amenities for all the residents. More importantly, it contributed significantly to the transformation of Robertson Quay, enhancing the area with its distinctive development and expanding the public domain.

The URA had made provisions for the inclusion of food and beverage establishments within the redevelopment parcel. However, instead of siting such activity-generating uses along the entire river frontage, the food and beverage establishments were localised at the area where the river promenade intersects with the pedestrian mall linking to Martin Road. This draws foot traffic naturally to the establishments, while freeing up the riverfront to facilitate a gradual transition from the bustle of commercial activity to the more leisurely atmosphere of Kim Seng Park further upriver. The open space, coupled with the food and beverage establishments, have made this area an attractive and popular public space for both residents and the public visiting or passing through the area.

The second storey of the ORA gives a new vantage point of the Singapore River. *Source: URA, 2023*

ORA Pods at The Central: A New Vantage Point to Enjoy Views

The Central is another project which had also proposed a unique feature to contribute actively to the experience of the promenade. The site had been identified for a landmark development given its strategic location directly above Clarke Quay MRT station and proximity to the Fort Canning Park. In designing its ORAs, the developer and architect took advantage of the view of the low-rise Clarke Quay Festival Village that the site had to offer, by proposing 2-storey ORA structures within the 15-metre-wide pedestrian mall, where permanent building structures were typically not allowed. Considering its strategic location and in keeping with the more vibrant character of this part of the river, these 2-storey ORA structures were supported by the DGWC. The ORAs would provide a new vantage point of the river and and are themselves attractive visual features along the promenade. Due to the success of these ORAs and how they have enhanced the area, current ORA guidelines allow such 2-storey structures to be more widely adopted at Clarke Quay.

Clarke Quay Festival Village's Rejuvenation: Flexibility in Design to Create a Unique Destination

Top: With the ORA structures detached from the conserved building façades, pedestrians walking along the promenade are better able to appreciate the conserved buildings in totality. *Source: URA, 2018*
Bottom: View of the "angel" structures against the conserved buildings in Clarke Quay. *Source: URA, 2018*

In early 2000s, after close to a decade of family-themed entertainment and use, the owners of the Clarke Quay Festival Village—CapitaLand Group—saw a need to reposition and rejuvenate the area to fully capitalise on the unique riverfront location. Shifting to a more cosmopolitan outlook and responding to a booming entertainment scene for working adults, the area was repurposed to be a vibrant entertainment destination in a major revamp led by the design consultant Alsop Architects. The revamp included a large-scale urban intervention with umbrella-like steel structures, informally referred to as "angels". These cushioned canopies were made with Ethylene Tetrafluoroethylene (ETFE) and extended over the shophouses to provide shelter to the streets from both rain and the sunshine. The canopies of the shade structures, which were decorated with tree-leaf motifs, helped reduce solar penetration. Together with slow rotating fans within the structure, the internal streets have been cooled by several degrees, which has created a more comfortable environment. In addition, more elaborate structures, which were organic in form and akin to "lily pads and bluebells", were also added to define the ORAs. Although the structures partially obstructed the views of the conserved shophouses from across the river and their design contrasted with the existing buildings, the overall proposal was approved. Since the structures were independent from the conserved buildings, the conserved shophouses could still be appreciated in totality by pedestrians walking along the public footpath between the ORAs and the shophouses.

Since these structures could be removed or updated without permanently affecting the conserved buildings, the flexibility to make such extensive changes was accorded to the owners, so as to encourage them to rejuvenate the area when required.

"We knew the new structures would be controversial with some people seeing them as a modern intrusion into this cluster of conserved buildings. We came from the perspective of transforming the place. It was not so much in the appearance, but the ambience that these insertions created, making Clarke Quay as a backdrop that is more fun and relaxed. The structures are also not touching the conserved buildings, making clear what is old and what is new, which we thought was the appropriate approach."[39]

– Poon Hin Kong, Senior Advisor of Project Development & Design at CapitaLand Development Singapore (2020 to 2022).

More Delightful Experience Along the Promenade

All the key infrastructure works to link up the quays and to make a continuous and accessible promenade were completed by 1999. Through the introduction of the ORAs and other initiatives progressively over time, the URA had successfully converted the riverside into a popular and well-utilised recreational area.

Greater Vibrancy Through the Arts

The sculpture, *First Generation*, by Chong Fah Cheong. *Source: STB*

Encouraging Public Art

Recognising that public art can contribute greatly to the sense of place and identity of the city, in 2002, the URA released the Public Sculptures Master Plan to provide a comprehensive guide for the implementation of public sculptures in the city centre. The plan identified key routes and sites in the Central Area where public sculptures could be installed, to enhance the attractiveness of our city, to bring an added creative dimension to our experience, and to enhance the image of the place. The Singapore River was identified as one of these key routes.

Capitalising on the conserved buildings and other significant historical features including the river wall, the Singapore River was conceptualised as an open concept museum by the STB.

Top: *The River Merchants* by Aw Tee Hong. *Source: STB, courtesy of Mindy Tan*
Middle: *A Great Emporium* by Malcom Koh. *Source: URA, 2014*
Bottom: *From Chettiars to Financiers* by Chern Lian Shan. *Source: URA, 2022*

Commissioned by the STB for what was titled the "People of the River" series, four life-sized bronze sculptures depicting the life of the early inhabitants along the river were installed between 2000 and 2001 with stakeholder support, to provide an immersive experience for the visitors. These sculptures provide insights into the historical significance and humble beginnings of Singapore River.

Complementing this series were various sculptures installed by members of the private sector, including earlier sculptures such as the UOB's *Bird* by Fernando Botero and *Homage to Newton* by Salvador Dali at UOB Plaza. In 2007, another developer—City Developments Limited—took advantage of the Public Art Tax Incentive Scheme (PATIS) to commission a public sculpture—*The Reed*—along the Teck Guan Street pedestrian mall fronting its development—The Pier. The display of public sculptures continues to help mark important milestones for Singapore today. As part of Singapore's Golden Jubilee (SG50), new public sculptures were commissioned along the Singapore River, such as the interactive *24 Hours in Singapore* by Baet Yeok Kuan at the grounds of the Asian Civilisation Museum (ACM). Another notable series is the sculptures along the ACM promenade, which pay tribute to ASEAN's key political leaders. While these sculptures are of different genres, collectively, they add to the cultural richness of the Singapore River, adding points of interest to the public spaces along the river promenade.

Left: *The Reed* Sculpture by Peter Chen. *Source: Victoria See, 2021*
Right: *24 Hours in Singapore* by Baet Yeok Kuan. *Source: URA*

Left: Singapore Repertory Theatre.
Right: Singapore Tyler Print Institute.
Source: Victoria See, 2022

Housing the Arts

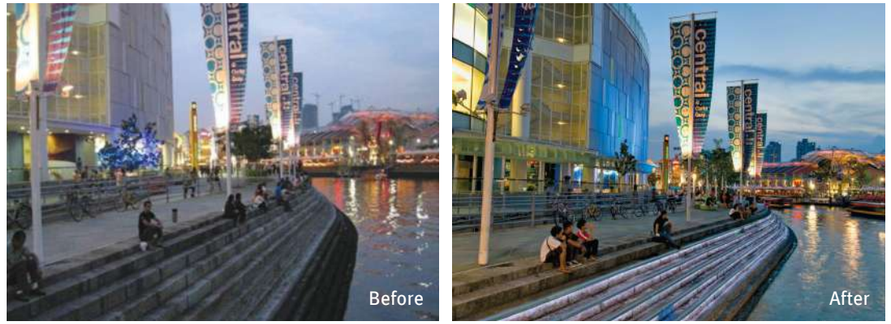
As early as 1992, the URA had identified two sets of state-owned warehouses, one on Merbau Road and the other on Caseen Street at Robertson Quay, as having notable architectural merit and to be considered under the National Arts Councils (NAC) Arts Housing Scheme to house local arts groups. Earmarking some of these warehouses for arts and culture related uses would help to bring diversity to the area and allow for better appreciation of the heritage buildings. And so, these sites were zoned for Civic and Community Institutions under the Singapore River Development Guide Plan. The KC Arts Centre—previously known as the DBS Arts Centre—at 20 Merbau Road, was the first of the former warehouses that was converted, and it has been home to the Singapore Repertory Theatre (SRT) since 2001. The Singapore Tyler Print Institute (STPI), led by renowned New York-based master printer Ken Tyler, took over the river-fronting Caseen Street warehouses and opened its doors in 2002 as an art gallery and workshop which focuses in the art of printmaking. The adjoining warehouses fronting 72-73 Mohammed Sultan Road later became the home for TheatreWorks which focuses on contemporary performing arts and has a black-box theatre fitted within the voluminous space of their building. These facilities provide venues for the public to enjoy and experience different genres of the arts, enriching the variety of experiences which can be found by the river.

Better Night Lighting

In 2006, as part of the wider strategy to enhance the character of the city centre and to take advantage of Singapore's cooler evenings during which more people are likely to be outdoors, the URA commissioned the Lighting Planner Associates (LPA)—a consultancy headed by internationally renowned lighting designer, Kaoru Mende—to develop a Lighting Master Plan for the Singapore city centre. This served as an update and extension to the Civic District Lighting Plan that was developed in 1999 and governed the lighting of key buildings and streets within the Civic District.

As a strategy under the Lighting Master Plan, each precinct had a different focus and was given unique lighting treatments within the general theme of featuring the tropical greenery. The night lighting for the Singapore River was intended to highlight the water, connect the three quays, create dynamic lighting for residual spaces such as bridge underpasses, and make the entire waterfront safer and visually exciting. Guided by the Lighting Master Plan, lighting works were carried out in collaboration with the STB for the tree-lined promenade in 2008, lighting the trees, river wall, bridges and underpasses. The night lighting successfully strengthened the unique character of the riverfront and greatly improved the ambience of the river, enhancing its appeal at night.

Night lighting enhances the overall ambience along the river promenade by highlighting the water and greenery. *Source: URA, 2009*



Top left and top right: Lighting along the riverwall and for the greenery. *Source: URA, 2009*
Bottom left and bottom right: Lighting along the river steps. *Source: URA, 2009*

Lighting on Cavenagh Bridge highlights its features. *Source: URA*

Revamp of ORA Structures at Boat Quay

Top: ORAs with small scale umbrella structures that are in line with the vision for alfresco dining. *Source: URA, 1999*
Bottom: ORAs with bulky structures blocking the view of the river and Empress Place. *Source: URA, 2014*

The Boat Quay promenade was one of the earliest areas in the city where the use of outdoor spaces for alfresco dining had been promoted through the use of ORAs. After the introduction of the ORAs along the Boat Quay promenade in 1993, their physical character continued to evolve. The original intention for the ORAs was to capitalise on the riverfront for the views and breeze, and to allow for alfresco dining under the sky for better appreciation of the riverfront. Given Singapore's tropical weather, small scale umbrellas or tent structures were subsequently allowed as part of the guidelines to provide some shade and shelter for the ORAs. The structures grew bulkier over time and began limiting both views and air movement in the vicinity, including obscuring the view of the conserved shophouses and the river which were supposed to be a feature of the area.

Recognising that the Boat Quay promenade had deviated too much from the original urban design intention, the URA carried out a round of environmental improvement works in 2016, following extensive consultation with the business and property owners to develop a collective vision for Boat Quay. Stakeholders were keen to bring back the attractiveness of the river and were supportive of the design intent which would promote a greater appreciation of the riverfront and the conserved shophouses. To achieve these goals, improvement works were carried out to address several issues.

First, it was important to recover the open spaces along Boat Quay. Due to the popularity of alfresco dinning and to be more pro-business,

Bulky ORA structures blocking the view of the shophouses. *Source: URA, 2014*

Top: ORA with views to the river and Empress Place.
Bottom: Open space for non-diners to enjoy the view as well. *Source: URA, 2016*

ORAs had been allowed to use the open spaces which had previously been set aside, limiting access to the riverfront. As part of the improvement works, two open spaces, which provided the public with good vantage points to rest and view the adjacent Civic District and Marina Bay, were re-established.

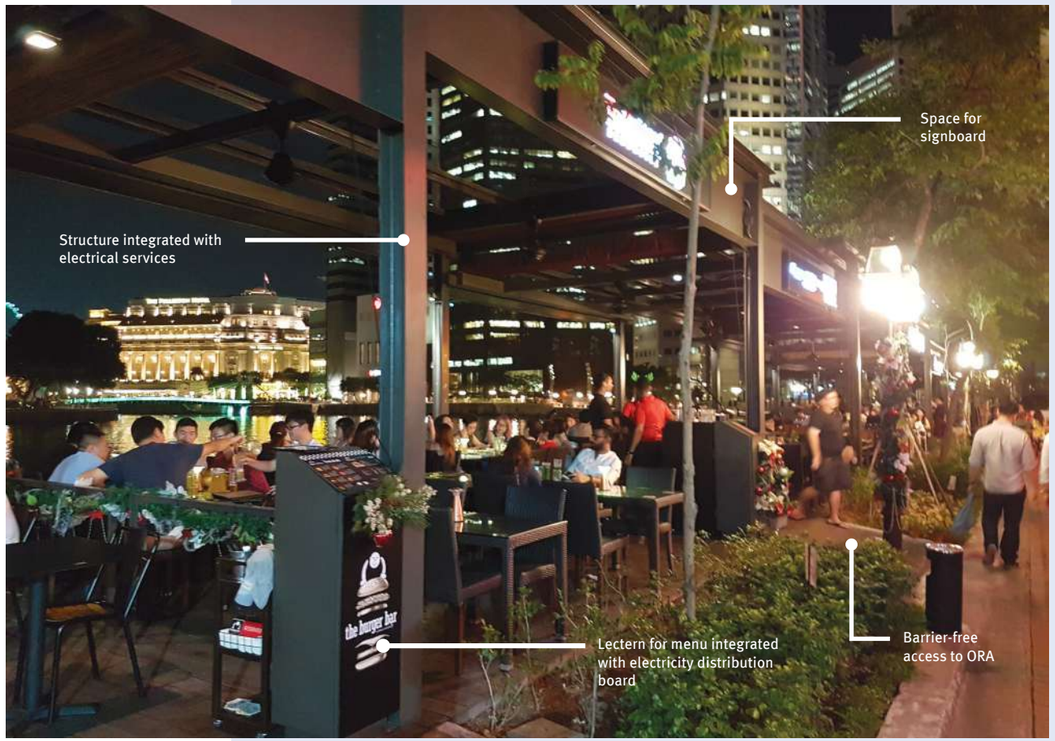
Second, the lightweight and elegant ORA structures were designed to provide unobstructed views of the shophouses from across the river, and a clear view of Empress Place on the opposite bank. The canopies for the ORAs were also designed to be retractable to provide the option for the ORA to be fully open to the sky in good weather. To complement the non-uniform nature of the conserved shophouses, the URA deliberately introduced height variations as part of the design of the ORA structures, to correspond with the first-storey height of the shophouse opposite each ORA. To further this non-uniform aesthetic, the owners of the shophouses could choose the colour of the fabric for their ORAs from a fixed palette of options.

Third, infrastructure supporting the ORAs had to be addressed. The ORAs were originally envisaged to be open-air areas with minimal need for additional lighting beyond the promenade street lamps. Therefore, no electrical service for the ORA had been installed. Over time, ORA operators had pulled overhead electrical cables from their shophouses to supply electricity for lighting and fans. These cables were overhanging across the pedestrian walkway, which was unsafe and added to visual clutter along the promenade. Recognising the need for electrical services at the ORAs, the redesign included underground electrical cabling and associated works for individual metering as part of the infrastructure works.

Lightweight ORA structures improve visibility and allow for the shophouses to be appreciated from a distance. *Source: STB*

Detailed Design of the new ORA Structures

The design of the new ORA structures at the Boat Quay promenade was carried out with close attention to details, to create practical and efficient facilities. To address the needs of the businesses while giving a more coordinated look and feel, the new ORA structures were designed to incorporate space for common business and shop design elements, allowing the businesses some design flexibility within a defined framework. The ORA structures adopt a kits-of-part concept, with a standard provision of several items including a menu display lectern, a frame or space for business signs, planters to enhance greenery, and ramp and step access. In addition, all the wiring for electrical points and lights are concealed in the structural frame and beneath the raised flooring for a neater look and ease of maintenance. The menu display lectern at each ORA also houses a distribution board and electricity meter to easily track electricity consumption.



ORA structures designed with integrated features. *Source: URA, 2016*

Examples of murals at the underpasses in 2021. Top: The Back to the Past mural, in the underpass below the Elgin Bridge, depicts a mixture of the modern with the past and recreates the environment of yesteryears. *Source: SRO, 2021*
Bottom: The Gaia mural depicts the stories of history, urban folktales and environmental messages. *Source: SRO, 2021*

Close Partnership with Stakeholders for Placemaking

Taking a more collaborative approach with stakeholders has helped them develop a greater sense of ownership. This has enabled the URA to partner the stakeholders to develop initiatives that were relevant and improve the area noticeably.

From the early 2000s, the image of Boat Quay had gradually deteriorated as businesses competed with each other, adopting increasingly aggressive marketing tactics, such as extensive touting, which had a negative effect on the ambience of the area. It was clear that there was a pressing need to foster closer partnership amongst all stakeholders, public and private. Recognising this, the URA worked with some of the key stakeholders who were passionate about this precinct to establish the Singapore River One (SRO), a non-profit company which does place management for the Singapore River precinct. SRO provides a platform for stakeholders to be involved in new initiatives, allowing a ground-up approach.

Since its establishment in 2012, SRO has successfully forged stronger partnerships with its stakeholders, most notably in more coordinated marketing and business development programming, such as the Singapore River Festival, to increase patronage of the area. For Boat Quay in particular, SRO galvanised the stakeholders to take a more active role in contributing ideas for the ORA revamp and championed the regular weekend closure of Circular Road to create a more enjoyable visitor experience. SRO also developed public realm programmes to enhance the identity of the river district, increase visitor numbers and encourage repeat visits. These programmes include art murals at the pedestrian underpasses which add vibrance to the otherwise utilitarian connections between the different quays and has helped to add to the concept of an open museum. These programmes also help engage the community including local artists and stakeholders, building a stronger sense of ownership of the area.

The public spaces set aside under the Singapore River Concept Plan have proven to be popular social spaces, especially for the residents in the area. Capitalising on its connections with businesses, SRO collaborated with private sponsors to introduce street furniture in the form of children's playsets and public benches at the Robertson Quay area to serve the residents and visitors alike. Programmes such as these, the result of a more community-led approach in designing and improving public spaces, help ensure the sustained vitality and attractiveness of the Singapore River.

"Public-private partnerships are always complex but when executed successfully, it can be very powerful. In this case, [the] Singapore River is a good example of a successful public-private partnership. The continuous rejuvenation undertaken by the public sector has been one of the main contributors to bringing the riverfront to life. The public walkways, cycling paths, interacting seamlessly with the programming on the commercial side has enhanced the businesses along the river. People from all over Singapore congregate along the riverfront, as a sense of escape from their busy lives, benefitting the commercial tenants and bringing energy to the river."[40]

– Kishin RK, CEO, RB Capital Group and founding Board Member of SRO (2012 - present)

Left: Blocks for the Future, a children's playset, located at Robertson Quay. *Source: URA, 2018*
Right: The Route, a public seating, at Robertson Quay. *Source: SRO, 2018*

Top: Artist's impression of the Rivière with conserved buildings and low-rise buildings along the river. *Source: Frasers Properties, 2022*
Bottom: Artist's impression of the interface of the private landscaped area with the publicly accessible promenade. *Source: Frasers Properties, 2022*

LOOKING AHEAD

More than three decades after the River Clean-Up, the Singapore River is today a vibrant activity corridor with a unique pedestrian-friendly environment and a rich heritage.

With few vacant sites still available along the riverfront, it is especially important that new development or rejuvenation projects be complementary to the existing context and strengthen the character of this important historic urban waterfront. As the river district transforms and evolves, the strategic plans and implementation strategies will need to adapt to maintain relevance. A number of key projects, which are currently in the pipeline, are aimed at further enhancing and updating the district and helping reinforce the river's status as an asset to Singapore.

Rivière at Jiak Kim Street at the Former Site for Zouk

As part of Government Land Sale programme, a set of three former warehouses at Jiak Kim Street and the adjoining vacant land were sold as a single plot for a residential development with some commercial use. The set of buildings at Jiak Kim Street, which comprised some of the first few warehouses to be revitalised at Robertson Quay in 1991, had been occupied by Singapore's homegrown and internationally reputed nightclub Zouk. However, over the years, as Robertson Quay moved to a more residential focus, in line with the Singapore River Concept Plan, the popular nightclub had became increasingly incompatible with the area, and relocated to a more suitable venue at the end of 2016.

With the buildings being part of the integrated development on this plot, this set of unique conserved warehouses will be restored to their original form, which included voluminous double-storey spaces and timber roof trusses. These former warehouses will be utilised for public-facing, activity generating uses so that the architecture can be appreciated by the general public.

The new development is governed by the following key urban design strategies. First, the development has to provide a pedestrian walkway through the site to connect Jiak Kim Street to Jiak Kim Bridge, improving the connectivity from Havelock Road to the river. Next, the development must be seamlessly integrated with the public promenade. In addition, the buildings fronting the river must be low rise to keep to the area's character and to blend with the conserved warehouses in terms of scale.

Canninghill Piers at River Valley Road at the Former Liang Court

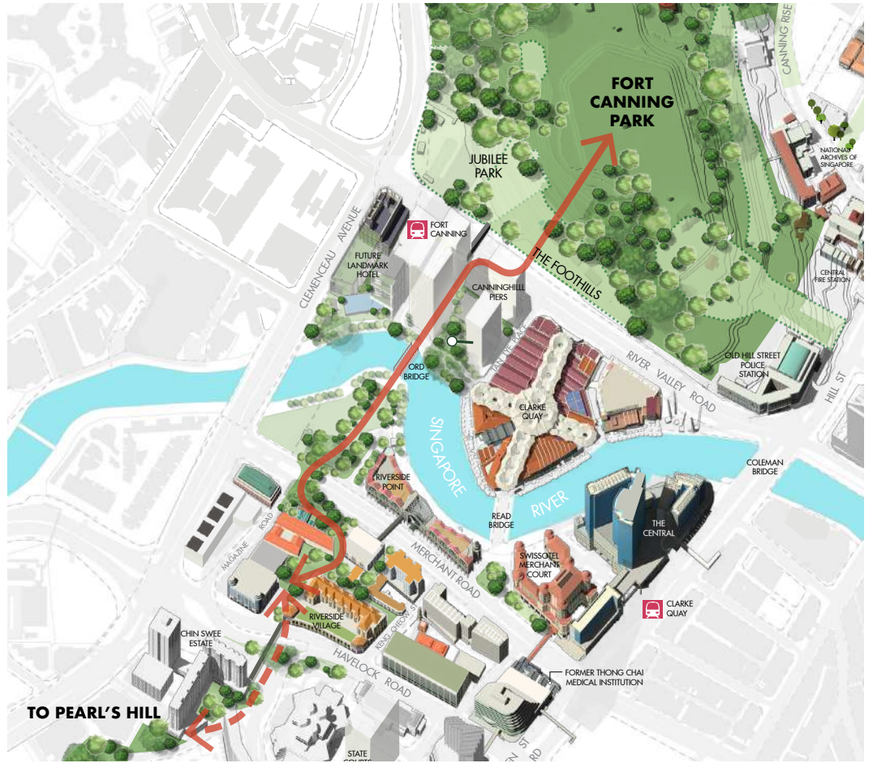
Artist's impression of the pedestrian access through the parcel to create an attractive public space. *Source: CapitaLand and City Developments Limited 2022*

The former Liang Court development was built prior to the River Clean-Up, and while there have been previous rounds of rejuvenation, its overall building form had remained essentially the same since its completion in the late 1970s (see box story on page 158). In 2019, the new owners of the site, a consortium formed by City Development Limited, CapitaLand and Ascott Residence Trust, decided that it was time to redevelop the Liang Court site to better capitalise on the river frontage and close proximity to Fort Canning Park. Given that the existing gross floor area would need to be honoured, the URA directed the development to create a more porous street level and depart from its current monolithic podium-tower typology. This redevelopment would present opportunities to implement some of the urban design strategies that are congruous with the Singapore River Concept Plan.

Artist's impression of Canninghill Piers with its riverfront portion turned into a public space. *Source: CapitaLand and City Developments Limited 2022*

First, the development will rejuvenate its river promenade. The existing access road fronting the river will be removed, allowing for a wider pedestrian promenade. With the removal of the service access and back-of-house areas currently fronting the river, the building will be able to establish a better relationship with the promenade. Together with the river taxi landing point, this part of the promenade has the potential to be an activity node.

Second, a public space within the site will provide public pedestrian access to the river from River Valley Road. The departure from the former monolithic design of the site will help provide the visual and physical porosity between the river and Fort Canning Park.



Pedestrian access through Canninghill Piers will form a part of the hill-to-hill connection between Fort Canning Park and Pearl's Hill. *Source: URA, 2021*

Round Island Route

The Singapore River has become a key activity corridor and is also part of the 150-kilometre-long Round Island Route (RIR), bringing new amenities and vitality to the Singapore River. Given the increased usage and the need to maintain safety, the clay tile paving of the promenade at Robertson Quay has been changed to be consistent with the granite paving that had been adopted for the promenade at Clarke Quay. This deviates from the initial intention to differentiate the characters of the quays through the promenade paving. When these guidelines for the paving materials for the promenade were drawn up, the characters of the three quays were not yet developed. The varied paving types were seen as a means to help differentiate the quays. Today, the quays have their own established identities, and a unifying element such as a continuous paving type does not detract from the differentiated identity of the different quays.

Conclusion

Urban design has and continues to play a key role in the transformation of the Singapore River, differentiating it from other precincts in Singapore and creating a unique environment with an ambience that people can enjoy. Urban design has been carried out at many levels for the Singapore River Planning area, from broader aspects such as the building forms, open spaces, and pedestrian network, to a more granular level, such as details in the promenade design. At both macro and micro level, design concepts have been exercised with a lot of care and thought, for example, with the promenade design and choice of trees. With an even greater appreciation of the public realm by the general public today, and the call for a stronger national identity and ownership, there is a growing need to look beyond the hardware and infrastructure as the river continues to evolve. Working with stakeholders such as SRO, to chart the way forward for better public spaces and programming, while serving the need of the stakeholders, will make the public realm more appealing and the Singapore River a place that Singaporeans are proud of.

Left: A new granite paving along the promenade in Robertson Quay has helped to give it an identity as a segment of the Round Island Route (RIR) in Singapore. *Source: URA, 2021*
Right: Programming by stakeholders, such as the mid-autumn festival community walk, would enrich the Singapore River experience.
Source: SRO

[1] Then-Prime Minister Lee Kuan Yew at the opening of the Upper Pierce Reservoir on 27 February 1977.

[2] The clean-up of the Singapore River and the Kallang Basin involved many government agencies, including Ministry of the Environment, Ministry of National Development, Ministry of Trade and Industry, Ministry of Communications and Information, Ministry of Law, Housing and Development Board, Urban Redevelopment Authority, Jurong Town Corporation, Primary Production Department, Port of Singapore Authority, Public Works Department and Parks and Recreation Department.

[3] *URA Annual Report 1977/78,* (Singapore: URA, 1978).

[4] Ibid.

[5] *URA Annual Report 1981/82,* (Singapore: URA, 1982).

[6] *URA Annual Report 1979/80,* (Singapore: URA, 1980).

[7] Goh Hup Chor, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 17 December 2013, transcript, accession number CLC/017/2013/005.

[8] Pamelia Lee, "50 Years of Urban Planning and Tourism", in 50 Years of Urban Planning in Singapore, ed. Heng Chye Kiang (Singapore: World Scientific Publishing Company, 2016).

[9] "Ideas wanted for conservation of Singapore River", The Business Times, 6 May 1983, http://eresources.nlb.gov.sg/newspapers/Digitised/Article/biztimes19830506-1.2.14.3.

[10] M. Gretchen, "New Face Plan for Boat Quay", The Straits Times, 6 May 1983, http://eresources.nlb.gov.sg/newspapers/Digitised/Article/straitstimes19830506-1.2.2.

[11] Mok Wei Wei and Justin Zhuang, "Totally Contextual": The Architecture of Mok Wei Wei, Mok Wei Wei: Works by W Architects (Singapore: Thames & Hudson, 2021).

[12] Irene Ngoo, "What the young ones want... modern city flavoured with the past", The Straits Times, 4 September 1983, http://eresources.nlb.gov.sg/newspapers/Digitised/Page/straitstimes19830904-1.1.14.

[13] *Skyline Jul/Aug 1984*, (Singapore: URA, 1984).

[14] William Ong Wei Young, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 19 October 2020, transcript, accession number CLC/ 058/2020/009.

[15] Liu Thai Ker, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 9 October 2014, transcript, accession number CLC/022/2014/003.

[16] *URA Annual Report 1983/84,* (Singapore: URA, 1984).

[17] Ministry of Communications and Information, "Redevelopment of the Singapore River Area", 8 September 1985, press release, https://www.nas.gov.sg/archivesonline/speeches/recorddetails/37eeaea4-a160-11e9-9972-001a4a5ba61b.

[18] Stephanie Yeo, "Designing the look of the city", The Straits Times, 8 April 1995, http://eresources.nlb.gov.sg/newspapers/Digitised/Page/straitstimes19950408-1.1.56.

[19] Gretchen Liu, Singapore A Pictorial History 1819–2000 (Singapore: Editions Didier Millet, 2001).

[20] Koh-Lim Wen Gin, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 9 November 2020, transcript, accession number CLC/058/2020/012.

[21] "Rehabilitation of shophouses on land bounded by Boat Quay, South Canal Road, Circular Road and South Bridge Road", Press Release, 31 March 1989.

[22] Goh, CLC interview.

[23] Ministry of Communications and Information, "Government announces measures to phase out rent control" 24 October 1988, press release, https://www.nas.gov.sg/archivesonline/speeches/record-details/7b3957b5-115d-11e3-83d5-0050568939ad.

[24] Rent control for conservation areas was lifted under the Controlled Premises (Special Provisions) Act, which was first enacted in 1970 to enable owners to recover possession of rent-controlled properties for the development purposes in designated areas such as Golden Shoe Area.

[25] Development Charge has been replaced by Land Betterment Charge (LBC) with effect from 1 August 2022.

[26] *Skyline Nov/Dec 1986*, (Singapore: URA, 1986).

[27] *Skyline Mar/Apr 1989*, (Singapore: URA, 1989).

[28] *Skyline Nov/Dec 1988*, (Singapore: URA, 1988).

[29] Former Minister of State for National Development, Peter Sung, mentioned at the signing of the Clarke Quake sale of sites. *Skyline Jan/Feb 1990,* (Singapore: URA, 1990).

[30] The platform levels of the old warehouses were low in relation to the promenade level. If kept at that low level, there will be risk of flooding.

[31] The Robertson Blue was one of the first privately owned sites to redevelop a set of retained warehouses. Sonny Chan, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 24 June 2021, transcript, accession number CLC/058/2021/019.

[32] The Planning and Development Guidelines for Robertson Quay area preceded the Robertson Quay Envelope Control Plan in 1994.

[33] Ole Johan Dale, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 20 November 2020, transcript, accession number CLC/058/2020/013.

[34] The Singapore River Environmental Design Master Plan was an outcome by the Singapore River Steering Committee, chaired by the URA, that was set up in 1992 to drive and monitor the progress of the redevelopment works of the Singapore River. It was intended to illustrate and coordinate the design and implementation of all environmental improvements works along the Singapore River that involved both the government agencies and private sectors.

[35] Sharon Chin and Cheryl Tan, "Riverside Trek – Obstacle course awaits those who want to take a walk along the river", The Straits Times, 20 April 1993, 25, http://eresources.nlb.gov.sg/newspapers/Digitised/Page/straitstimes19930420-1.1.25.

[36] *Skyline Sep/Oct 1997*, (Singapore: URA, 1997).

[37] Parts of the original straight wall profile fronting Asian Civilisation Museum has been altered to create wide river steps to bring the public closer to the river, which is part of the public terrace that leads to the newly created entrance fronting the river promenade, giving the entrance more prominence.

[38] Five of the bridges have been subsequently gazetted for conservation in December 2009. These were the Anderson Bridge, Cavenagh Bridge, Elgin Bridge, Ord Bridge and Read Bridge.

[39] Poon Hin Kong, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 2 July 2021, transcript, accession number CLC/058/2021/020.

[40] Kishin RK, "Interview by CLC", Centre for Liveable Cities, Ministry of National Development, 6 July 2021, transcript, accession number CLC/058/2021/021.

View of Singapore River from the river mouth.
Source: Shawnn Tan/Unsplash

POSTSCRIPT

Hwang Yu-Ning

Chief Planner & Deputy Chief Executive Officer, Urban Redevelopment Authority (2017–2023)

The impact of urban design in sculpting a distinctive and liveable built environment in Singapore is clear, and over time has been recognised by many.

Urban design in Singapore is realised through close cooperation and collaboration with developers, architects, as well as other built environment professionals, turning guidelines into reality.

The work of the urban designer is never complete. As a contextual discipline, urban design will continue to evolve based on changing contexts. This may include immediate changes such as the development and redevelopment of land parcels and buildings to support new uses and meet needs, or as part of longer-term planning to address unfolding trends such an ageing population, and also to prepare for disruptions that may arise due to climate change. In step with changing contexts, the URA has rolled out urban design guidelines to encourage and, in some instances, mandate the incorporation of various elements to enhance our built environment. These elements include urban greenery, public spaces, sheltered linkways, better mobility networks with barrier-free access, just to name a few.

Going forward, we need to be even more data-informed in our urban design. Through both spatial and data analytics, we can gain rich insights into how people interact with the built environment, such as the way we use public spaces and how our guidelines impact developments such as the effect of urban greenery requirements. The URA Design & Planning Lab has put in place various analytics tools to help our urban designers make more informed decisions to shape our physical environment positively. We will continue to strive to take full advantage of the advancements in urban design and planning technologies to further enhance Singapore's urban design expertise for a built environment that is considered and designed more holistically, as well as adaptable to future circumstances.

I want to thank the team who put this publication together to record our short yet rich urban design heritage. It documents the foundational work done at the Singapore River, as well as at newer districts like one-north and Bedok Town, to showcase the diversity and complexity of urban design in shaping the identity of places. Singapore's urban design effort will surely continue to expand as our island nation continues to develop. I hope that this publication will spark your excitement for the future of urban design in Singapore as much as it has in us.

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Urban design shapes Singapore's urban fabric, developing distinctive and liveable areas—flat plots of land are developed into vibrant young towns, and mature estates are rejuvenated to add new vigour, industrial and innovation districts are reimagined with people-friendly accessible areas, while rivers are transformed from pollutive industrial areas into convivial live, work and play precincts.

As a contextual discipline, urban design evolves from and relies on close partnerships between the public, private and people sectors. Through case studies on the Bedok Town Centre, one-north and the Singapore River, this publication highlights Singapore's unique approach to urban design and its role in developing the cosmopolitan island nation that we see today.