WALKABLE AND BIKEABLE CITIES: LESSONS FROM SEOUL AND SINGAPORE

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About the Centre for Liveable Cities

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

CENTRE for LiveableCities SINGAPORE

MND SINGAPORE

About The Seoul Institute

The Seoul Development Institute was established by the Seoul Metropolitan Government (SMG) in 1992 and was renamed as the Seoul Institute (SI) on 1 August 2012. The Seoul Institute's goal is to establish a medium- to long-term vision for Seoul and propose social policies on welfare, culture, education and industries and urban management policies on city planning, transportation, safety and the environment. SI's primary objective is to improve municipal administration through professional research, improve the quality of life in Seoul, and reinforce and sustain the competitiveness of Seoul. https://www.si.re.kr/

서울연구원
The Seoul Institute

CONTENTS

FOREWORD BY SEOUL

Greetings,

I am very glad to see that the collaborative research project between the Seoul Institute and the Centre for Liveable Cities has finally come to fruition. Today, sustainability is the definite underlying principle of urban policy in Seoul. The Seoul Metropolitan Government has undertaken a variety of programs to promote sustainable growth. Creating a walkable and bikeable Seoul is at the core of such efforts. In this regard, research at the Seoul Institute has provided a critical basis from which to initiate a paradigm shift from car-oriented to pedestrian-friendly transport planning. In particular, the Institute has drafted the Seoul Transport Vision 2030 that established a foundation for walkable and bikeable city. Under this vision, the Seoul Metropolitan Government has completed multiple ambitious projects to improve the walkability and bikeability of the city. One of our plans, for instance, "Seoul Station 7017 Project" has attracted wide acclaim.

Cities in other parts of the world have expressed interest in better understanding the experience of implementing pedestrian and bicycle policies in Seoul. However, there has never been a joint study between the Seoul Institute and a prominent urban think-tank. As the first of its kind, ***Walkable and Bikeable Cities: Lessons from Seoul and Singapore*** introduces remarkable policy experiences that have improved walkability for citizens in different built environments.

It is interesting to note that in both cities, constant communication with communities has been the key to translating visions of pedestrian-friendly cities into practice. As seen in our case studies, it is important to be as inclusive as possible in identifying and communicating with citizens and communities. Their cooperation and understanding has been the most important element behind the success of numerous projects. Since citizens in both cities had their own authoritarian leaderships in their past, this is a meaningful discovery. It tells us where the focus should be in planning for pedestrian- and bicycle-friendly environments.

I praise the collaborative effort that went into completing this wonderful piece of work. This publication shows that researchers at the Seoul Institute and the Centre for Liveable Cities are extremely capable and hard-working. I would like to commend the researchers whose excellent work has been indispensable in writing this book. I sincerely hope that the research represented herein will assist both Seoul and Singapore as we strive for sustainable futures.

Thank you.

Park Won Soon
Mayor, Seoul
South Korea

FOREWORD BY SINGAPORE

Singapore has always placed her people at the centre of our urban plans.

In the early days when we expanded our road network to relieve traffic congestion and facilitate development, we also took care of the needs of pedestrians.

The Walkway Unit was set up in 1977 in the Public Works Department to build footpaths along all the roads throughout the city. We conscientiously planted trees along our streets to provide shade and visual relief, in line with the Garden City campaign in 1963. These efforts ensured safety and comfort for pedestrians in our tropical city.

In addition, we have been mindful of the negative impact of cars on the city since the early years; hence, policies were introduced to control car population and usage. Our transport policies ensure that everyone can move around comfortably in a relatively congestion-free city.

Our current car-lite vision builds on our earlier urban policies to ensure sustainability as we continue to grow. As a city-state with limited land, we know that more needs to be done to further reduce our reliance on cars and encourage sustainable travel modes like public transport, walking and cycling.

Today, Seoul and Singapore share the same aspirations to make our cities less reliant on cars and friendlier for pedestrians and cyclists. For both cities, moving away from cars goes beyond sustainability—it is also about making our cities more attractive and liveable. By introducing car-free zones and expanding public spaces, we can make the city more lively and vibrant.

Both Seoul and Singapore also recognise the importance of active involvement by the private and people sectors in making our cities more walkable and bikeable. In Singapore, we have a robust system in place to guide and incentivise private developers to integrate pedestrian-friendly features like sheltered walkways in their developments. We are going a step further with the new Walking and Cycling Plan to be introduced in 2016, which requires developers to include walking and cycling connections and amenities in their development plans. To bring the community on board, we also have platforms like "Streets for People" to encourage ground-up street closure events in the neighbourhoods.

Walkable and Bikeable Cities: Lessons from Seoul and Singapore distils the unique experiences of both Seoul and Singapore in promoting walking and cycling. I hope this inaugural research collaboration between the Centre for Liveable Cities, Singapore, and the Seoul Institute will offer useful lessons that bring both cities a step closer to a more liveable, car-lite future.

Lawrence Wong
Minister for National Development
Singapore

1. INTRODUCTION

Walkability and bikeability have gained greater prominence in cities throughout the world in recent years. People, communities and governments are increasingly aware of the environmental, social and even economic benefits of such active mobility, and have begun to demand more walkable and bikeable places.

Different Contexts, Common Goals

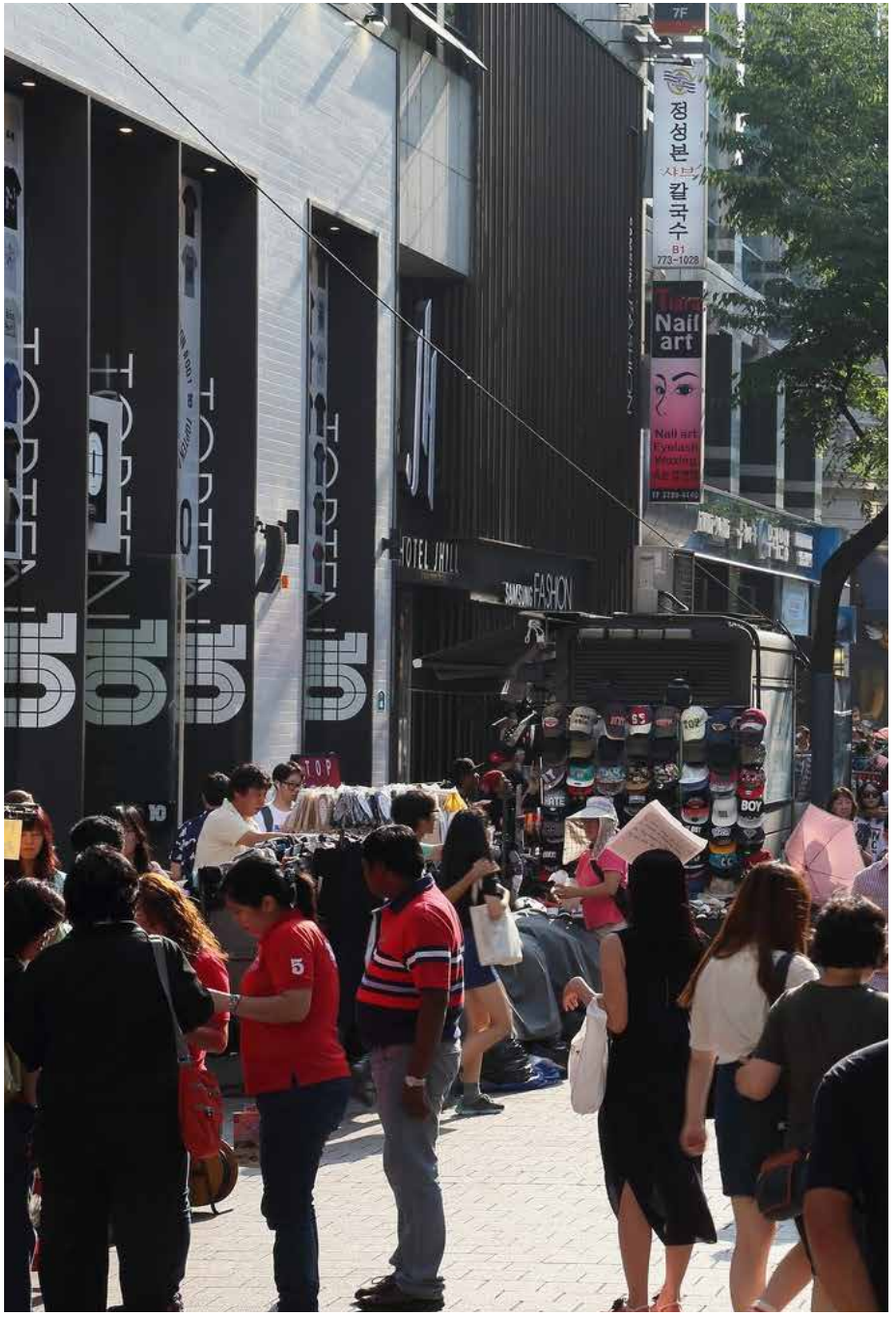
Each city is driven by a unique set of circumstances to make its environment pedestrian- and cyclist-friendly.

In Seoul, decades of serious traffic congestion are projected to chalk up to KRW 22 trillion in costs by 2030, a significant increase from KRW 7 trillion in 2008. The Seoul Transport Vision 2030 is a mobility paradigm shift that aims to create a people-centric transport system focusing on public transport, pedestrians and cyclists. It is underpinned by a comprehensive public transport system created through decades of investments in urban rail networks and a major bus system reform in 2004. This provides a viable alternative for people to move around the city through a combination of active mobility and public transport, without the need for private cars.

Singapore has remained comparatively free of crippling traffic congestion, thanks to a robust system of integrated land use and transport planning, as well as car population and usage controls in place since the 1970s. However, Singapore's population is steadily growing; and this, coupled with the city-state's fundamental land scarcity, poses an obstacle to further growth. With 12% of Singapore's land area already dedicated to land transport infrastructure—almost the same as that for housing at 14%—the need to further cut back the use of private cars has become more urgent, if Singapore is to continue growing in a sustainable manner. The car-lite vision, launched in 2015, is a key strategy under the Sustainable Singapore Blueprint, with walking and cycling as its important aspects.

Beyond Mobility: Re-orienting the City to Its People

Walking and cycling, however, is more than just moving around the city—walkable and bikeable cities are also often highly liveable cities. Traffic-calmed neighbourhoods, car-free streets and civic plazas created from active-mobility-related initiatives play a key role in enhancing quality of life. As evident in the cases covered in this publication, in promoting walking and cycling through the re-allocation of limited urban space from cars to pedestrians and cyclists, Seoul and Singapore are a step closer in becoming safe and vibrant cities for their people, thus generating wider benefits for more citizens.



Pedestrian street in Myeongdong, Seoul

PARK(ing) Day 2014 saw parking lots in Singapore's roads being transformed into vibrant spaces for people.

Distilling and Sharing Knowledge on Creating Walkable and Bikeable Cities

In recent years, both the Seoul Institute (SI) and the Centre for Liveable Cities (CLC), Singapore have dedicated research efforts to promoting walking and cycling in each city. SI was instrumental in formulating the Seoul Transport Vision 2030, which paved the way for Seoul's paradigm shift from a car-centred to a people-oriented transport system that prioritises pedestrians and cyclists. CLC completed key research projects on active mobility, including the 2014 collaborative project with the Washington-based Non-Government Organisation Urban Land Institute, "Creating Healthy Places through Active Mobility", which has influenced mobility policies in Singapore and generated greater interest in walking and cycling.

This collaborative research project between SI and CLC examines a series of case studies on walkability- and bikeability-related projects from both Seoul and Singapore, for a deep understanding of each city's unique approaches and experiences. The knowledge gleaned from the research process will not only help further Seoul's and Singapore's efforts to promote walking and cycling, but will also enable other cities to create people-oriented, walkable and bikeable places.

Key Mobility Statistics for Seoul and Singapore

SEOUL

Land Area (km²)	Population	Density (per km)	% of land used for land transport infrastructure
605.25	10.3 mil	17,018	13.9

No. of daily journeys

32.5mil

Road fatality rate per 100,000 population

3.9

Public Transport

Length of urban rail network	327.1 km
Public bus fleet	8,979
Daily passenger volume '000 (trains)	12,630
Daily passenger volume '000 (buses)	8,813

SINGAPORE

Land Area (km²)	Population	Density (per km)	% of land used for land transport infrastructure
719.1	5.54mil	7,697	12

No. of daily journeys

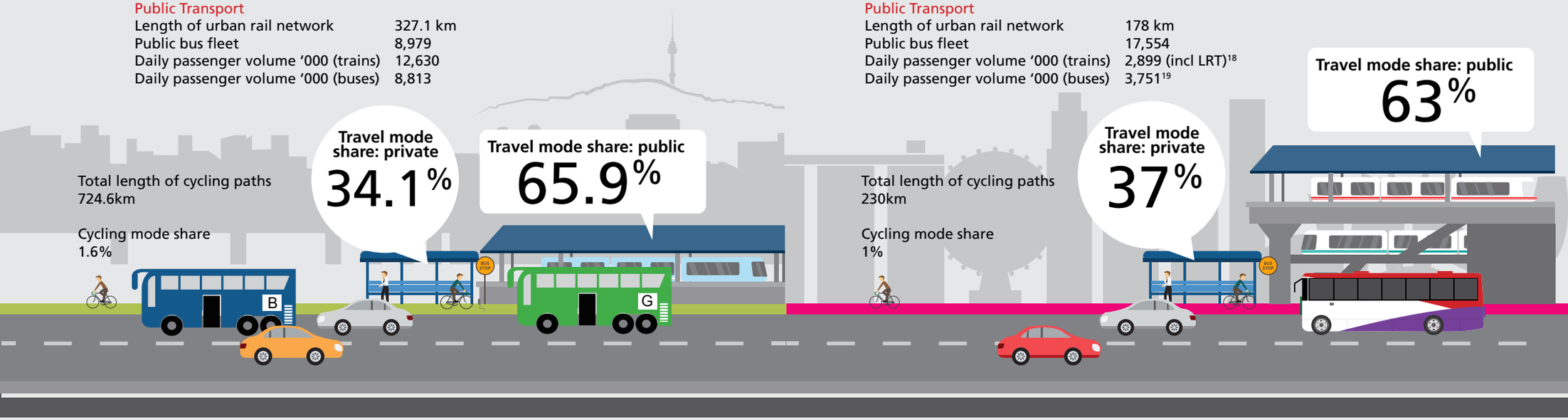
12.5mil

Road fatality rate per 100,000 population

2.82

Public Transport

Length of urban rail network	178 km
Public bus fleet	17,554
Daily passenger volume '000 (trains)	2,899 (incl LRT)[18]
Daily passenger volume '000 (buses)	3,751[19]



Private transport

Private car population	2,387,614
% of households with cars	56.9
Average car speed on main roads	25.0 km/h
Average annual car mileage	10,516 km

Private transport

Private car population	536,882
% of households with cars	46
Average car speed on main roads	28.9 km/h
Average annual car mileage	17,500 km

2. FROM CARS TO PEOPLE: A MOBILITY PARADIGM SHIFT IN SEOUL AND SINGAPORE

Seoul's Vision for Urban Transportation

Over the past 40 years, Korea's dramatic economic development and rapid urbanisation have led to an explosion in private car ownership, due largely to the affordability of cars for lower-income citizens. In the past four decades, Seoul's population increased fourfold but the number of cars grew fiftyfold. More cars on the road has led to greater demands for infrastructure such as flyovers, widened roadways and car parks, and less room for other needs such as pedestrian spaces.

Previously, Seoul's transport policies catered to the growing car population. Such car-oriented policies, however, have proven to be insufficient to meet the ever-increasing demand for private transport. Traffic congestion worsened, with average car speeds lower than 16 km/h in the central business district (CBD). In the early 2000s, the social cost of traffic congestion in Seoul was an estimated US$6 billion a year.

From the 2000s, the city began introducing systemic measures to reorganise the bus system after piecemeal approaches to improve bus services did not come to fruition. In 2004, the Seoul Metropolitan Government (SMG) undertook bus system reforms. Their objective was to redesign the entire bus system in light of environmental concerns, financial sustainability of the bus industry and passengers' needs. The bus reform was a package deal that included rigorous monitoring, route restructuring, exclusive median bus lanes, an automatic fare collection system and a new incentive framework for the industry.

The city also introduced a new form of governance: the Quasi-Public Bus Operating System. Under this system, the city assigned bus routes, determined bus schedules and managed fare revenues. Bus companies shared all the revenue and the SMG provided subsidies to companies that were unable to balance their budgets. This scheme ended the cut-throat competition between bus companies over profitable routes and instead allowed bus operators to ply their routes with stability, providing faster and safer bus service. The purpose was to maximise efficiency and simultaneously, enhance the quality of transit service.

Despite bus system improvements and other policy interventions such as travel demand controls, a significant 26% of trips in 2010 were still made by passenger cars, which

accounted for 56% of energy consumption in the transportation sector.

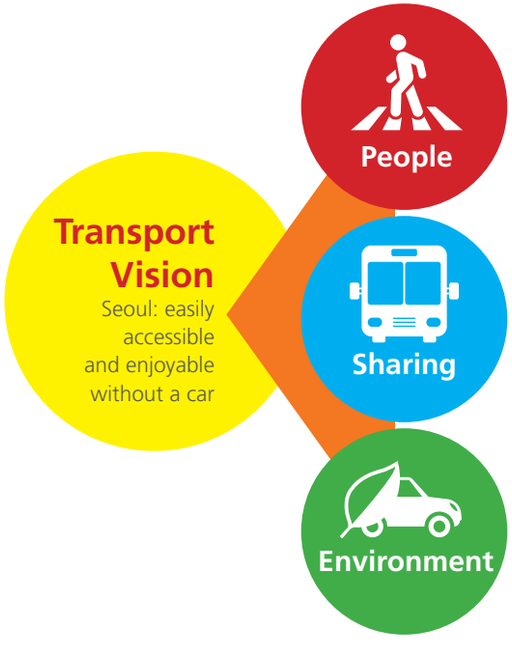
Under these circumstances, it was clear that continued dependence on private cars would lead to unsustainable urban development and growing inefficiency in the transport system.

Seoul Transport Vision 2030

To address the city's transport concerns, the SMG developed a long-term strategic policy for transportation. The Seoul Transport Vision 2030, the outcome of this effort, was announced in May 2013 and championed by the Seoul Mayor. The proposed pedestrian-first approach also enjoyed popular support from the Seoul citizens, having recognised the tangible benefits from earlier pedestrian-friendly projects like the Cheonggyecheon Stream Restoration, which was completed in 2005.

Incorporating perspectives from citizens and subject-matter experts, the vision set forth important paradigm shifts in Seoul's transportation policies—changing the focus of transport planning from private transport to public transport and beyond, to include pedestrians and cyclists. This was to ensure that Seoul's transport policies would benefit all citizens.

Seoul's Transport Vision and Policy



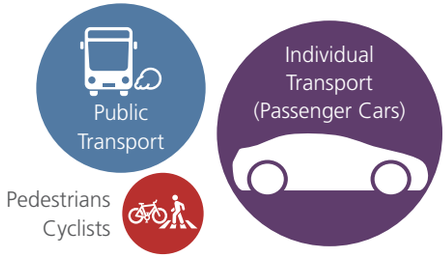
People-first transport
- Priority on pedestrians & cyclists
- Reduce traffic fatalities
- Ensure universal mobility for those with limited access to transport

Transport for all users
- Rail-oriented public transit system
- Faster public transit
- Transportation shared by all

Transport that minimises environmental degradation
- Minimise unnecessary movement
- Eco-friendly, efficient transportation environment
- Creating a civilised transportation culture together

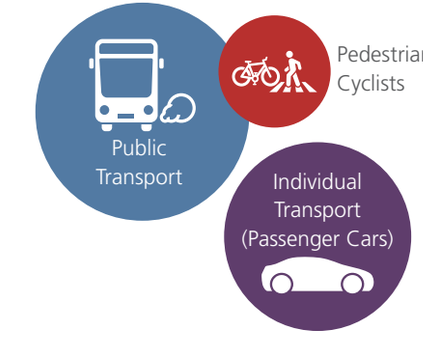
A Paradigm Shift from Car-centred to People-oriented Policies

[Past] Individual Transport



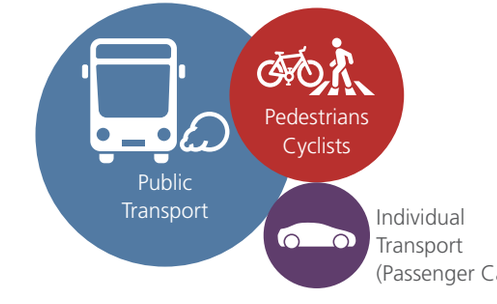
Infrastructure built for individual transport

[Present] Public Transport



Infrastructure built for public transport

[Future] People-first Transport



Infrastructure built for people transport

(User Pay Principle) Aggressive management of demand

Vision

To anchor its new vision, SMG adopted the transport future scenario "Seoul: easily accessible and enjoyable without a car" as well as three key concepts: "People-first transport", "Transport for all users" and "Environmentally-friendly transportation". SMG also set out an array of detailed transport objectives, called "2030 Triple 30": a 30% reduction in automobile use, a 30% reduction in public transit travel time and an increase in the green space ratio in the CBD from 10% to 30%.

If successful, Seoul could experience a 10% increase in the green transport mode share from 70% to 80%, with a reduction in transportation CO_2 emissions from 1.2 to 0.9 tonnes per capita a year. SMG hopes to achieve this by 2030. The setting of these ambitious goals was enabled by the 2004 public transit reforms, which laid a firm foundation for a successful environment-friendly transport policy.

Towards a People-first Transport Vision

Today, Seoul's new people-first transport vision that prioritises people and the environment is already being realised.

Road diet

Seoul has been actively narrowing roads to create sidewalks and cycling paths for pedestrians and cyclists since the early 2000s. To facilitate more direct pedestrian connections, Seoul has also progressively removed footbridges and introduced pedestrian crosswalks throughout the city. Key projects like the Yonsei-ro Transit Mall—accessible only to buses, emergency vehicles and pedestrians—were established by SMG to encourage public transport use and discourage driving.

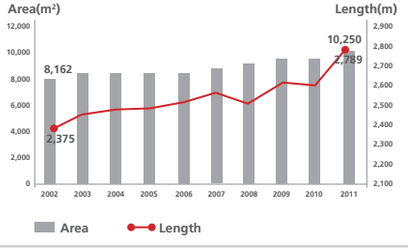
Removal of flyovers

While flyovers help keep car traffic flowing, they can blight the urban landscape, obstruct pedestrian movement and hinder the installation of median bus lanes. So, SMG demolished some flyovers to promote urban vitality. A subsequent survey indicated that vehicular speeds have remained the same while land values near the new intersections have risen after the flyovers were removed.

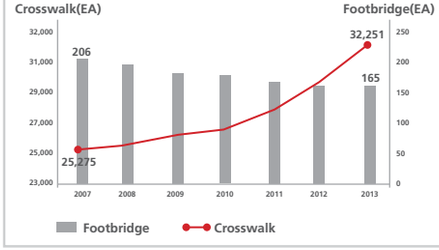
Environment-friendly car sharing

To further reduce the demand for cars, SMG launched a car-sharing programme in 2013, which saw the deployment of more than

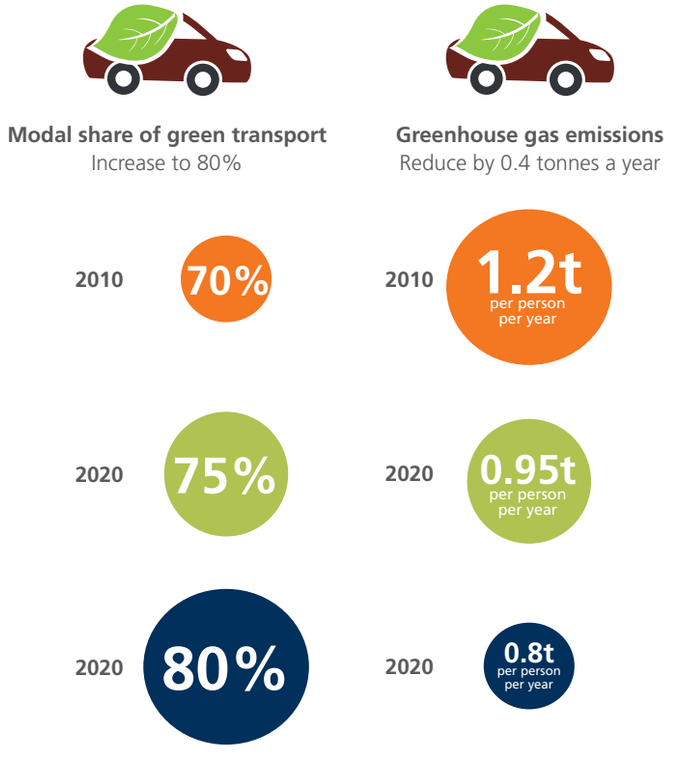
Sidewalk Length and Area in Seoul



Number of Pedestrian Crosswalks and Footbridges in Seoul



The Seoul Metropolitan Government's Triple 30 Goals to be Achieved by 2030



Modal share of green transport: Includes public transit (+ transfers), walking, cycling.

2030
Triple 30

Passenger car travel to reduce by
30%

Average commute time via public transport to reduce by
30%
(Current: 53 min)

Area covered by green transport to increase to
30%
(Current: 14.7%)

1,300 cars, approximately 300 of which are electric. Since September 2014, 10 electric taxis have begun operating in the city and the service is being evaluated to assess the electric taxi's viability as a commercial vehicle for longer travel distances.

Reducing Demand for Cars

Beginning in the 1990s, economic growth and the popularity of owning a car have led to soaring numbers of personal cars on the road and consequently, to even more serious traffic congestions.

To tackle congestions, city mayors were empowered by the Urban Traffic Readjustment Promotion Act to manage transport demand. Article 15 of the Act states that when a city mayor deems it necessary to adopt the Transportation Demand Management (TDM) approach in an area under his or her jurisdiction to facilitate traffic flow, improve air quality or promote the efficient use of transportation infrastructure, it may be undertaken after a review by the Regional City Transportation Policy Deliberation Committee. The City of Seoul has developed various TDM programmes that are mandatory as well as voluntary. These include a congestion impact fee, "Weekly No-Driving Day" programme and travel demand management for businesses.

Congestion impact fee

Buildings such as wedding halls and department stores induce a sudden rise in traffic at specific hours, causing congestion. First introduced in 1990, the congestion impact fee was designed to have the owners of these facilities bear the financial cost according to the "polluters-pay" principle. The congestion impact fee, which is used to improve urban transportation, is levied on owners of facilities with a total floor area of 1,000 m^2 or more.

This system saw a certain level of resistance from potential fee payers but in general, the public understood the need to reduce congestion and its social costs.

Weekly No-Driving Day

The voluntary Weekly No-Driving Day programme was introduced in July 2003 to manage transportation demands and relieve congestion. The programme encouraged residents not to drive on one out of five weekdays, with car owners whose license plates ended in certain numbers being asked not to drive on a corresponding day. SMG provided incentives for participants at the beginning of the programme. Office buildings that participated in the Weekly No-Driving Day programme received a 30% discount on the congestion impact fee, while people who participated in the programme were given a 20% discount on fees at public parking lots. As of 2012, the take-up rate was 44.3%—nearly half of all passenger cars in Seoul were in the programme.

According to research by the City of Seoul in 2014, the Weekly No-Driving Day programme has helped reduce Seoul's traffic volume by 1.1%. In financial terms, reduced travel and enhanced air quality are worth KRW 144.4 billion per year.

Travel Demand Management (TDM) for business

Seoul introduced a TDM system for companies, designed to get them involved in reducing traffic volume on a voluntary basis. Companies participate in traffic volume reduction programmes, the outcomes of which determine their discount on (or even exemption from) the congestion impact fee. Demand management programmes for personal cars, such as the Weekly No-Driving Day or mandatory parking fees and programmes to encourage bicycling, such as installing bicycle stations, account for 70% of all programmes. These programmes are easier than others for companies to take part in.

Conclusion

Seoul's transportation policy in the past focused on vehicle-oriented approaches such as building road infrastructure, signal systems, and pedestrian and vehicle overpasses to accommodate increasing travel demand. However, this has led to a soaring volume of cars for personal use; transportation alone accounted for 30% of all energy use in Seoul. Personal cars, particularly, accounted for 60% of all energy in the transportation sector, not to mention a large percentage of air pollutant emissions. Citizens had no say in policy development and public officials were mostly uninterested in details of actual public demand for a better transportation system. However, Seoul Transport Vision 2030 marks a break from the past.

First, its focus is not individual transport modes but citizens as a whole. The plan provides infrastructure for the benefit of the public by creating an environment dedicated to pedestrians, bicycles and public transit while ensuring effective transportation demand management (i.e., restricting the volume of personal cars). It encourages transport sharing and preserves the environment as a key to improving the city's sustainability.

Second, Seoul Transport 2030 requires a collaborative effort between the city, the central government, the private sector and the people. Under the auspices of the central government, Seoul needs to develop its own systematic, environment-friendly transportation policies and encourage private companies to contribute towards this effort. Insistence on a government-led approach is not the only answer to transport problems; residents must be able to take part in the transformation of Seoul's transportation system so that it preserves and improves the environment.

A "Car-lite" Singapore

Singapore's transport system today stems from decades of long-term planning and infrastructure development. Transport planning is integrated with land use planning, creating a mobility system that has been key to supporting liveability in Singapore.

1971 Concept Plan

Transport Planning in Singapore over the Years

The transport system in Singapore prior to the 1960s was highly disorganised and inefficient. About 90% of the people in Singapore depended on public transport in the mid-1950s.[1] The bus system was run by private operators and it was prone to frequent bus strikes, in addition to poor service quality. There was also serious traffic congestion

in the city centre. With a rapidly growing post-war population and limited land supply, Singapore had a growing transport problem, which needed to be addressed in tandem with her development needs.

Public transport development[2]

To establish a more integrated land use and transport system that can support the city-state's growth needs, the Singapore government commissioned the State and City Planning (SCP) project in 1967. The outcome was the 1971 Concept Plan, which laid out the urban structure for a population of 3.4 million in Singapore by 1992, and a longer term population of 4 million. The Concept Plan proposed the idea of a "Ring Plan" which visualised high-density public housing towns surrounding the central water catchment area—the forested areas and reservoirs at the centre of the island. Land was safeguarded under the plan for the construction of the Mass Rapid Transit (MRT) system, which would serve as the backbone to this ring of development corridor to connect towns to the city centre and industrial areas. The decision to construct the MRT system was eventually made in 1982 after a 10-year public debate, with the first line completed in 1987.

The government also reorganised the private-run bus industry. Following the 1970 White Paper on Reorganisation of the Motor Transport Service, 10 privately-owned bus companies were merged into three companies. Further mergers and consolidation were undertaken in the following years, with bus routes and operations centrally planned and coordinated to ensure better bus service delivery for the people.

Car restraint policies

Rapid economic growth, growing population and rising affluence of Singaporeans meant that the demand for private transportation will inevitably increase due to its convenience and comfort, even as Singapore was investing heavily on improving public transport system. From 1962–1973, the growth rate of motor vehicle population averaged 8.8%.[3] The SCP anticipated that congestion within the city centre—where further expansion of road space was unfeasible due to the existing high-density developments—would reach unacceptable levels if car restraint policies were not put in place. The Concept Plan thus recommended that restraints on car ownership and usage in the city were required to manage vehicular traffic.

The government took the SCP recommendations seriously. Since 1972, Singapore began putting in place a series of tax measures to control car population growth. The Vehicle Quota System (VQS) was implemented in 1990 to effectively control the growth of vehicle population at sustainable levels. Under this system, each prospective car owner would have to bid for a Certificate of Entitlement, which would only be valid for 10 years.[4]

Car ownership restraint policies are also balanced with car usage measures. One such measure was the Area Licensing Scheme (ALS) introduced in 1975. The ALS was the first congestion pricing scheme implemented in the world, and it required all motorised vehicles (including car pools and company cars) to pay a fee to enter the city centre during restricted hours. The ALS eventually evolved into the automated Electronic Road Pricing (ERP) system in 1998. Together, these private car restraint policies helped Singapore avoid serious traffic congestion that has crippled cities around the world.

Pedestrian safety measures

While improving the city's transport infrastructure, the government also sought to ensure the safety of the most vulnerable group of road users—the pedestrians. Increasing vehicular traffic in the 1950s-1970s contributed to the rise in accident fatality rates, which reached as high as 18 per 100,000 people in 1972, with pedestrians bearing the brunt of the road deaths.[5] In response, the government launched a national campaign to cut down road death tolls, adopting a multi-pronged approach of public education on road safety; enforcement against recalcitrant motorists; construction of pedestrian infrastructure; and legislation for pedestrian crossings. The Walkway Unit of the then-Public Works Department led the formidable task of constructing pedestrian paths along most roads in Singapore, as well as the building of safe pedestrian crossings such as overhead bridges. As a result, road accident casualties fell by 42% between 1973 and 1986,[6] and pedestrians in Singapore were able to enjoy basic levels of road safety provided by the footpaths and pedestrian infrastructure.

Current Mobility Challenges

Although Singapore has developed a robust system of integrated land use and transport planning, complemented with transport policies to keep traffic congestion in check, urban mobility challenges continue to persist in recent years.

Growing population and economy with limited land

Singapore experienced rapid population growth from around 2005-2010, creating significant pressure on the city's transport infrastructure. Its population is further projected to continue growing, up to about 6.9 million by 2030. Land supply, however, remains limited. Given that 12% of the land in Singapore is already allocated for land transport infrastructure—almost as much as the land for housing at 14%—there is little scope to continue expanding road infrastructure to cater to increasing demand.

Persistent high car usage

Despite having some of the heftiest car ownership and usage taxes in the world, car usage in Singapore remains relatively high compared to other cities. For example, the annual mileage of cars in Singapore on average is far higher at 17,500 km (2014),[7] compared to other high-density cities like New York at 5,300 km (2010).[8] This could be an unintended result of high-ownership costs, prompting car owners to maximise the value of their cars by driving whenever possible. Further road expansion is challenging especially in densely built-up areas and also unsustainable in the long term. As such, there is an urgent need to reduce Singapore's reliance on private cars by prioritising mass public transport that is more space-efficient in transporting people, as well as walking and cycling.

Changing mindsets

There are challenges in changing people's mindsets and habits to be less reliant on cars because driving is currently the fastest and most convenient travel option for most trips. Singapore has largely avoided a congestion crisis unlike other developing cities, due to pre-emptive policies such as the VQS and ERP that ensure smooth-flowing road traffic. Today, motorists in Singapore enjoy one of the highest average traffic speeds of 28.9 km/h on arterial roads, and 64.1 km/h on expressways during peak hours.[9] Ample parking spaces at residences as well as destinations have also contributed to the convenience of using a car.

Evolution of Walking and Cycling Policies in Singapore

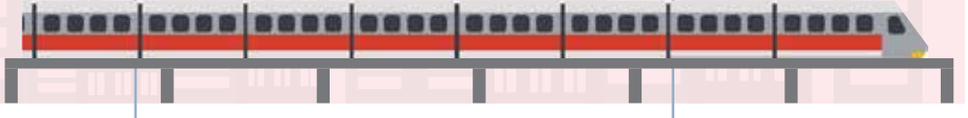
GENERAL TRANSPORT POLICIES

1950s-1960s

- **1950s: About 90% of the people in Singapore depended on public transport.** Transport system was plagued with frequent bus strikes and serious traffic congestion.
- **1962 to 1973: Growth rate of motor vehicle population averaged 8.8%** as a result of rapid economic growth.
- **1967: State and City Planning (SCP) project** commissioned to plan and integrate future land use and transport needs.

1970s

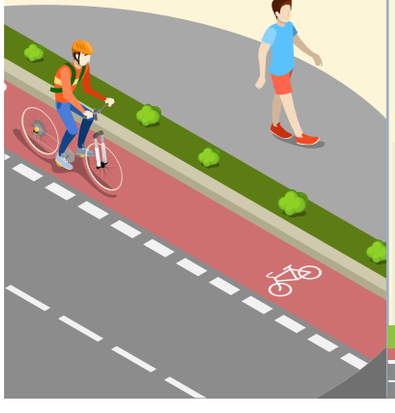
- **1971: 1971 Concept Plan** as outcome of the SCP. Land was safeguarded under the plan for the construction of the Mass Rapid Transit (MRT) system.
- **1972: Tax measures to control car population growth** was introduced.
- **1975: Area Licensing Scheme (ALS)** was introduced.



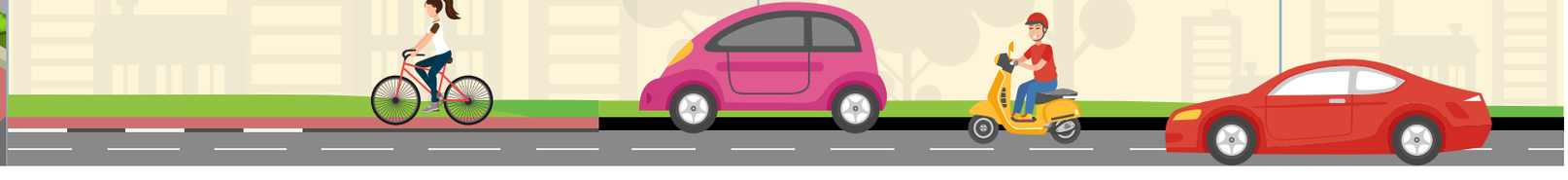
1980s

- **1982: Decision to construct the MRT system** after a 10-year debate, with the first line completed in 1987.

WALKING & CYCLING POLICIES



- **1960s: Bicycles were a main mode of transport**. Several major roads had bicycle tracks next to the footpath.
- **1970:** Cars and motorcycles gained popularity. **Bicycle usage started to drop drastically.** Cycle tracks were removed to widen roads.
- **1977: National campaign on Road Safety** launched. The **Walkway Unit** was tasked to construct pedestrian paths along most roads.



1990s

- **1990: Vehicle Quota System (VQS)** was implemented to effectively control the growth of vehicle population at sustainable levels. VQS was subsequently renamed as Electronic Road Pricing (ERP).

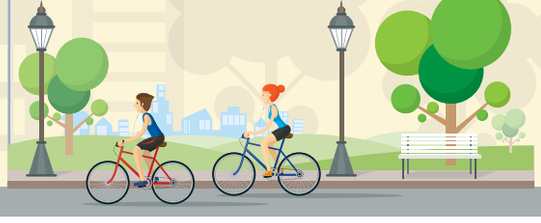
- **1991:** The authorities constructed between 20–80 **bicycle parking stands at 24 MRT stations.**
- **1992:** A 300-km **Park Connector Network** for cycling, jogging and other recreational activities was planned and developed around the island.

PCN

2000s

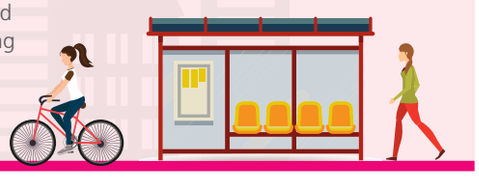
- **2007:** Full day **Bus Lane Scheme** started.
- **2008: PublicTransport@SG** portal launched to provide comprehensive public transport information for commuters.

- **2005:** Tampines New Town piloted as a cycling town.



2010-Present

- **2013: Land Transport Master Plan 2013** focused on creating a people-centred land transport system.
- **2014: Car-lite Vision** announced by Prime Minister Lee Hsien Loong.
- **2016: North-South Corridor** reconfigured to include dedicated bus lanes and cycling and walking paths.



- **2010:** Legalised sharing of footpaths between pedestrians and cyclists in Tampines New Town.
- **2012: National Cycling Plan** introduced. The aim is to create a comprehensive island-wide cycling path network of over 700 km by 2030.
- **2013: Walk2Ride programme** introduced by LTA to construct sheltered walkways from transport nodes to destinations within 400 m.
- **2013: Inter-agency Pedestrian and Cyclist Safety Committee** set up to review road safety for seniors and children; **Silver Zones and Enhanced School Zones programmes** launched.
- **2015: Land Transport Authority Activity Mobility Advisory Panel** set up. Recommendations include allowing bicycles and personal mobility devices on footpaths, but with a speed limit of 15 km/h.
- **2016:** New requirement for developers to submit **Walking and Cycling Plan** and take into account key pedestrian and cyclist access routes and amenities.
- **2016:** First **Car-free Sunday** in the Civic District.

Additionally, one may also argue that car drivers have a sense of entitlement to use the roads because of the high prices they have paid for their vehicles. This poses challenges to implementing initiatives that attempt to reprioritise road space for public transport, cycling and walking.

In order to bring about a significant change in people's mindsets and travel habits, significant improvements in public transport and alternative mobility modes have to be made, to close the gap with car travel and demonstrate the tangible benefits of using these other modes.

Changing commuter expectations

Rising affluence and increasing expectations for higher quality of life have also created the desire among the citizens to have a say in public policies, service delivery and infrastructure. The volume of feedback received by the Land Transport Authority (LTA), for example, had risen by about 35% from 900,000 emails and calls in 2009 to more than 1.2 million in 2012.[10] This signals a greater need for public engagement and even participation in policy-making and project implementation processes where appropriate.

Land Transport Master Plan 2013: Towards a People-centred Land Transport System

To address the multiple challenges, the Land Transport Master Plan (LTMP) 2013 proposed renewed efforts to improve public transport and make it a choice mode of travel—by increasing bus and train capacity, expanding the train network and enhancing the overall travel experience. In particular, the MRT rail network will be doubled to 360 km so that eight in 10 homes island-wide will be within a 10-minute walk from a train station.

Walking and cycling

The LTMP 2013 also aimed to facilitate more walking and cycling to enhance access to public transport nodes. This is especially critical for the first and last legs of public transport journeys. To make walking more comfortable in the tropical weather, LTA is building sheltered walkways from MRT stations to trip-generating hubs (i.e. schools, healthcare facilities, offices, residential developments, etc.) within 400 m of the stations. The National Cycling Plan was also launched as an inter-agency effort, led by the Urban Redevelopment Authority (URA) and LTA, to create intra-town and inter-town cycling path networks to facilitate both daily short-distance and long-distance commuting cycling trips. The aim is to create a comprehensive island-wide cycling path network of over 700 km by 2030.

Car-lite Singapore: Initiating a Paradigm Shift from Cars to People

The current "Car-lite Singapore" vision gave a greater impetus for the paradigm shift in urban development from cars to people that was initiated in the LTMP 2013. Lee Hsien Loong, Prime Minister of Singapore explained it as follows:

"… We will aim for a "Car-lite Singapore" by promoting and developing other modes of transport, making them more convenient. We have to rely less on cars on the roads because we cannot keep on building roads—more roads for more cars. So we will provide more options for Singaporeans that are better than cars. Buses, more of course. Expanding the MRT network—that is happening everyday—but also other modes of transport, for example, bicycling."[11]

In line with the car-lite vision, five new MRT lines and 40 new bus services will be progressively introduced so as to increase public transport capacity. Plans were also put in place to further discourage private car ownership and usage through controlling road growth, parking supply, and reprioritising road space allocation. A dedicated Active Mobility Unit has also been set up in LTA in 2015 to plan and implement walking and cycling infrastructure, regulation of cycling and use of personal mobility devices, as well as public engagement and communication of relevant policies. This highlights the growing importance of "active mobility" in Singapore's transport planning process by complementing the broader public transport strategy and closing the first and last mile gap, as well as substituting cars with these modes for short journeys.

Creating a more people-friendly city

Beyond the plans to improve public transport and tough measures to control car ownership and usage, there are also programmes to create more inclusive streets, such as Silver Zones. Many streets have also been converted to car-free zones and popular pedestrian malls, improving pedestrian-friendliness and providing public spaces for social activities and events. The objectives of "Car-lite Singapore" are therefore broader than mobility issues alone. As explained by Lawrence Wong, Minister for National Development:

"Over the last 50 years of development, we have built more roads; we have designed our city to accommodate more cars. And if you were to just project that trend for the next 50 years, I don't think it's going to be sustainable. It's not just about becoming more environmentally-friendly…. It is about becoming a more attractive, a more liveable and a more people-friendly city."[12]

By reducing car use, improving and encouraging public transport, Singapore hopes to not only achieve a more sustainable mobility system that can support growth and development needs, but also create a more liveable city that has more space for people—pedestrians and cyclists alike—to enjoy.

Enhancing public transport and access to transport nodes by walking and cycling.

3. RESEARCH PROCESS: A COLLABORATIVE JOURNEY ON FOOT AND BIKES

The joint research process between the Centre for Liveable Cities (CLC) and the Seoul Institute (SI) involves exchange of knowledge and experience from both cities through a practitioner-oriented approach. Researchers from both teams conducted site visits to the case study locations in each city in March 2016, hosted by the relevant planners and officers for each site. In-depth discussions were carried out to facilitate understanding of how each case study site was transformed into a pedestrian- or cyclist-friendly place.

The research teams also organised roundtable discussions with relevant experts, planners and policy-makers to deepen Seoul's and Singapore's understanding of each other's approach to promoting walking and cycling in their respective cities. Finally, a workshop was conducted in May 2016 to consolidate the findings from the research process.

Reflecting on his experience from the site studies in Singapore, lead researcher, Dr Hyuk-Ryul Yun (Senior Research Fellow, Director of the Office of Planning & Coordination, the Seoul Institute), opined:

"Singapore is particularly effective in involving the private sector to incorporate pedestrian- and cyclist-friendly features into private developments. In addition, strong policy enforcement in Singapore makes for relatively effective policy implementation, especially for temporary road closures where illegal parking may pose a problem.

However Singapore could consider reviewing two issues: reducing car speeds to prioritise pedestrians; and imposing heavy taxes on car ownership and usage to control car population and use. The latter may create expectations among drivers for the government to prioritise their needs.To make the city more walkable, Singapore may need to move beyond creating such expectations and achieve a better balance between pedestrian and driver needs."

Similarly, Dr Limin Hee (Director, Centre for Liveable Cities), shared her observations on walking and cycling in Seoul:

"Seoul has done a lot to improve pedestrian conditions in recent years—from reclaiming road space for people to lowering road kerbs in the city centre so that the road space is friendlier to people. This is an area which Singapore can potentially learn from.

There is great potential to share ideas from our experience in both the Seoul Transport Plan 2030, and in Singapore, where recent efforts include Singapore's National Cycling Plan and the Walk, Ride, Cycle initiative."

4. TURNING VISION INTO ACTION: CASE STUDIES FROM SEOUL AND SINGAPORE

Plans are only as good as how effectively they are implemented. This section focuses on a series of case studies from Seoul and Singapore which have been realised and offers unique insights on each city's approach to walking and cycling.

The case studies go beyond the explicit outcomes that can be observed and experienced by visitors today to examine the underlying challenges and success factors in the process of planning and implementing each project or initiative. Through these case studies, the research hopes to gain a deeper understanding of how Seoul and Singapore work towards becoming friendlier to pedestrians and cyclists, and eventually reduce both cities' reliance on cars.

The case studies are organised into six themes covering various key aspects of walking- and cycling-related initiatives:

Above: The wide sidewalks and plazas along Orchard Road provide ample space for events and pedestrians.
Left: Families and children enjoy the space and the fountain at Gwanghwamun.

School-children walking home from school along the A.Ma.Zone.

Vibrant Commercial Districts

As two high-density metropolises, Seoul and Singapore are often associated with vibrant shopping and entertainment areas. How did Seoul and Singapore create attractive places that are not only enjoyed by people, but benefit businesses as well? Myeongdong Shopping District and Yonsei-ro Transit Mall show how Seoul improves the pedestrian environment by removing private cars in these areas; while Orchard Road and Club Street demonstrate how Singapore works with local business stakeholders to create pedestrian-friendly destinations.

People-oriented Civic Spaces

Every city has a historic core which captures an important slice of its past. Although cars are a relatively recent introduction in cities, they have sometimes threatened to dominate these historic areas by limiting the accessibility and availability of space for people's enjoyment. Sejong-daero, a 600-year-old historic avenue in Seoul, exemplifies Seoul's bold efforts in reclaiming space from cars for the people. The Civic District in Singapore shows how the creative replanning and redesigning of streets can create a people-friendly civic space in the heart of the city.

Safe Community Streets

Residential neighbourhoods have to accommodate the diverse needs of the community—from working adults to the more vulnerable elderly and young children. Neighbourhood streets therefore need to be inclusive to ensure access and mobility for everyone. Seoul's A.Ma.Zone programme incorporates community participatory elements to produce inclusive solutions and promote local ownership of the proposals; whereas Singapore's School Zone and Silver Zone programmes help improve road safety for more vulnerable groups like school children and the elderly with comprehensive traffic calming measures.

Parking lots were converted into public spaces during the international PARK(ing) Day in Singapore.

Outreach Programmes

Physical infrastructure projects also need to be complemented by software programmes to influence and educate people on the benefits of walking and cycling. The Seoul Walk & Bike Festival aims to promote benefits of a walkable city through road closures in downtown Seoul for pedestrians and cyclists. In Singapore, temporary street closures are also organised through both government-led events like Car-free Sunday and community-initiated proposals like Streets for People to cultivate people's interest in car-free environments.

Cycling in Singapore

Commuter Cycling

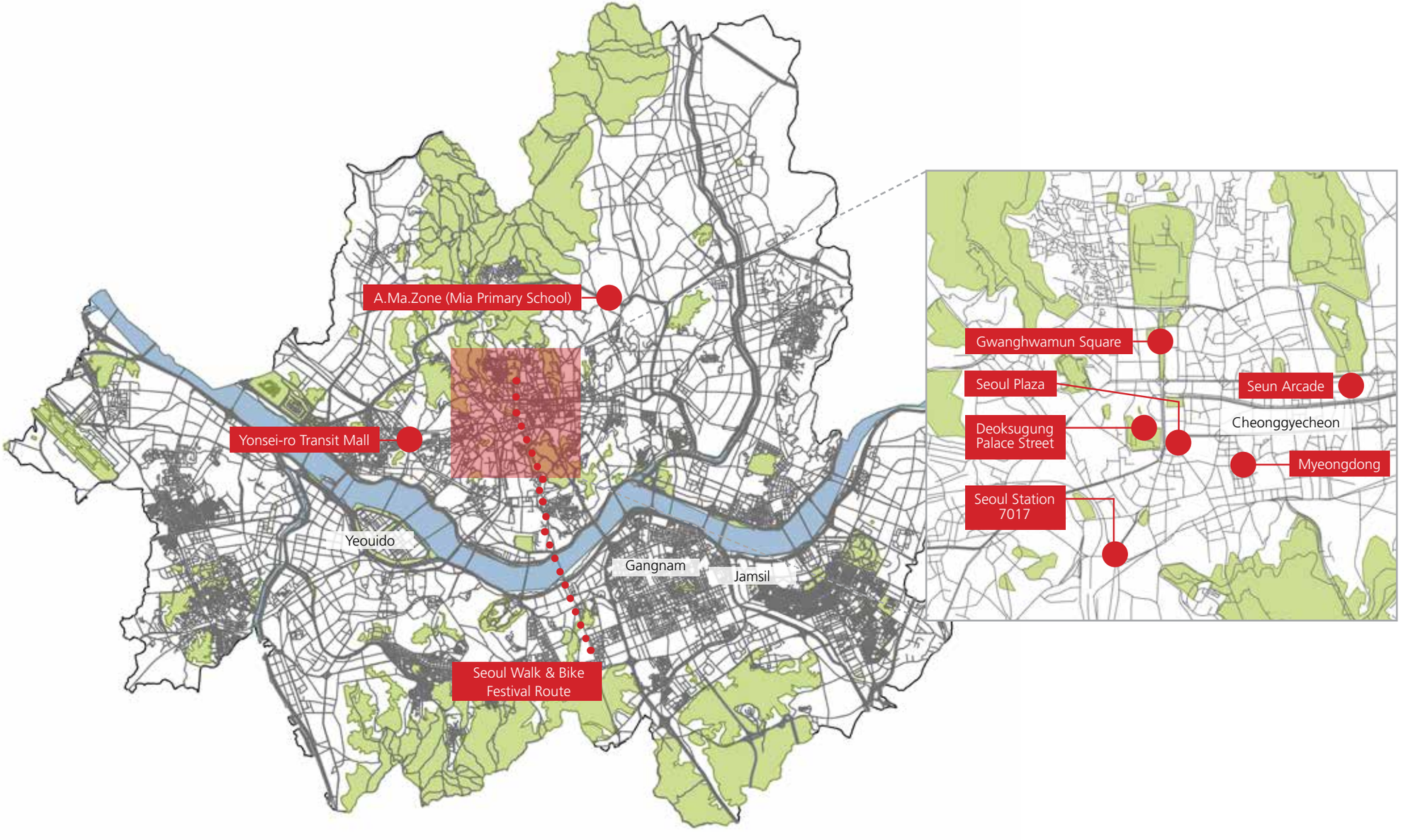
Cyclists are often described as pedestrians on wheels. Cycling can play a key role in sustainable mobility strategies by facilitating journeys that are too long to be completed on foot, without relying on cars. Both Seoul and Singapore aim to facilitate everyday short-distance cycling trips by introducing a bike-share system in downtown Seoul, and constructing intra-town cycling networks in Singapore public housing towns.

Future Projects

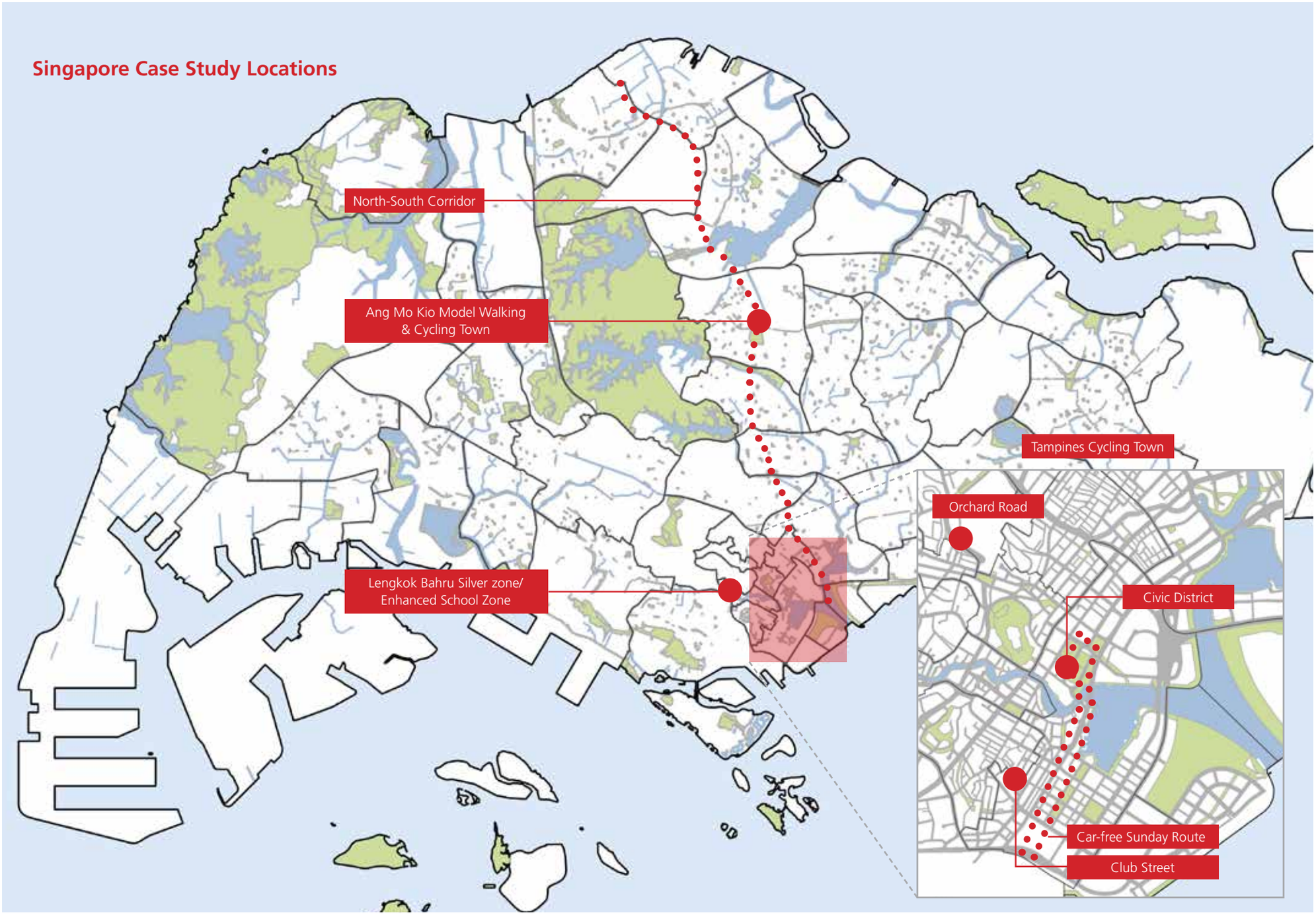
What is in store for pedestrians and cyclists in Seoul and Singapore in the years to come? This section introduces major pedestrian- and cyclist-friendly projects in the pipeline for both cities.

Artist's impression of Seoul 7017

Seoul Case Study Locations



Singapore Case Study Locations



VIBRANT COMMERCIAL DISTRICTS

Seoul

- Myeongdong
- Yonsei-ro Transit Mall

Singapore

- Orchard Road
- Club Street

Seoul: Myeongdong

Background

Myeongdong is the commercial and financial centre of Korea and the number one place for shopping, culture, art and fashion in Seoul.[13] Generally, "Myeongdong" refers to an approximately 1-km-long stretch of streets that lead from Myeongdong Station (Subway Line No. 4) to Euljiro and Lotte Department Store.

Evolution of a Vibrant Street-oriented Shopping District

The charming and unique character of the walking streets in Myeongdong attracts people to the area, even if they have no intention of shopping. Myeongdong remains a draw because much of the urban physical elements (roads, land lots and buildings) have not changed much since the 1960s or even earlier. The area originally housed facilities related to political and military powers during the Joseon Dynasty (from the 14th century to the 20th century). During the colonial era (1910-1945), the Japanese occupied most of the commercial district in Myeongdong and developed it into the main street for Seoul. During this period, commercialisation progressed rapidly, driving up the demand for and price of land, and individual land plots were intentionally divided, resulting in the slender lots connected to the street. This gave character to the Myeongdong of today, which is known for its small shops fronting vibrant streets.

Above: The streets of Myeongdong in the 1970s
Left: The streets of Myeongdong today

Small stores and vendors in the streets of Myeongdong.

Leading up to independence, Myeongdong's urban fabric was seriously damaged, and in the process of restoration, the roads and land lots were standardised through a land readjustment project.[14] From 1952, this land readjustment project opened up dead-end streets and converted irregular routes into an organised grid. The width of one of the main streets, Myeongdong-ro, was expanded to 15 m, Jungang-ro to 10 m, and other back streets by 4-6 m.[15] In 1973, the Seoul Metropolitan Government (SMG) started closing streets in the district to vehicular traffic on weekends and holidays to better accommodate shopping crowds.

In 1978, the original character of Myeongdong was threatened as the district was designated for large-scale modern developments along with other districts in the city. However, merchants decided that the fame of Myeongdong must be maintained and they formed a group to protest the redevelopment. Thanks to these efforts, Myeongdong was excluded from large-scale redevelopment plans in 1980, and its identity as a vibrant street-oriented shopping district was maintained.[16]

By the 1980s, however, most of the commercial buildings in Myeongdong were old and deteriorated and new developments were often not possible due to various regulations. For example, parking space requirements for commercial buildings were imposed after the 1980s. This made remodeling or rebuilding in Myeongdong practically impossible as building owners could not afford the cost of any physical improvements. Hence, only small building renovation works were done.

Creating a Car-free Shopping District

As large-scale redevelopment in Myeongdong was not possible, most of the improvements to the district focused on public streets and spaces. From 1997, Myeongdong was designated as a car-free area at all times.[17] From 10am to 11pm, Myeongdong-gil (480 m in length) and Jungang-ro (1,080 m in length) are operated as car-free streets. To better facilitate and coordinate preservation guidelines and necessary renovation works, SMG initiated a district unit plan in 2004 to systematically improve pedestrian conditions, including walkways and street furniture. The plan was completed in 2006. In addition to this, private property residents were involved in the maintenance and repair of outdoor billboards.[18]

One of the main items in the district unit plan was "Pedestrian-Friendly Myeongdong", which meant an improvement to the street environment. The Myeongdong Street Environment Improvement Project was carried out by SMG from December 2006 to August 2010.[19]

The project proceeded with the aim of enhancing Myeongdong as a gathering place for people. To minimise inconvenience for visitors, the project was split into four stages. Sidewalks, roads, and underground facilities (such as sewer pipes and electric wires) were repaired.[20]

The proposal paid attention to details to address the needs of visitors and local stakeholders. For example, excessive gaps in street paving were avoided in view of the requirements of baby carriages, wheelchairs, tourists carrying suitcases and pedestrians wearing high heels. Also, trees with higher crowns were planted to avoid interfering with pedestrians and covering up store signs.[21]

A Pedestrian-friendly Commercial Street Symbolising Seoul

While sidewalks and street facilities were repaired, further areas for improvement remained. These included creating rest areas and improving the connectivity of the pedestrian network. In December 2013, SMG designated Myeongdong as a district for improvement of the pedestrian environment and established plans to make Myeongdong even more pedestrian-friendly.

Improving pedestrian connectivity, ensuring safety and providing a sense of uniqueness were some of the key considerations in the plans. For example, some roads have been fully pedestrianised while others still allow partial access to cars. Penalty for illegal parking has also been more strictly enforced to enhance pedestrian safety. Information facilities and amenities were expanded to improve convenience and closed-circuit television cameras have been installed to create a safer pedestrian environment.[22]

Conclusion

People's first impressions of Myeongdong are streets crowded with tourists and shoppers alike. According to a study of day-time population in Seoul, seven of the top ten busiest places in Seoul are in Myeongdong. The Noon Square at the entrance to Myeongdong has the most pedestrians on both weekdays and weekends, with a maximum of 97,000 pedestrians passing through the area between 7am and 9pm.[23]

People visit Myeongdong for many reasons but one of the major reasons is the unique character of the place. Instead of large generic shopping malls, Myeongdong's streets are lined with small stores.[24] Another attractive element is the comfortable public pedestrian environment. Burying cables and pipes underground to improve the appearance of the street, improving the walkway pavement and keeping the street vehicle-free are policies that were executed in consideration of visitors on foot.

Above all, the popularity of Myeongdong as a walkable shopping district is a result of incremental improvements through long periods of history. This approach helped to preserve and enhance Myeongdong's unique character, making it an attractive destination today.[25]

Map showing the pedestrianised streets in Myeongdong.

People enjoying the extra space in Myeongdong.

Seoul: Yonsei-ro Transit Mall

Background

In January 2014, Seoul opened the Yonsei-ro Transit Mall, closing off a busy and frequently congested road zone to private cars and allowing only public transport like trams, light rails and buses.

Yonsei-ro, Seoul's first transit mall, is the 550-m stretch between the renowned Yonsei University and a subway station. Situated in the centre of the Shinchon area, a popular nightlife district, it is a favourite of university students and is filled with interesting retail shops, famous restaurants and hip-fashion boutiques. There, private vehicles have been restricted, streets narrowed and sidewalks widened to encourage public transport and provide a pleasant pedestrian environment for local residents. The Yonsei-ro site was carefully selected as a pilot site under a comprehensive transit-mall plan developed in 2012.

Because vehicle access would be denied, some protest was expected from residents, vendors and pedestrians. Anticipating this, the city held presentations for residents, discussed ways to revive commerce in the Shinchon district, held deliberations with the Seoul Metropolitan Police Agency and communicated actively with interested parties to address complaints and conflicts. The Yonsei-ro Transit Mall programme is an example of how carbon dioxide emissions can be reduced by encouraging the use of public transport and how local communities at the city centre can be revitalised.

Yonsei-ro before and after implementation of the transit mall.

Yonsei-ro Transit Mall area

How Yonsei-ro was Selected

In late 2011, Seoul began to review a transit mall system as part of its transportation goal of building an urban environment where people and public transport come first.

First, the city worked with the Seoul Institute to prepare a list of criteria for the selection of transit-mall sites for the pilot programme. Next, the city considered various elements such as land use, day-time population, access to public transport, the number of public transport users, extension of target roads, road continuity, access to parking facilities, the presence of restricted access facilities, characteristics of the commercial district and symbolic significance. After deliberation, Seoul identified 82 public transport nodes with a large day-time population as pilot sites and reduced the number to 32, based on the location of metro stations within the district, the number of metro users and day-time population. The city then came up with 10 pilot sites, from which Yonsei-ro was selected as the final one in August 2012.

Minimising Congestion and Potential Traffic Woes

Yonsei-ro was a congestion-prone zone, with an average travel speed of only 10 km/h, lower than Seoul's average travel speed. The traffic volume itself was not high—at 1,500 vehicles per hour—but still, traffic flow at certain points was congested.

The volume of through traffic, however, was high. This not only affected Yonsei-ro but also the Shinchon Five-way Intersection and consequently, the segment between Shinchon and Yanghwa-ro, another major road.

To identify the cause of the congestion, Seoul monitored license plates and examined the characteristics of vehicles entering and exiting Yonsei-ro. It found that most vehicles were simply passing through the area. Tackling this challenge became one of the priorities in the traffic plan.

Planners saw how a transit mall could potentially cause congestion, as cars would need to detour around the zone. The city

implemented two car-free days on Yonsei-ro to analyse the effect of vehicle restrictions. The study indicated that vehicles going north-to-south were distributed across nearby roads and did not contribute to the congestion in the surrounding areas. However, most of the vehicles going south-to-north took a three-way intersection in Donggyo-dong and detoured to Yanghwa-ro and Yeonhui-ro, increasing congestion on both roads. A detour route for vehicles going toward Susaek was identified as a suitable way to address this congestion. The city built an intersection in front of the underpass for Shinchon Train Station.

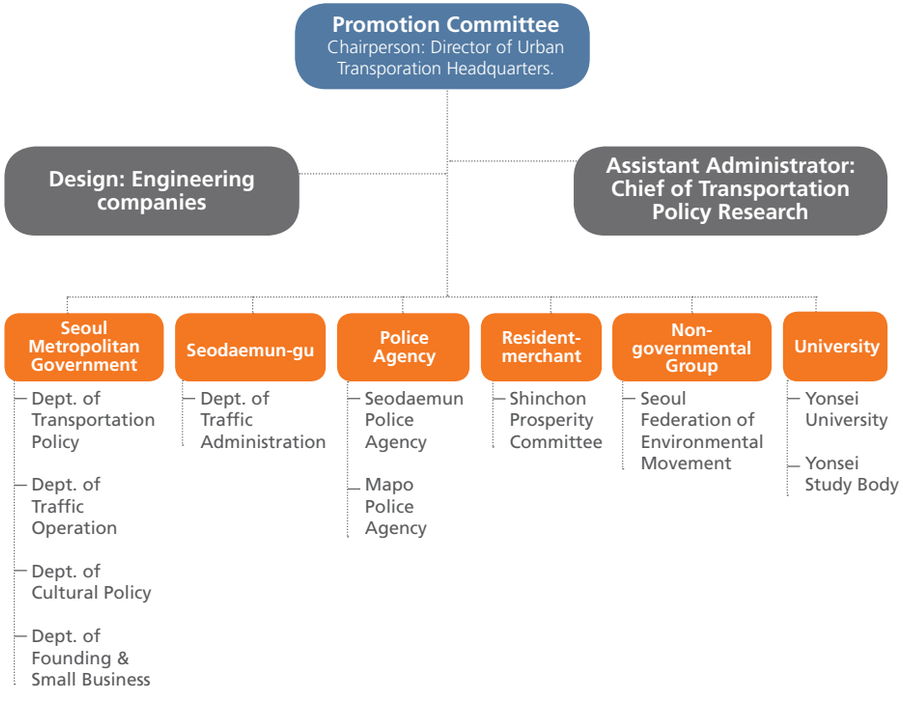
Managing Conflict between Stakeholders

The transit mall restricts vehicle access and with that, citizens voiced concerns about inconvenient access to the area while street vendors worried about a slowdown in business. There was also conflict between SMG and other interested parties. For instance, power company KEPCO had concerns about relocating electric distribution boxes on the sidewalks to build the transit mall.

The city organised a committee to engage residents to seek their opinions on the programme. Public hearings were held. As a top priority, Seoul ensured it communicated constantly with the residents and talked to interested parties in the region to improve the traffic system and commerce.

In 2013, this programme was selected as a successful example of conflict management by the city and the central government in a joint evaluation. As the next step, a comprehensive programme promotion committee was organised involving six different institutions working together in three subcommittees (Transportation, Design/Construction and Public Relations).

Promotion Committee for the Yonsei-ro Transit Mall Programme



The table below lists the conflicts that existed between the relevant administrative authorities and how they were resolved. The list illustrates how complex it is to resolve silo issues between public agencies and how extensive stakeholder engagement had to be for major inner-city projects in Korea. Many of these conflicts took some time to resolve. The length and complexity of this process illustrate the need for more collaborative approaches to urban planning and governance.

Major Conflicts between Relevant Administrative Authorities and Resolution

Parties Involved	Issue	Resolution
Residents & Merchants	• Reduced business due to controlled vehicle access • Nearby road networks congested due to detours • High demand for public parking facilities	• Convey the fact that 80% of vehicles passing through cause congestion, but only a few enter the area. • Offer actual examples of how increased foot traffic has positive effects on business, locally and abroad. • Explain ways to attract visitors (e.g., cultural events). • Outline effective transportation plans (e.g., detour, new intersection). • Explain traffic simulation results (e.g., similar road-diet projects like Cheonggyecheon, Gwanghwamun were cited). • Provide extra parking capacity after investigating parking facilities in the Shinchon area. • Agreement signed with Hyundai Department Store and night time discounts offered to merchants to counter a potential drop in customers.

Parties Involved	Issue	Resolution
Hyundai Department Store	• Reduced revenues due to access control • Demand for a new intersection in front of Hyundai Department Store on Yanghwa-ro	• Potential issues from building a new intersection was explained. • Allow left turns from Sogang Bridge to Donggyo-dong Intersection to secure an extra access route.
Seoul Metropolitan Police Agency	• Concerns of traffic congestion from the extra crosswalk in front of Yonsei University and a new intersection in front of Severance Hospital	• Work with Yonsei University to simplify and link the signals by removing the straight-ahead/left-turn signals for vehicles leaving Yonsei University. • Propose a detector that prevents lines of tailgating cars entering the intersection at red signal. • The merchants' association can participate in a review of traffic safety facilities to understand the importance of the programme.
KEPCO	• The definition of the programme as prescribed by the Urban Traffic Readjustment Promotion Act • Demand for the city to finance the cost of moving 40 power distribution units, which were blocking the sidewalks	• The transit mall as prescribed by the Urban Traffic Readjustment Promotion Act is related to the operation of the roads. The construction itself is controlled by the Road Act. • Due to KEPCO's reluctance to move the electric distribution boxes, three legal advisors were engaged to convince that the demand for the city to pay for moving of the power distribution units is not consistent with the KEPCO guidelines and the Road Act.
Street Vendors	• Demand to stay in the current locations even after transit mall opens • Demand for a new intersection in front of Hyundai Department Store on Yanghwa-ro	• Proposal to move to alternative locations. • A council was formed, consisting of the Seodaemun-Gu district office, the merchants' association and street vendors to develop a protocol for street stalls that specifies the locations, numbers, sales methods, etc.

Source: Seoul Solution (seoulsolution.kr).

Vibrant public spaces at Yonsei-ro Transit Mall.

Tightening Vehicle Restrictions

Passenger vehicles are not allowed in the Yonsei-ro Transit Mall and other types of vehicles are required to travel at 30 km/h or slower. Vehicles with a seating capacity of 16 or more persons, emergency vehicles and bicycles are allowed. To prevent congestion, taxis are allowed only between midnight to 4am when other modes of public transport are not in operation.

Business vehicles that need to enter the area must obtain approval in advance and can only travel between 10am to 11am and 3pm to 4pm. All other vehicles are prohibited from stopping or parking on the road. And on weekends, the area is fully closed to traffic. Over the weekend, from 2pm on Saturdays to 10pm on Sundays, all buses passing through Yonsei-ro make a detour, thus enabling the transit mall to be completely pedestrian-only.

The Transit Mall as a Hub for Life and Culture

From the beginning, local long-term development strategies were discussed with the transit mall programme. Due to vehicle access controls, there are no through roads at either end of the intersection. The resulting plaza space is used for open-air theatre performances, B-boy battles, festivals, etc. There is space on Yonsei-ro for spontaneous performances to be hosted without performers having to go through a complicated administrative process. Such liberal use of space by the public helps create a culture unique to Shinchon and provides visitors with more to see and enjoy.

Selected Key Statistics Indicating the Success of Yonsei-ro Transit Mall

TRAFFIC ACCIDENTS

34% reduction from 2013 to 2014

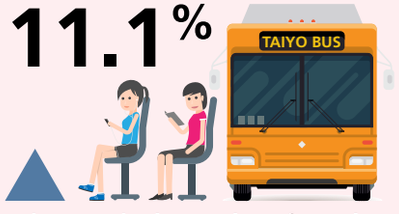
VISITOR SATISFACTION

2014 **70%**

2013 **12%**

BUS USERS

11.1%



increase in the number of people visiting Yonsei-ro via bus in 2014

BUSINESSES

revenues ▲ **4.2%**

transactions ▲ **10.6%**

visitors ▲ **28.9%**

HUB FOR LIFE AND CULTURE

Space for cultural events, street performances and festivals encourages freedom of self-expression

Pedestrian conditions along Yonsei-ro before and after implementation of transit mall.

Benefits of the Yonsei-ro Transit Mall

In the six months following the opening of the transit mall, traffic accidents fell by 34% from the previous year. Majority of people also said they felt much safer than when both people and vehicles shared the roads.

Many also responded positively to questions on user convenience and improved appearance. A survey on 10 bus routes showed that 54,000 people took the bus to visit Yonsei-ro between January and May of 2013. During the same period in 2014, 61,000 people used the bus—an increase of 11.1%. This was due to the fact that congestion on Yonsei-ro, which had an average vehicle travel speed of only 3-4 km/h on both weekdays and weekends, was substantially improved due to the timely bus service and transition of the area into a transit mall.

The mall also brought financial benefits. Compared with 2013, the number of visitors to the shops in Shinchon rose by 28.9%; the number of transactions that resulted in revenues went up by 10.6% and total revenues rose by 4.2%.

Conclusion

The first transit mall in Seoul has been deemed a success and plans are being reviewed to turn this area into a complete pedestrian-only zone in the future. Based on Yonsei-ro's success, another candidate district is being reviewed.

The comprehensive transit mall programme has been the result of an endeavour to place people and public transport first, which is the vision of SMG, and to build a sustainable urban environment. However, the current transit mall on Yonsei-ro is still in its infancy and it lacks adequate amenities, trees and landscaping, and other necessary facilities. Moreover, there may be issues in the future that have not emerged just yet, including jaywalking among pedestrians who are lulled into a false sense of security by low traffic, as well as business impact on shops in the district beyond the transit mall. Before moving onto a second site, it would, therefore, be wise to review the problems of the first example and take necessary counter-measures.

Singapore: Orchard Road

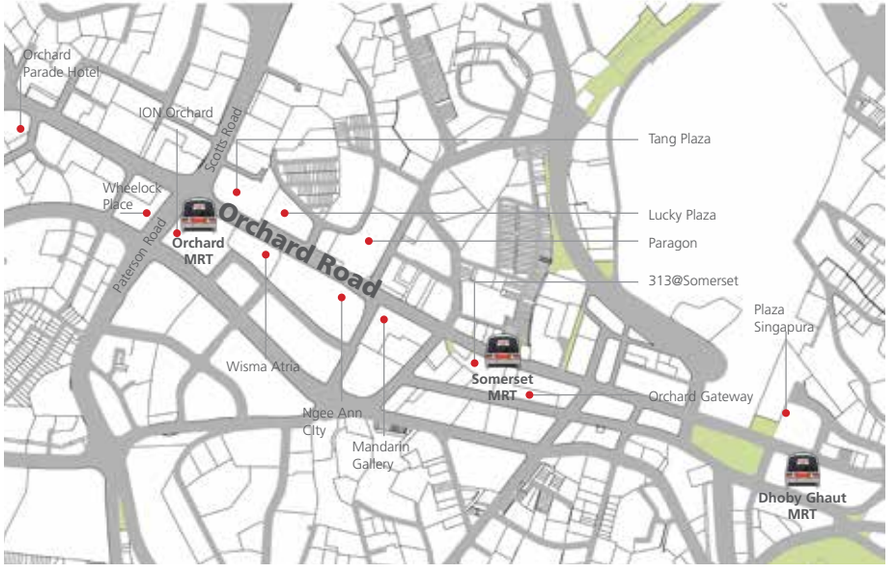
Background

Orchard Road is Singapore's main shopping district. Set in an area of what used to be fruit orchards and spice plantations in the 19th century,[26] the 2.4-km-long boulevard was redeveloped into a vibrant shopping destination after Singapore's independence in 1965. Today, a stroll down Orchard Road reveals a network of pedestrian malls, plazas and other aboveground and underground links that contribute to an attractive, unique and lively shopping area. This was achieved over several decades with detailed planning and development by the government, in collaboration with private stakeholders.

Foundations for a Safe Walking Environment

As the main thoroughfare to the Central Business District, Orchard Road became increasingly popular as a shopping district in the post-war years. Hotels and shops emerged, though these were too scattered to provide a holistic shopping experience.[27] Being in a low-lying area,[28] Orchard Road is prone to flooding. Therefore one of the first major infrastructure developments was the deepening and widening of Stamford Canal, which ran along the length of Orchard Road, in 1972.[29]

Recognising Orchard Road's potential as a shopping destination, the Public Works Department (PWD) covered the Stamford Canal and built a 900-m-long and 8-m-wide pedestrian walkway from Ming Court (now Orchard Parade Hotel) to Mandarin Hotel (now Mandarin Orchard) in 1973. This



Map of Orchard Road

"Orchard Mall" became a distinguishing feature for pedestrians, who thronged the mall even before its completion.

One of the challenges in creating Orchard Mall in the early 1970s was to convince stakeholders to remove certain architectural features that were in the way of the Orchard Road pedestrian mall. After much deliberation, stakeholders recognised the benefits of a walkable environment for their businesses,[30] and eventually gave in. Subsequent rounds of stakeholder engagement with building developers coupled with the incentives given by the Urban Redevelopment Authority (URA) also led to the development of retail space that integrated with Orchard Mall, as seen in the case of Wisma Indonesia and Mandarin Hotel.

It was also during this time that a nation-wide focus on pedestrian safety gained greater prominence. This was mainly due to the high accident rates across Singapore,[31] which led to the establishment of the Walkway Unit[32] by the MND in 1977. Pedestrian paths therefore came to be built along major roads throughout the city. Further improvements were done to pedestrian walkways at Orchard Road; also, footpaths were included along smaller streets in the area.

Physical Enhancements: Putting Pedestrians First

Enhancing pedestrian comfort

As part of the national Garden City Movement of the 1970s, a linear alley of Angsana trees were planted along Orchard

The trees along Orchard Road provide shade for the pedestrians.

Road. By the 1980s, these grew, creating a lush natural canopy shading the pedestrian walkway. Recognising the benefits of trees as a canopy and buffer for pedestrians against vehicle traffic, the URA in 1994 planned a "total pedestrian network" for the Orchard Planning Area that emphasised such plantings.

In the plan, the area was to be transformed into a shopping, hotel and entertainment hub with street-length pedestrian malls and "plaza spaces."[33] For instance, Ngee Ann City's civic plaza demonstrates how pockets of spaces along Orchard Road can contribute to a vibrant pedestrian precinct by providing spaces for events. The plan also highlighted

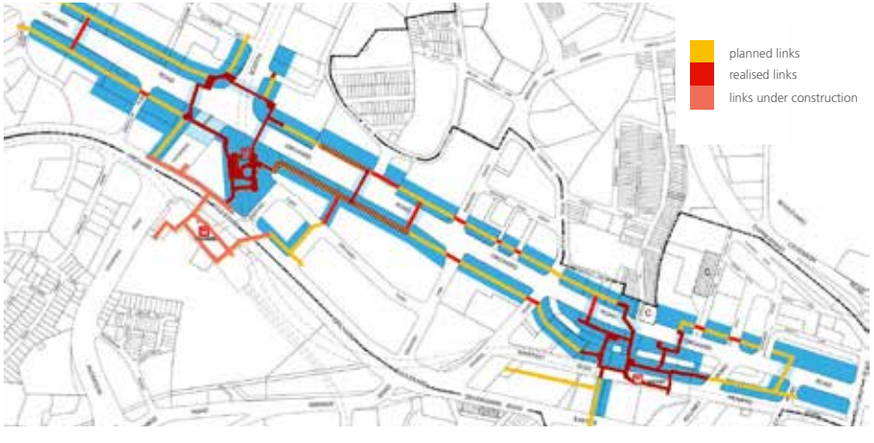
Event at Ngee Ann City city plaza

the need for covered walkways to link buildings and provide shelter to pedestrians. In 2008, the Singapore Tourism Board (STB) led an inter-agency taskforce on mall enhancement works along Orchard Road, including upgrading of street lighting, paving works, landscaping, seating and public furniture.

Accessibility at all levels

As transit links to Orchard Road grew, new ways of linking pedestrian areas were envisioned. As early as 1977, the URA had plans for an underground pedestrian network.[34] In December 1987, the underground Orchard MRT Station was opened, with links to nearby developments such as Dynasty Hotel (now Tang Plaza) and Wisma Atria. Seeing the need to improve pedestrian facilities from Orchard and other MRT stations, the government set aside S$49 million to create both underground and at-grade pedestrian malls.[35] Constructing a successful underground pedestrian network, however, required buy-in from building owners and other stakeholders via incentives and regulations. The URA developed the Central Area Underground Master Plan in 2006 to guide the construction of underground pedestrian link in city centre areas, including Orchard Road. To encourage private sector involvement, the URA Cash Grant Incentive Scheme for Underground Pedestrian Links (UPLs) was introduced in 2004 and further increased in 2012 to reflect a rise in construction costs. A Central Area Underground Master Plan was also developed in 2006 to act as a guide in the construction of underground pedestrian links. The pedestrian walkway component and the vertical circulation (e.g. escalators, lifts and staircases) of the underground links can also be exempted from being computed as part of the respective developments' Gross Floor Area (GFA).

Despite the availability of incentives and governmental cash grants, it was difficult to get the developers on board with the idea. Some building owners were concerned that shoppers would be diverted to other malls or would fail to fully utilise the links. Some of the existing developments also did



Underground pedestrian network plan at Orchard Road.

Mandarin Gallery before and after refurbishment

not have meaningful basement spaces to be connected to (e.g., basement car parks) and substantial internal works would have been necessary to reconfigure the spaces to facilitate these underground pedestrian links. Besides being approximately four times more expensive than surface projects to construct, owners in strata-titled malls also found it difficult to raise funds amongst themselves to work out apportioning the construction cost of underground links.

Meanwhile, at street level, authorities continued to improve pedestrian experience. In 2000, the URA issued the Detailed Plan of Implementation outlining the need to remove several front-entrance vehicular access points to buildings along Orchard Road. In its place, a rear service road system was to be established. This served to expand the extent of the pedestrian promenade and reduce the number of pedestrian-vehicular intersections.

For example, the drop-off point at Mandarin Gallery used to be located in front of the building along the main Orchard Road pedestrian mall. This mix of vehicular and pedestrian traffic was not only inconvenient but also dangerous to pedestrians. After Mandarin Gallery was refurbished, the drop-off point and vehicular access was relocated to the side road, along Orchard Link. This opened up the front of the development for activity-generating uses and also provided pedestrians with a safer, wider and more pleasant walking environment.[36]

Getting the Private Sector Involved in Walkability: Carrots and Sticks

Grants and GFA exemptions are part of a larger slate of incentives, guidelines and regulations that are carefully conceived and continually updated to better serve pedestrians and offer a lively shopping experience.

In 1996, the URA recognised that Orchard Road's pedestrian walkways lacked urban design elements for pedestrian engagement. It then introduced guidelines for outdoor kiosks and outdoor refreshment areas—alfresco or outdoor dining spaces—to develop a more vibrant streetscape.[37] These guidelines are continually reviewed in consultation with the Orchard Road Business Association (ORBA)[38] to ensure they remain relevant in enhancing the visitor experience in Orchard Road and to meet the operational needs of restaurant and kiosk owners. In some cases, conditions and incentives have been highly effective at encouraging the conceptualisation and building of pedestrian links.

The Stamford Canal before 2005

The Discovery Walk was built over the Stamford Canal to provide a vibrant through-link.

For example, the URA drew up a plan and guided the developers of three private shopping developments—313@Somerset, Orchard Gateway and Orchard Central—to work together to create the Discovery Walk, a 24-hour surface-level through-link that runs through all three buildings. The Discovery Walk leads to the Somerset MRT Station and branches off to a lively strip of shops, cafes and other semi-open-air food and beverage outlets. Orchard Central also featured a public roof garden and art installations to boost civic engagement. Notably, the Discovery Walk was constructed on the decked-over Stamford Canal and this was an efficient multi-purpose use of space. Separately, to encourage the innovative redevelopment of existing properties, the URA set up the Orchard Road Development Commission (ORDEC) in 2005. Under ORDEC, Orchard Gateway was developed as a crucial linkage between 313@Somerset and Orchard Central. As an incentive, Orchard Gateway was allowed to be built over and above the permitted zoning plot ratio and building height.

In another example, the shopping mall ION Orchard, as part of land-sales conditions, was required to be integrated with the existing Orchard MRT station and to provide an underground pedestrian link to the adjacent Wheelock Place. Today, ION Orchard is linked to Orchard MRT Station and Wheelock Place, as well as Tang Plaza, where the Land Transport Authority took the first step in building a wide underpass and subsequently selling it to the developer of ION Orchard. Besides the "stick" approach under land-sales conditions, the URA also dangles the "carrot" of additional GFA. For instance, GFA incentives are offered for outdoor refreshment areas (ORAs) and urban verandahs. The GFA for the ORAs and urban verandahs can be computed over and above the approved or the total permissible GFA for the development.[39]

Incentives also encourage building owners to open up mall fronts for more interesting and engaging streetscapes; both the Wisma Atria and Paragon shopping centres have enjoyed facelifts under this scheme.

Beyond Physical Space: A Colourful Street Life Evolves

By the 1960s, parts of Orchard Road were already bustling with retail shops, street stalls, markets and nightlife at hotel bars. The vision for Orchard Road was for these to be part of a larger whole—for the street to become a "modern and vibrant commercial corridor alive with day and night activities".[40]

Over the years, there have been various programmes and promotions to encourage a vibrant street life, including introducing street busking and performances, temporary pedestrian and road closures on one Sunday per month between 1989 and 1992, and the Great Singapore Sale organised by the STB in conjunction with the Singapore Retailers Association.[41] Unfortunately, as the amount of activities dwindled over time, the Sunday road closures did not last long. The absence of activities did not justify the inconvenience that came with the road closures, such as bus route diversions and ensuring the safety of intoxicated pedestrians lingering on roads after they reopen. The planning authority had also allowed building owners and developers to lease pockets of state land along Orchard Mall for landscaping or the injection of some cultural elements or temporary outdoor exhibitions like those by the Opera Gallery in order to enhance the overall street experience for all visitors.[42]

Most recently, an attempt was made to revitalise the shopping belt. After a series of extensive stakeholder engagement sessions, ORBA launched a six-month trial of "Pedestrian Night" in October 2014 to create a monthly car-free zone that stretched 660 m from ION Orchard to Ngee Ann City.

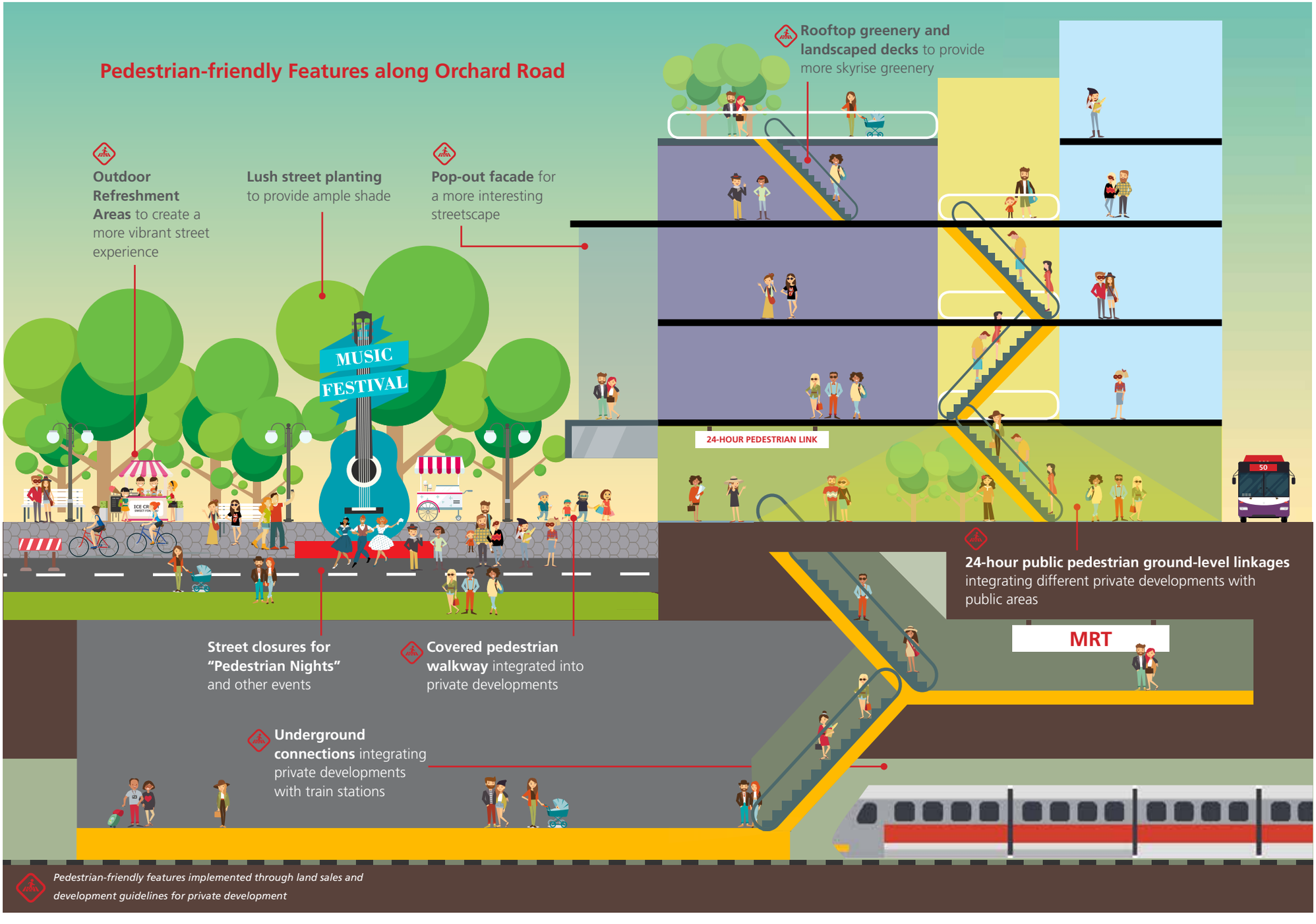
Fundamental Challenge: Cars VS People

Orchard Road today is a product of public and private sectors working together, integrating private developments and public areas to create a successful shopping destination. While the threat of floods had been overcome, basic pedestrian safety issues had been addressed and private developments had been successfully coordinated by the public sector to facilitate pedestrian connections, the problem of car dominance still poses the greatest hurdle towards a more attractive and walkable Orchard Road. This is due to the road serving as a major thoroughfare into the city centre.

The challenge of balancing traffic flow and pedestrian needs in Orchard Road has been in place for some time. In 1989, the closure of the pedestrian crossing outside Lucky Plaza to facilitate traffic movement spawned heated public debates on how motorist and pedestrian needs should be addressed.[43] More recently in 2009, a street-level crossing across Paterson Road at the junction with Orchard Road, between ION Orchard and Wheelock Place malls, was removed to ensure pedestrian safety—given the high incidence of jaywalking at the junction—and improve traffic flow. According to LTA, the car queue on Orchard has decreased by 70% since the removal of the crossing.[44] However, businesses at the malls on either side of the crossing suffered due to the loss of direct pedestrian connection.[45] Consequently, vibrancy at street-level has been affected.

As observed in the case of the Paterson Road crossing, the need to further calibrate the balance between the street-level space for vehicular traffic and pedestrian needs remains, despite the availability of alternatives such as underground crossings. With a growing interest in car-free public spaces, supported by a rapidly expanding MRT system, perhaps the balance may eventually tilt further to address people's needs along the main street of Singapore.

Orchard Road Pedestrian Night.


Pedestrian-friendly Features along Orchard Road
Rooftop greenery and landscaped decks to provide more skyrise greenery
Outdoor Refreshment Areas to create a more vibrant street experience
Lush street planting to provide ample shade
Pop-out facade for a more interesting streetscape
MUSIC FESTIVAL
24-HOUR PEDESTRIAN LINK
24-hour public pedestrian ground-level linkages integrating different private developments with public areas
MRT
Street closures for "Pedestrian Nights" and other events
Covered pedestrian walkway integrated into private developments
Underground connections integrating private developments with train stations
Pedestrian-friendly features implemented through land sales and development guidelines for private development

Singapore: Club Street

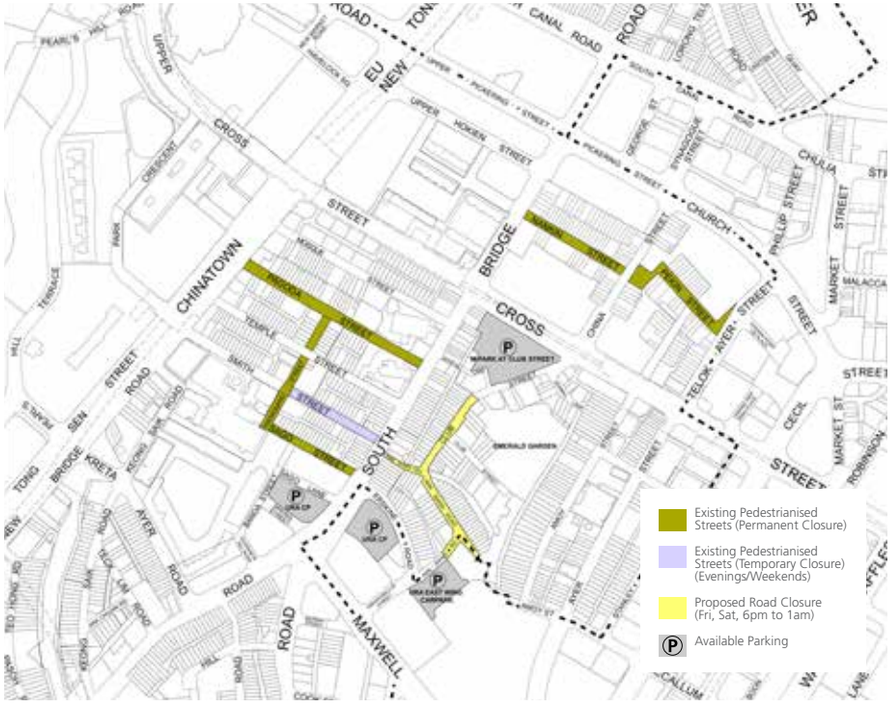
Background

Club Street and Ann Siang Road, which form a sort of perpendicular dog-leg, are located in the the Chinatown Historic District and at the fringe of the Central Business District. Once home to high-society Chinese clubs and associations, they are today a popular leisure spot, lined by two- and three-storied conserved shophouse buildings which house an eclectic mix of restaurants, bars, offices, shops, and boutique hotels.[46] The large number of F&B outlets and a location at the Central Business District fringe makes the area a popular meeting point after work.[47]

Streets there are closed to traffic on weekends, starting from Friday evenings. The road closure is approximately 435 m in length, from the junction of Ann Siang Road and Kadayanallur Street, to the junction of Club Street with Mohamed Ali Lane.[48] In the pedestrianisation process, working with stakeholders was a key factor to success.

Beginnings

The Singapore government has always been open to opportunities to create car-free streets for a more sustainable, liveable and vibrant city. These efforts were intensified



Proposed car-free zones in the Chinatown area.

in 2012, as planners pushed for more such streets. The increase in the number of successful pedestrianisation cases around the world further strengthened its resolve to do so.

After doing a study, Singapore's Urban Redevelopment Authority (URA) decided to implement temporary road closures in the form of weekend car-free schemes.[49] In a search for candidate roads, Club Street and Ann Siang Street surfaced as the top contenders. The strip's popularity coupled with its narrow sidewalks, and kerbside parking, had led to crowds frequently spilling onto the road carriageways, creating safety issues.[50] Closing the roads here seemed like a win-win situation: not only would it enhance safety, but F&B outlets could potentially extend their space onto the road, enhancing street vibrancy.

Certain factors also made implementation quick and easy. The shophouses, in a conservation district, were served only by kerbside parking, so fewer cars had to leave buildings during road closure hours. Ample public car parks close by served as alternative parking spaces. Last but not least, roadside parking was managed by URA—the same agency overseeing the scheme there—so it was easy to suspend vehicle parking along Ann Siang and Club Street during the road closure hours.[51]

Carrying Out the Plan

Prior to a trial, the URA held a dialogue session, and went door-to-door to inform local residents, offices, and businesses about the scheme. This proved to be informative in refining the scheme. Feedback revealed that the road closure periods should be adjusted from closure hours of 6pm to 1am, to 7pm to 2am, to accommodate office workers who leave work late, and to match the operating hours of F&B outlets. The road closure stopped just before Emerald Garden, a private residence, so that residents could get in and out. This process of engaging stakeholders continued throughout the trial.

The three-month trial began in mid-2013. Auxiliary police service Certis CISCO was commissioned to man the road closures—blocking the roads using barricades, redirecting traffic and removing barricades when roads were open to traffic again. Officers on duty also helped to remove the barricades for cars that were permitted into the closed road, such as those whose drivers worked at Liberty House, a commercial building. Drivers who parked along these were given advisory notices during the trial road closure; now, summonses are issued and fines imposed on motorists to deter them from parking.

When the roads were first closed, it was clear that people enjoyed the increased space, as they began to walk along the road almost immediately. Even though alfresco dining was not yet permitted, its potential was very quickly recognised, and restaurants and pubs began setting up tables and chairs along the road to cater to the demand.

The trial was extended by another three months to November 2013, to allow the Land Transport Authority (LTA) to conduct further studies on the impact of the road closure on traffic. At around the same time, in July 2013, a formal URA survey was conducted. Of the 16 F&B operators who had responded, half had indicated that the road closure had a positive effect on business, three quarters were interested in extending their business along the roads and 44% were willing to fund the road closure.[52]

Street closure at Club Street

Taking Charge: Moving onto the Street

Towards the end of the trial period in November 2013, an F&B operator hosted a follow-up meeting for the stakeholders to decide the fate of the scheme. At this meeting, the stakeholders agreed to take over the management of the scheme and simultaneously began the application process to serve food outdoors or operate Outdoor Refreshment Areas (ORAs). The Club Street Association (CSA) was thus formed on 23 December 2013 to do precisely that. The table below shows the processes required to apply for the ORA and how its administration was carried out.

Agency	Requirement
Singapore Land Authority (SLA)	Club Street Association (CSA) to submit Temporary Occupation License (TOL) application for use of proposed Outdoor Refreshment Areas (ORAs) on behalf of individual operators. SLA will evaluate the TOL fee based on the actual areas to be issued TOL for.
Singapore Civil Defence Force (SCDF)	Clear driveway of 4 m to be maintained for emergency access. Clear path from the exit of the first storey or staircase from the second storey to the road.
National Environment Agency (NEA)	Outdoor Refreshment Areas (ORAs) only for dining purposes; with no preparation, display and sale of food. Operators to keep area free of litter during, before and after the road closure. Road to be accessible at 3am for refuse collection on Saturday and Sunday.
Land Transport Authority (LTA)	To put up notices on One Motoring, Singapore's online portal for traffic services, and inform taxi companies of the road closure.
Singapore Police Force	To provide a CSA point of contact to the Traffic Police, to facilitate answering questions from the public.
Singapore Power (SPPG)	To provide a CSA point of contact and emergency access to electrical substation at Ann Siang Road.

Results

With road closures led by the association and supported by URA, Club Street has become ever more vibrant and popular. The closed roads are thronged with pedestrians and diners; there has been a 20% increase in footfall and a 10-15% increase in sales. As of July 2014, the CSA had grown to 21 members, representing 27 out of 31 outlets within the road closure area. Each member shares the cost of administering the road closure (e.g. engagement of auxiliary police), and the TOL fee. At the stakeholders' suggestion, Ann Siang Road and Club Street have been converted into one-way streets. This created room for the road carriageway to be narrowed for more pedestrian space. In its place, the pedestrian footpaths have been widened, trees planted and dedicated spaces set aside for alfresco dining throughout the day. The story of this success is cited frequently to encourage similar initiatives in other areas in the city like Circular Road.[53]

CIVIC SPACE

Seoul
- **Seoul Plaza and Gwanghwamun Square**

Singapore
- **Civic District**

Seoul: Seoul Plaza and Gwanghwamun Square

Background

Seoul Plaza and Gwanghwamun Square are Seoul's two main public squares. Seoul Plaza, in front of Seoul City Hall, is an oval grass field of 13,207 m^2 or about 1.3 ha. Gwanghwamun Square is a linear stretch in the centre of Sejong-daero, measuring 555 m in length and 34 m in width.

The two squares were created by reducing or removing roads or parts of traffic circles to create a space to be used by the people. As the two main public spaces in the city, they have hosted a variety of events, assemblies and protests, or have served as places for people to sightsee or relax at.[54]

Seoul Plaza

Before Seoul Plaza was created, the space in front of Seoul City Hall was a constantly congested roundabout. Pedestrian access was only possible through an underground shopping area and passageway. Civic groups constantly campaigned for the place to become more pedestrian-friendly.

Since 1994, SMG considered creating a plaza to commemorate the 600th anniversary of Seoul (historically known as "Hanyang") as the national capital. However, due to gloomy political conditions, these plans were not implemented.

Public support for Seoul Plaza grew overnight with the 2002 World Cup, which transformed the space in front of the Seoul City Hall (current Seoul Plaza) into a Mecca for cheering the national team, the Red Devils. This street cheering cemented the public view that Koreans needed a city square.[55] With popular support, the Seoul government prepared the basic plan to develop a square in 2003 and Seoul Plaza came into being in May 2004.[56]

Above: Square in front of Seoul City Hall in the 1970s.
Left: The stepped plaza at Queen Elizabeth Walk in Singapore.

The square in front of Seoul City Hall was filled with people in red t-shirts, the colour of the national jersey, during the 2002 World Cup.

Gwanghwamun Square

A short distance away, Gwanghwamun Square became part of the "Downtown Re-creation Project" in September 2006 and a key project by the fourth administration of SMG. Gwanghwamun Square was officially opened in August 2009. The area has historical significance; it leads to Gwanghwa Gate (Gwanghwamun), which is the entrance to the main royal palace of Seoul's longest dynasty. Gwanghwamun Square was the result of converting a previously vehicle-oriented space into a cultural place for people.[57]

Citizens' feedback played a key role in the development of the Gwanghwamun Square. In September 2006, the government posed three options to the citizens regarding the orientation of Gwanghwamun Square. These options were to have the plaza: 1) flank the sides of the streets; 2) flushed to one side; or 3) in the centre.

By flanking the development on both sides, the square would be connected to the existing area, allowing use of the street; but this meant that the pedestrian space would be dispersed and there would be no square per se. If the square were to be flushed on one side, pedestrian view would be oriented towards the street.

The central arrangement meant that accessibility to the square was limited. However, having a large square in the centre of the street protected the view towards Gwanghwamun. When the citizens were consulted through a survey, this plan received the most favourable response (44.4%), and through citizen forums and expert opinions, it was finally confirmed.[58]

Streets of Sejong-ro in 1974

Gwanghwamun Square today, where six lanes were removed to widen the plaza.

Seoul Plaza today

A Square to Counter Traffic Woes

Seoul Plaza was developed to meet four basic goals: restore historic and symbolic value, reorganise traffic, meet the needs of pedestrians and create a cultural space. To increase access to Seoul Plaza, crosswalks were installed in four places and the main entrance to Seoul City Hall was connected directly to the Plaza. Around the rounded-square Plaza, granite stones were laid as walkways, while at the centre, a round grassy area was created for use as an event space. Floor lamps were installed around the Plaza instead of lighting towers to save space.[59]

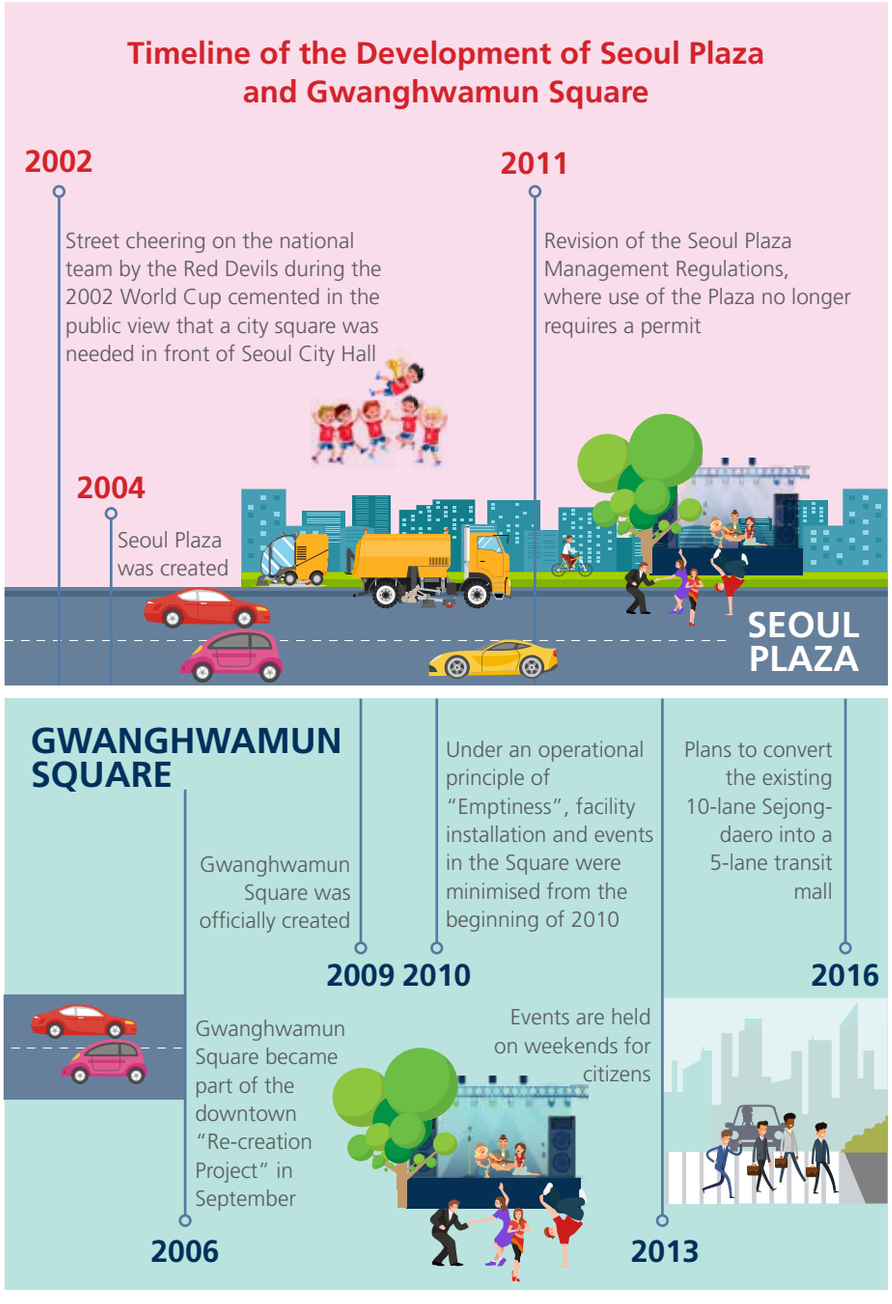
To develop Gwanghwamun Square, the number of traffic lanes had to be reduced from 16 to 10 and traffic counter-measures had to be put in place to minimise congestion. From September 2006, discussions were held with the Seoul Metropolitan Policy Agency, which had legislative rights on road management, to reduce the traffic congestion in the city centre. As a result, left-turning and U-turn lanes were created on the southern side of Sejong-daero intersection, and the side streets were expanded.

The construction of the square greatly improved the pedestrian environment of Sejong-daero. To increase access to the square, crosswalks were set up on the east and west sides on an island at the centre of the street. In addition, a pedestrian passageway connecting Gwanghwamun Station (Line No. 5) and Gwanghwamun Square was constructed.[60]

How Should the Square be Used?

Permits vs reports

Soon after its opening, Seoul Plaza was a hit, partly due to a variety of cultural events being held in the square. However, at the time the Plaza was created, the city administration managed its use closely and strictly. This changed in 2011, when the Seoul Plaza Management regulations were revised and the use of the Plaza no longer required a permit. Now, the only requirement is a report that the Plaza would be used.[61] Today, the Seoul Plaza hosts activities such as protests, assemblies, performances, exhibitions and international events, and also provides people a place of respite.[62]



Thoughtful emptiness?

Gwanghwamun Square struggled with its identity during the initial period. Over the first four months, large events were held such as the Experience Event for the 2009 Seoul Design Olympics and a Snow Jam Festival, when an ice rink was also installed. This led to concerns that the events and facilities were making the area "confusing and inconvenient", and "inappropriate to the identity of Gwanghwamun Square as a symbol of history and culture". The government listened to these concerns from citizens, and under an operational principle of "emptiness", facility installation and events in the Square have been minimised since the beginning of 2010.[63]

Since 2013, events have been held on the first and third Sunday of every month, coinciding with car-free events held in Sejong-daero (See Outreach Programmes). As for the rest of the time, Gwanghwamun Square continues to retain its thoughtful emptiness.

Conclusion

Seoul Plaza is a historic and symbolic urban space in front of Seoul City Hall and is a showcase of unprecedented development of a large grassy area. An average of 20,000–30,000 people visit the Plaza daily and a variety of cultural events and programmes inspire the city.[64]

Gwanghwamun Square offers a representative view of the city and contributes to tourism; and it has improved the urban environment for pedestrians. An average of 12,871 visitors come to the Square on weekdays and 24,514 on weekends. Its peaceful environment as part of the "emptiness" principle have made it a popular place for people to come and relax in.[65]

These two squares have been embraced by citizens since they were implemented. Some people come to take photos or go on dates, while others come to protest or express their views. The outcomes have been generally positive, with 95.2% of visitors and 85% of businesses at Gwanghwamun being satisfied with the Sunday street closures, based on user surveys.

Building on the success of the two plazas, plans are also afoot to expand Gwanghwamun Square further by converting the existing 10-lane Sejong-daero into a five-lane transit mall, in phases. The transit mall will possibly allow only buses through the major avenue. Together with the transit mall proposal, other measures such as further traffic calming features, passenger car management systems and traffic junction redesign and re-sequencing will be needed to allow vehicular traffic to adapt to the changes. The proposal will eventually create an even more accessible and people-friendly space for citizens and visitors alike to enjoy.

Singapore: Civic District

Background

Located on the banks of the Singapore River, the nation's Civic District is the historic birthplace of modern Singapore. The district was part of the master plan created by British colonial founder Sir Stamford Raffles in 1822 and is home to historic buildings such as the former City Hall (now part of National Gallery of Singapore), the Singapore Cricket Club, the Asian Civilisations Museum and the Victoria Theatre and Concert Hall. The former City Hall, for example, was where the occupying Japanese forces surrendered at the end of World War II.

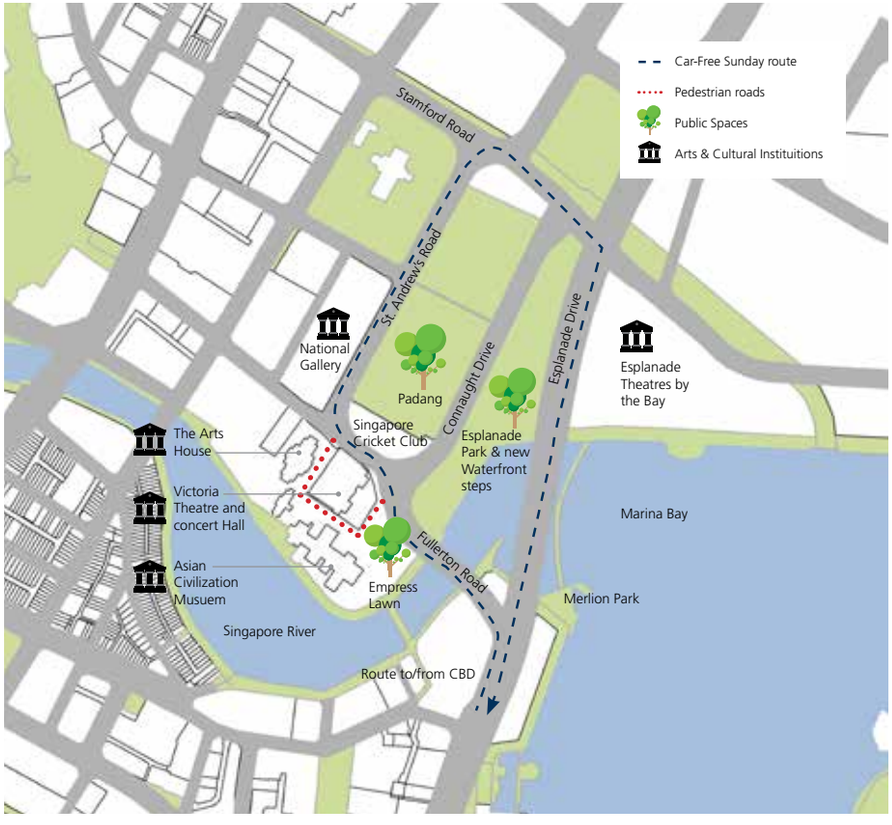
Once, the Civic District was a vibrant area, drawing crowds who took part in leisure activities and enjoyed local delicacies at the Satay Club, a famed open-air hawker area. Over time, however, it lost its appeal for a variety of reasons. These ranged from a lack of natural shade and absence of pedestrian-friendly infrastructure to insufficient public spaces and excessive roads.

Envisioning a Car-free Arts and Cultural Hub for Singapore

The last master plan for the area was prepared during the 1980s. Since then, the situation on the ground has not changed much. With newer, more accessible leisure options available, visitor numbers declined. Meanwhile, many civic and cultural institutions, such as the Merlion Park waterfront (a tourist hotspot) and the ArtScience Museum at Marina Bay, have been added to the landscape. Surrounding historic buildings were also rejuvenated and adapted into museums and other new uses. The Urban Redevelopment Authority (URA), in-charge of Singapore's master plans,

Artist's impression of the enhanced Civic District.

Map of the Civic District



began drawing up new plans in 2014 to enhance the Civic District and integrate it with the Marina Bay area, consolidating all the surrounding attractions, monuments and cultural institutions into the Civic and Cultural District by the Bay.

To rejuvenate the area, planners envisioned the entire Civic District as a large walkable zone of about 146.98 ha, with the city's open green spaces integrated into it. At the same time, the old Supreme Court building and City Hall were being preserved and adapted for use as the new National Gallery of Singapore, while the Victoria Theatre and Concert Hall and the Asian Civilisations Museum were renovated. These enhancement works complemented plans to revitalise the area and create viable public spaces—to turn the Civic District into a world-class arts and cultural hub for Singapore.

URA began working with various stakeholders to improve the quality of public spaces and landscape within the precinct to ultimately strengthen the identity and attractiveness of the Civic District.

Creating a Walkable District for People and Events

Improving the walking environment of the district was key to revitalising it. The plan was to keep the existing roads around the Padang, build a civic open space in the heart of the district and cut it off from the rest of the buildings around it. To transform the area into a walkable public space, URA worked with the Land Transport Authority (LTA) to reclaim roads for public spaces where possible. For example, part of Fullerton Road between Anderson Bridge and Singapore Cricket Club was realigned to create space for a lawn—the Empress Lawn—in front of the Victoria Theatre and Concert Hall. The new Empress Lawn not only showcases the frontage of the theatre, a national monument, but also provides a new venue for outdoor activities and events.

Connaught Drive has been narrowed from four to two lanes and paved over to make it easier for pedestrians and provide easy access between the Padang and the Esplanade Park; traffic is also restricted to tour coaches and public buses. One unique feature is the

The Empress Lawn after enhancement of the Civic District.

Activities along Connaught Drive during Car-free Sunday.

building of reinforced footpaths that can hold the weight of emergency and military vehicles; emergency vehicles are used during Formula One races and military vehicles in National Day Parades, held at the Padang once every five years.

More trees have been planted to provide shade and make the precinct more walkable. Moreover, trees and landscaping efforts helped balance the built-up environment by "softening" the district and providing respite from the surrounding buildings. Working with the National Parks Board (NParks), URA ensured trees were planted around pedestrian footpaths along the waterfront and in the vicinity of Raffles Landing. Eight mature rain trees were transplanted in the lawn area to provide shade and make it more conducive for people to stay there during the day.

As a nod to history, five angsana trees were planted at a well-known spot in Esplanade Park known as *"gor zhang chiu kar"* ("under the five trees" in the Hokkien dialect). The name refers to the five angsana trees that used to stand in the same spot, which was a popular meeting point for couples in the 1960s. Unfortunately, these trees became diseased and were removed in the 1990s. The replacements were a memento of the past for older generations of Singaporeans and a promise of shelter to draw younger ones to the spot.

In all, reclaiming road spaces and enhancing the landscape created a safe and inviting green oasis for visitors on foot.

Laying the Groundwork for a Vibrant Public Space

Besides roads and trees, infrastructure was added to encourage people to congregate at the Civic District's open spaces and to allow events to be held there. These included street furniture, lighting, drainage and a power supply.

URA introduced subsoil drainage, enhanced the electrical supply within the area to support events and activities and installed additional night lighting throughout the area to create an attractive evening ambience. In addition, "smart" lighting poles with additional power points located at the base were erected in strategic locations around the Civic District, providing easy access to electrical supply for pop-up kiosks and other uses during events.

To encourage pedestrians to linger, benches equipped with USB charging points were added. Renovations at Queen Elizabeth Walk and the Asian Civilisations Museum introduced waterfront stepped plazas that allow visitors to get closer to the river and enjoy skyline views.

Beyond Physical Space: Post-implementation Events and Activities

Improving the physical spaces was only the first step in revitalising the area. Today, NParks and the National Arts Council (NAC) manage the Civic District together after its physical changes in line with its dual role as a green space and a cultural hub. This ensures that physical designs are aligned with district-management plans and requirements and that the spaces are well-used by people.

The two agencies, along with URA, have made efforts to introduce events and activities. Car-free Sunday (see Singapore Outreach Programmes), for example, was a programme introduced by the URA in the Civic District, and includes several fringe activities like safe cycling clinics for children, food trucks and concerts organised by NParks.

To further add interest to the locale, art installations were set up at various locations around the Civic District. An 8-km-long route, the Jubilee Walk, was designed to connect key attractions throughout the Civic District and Marina Bay. Trail markers along the entire length of the route from Fort Canning to Marina Barrage trace Singapore's progress from past to present and into the future.

Conclusion

The revitalisation of the Civic District has transformed the area into a more walkable, people-friendly public space. Nevertheless, it is still a work in progress. More improvements are being planned or reviewed such as potential future road closures, which could fully realise the Civic District as a lush pedestrian plaza in the city. By re-focusing planning intentions and prioritising people, and with support from both private stakeholders and members of the public, it is hoped that the Civic District will become one of the most well-loved car-free spaces in Singapore.

SAFE COMMUNITY STREETS

Seoul
- A.Ma.Zone

Singapore
- Silver and School Zones

Seoul: A.Ma.Zone

Introduction

"A.Ma.Zone" is a Korean abbreviation of "A zone where children can play safely" and was presented as part of Seoul's vision of a pedestrian-friendly city by the Seoul Metropolitan Government (SMG) in 2013. Building on the government's aim to introduce and expand pedestrian-friendly streets, where children and persons with disabilities can have comfortable access, A.Ma.Zone also includes measures to protect children from kidnapping or violence. It is a comprehensive public safety measure that goes beyond the policy of existing Child Protection Zones.

Limitations of School Zones

The Child Protection Zone was first introduced in Korea in 1995 with the intention of protecting children (defined as those under the age of 14) from vehicles. These zones are areas of 300 m from the main entrance to elementary schools or kindergartens. Apart from signs and traffic safety facilities such as fences protecting sidewalks from roads to enhance safety for pedestrians, road safety rules are stricter here—stopping and parking of vehicles in these zones is prohibited and speeds are also limited to 30 km/h or less.

By the end of 2014, there were up to 1,704 Child Protection Zones[66] in Seoul. Despite these efforts, car accidents within these zones were also increasing.[67] Issues identified in the programme include how drivers fail to

Comparison of Child Protection Zones and A.Ma.Zone[68]

	Child Protection Zones	A.Ma.Zone
Scope	• Facilities near schools, kindergartens, daycare centres etc. • Linear (partially near the facility)	• Areas with many children such as parks, private academies, playgrounds, etc. • Units of sections and spaces
Project Entity	• Promoted and led by the government	• Local consultative groups organised and led by the residents
Range of Designation	• Road within a 300-500 m radius of these facilities	• Range can extend to be over 500 m when integrated with originally designated School Zones
Scope of Enforcement	• Simple traffic safety facilities (signs, speed bumps, road markings, etc.) in accordance with the Road Traffic Act	• Installation of safe roads and traffic safety facilities using traffic calming techniques
Traffic Control	• No traffic control	• Cars restricted, with one-way-only traffic during commute times
Others	• No separate software operation	• Local residents directly participate in safety

fully take into account the walking behaviour of children. Coupled with the increase in crimes such as child kidnapping and school violence, a new paradigm was required to ensure the safety of schoolchildren.

Accordingly, A.Ma.Zone was conceptualised as the creation of a child-friendly urban environment that takes into consideration local characteristics. Along with physical improvements to the pedestrian environment, the A.Ma.Zone project also introduces a crime prevention programme, all with the cooperation of local residents.[69]

A.Ma.Zone: Creating a Safe Environment for Children to Play and Walk

A.Ma.Zone had four main goals. The first was to construct an operation-and-management-centred system. To respond to the multiple issues related to roads near the school without sidewalks, physical elements had to be introduced, along with an operational programme that could provide safe spaces for children.

Second, pedestrian behaviour and psychology are taken into consideration in the design of space. A.Ma.Zone breaks from the usual idea that pedestrians must use only the sides of the road or a sidewalk and is instead designed so that pedestrians can use all parts of the roads.

Third is the construction of a traffic management system, which incorporates resident participation. Development of a child-friendly environment requires the speed and amount of traffic to be controlled. To make this happen, changing the perceptions of and cooperating with residents of the area are imperative.

Lastly, the children must be protected from more than just traffic dangers. Closed Circuit Television monitoring and regular monitoring systems must be introduced to prevent crimes and road accidents during the time they move back and forth from school.[70]

Selection Process

SMG announced its plans to seek input from the public in selecting areas for the A.Ma.Zone Demonstration Project in April 2012. Field experts were sent to each of the 19 Gu (or autonomous districts) to conduct field studies, after which five regions were selected for the project in July 2012. At the end of December 2012, three A.Ma.Zone Demonstration Projects for 2013 were initiated, two of which were near Gaebong Elementary School (Guro-gu, 100,000 m^2) and Mia Elementary School (Seongbuk-gu, 94,000 m^2).

Gaebong Elementary School was chosen for its concentration of 60 private academies and local stores around the school. The width of the walkway was also narrow, at 1.5 m, and streets there had a high volume of car and pedestrian traffic, raising concerns about accidents.

Mia Elementary School was an ideal location due to its proximity to a kindergarten, private academies and parks—places frequented by children. The front of the main school entrance was too narrow to cater to a high volume of student movement. School fences and illegally parked vehicles further served to reduce the space available for schoolchildren.

The A.Ma.Zone Demonstration Project incorporated opinions from area residents and advisors to confirm the design for the respective areas in May 2013. Construction for the demonstration project began in October 2013 and ended in February 2014.

Designed for Child Safety

The A.Ma.Zone Demonstration Project aimed to improve three areas: road management, pedestrian environment and living environment.

Road management

The goal was to convert the existing vehicle-oriented roads into pedestrian-friendly ones, with traffic-calming techniques such as using chokers to narrow lanes and chicanes to reduce speeds. For the area around Mia Elementary School, discussions were held with local residents and police officers on changing roads from two-way to one-way traffic.

Pedestrian environment

A "part-time traffic zone" was to be created by closing the roads during peak periods before and after school to enable children to go to and from school safely. A traffic officer would be stationed at the entrance of the part-time traffic zone to redirect traffic. The walkways on one side of the roads were expanded for pedestrians.

Living environment

Closed Circuit Televisions (CCTVs) and Variable Message Signs (VMS)—which are electronic traffic signs on roadways to give travellers information about traffic—were installed in the A.Ma.Zone to monitor cars stopping or parking illegally. An A.Ma.Zone Keeper System was introduced and linked to traffic safety instructors who patrolled the area to discourage crime in vulnerable areas around the neighbourhood. Trick art and wall paintings at a child's eye-level were used to enhance the street environment.[71]

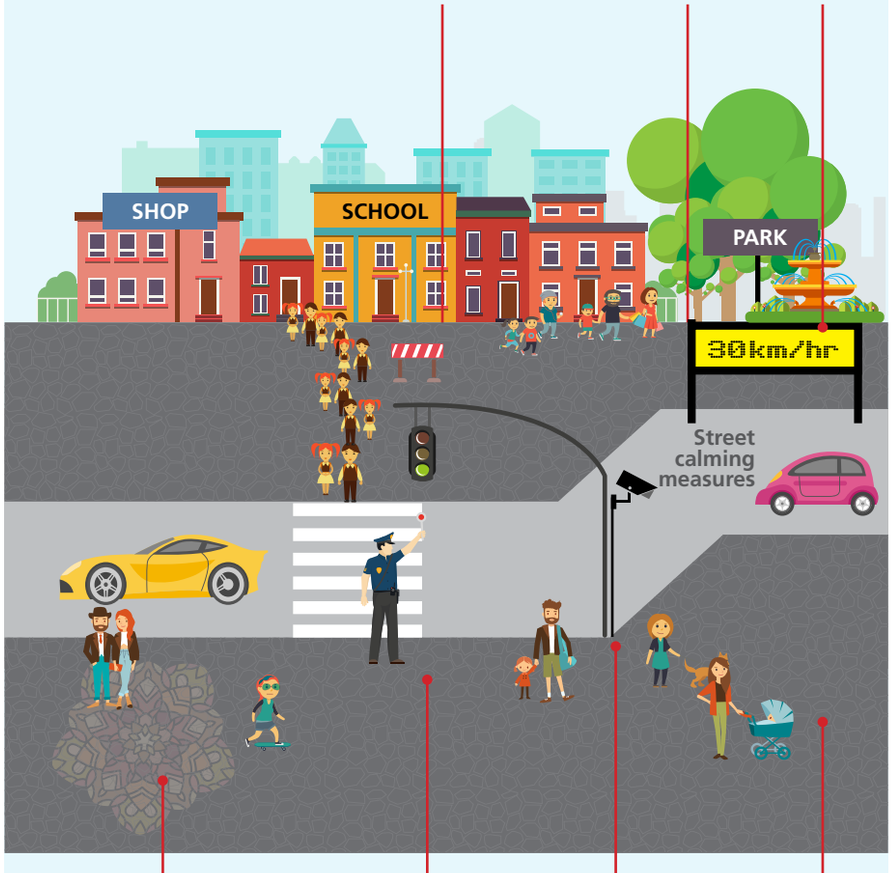
Street calming measures

Key Feature of the A.Ma.Zone

Temporary road closures during peak hours for schools

Limiting vehicle speeds to 30km/h to increase pedestrian safety

Electronic Information Board

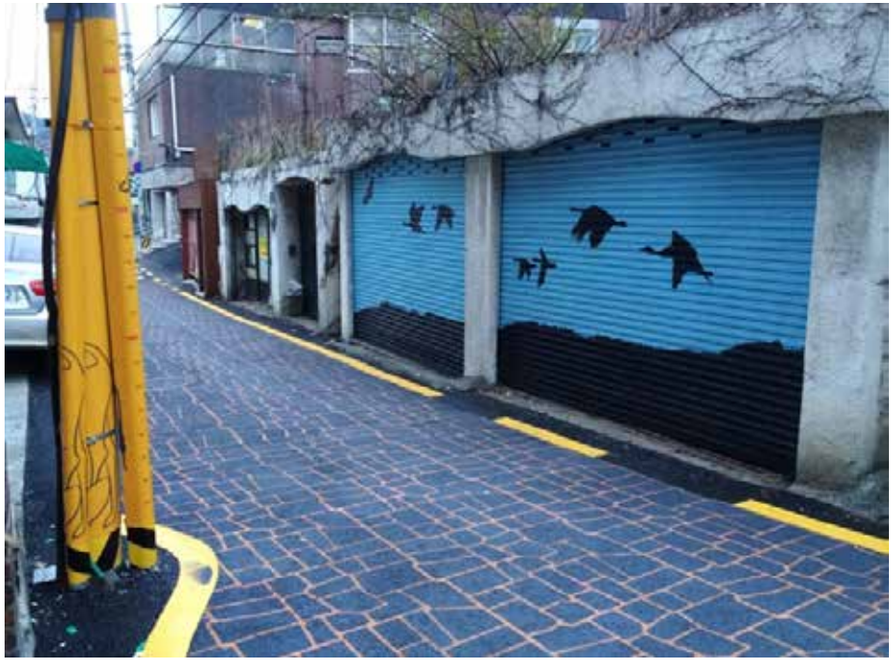


Artwork to make the walkway more interesting

A Traffic Officer stationed at the entrance to re-route traffic

Installation of CCTVs to enforce the new speed regulations

Expanded walkway to increase comfort and safety of pedestrians



Brightening an alley near Segeomjeong Elementary School through pedestrian-friendly pavement and paintings of nature

Community Participation in Decision-making

A key factor in conceptualising the A.Ma.Zone projects was resident participation. A survey was distributed to parents via the school newsletter to understand how their children went to school and what problems they encountered. The survey indicated that most of the children walked to school and they felt the most danger from speeding cars.

Resident consultation sessions were also organised for the two zones at Mia and Gaebong Elementary Schools, comprising about 20 local residents and owners of local stores and buildings, relevant staff from the elementary school, police officers and Gu Office personnel. These local residents participated directly in four to six discussion sessions that covered the status and issues at that time, as well as plans for improvement. During these discussions, the idea of "part-time traffic" was mooted. While there was initial resistance from the residents, they were eventually won over with comprehensive explanations regarding the safety of the children.

More significantly, the government officials incorporated the perspectives of the elementary school students. Class presidents of fourth to sixth grade classes gathered opinions and experiences from their classmates and these were later reproduced

in drawings and community mappings. When the A.Ma.Zone plans were in place, a briefing session was held for locals, to increase understanding and encourage participation in keeping the neighbourhood safe.[72]

Benefits of A.Ma.Zone

The overall satisfaction level among the community in these two areas was only about 50%, but once the project was complete, this increased greatly to about 80%. Approximately 85% of local governments expressed positive views on expanding the A.Ma.Zone project, citing reasons such as "improvement of student and pedestrian safety", "improvement of street convenience" and "improvement of pedestrian convenience".

For the Gaebong Elementary School project, "installation of streetlights and CCTVs" and "limiting vehicle speeds" in the management programme received high scores in terms of satisfaction. For the Mia Elementary School project, "installation of art work and sculptures" to improve the physical environment and "traffic officer and part-time traffic zone" in the management programme received high scores. Due to the part-time traffic zone, the amount of traffic decreased, with 88.5% of vehicles obeying the speed limit of 30 km/h in the A.Ma.Zone at Gaebong Elementary School and 83.5% at Mia Elementary School.[73] In summary, the A.Ma.Zone Demonstration Project has effectively improved the safety of children.

Following the success of the A.Ma. Zone Demonstration Project in 2013, the A.Ma.Zone was implemented in seven neighbourhoods in 2014 and in five in 2015.

Conclusion

A.Ma.Zone breaks free from the uniformed designation of traffic safety facilities of the Child Protection Zones, while expanding these zones to prioritise protection of children when they are in the neighbourhood.

The multi-stakeholder approach in drafting the A.Ma.Zone plans, especially incorporating the children's perspectives, was a key factor in their success. Resident consultation groups and other group discussions, while enabling planners to respond to pedestrians' concerns, also led to increased understanding of the A.Ma.Zone Demonstration Project.

Last but not least, the A.Ma.Zone project enhanced the safety of young pedestrians not only through improvements in road design but also through educating drivers to be more aware of pedestrians while driving. This forms a comprehensive approach to planning safe pedestrian environments.[74]

Singapore: Silver and School Zones

Jointly drafted by CLC and LTA Road Safety Engineering Unit

Background

The safety of exposed road users, such as pedestrians and cyclists, has always been a priority for Singapore. In particular, the most vulnerable road users—senior citizens, children and the disabled—need the most protection.

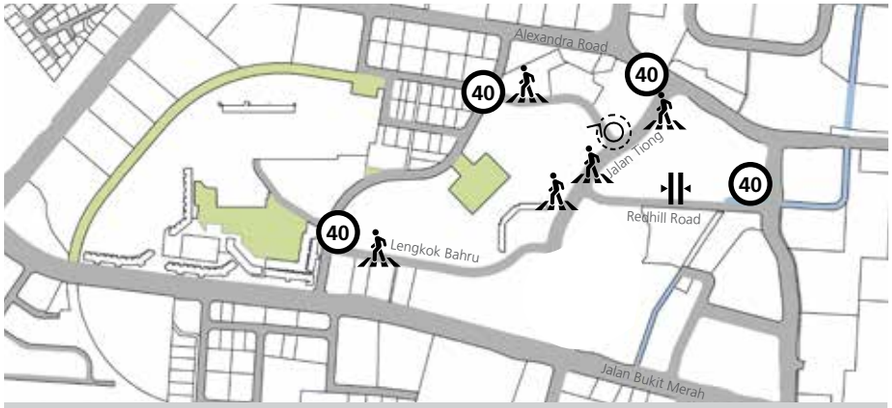
As Singapore's senior resident population grows by 32,000 people a year, there is increased focus on this issue. In 2013, the government set up the inter-agency Pedestrian and Cyclist Safety Committee, chaired by then Parliamentary Secretary for Transport, Dr Muhammad Faishal Ibrahim, specifically to review pedestrian safety and make roads safer for seniors and children.[75]

The Land Transport Authority (LTA) implemented designated School Zones since 2000 and these underwent a round of enhancements under the Enhanced School Zone (ESZ) scheme in 2004. ESZs were implemented along roads fronting primary schools with relatively high interaction between students and vehicular traffic. On top of these measures, LTA also conceptualised and implemented Silver Zones—neighbourhoods with specific traffic policies, road infrastructure and other design features to encourage motorists to slow down and pedestrians to exercise caution. The School Zone scheme was also extended to secondary schools.

While Silver and School Zones began as pilots in selected spots, they have now become mainstays, with eight Silver Zones (and 48 more to be completed) and 205 sites. In the neighbourhood of Lengkok Bahru/ Jalan Tiong/Redhill Road/Redhill Close, a Silver Zone and an ESZ have been implemented through design measures and changes to road infrastructure.

Silver Zone in the neighbourhood of Lengkok Bahru/Jalan Tiong/Redhill Road/Redhill Close

Key Features of the Silver Zone in Lengkok Bahru, Redhill Road and Jalan Tiong



Safe Havens for the Pedestrian: Silver Zones

As one of the first town centres established in Singapore in the 1960s, the Redhill neighbourhood has a large concentration of older residents, as well as senior amenities; at the same time, it has a relatively high rate of traffic accidents involving the seniors. Hence, it was chosen as part of the Silver Zone programme.

Several traffic calming measures were implemented to slow motorists down within the zone. The 1.5-km Silver Zone in Lengkok Bahru/Jalan Tiong/Redhill Road is marked out, like all Silver Zones, by a Gateway which includes bright fluorescent yellow-green Silver Zone signs and yellow rumble strips—raised, painted strips on the road. There, the speed limit is 40 km/h, compared to 50 km/h outside the zone. The lower speed limit is posted prominently both on signboards and on the ground, as a reminder to motorists.[76]

Apart from reducing legal speed limits, a range of traffic calming measures is implemented in Silver Zones, depending on the suitability of the estate.[77] In this Silver Zone, a roundabout was created at a T-junction and lane widths of roads were narrowed to 3.1 m to create pinch points that stretch for 45 m, encouraging motorists to drive at lower speeds. Where visual prompts were more appropriate, chevron markings were drawn on the roads.

Measures were also taken to enhance the safety of pedestrians when crossing the road. Along Lengkok Bahru/JalanTiong/Redhill Road, several additional crossing points—Courtesy Crossings—were created to facilitate pedestrian crossing. The number of lanes at some sections of the road was also reduced from two going in each direction to one, to shorten the crossing distance and exposure time to traffic. Large areas of greenery were planted at the widened centre divider. The centre road divider is also kept low to allow emergency vehicles to pass over them when necessary and safe to do so.

At other Silver Zones, different road safety measures enhance safety and improve walkability depending on site suitability and feasibility. "Eye-lands" are traffic islands—enlarged centre dividers where pedestrians can cross in two stages, pausing to rest and look out for traffic in one direction at a time. Speed humps, where feasible, are implemented just before these "Eye-lands" to encourage motorists to slow down. And all crossings within the Silver Zone come with ramps to allow barrier-free accessibility for senior pedestrians, residents with baby strollers and persons with disabilities.[78]

Some design features signal to pedestrians that they should pause and be alert. For instance, the "LOOK" markings at zebra crossings and courtesy crossings are painted in white to serve as a reminder to pedestrians to watch out for oncoming traffic before crossing the road. Silver Zone bollards are painted in bright fluorescent yellow-green to delineate motorists and at the same time to alert pedestrians and motorists that they are approaching a crossing. Furthermore, the crossings are paved with homogeneous yellow tactile tiles for pedestrians who are visually handicapped.[79]

The Silver Zone in Lengkok Bahru/Jalan Tiong/Redhill Road was launched to mixed reviews. While some residents welcomed the changes, citing that the measures enabled them to cross roads with less anxiety,[80] others felt the traffic calming measures overlooked certain scenarios such as breakdowns in a one-lane road. LTA issued a media reply to inform

Before and after the addition of an "Eye-land" in the middle of the road.

the public that the kerbs have been made mountable to account for such situations.[81] When faced with complaints from the public that travel times had increased as a result of the Silver Zone measures, officers from LTA explained the importance of keeping travelling speeds low to enhance the safety of all pedestrians in the neighbourhood. With constant engagement, motorists gradually began to accept these changes.

School Zones

School Zones have been in place since 2000 in areas around primary schools, demarcated using simple "School Zone" signs at both the start and end of the zones. Additional road safety measures such as pedestrian crossings, parking restriction lines and "SLOW" road markings serve to remind motorists to be alert to young pedestrians.

In 2004, LTA implemented additional safety measures for primary schools, which were noted to have relatively high interactions between students and vehicular traffic.[82] This formed the ESZ scheme. To increase the visibility of the School Zones at primary schools, road markings were changed to "SLOW" and "SCHOOL", and roads were paved with red-textured materials to increase visibility.[83] Provision of more pedestrian crossings and prohibition of parking along the road by means of parking restriction lines were other measures introduced in an effort to make the roads safer.[84]

School sign with flashing light

After the review by the Pedestrian and Cyclist Safety commitee, ESZs underwent yet another round of improvements.

The speed limits of the roads in such School Zones were reduced to 40 km/h during certain hours of school activity such as before and after school hours when a higher volume of students use the roads. The "School Zone" signs have been modified and enhanced for these schools—apart from the similar fluorescent yellow "Children Ahead" sign that is used, a "40 km/h" speed limit sign and a "When Lights Flash" information sign accompanied with a pair of amber lights that flash whenever the speed reduction is in place were added.

A toolkit containing existing and new traffic calming measures similar to those in Silver Zones has also been compiled to aid planners in designing schools' frontages to promote safer road driving. Planners have a choice of which road safety measure they wish to use, according to the layout of the road outside the schools.[85] For example, either centre road dividers can be implemented, or, to further narrow the streets, chevron markings can be drawn on the ground to provide a visual cue.

Making School Zones safe does not come solely from infrastructural changes and policies; it requires significant support from its users—the community. Recognising this, parents and concerned citizens are encouraged to become Community Wardens to help promote road safety in the neighbourhood. With training from the Singapore Police Force, volunteers are stationed outside school gates during peak hours to guide schoolchildren across the roads safely. They will also remind motorists to drive carefully in school zones and park at designated areas. They are also privy to the habits of drivers and pedestrians and hence, can provide feedback on road safety issues and make recommendations on improving road safety.[86]

Motivated to create safer streets, the Pedestrian and Cyclist Safety Committee focused on designing streets for the more vulnerable road users—in particular, children and the seniors—rather than motorists. With the success of Silver and School Zones, the committee intends to extend this approach to town centres as well as the city centre[87]—an exciting prospect for road safety and walkability in Singapore.

OUTREACH PROGRAMMES

Seoul
- **Walk & Bike Festival and Car-free Zones**

Singapore
- **PARK(ing) Day, Streets for People, Car-free Sunday**

Seoul: Walk & Bike Festival and Car-free Zones

Background

The Seoul Metropolitan Government (SMG) operates a variety of programmes to reclaim the streets from vehicles and return them back to the people. The Walk & Bike Festival is one of the main street festivals in Seoul. It is held with the aim of emphasising the importance of and spreading a culture of walking and cycling as a way of getting around the city.

Since 2013, the Walk & Bike Festival has been held annually in autumn on a Sunday from 9am in the morning to 12 noon. Roads are closed and the route starts from Gwanghwamun Square and ends at Banpo Hangang Park. For pedestrians, the festival is a 7.6 km walk or stroll. Cyclists have a longer route of 15 km.[88]

While the Walk & Bike Festival is a large annual car-free street festival, there are other streets in Seoul that are regularly pedestrianised. As of November 2015, there were a total of 69 pedestrian streets with a total length of approximately 22 km.

Three of these pedestrian streets are managed directly by SMG, while 66 are managed by the Gu (autonomous districts). Two of the main pedestrian streets managed by SMG are Sejong-daero (Gwanghwamun Three-Way Intersection to Sejong-daero Intersection, 550 m) and Deoksugung-gil Walkway (Daehan Gate to Round Fountain, 310 m). In Sejong-daero, cars are prohibited from entering from 9am to 5pm on the first and third Sundays of the month. Deoksugung-gil Walkway is closed for two hours during lunch on weekdays to allow better access to various events.

Walk & Bike Festival

People-friendly street festival

The Walk & Bike Festival was promoted in 2013 as a pedestrian-friendly policy initiative by SMG to introduce a people-friendly street culture. Prior to this event, SMG introduced Car-free Day from 2006, when cars were restricted from entering main roads in the city and roads were managed as car-free streets.[89] Later, a new concept of a festival for the pedestrians which showcases Seoul as a pedestrian-friendly city was separately announced.

SMG promoted the festival with the aim of encouraging 'citizens to participate in creating and enjoying the festival' and 'cultivating a consensus among citizens on green transportation that include cycling and walking'. For the Walk & Bike Festival, members of the Seoul Metropolitan Transportation Headquarters were organised into four teams: General Management, Traffic Measures, Event Management and Site Management.

The Festival aimed at minimising citizen inconvenience and discomfort by reinforcing safety measures and traffic control. Marketing and promotion efforts were carried out on a variety of media platforms including the Seoul City homepage, the press and the Variable Message Signs (VMS), which is an electronic sign commonly used on roadways to convey information about the traffic situation. Traffic measures such as vehicle demand control, a bus detour guide and parking control to minimise traffic complaints were also put in place.

Walk & Bike Festival walking & cycling routes

The aim of these efforts was to get citizens to voluntarily participate in the festival and make it their own.

Citizens directly participate in development and management

The Walk & Bike Festival is only held once a year but the priority is on citizens' participation. Along with the programmes provided by SMG, citizens are able to plan and manage their own programmes as well.

To help create an enjoyable atmosphere during festivals, performance groups such as bands, dance teams, traditional Korean percussion groups and costume performance groups are recruited.

Parades, light shows, photo zones, magic shows and other activities create a festive atmosphere for participants.

Light show within the Namsan Tunnel when it was closed to traffic

Car-free Zones

Creating streets for people to enjoy instead of simply prohibiting vehicles

Car-free zones were first introduced in 1997 in Myeongdong and Insadong, and gradually rolled out across the city. Car-free zones refer to streets where vehicles are prohibited on a specific day of the week at a certain time, or streets that are permanently converted into a pedestrian street. The criteria for setting up a car-free zone are as follows—shopping and tourist attractions with high pedestrian volumes, and historic areas where preservation of the traditional culture is desired.

The car-free zone project was managed as a way of prohibiting vehicles in designated areas until early 2010. Zones were set up in spots where stopping these vehicles was convenient, and the project was promoted by the government without participation from residents.[90]

To change this, SMG announced its 'Pedestrian-friendly Seoul Vision' in November 2013 to create pedestrian streets tailored to the needs of each area. The essentials of this project were:

i. Pedestrian streets would be designated by considering pedestrian volume, road functions and amount of traffic;
ii. Regular traffic would be controlled by prohibiting vehicles all day or at a certain time (weekends or weekdays); and
iii. Instead of simply prohibiting vehicles, the streets would be managed as cultural spaces for all to enjoy.[91]

Facilitating themed programmes through a step-by-step approach

1. Sejong-daero Pedestrian Street

   Sejong-daero is a symbolic main road near Gwanghwamun Square with high volume of pedestrians and vehicular traffic. However, previously, the vehicles were prioritised and the huge volume of traffic was very difficult to control. SMG designated Sejong-daero as a pedestrian street to raise awareness of pedestrian rights and also to provide an opportunity to expand the car-free zone project.

   In September 2012, SMG (Urban Traffic Headquarters) ran a pilot project to turn Sejong-daero into a car-free zone. About 53,000 pedestrians participated and visits to nearby stores increased fourfold, while sales for that day also increased by an average of 10%.

   After interest peaked through the issuance of press releases, the event was held regularly on the third Sunday of each month from March 2013. From September of that year, the event was expanded and held on the first and third Sundays of each month. Cultural events are held on the first Sunday and the Gwanghwamun Flea Market on the third Sunday.

   SMG also established plans to increase and improve citizen-organised cultural experience events. A private contractor was hired to run the basic operations and people were encouraged to apply online for spaces to hold performances. In addition, street performances and exhibitions were organised for people to enjoy while walking around.[92]

Sejong-daero transformed into a lawn

2. Pedestrian Street on Deoksugung-gil

   Pedestrianisation of Deoksugung-gil was promoted in March 2014 as part of the plans to expand and develop a pedestrian-friendly city programme. Deoksugung-gil is used by many office workers who work at the plethora of government offices and companies nearby. However, the number of pedestrians at lunchtime and the narrowness of the footpaths often result in pedestrians spilling over onto the road.

   Before running a pilot programme, SMG held a meeting in April 2014 with relevant agencies (Jung-gu Office, Seoul Metropolitan Police Agency and Namdaemun Police Station) and major stakeholders near the car-free zone (embassies, religious establishments, etc.). Most of them responded positively to the idea of a pilot programme.

   In May, the pilot programme ran for two hours around lunchtime. All vehicles were prohibited and with the cooperation of Jung-gu Office, parking attendants were placed around the car-free zone. During the two hours, the pedestrian volume increased by 5%. When surveyed, over 90% liked the idea of a pedestrian street and more than 50% wished that it could be a car-free zone every day.

   After gathering opinions from citizens and monitoring the area, various facilities were improved before plans for turning the street closure into a regular operation were put in place. For example, motor-operated bollards were installed at the entrance to Deoksugung-gil and parts of the walkway were expanded. Some of the bollards within Deoksugung-gil were removed or changed to avoid creating obstructions for pedestrians.

   Since September 2014, the pedestrian street has been running regularly for two hours on weekdays, along with a variety of methods used to generate more interest and buzz. For content variety, a master planner was chosen to propose different themes each month. For example, every Wednesday is "Lunch Box Street", and street umbrellas are installed under which people can eat their lunches and every Monday is "Culture Street".

Walking comfortably on Deoksugung-gil Pedestrian Street

Conclusion

SMG is managing a variety of programmes to reclaim the streets from vehicles and prioritise walking as a means of mobility.

The Walk & Bike Festival has managed to achieve its goals of raising awareness on the value of walking and cycling and promoting pedestrian-friendly policies. In the inaugural festival in 2013, only 7,000-8,000 people participated. Numbers were relatively low due to rainy weather but by the third festival in 2015, participation rates had increased to 15,000, cementing its status as a festival recognised for pedestrians.

SMG is planning to expand the event in 2016 by diversifying the cultural content and ramping up promotion efforts with the hope of attracting a target audience of 20,000, including international audience.[93]

Outreach programmes are also in place to create a culture of walking and raise awareness of pedestrian rights to road space. Rather than simply removing vehicles, there are plans to go one step further to develop these streets into cultural spaces for the public's enjoyment.

Currently, 20 programmes are running on Sejong-daero, with approximately 30,000 people participating in each programme.[94] In addition, Deoksugung-gil runs a variety of themed programmes each month.

City officials take into consideration the various characteristics of each area when planning festivals and events to attract residents. To ensure that the programmes are sustainable, there is an emphasis on involving local residents and encouraging them to participate in the project directly.[95]

Singapore: PARK(ing) Day, Streets for People, Car-free Sunday

Background

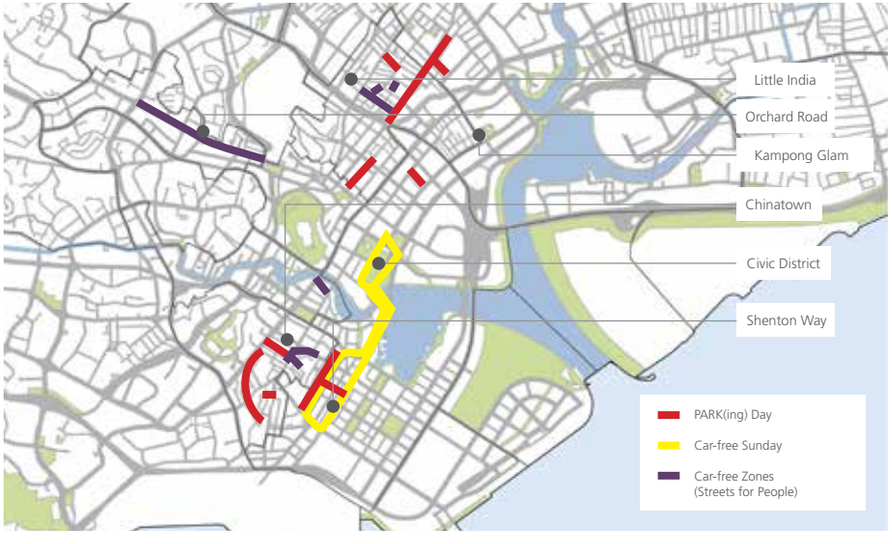
In land-scarce Singapore, there is a growing consensus the city-state should move towards a car-lite future. To that end, government policies and infrastructure support the reduced use of cars and encourage walking and cycling. Efforts are also made to educate the public to help shift perceptions and attitudes towards active mobility.

Three recent outreach programmes aim to show people how traditional motor vehicle infrastructure like roads and car park spaces can be put to alternative use. These programmes—(PARK)ing Day, Streets for People and Car-free Sunday—vary in strategy and scale but each reclaims part of the existing transport infrastructure from cars for public events and activities.

Transforming Roads into Public Spaces: PARK(ing) Day and Streets for People

Singapore's Master Plan 2014 highlighted the need for well-designed quality public spaces. This gave rise to the Urban Redevelopment Authority's (URA) publicity programme—a series of initiatives that sets out to reclaim spaces for the public. Two of these initiatives involved taking spaces from cars temporarily and giving them back to the people.

Map Showing the Locations of the Three Outreach Programmes in Singapore



PARK(ing) Day: Involving the community to enliven parking spaces

PARK(ing) Day is a movement started in 2005 by San Francisco art and design studio Rebar, which turned a single parking space into a temporary public park. Today, it takes place once a year in various cities, turning paid parking lots into community spaces "for creative experimentation and unscripted social interaction".[96]

Singapore's first PARK(ing) day was initiated by a group of students and faculty from the Singapore University of Technology and Design (SUTD) as part of Archifest 2013.[97] Parking spaces in MacPherson Estate were turned into a green park to improve pedestrian safety.

In subsequent years, the URA expanded the event to allow people to choose to use any of the parking spaces under URA's care—particularly, roadside parking spaces, which were highly visible and accessible. Popular spots were in the city centre such as at Bras Basah, Bugis, the Central Business District, Chinatown, Duxton Plain, Kampong Glam, Little India and Jalan Besar. The Housing and Development Board (HDB) also supported the programme in Tiong Bahru, releasing roadside parking lots in the area for community activities.

The URA took on a supportive role by waiving parking charges on the day of the event and providing an online platform for participants to view and reserve available spaces. It set simple ground rules such as disallowing commercial activities and encouraging adherence to safety regulations. The idea was to encourage people to see the potential of public space in their everyday lives.

Participants at PARK(ing) Day work on a poster that spans several parking lots.

This minimal structure allowed participants to take the lead in coming up with appropriate activities for their communities. Such activities included entertainment, seating spaces, design showcases, cultural exhibitions, information booths and mini gardens. PARK(ing) Day has received positive feedback: Participants reported enjoying the access to novel spaces where they could demonstrate their talents, interact with the community or simply relax. According to URA,[98] around 140 parking lots were reserved in 2015, up from 88 lots in 2014.[99]

The one-day affair also became a platform for some participants and interest groups to test their ideas for enlivening public spaces, resulting in longer-term collaborations and public space projects such as setting up table-tennis tables in public places to encourage interaction and leisure sports,[100] and placing pianos out in public spaces for people to play, adding an element of delight to the city.

Streets for People: Empowering people to reclaim the streets

As with PARK(ing) Day, Streets for People is part of URA's outreach effort to create shared community spaces. After efforts to pedestrianise various roads around central Singapore (see section on Club Street), URA began receiving requests to pedestrianise

People gather to watch performances on the street.

roads for an array of events. Streets for People was launched in July 2015 to support community-initiated projects seeking to transform streets into vibrant public spaces.[101]

URA formalised the street closure procedure, drew up guidelines such as seeking the approval of surrounding stakeholders and served as a middleman by connecting applicants to the relevant agencies such as the Land Transport Authority (LTA), the Singapore Civil Defence Force (SCDF), the Singapore Land Authority (SLA), the Singapore Police Force (SPF) and the National Environment Agency (NEA). It also provided seed funding of between S$2,000 (for one-off event) to S$5,000 (for regular events), as well as barriers, signs, safety personnel and other necessary equipment.

Similar to PARK(ing) Day, Streets for People supports community-based activities. Since September 2015, the programme has supported eight street closures, making it a relative success as stakeholders take up the initiative to organise the street, enliven the area and create more buzz.

Freeing the Streets for Active Mobility: Car-free Sunday

Of the three outreach programmes, Car-free Sunday is the largest. It was designed as an education campaign to raise public awareness about alternative modes of transport and was part of a series of demonstration road closures that illustrated the advantages and possibilities of a car-lite society.

First launched in February 2016, Car-free Sunday takes place every last Sunday of the month and encompasses approximately 4.7 km of roads right in the heart of Singapore's historic downtown core.

Between 7am and 7pm, closures of key thoroughfares are scheduled; roads close and re-open at varying times to mitigate traffic disruption. Members of the public can take part in sports and wellness programmes, take heritage trails, watch street performances and dine from food trucks.

They can take advantage of car-free roads to ride bicycles and personal mobility devices (PMD) such as electric scooters, kick-scooters, mobility scooters, motorised wheelchairs, hoverboards and unicycles.[102]

As a result, roads are filled with people with or without bicycles or mobility devices, offering the government an opportunity to observe the effects of road closure on traffic flow and test the public's response towards space sharing between pedestrians, cyclists and PMD users.

Car-free Sunday is planned for a six-month trial period until end-July 2016. Though it is driven largely by URA and its parent ministry, the Ministry of National Development, Car-free Sunday is strongly supported by the government in all aspects. Other agencies such as the National Parks Board (NParks) and national sport agency Sport Singapore help facilitate URA's interaction with private stakeholders prior to the event and hold events on the day itself.

At the same time, community groups and private stakeholders organise many activities for the public in conjunction with the event. For example, cycling interest group Love Cycling SG has been conducting guided cycling expeditions from heartland locations to the city every Car-free Sunday, while commercial venues such as the Fullerton Hotel and museums offer meal deals, earlier opening times and other special concessions.

Joggers taking the opportunity to reclaim the roads from vehicles on Car-free Sunday

Benefitting public, private and people sectors

Going by the public response to the event to date, Car-free Sunday has more than accomplished its objective of promoting a car-lite message. It has sparked debate about the viability of pedestrians sharing pathways with cyclists and other personal-mobility-device users and attracted strong participation from various community groups, from neighbourhood brisk walker clubs to fitness groups.

It has also attracted more people to the city centre on weekends with retailers reporting an increased footfall of 15–20%, indicating potential economic benefits. More importantly, the road closures have not attracted significant complaints from stakeholders and motorists. This could be the result of a gradual acclimatisation of the public to road closure events starting from small-scale temporary road closures at historic streets like Club Street or Ann Siang Hill Road in 2013 to the 20–30 organised weekend road closure events that take place in Singapore every year.

Government's Role: Facilitating the Process and Ensuring Sustainability

One agency to lead the way

As the lead agency, the URA streamlines application procedures and facilitates regulatory processes, such as seeking approval for road closures, as in the case of the Streets for People programme. It also connects stakeholders with shared interests so they can seek joint approval.

By restricting its role to that of a facilitator, URA also indirectly builds up capability within the private sector to organise and plan their own street closure programmes. What it has done has enabled private stakeholders to approach the government on their own as they become sufficiently familiar with the procedure and requirements over time. Meanwhile, URA's continued interaction with private stakeholders and government agencies builds up mutual trust and paves the way for future public-private partnerships. For instance, agencies were initially concerned about potential issues such as fire hazards, road safety, traffic management and noise pollution. Over time, with each approval and successful event, agencies were more willing to trust their private counterparts and support their proposal for car-free zones.

Sustainability and scale

These outreach programmes have shown encouraging results and the aim is for

People enjoying public spaces in the Civic District during Car-free Sunday

such programmes to continue in the years ahead. However, there are certain challenges to overcome such as funding, ensuring sustained interest and addressing traffic concerns when events are scaled up.

Currently, funding poses the biggest challenge to Car-free Sunday's sustainability in the long run. Most of the budget goes into ensuring safety for people taking part in the event. Barriers, safety personnel and medical support make up 60–70% of event expenditure. To ease the financial burden, URA has sought sponsors. Additionally, there were concerns that the novelty could wear off in subsequent editions, so efforts are being made to consider other routes and activities in the future.

There are also concerns if these street-closure programmes are to be scaled up in the future. While programmes are carefully planned so road closures have minimal impact on traffic, there are limitations to the extent of possible road closure, especially for roads with multiple bus services. Authorities are also cautious about holding road closure events near residential areas as households might complain of excessive noise or traffic disruptions. For example, a proposal to close a street in Ang Mo Kio Town for a bazaar could not be accepted as it was a key connecting road within the town and closing it would have disrupted existing bus routes.

Conclusion

The three outreach programmes detailed here illustrate the attempts made by the Singapore government to reclaim space from cars, encourage interaction and pedestrian movement and promote the alternative use of existing road infrastructure for an array of community activities. Public feedback thus far has been largely positive.

This success is due to a range of factors. There is strong support at high levels of government, and agencies are willing to collaborate and take risks. Programmes meet the pent-up demand for active mobility and car-free streets and help build interest among stakeholders.

Nonetheless, more effort is needed as Singapore pushes towards its goal of a car-lite future. There are plans in the pipeline to extend road closures to more areas of Singapore, especially into the heartlands, and seek a wider range of groups and organisations to drive and sponsor these programmes.

Ultimately, Singapore hopes to build on the momentum of these programmes to change people's mindset to consider the benefits and possibility of adopting alternative modes of travel, which could pave the way for bolder public space enhancement projects in the future.

COMMUTER CYCLING

Seoul
- **Ttarungi Bike-share**

Singapore
- **Intra-town Cycling Networks**

Seoul: Ttarungi Bike-share

Background

Cycling is becoming increasingly popular as a transportation mode in Seoul, with more and more cities introducing public bicycles in their jurisdictions.[103] The public bicycle-sharing system in Seoul, known as Ttarungi, was introduced in October 2015 to cultivate a cycling environment, in which bicycles are convenient and safe to use.

Ttarungi was named after the sound of a bicycle bell and Ttarungi bicycles come in a bright green or a traditional design. Through this bike-share programme, the Seoul Metropolitan Government (SMG) hopes to establish new urban values, such as a culture of space sharing between different road users, and improve the sustainability of the city.

Piloting the Bike-share Scheme

SMG presented its "Master Plan on Activating Bicycle Use" in 2008 to introduce a public bike-share system.

Before introducing Ttarungi, Seoul had a public bike-share service, which saw its first pilot in November 2010, with 440 bicycles and 43 stations in Sangam-dong.[104] By the end of 2012, an average of 585 public bicycles were used on a daily basis,[105] but this rate was continuously decreasing, due to a lack of stations and bicycle lanes.[106] Citizens called for an improved bike-share system and better services.

Expansion of Public Bicycle System at Low Cost and High Efficiency

Under these circumstances, the government began to modify the existing urban infrastructure to make way for a revamped public bicycle system. To promote cycling, the "Operational Plan for Expanding & Constructing a Public Bicycle-sharing Service" was established in 2014.

The plan aimed to increase the number of public bicycles to about 20 per 10,000 people and install sufficient stations so that there was at least one within a 5-minute walk from every residential home in Seoul. The service was first initiated in key areas with high visibility such as the vicinity of the City Hall or around major tourist attractions, as well as other places most likely to adopt the service early. There are plans to extend the scheme to where there is demand for cycling.

For ease of use, the rent and return system uses a smart phone application instead of kiosks. The bicycles were also mass produced exclusively for the service. These measures helped to keep the cost of setting up the service low.

Construction of the System

The Ttarungi service began in October 2015 with five bike-share areas, 150 bike-share stations and approximately 2,000 public bicycles. The selected bike-share areas were Yeouido, Sangam-dong, Shincheon and Seongsu-dong. Outside the CBD, these are mainly high-density residential areas, where city officials have observed a high demand for bicycle trips. Bike-share stations have been installed near subway stations, bus stops, apartment complexes and government offices. Use of the bicycles is

Left: Ttarungi bicycles

closely monitored and the number of bicycles for each station is adjusted accordingly, to improve the efficiency of the system.

The locations of the bike-share stations were selected in the following manner:

Demand for cycling

Conditions supporting a high cycling demand were taken into consideration. These include geographical layout (e.g. if the area was hilly), bicycle lanes, data on the number of people who pass through the area daily, rate of public transportation use and opinions from the Gu (autonomous districts).

Opinions from experts and citizens

Experts gave their assessment of candidate sites after field inspections and citizens' opinions were gathered both via online polls and surveys.

Final confirmation

After selecting approximately 150 sites for station installation, usage patterns were analysed to further determine the number of bicycles parked at each station and the size of the station was then adjusted accordingly.[107]

Operation of the Service

The Ttarungi system can be used by anyone 15 years of age or older. Registration, payment and even checking the number of bicycles available for rent at each station can be made through the system's website www.bikeseoul.com or its smart phone application, making it very user-friendly.

The website and smart phone application can be used to check real-time availability of the bikes at each Ttarungi station.

Ttarungi bike user

Passes can be purchased for a year, 180 days, 30 days, or seven days, and one-day tickets are also available for members and non-members alike. The minimum charge is low at KRW 1,000 (about US$0.85) for an hour per day, with an additional KRW 1,000 for every 30 minutes thereafter. Mileage points can also be accumulated when transferring from the bike-share system to public transportation. Members who purchase passes that last longer than a day would receive 100 points (KRW 100) when transferring to a bus or subway within 30 minutes of delivering the public bicycle to a station. The points can then be used as cash when purchasing the next Ttarungi pass.[108]

Creating Awareness on the Programme

The government advertised the public bike scheme extensively to create a brand identity and raise awareness. Professional public relations firms were hired to promote the designs for the name of the scheme, brand identity, bike stands, mobile application and the website. Ttarungi, the official name, was eventually decided through a public contest, while the design was selected through a survey.

Testers were recruited for each public relations campaign and also for creating and enhancing awareness of the programme.[109] For example, "Ttarungi Testers" were

recruited in October 2015 before the bicycle system was open to the public. The testers used the public bicycles for free until the end of the year to enable the system to be monitored.[110]

Ttarungi in traditional design

Seeing the Bicycle as a Viable Transportation Method

At the seventh month of operations (April 2016), Ttarungi had a total of 58,000 members, with about 245,000 citizens renting the bikes. Data reveals that people mostly use Ttarungi for short distances on a regular basis. Passes (representing 70% of total use) were used for an average of 26 minutes (about 3 km) each time. Utilisation rate was highest within the four main gates of the old city (30%). Citizens in their twenties were the main users (44%), and men used Ttarungi (67%) more often than women.[111]

Ttarungi is still in its initial stages, but compared to the pilot programme in the Sangam-dong and Yeoido region held from November 2010 to the end of April 2015, the average number of uses per bicycle has increased by 62%, and the number of members has increased by 220%. During the pilot programme, each bicycle was used an average of 1.35 times per day in March/April 2015, but that rose to 2.19 times in March/April 2016.

To further encourage Ttarungi as a common transportation option, the government intends to expand the programme to 3,600 public bicycles and 300 stations by July 2016, and eventually, to 20,000 bicycles by 2020. 138 citizen volunteers, known as "Ttarungi Citizen Keepers", were also chosen to regularly monitor each station.

Bike-share systems need to be complemented by bicycle lanes to create a safe and convenient cycling environment. 41.4 km of bicycle lanes have been constructed to date through reducing road space in Seoul. Including the 76.1 km of existing bicycle lanes, new construction in areas including Yongsan and Dongdaemun in 2016 would see a total of 112.9 km of bicycle lanes in Seoul.[112]

Conclusion

A public bicycle service can be an effective way to encourage cycling, but a lack of experience and the know-how of creating a bike-share system can lead to complaints and low utilisation rates. It is important to maintain a certain scale and service density that complements the urban context and traffic characteristics. Especially in large cities with extensive public transportation, bike-share stations should be placed close to public transportation nodes.[113]

Above all, instead of focusing on short-term results, public bicycle services must also be consistently promoted as a healthy means of transportation that can revitalise the urban environment and benefit everyone.[114]

Singapore: Intra-town Cycling Networks

Background

Intra-town cycling networks in Singapore facilitate everyday short-distance cycling in the public housing towns, where more than 80% of Singapore residents live. These cycling paths connect high-rise public housing apartment blocks to MRT stations, bus stops, schools and other daily amenities within the town, and are popular among residents where these networks have been implemented.[115]

As a mode of mobility, cycling helps fill a gap in high-density, compact public towns. Journeys of about 1–4km are too long to be completed easily on foot, but too short by public transport, which also does not offer the convenience of door to door, on-demand mobility like cycling.

A Historical Perspective on Cycling in Singapore

In Singapore's early days, cycling was a popular mode of transport. Bicycles outnumbered cars—in 1960, there were 268,000 bicycles and just 63,000 cars.[116] However, cycling rates declined rapidly from the 1970s onwards as more people took to private cars and public transport. In tandem with cycling's decline in popularity, transport planning also focused increasingly on motorised transport modes.

But this decades-long decline was reversed when the first Mass Rapid Transit (MRT) lines were completed in 1987. In public housing towns which are home to most of Singapore's residents, commuters were observed bicycling to and from MRT stations

Park Connector in Singapore

each day. In response to this uptick in cycling demand, the authorities installed bicycle parking facilities at 24 MRT stations.[117] Meanwhile, recreational cycling was also encouraged with the introduction of the Park Connector Network (PCN) by the National Parks Board (NParks) in 1992. The PCN consists of a network of paths for recreational cycling, jogging and walking, linking parks and major green spaces in the city, and are usually constructed from linear spaces along roads or waterways.

First Steps in Safe Cycling Infrastructure: Tampines, the First Cycling Town

Beyond bicycle parking facilities and recreational cycling paths, little attention was paid to cycling, particularly daily commuter cycling, until the early 2000s. In 2005, then-Member of Parliament for Tampines Irene Ng raised the issue in a parliamentary debate.

"Many of the 250,000 residents of the eastern Singapore town were cycling between their homes and schools, markets, MRT stations, and so on," she said; "but the legislation at the time did not allow cyclists on footpaths, and roads were too dangerous for people to cycle on safely. Furthermore, the number of cyclists involved in fatal accidents on busy roads had been increasing." Ms Ng advocated for more to be done to promote safe cycling and for cyclists to be allowed on footpaths.[118]

As a result of that parliamentary debate, the Members of Parliament for Tampines worked with the Land Transport Authority (LTA) and the Traffic Police on a two-year trial to share footpaths between pedestrians and cyclists. At the same time, the local Town Council also widened footpaths to accommodate both pedestrians and cyclists; education programmes such as safe cycling clinics were held; and volunteer cycling wardens helped guide cyclists and enforce the rules to encourage good etiquette.

Results were positive: 53% of residents in 2007 and 65% in 2008 supported the sharing of footpaths in Tampines.[119] With that success, by-laws were put in place in 2010 to allow pedestrians and cyclists to share footpaths in Tampines. LTA also proceeded to build an additional 6.9 km of bicycle paths— typically alongside existing pedestrian paths—within the town. Together with the widened footpaths and the Park Connector paths, these formed the basic cycling infrastructure for the first cycling town in Tampines.

Dedicated cycling paths in Tampines

Singapore's National Cycling Plan

Stacked bicycle parking spaces located at regional transport nodes are some facilities that make cycling more appealing and convenient.

Everyday Cycling: The National Cycling Plan and the Intra-town Cycling Network

Following the creation of the first cycling town in Tampines in 2010, the promotion of cycling as a safe, viable mode of transport in Singapore gained momentum. The National Cycling Plan was established in 2012. It aims to develop a safe cycling culture through education and programmes, and coordinates inter-agency efforts to develop an integrated, safe and convenient cycling path network. For instance, one of the plan's key priorities is to enable residents to cycle safely from their homes to major transport hubs and key amenities such as schools and food centres. As in Tampines, intra-town cycling paths of 2 m in width are constructed by LTA alongside existing footpaths. If there is space limitation, a shared path between cyclists and pedestrians of at least 3 m will be adopted. This requires significant inter-agency coordination, especially in mature towns with space constraints, to iron out how paths might affect existing roadside greenery, drainage, building setbacks and so on. Besides cycling or shared paths, other features of the intra-town cycling network include dedicated cycling crossings at mid-block crossings, as well as bicycle ramps to help cyclists cross overhead bridges. These measures help cyclists get across vehicular roads safely.

CLC and the Urban Land Institute at Ang Mo Kio, as part of the study on how to make the town safer for pedestrians and cyclists

Together, LTA cycling paths, NParks park connectors and cycling paths built and maintained by local Town Councils, provide the basic cycling infrastructure for each town. Since the launch of the National Cycling Plan, LTA has completed about 55 km of intra-town cycling paths in six estates. The aim is to provide 34 towns and estates across Singapore with a comprehensive cycling network for daily short journeys by 2030. The results have been positive—towns with cycling networks implemented have consistently higher cycling rates at 1.5–3.3%, compared to other towns which have cycling rates generally at 1% or below.

Design for Cycling: Ang Mo Kio

To further improve cycling infrastructure standards, Prime Minister Lee Hsien Loong announced plans to pilot Ang Mo Kio as a model walking and cycling town in November 2014, as part of the S$1.5 billion Sustainable Singapore Blueprint 2015.[120] Like Tampines, Ang Mo Kio is a mature town built in the 1980s, with about 178,000 residents. The idea of a model walking and cycling town in Ang Mo Kio arose from a joint study by the Centre for Liveable Cities (CLC) and the Washington-based Urban Land Institute (ULI) on Creating Healthy Places through Active Mobility. The study involved renowned Danish urban designer Jan Gehl, who contributed ideas to make the case study area, Ang Mo Kio, friendlier for both pedestrians and cyclists. Following the CLC-ULI study, the Urban Redevelopment Authority (URA), LTA, NParks and the Housing and Development Board (HDB) further developed the ideas for implementation. The pilot project will test ways to integrate walking and cycling, reduce pedestrian-cyclist conflicts, and give priority to pedestrians and cyclists over cars, to create a first model town for walking and cycling in Singapore.

For the proposed Ang Mo Kio cycling network, a number of design enhancements will be introduced. It will feature a 20-km-long cycling network when completed—currently the longest in any residential town. Where possible, dedicated paths for walking and cycling wil be provided to reduce the conflict between pedestrians and cyclists. In addition, the cycling network in Ang Mo Kio will feature cycling paths painted red to provide clear demarcation between pedestrians and cyclists. Pedestrian priority zones will be set up in areas where pedestrians and cyclists need to share space, such as behind bus stops and before crossings. These pedestrian priority zones will include rumble strips to slow cyclists down and contrast markings to guide pedestrians and cyclists to use their respective paths to enhance the safety for both users. These measures will aim to reduce pedestrian-cyclist conflicts and slow down the speed of cyclists. In addition, traffic calming measures and enhanced safety features will be introduced at pedestrian and cyclist crossings to slow down vehicles and alert motorists to the presence of cyclists and pedestrians.

There are also plans for a 2.6-km-long linear park along the MRT viaduct between Yio Chu Kang MRT and Bishan-Ang Mo Kio Park. This corridor will provide a seamless path for pedestrians and cyclists to travel between their homes and the MRT stations. More greenery will be added beneath the MRT viaduct, including terrariums showcasing special orchids and native forest plants.

These cycling infrastructure and design enhancements were, in part, the outcome of active engagement with Ang Mo Kio residents and local cycling interest groups such as Love Cycling SG, other cycling enthusiasts and local grassroots leaders. These interested parties were invited to contribute their ideas in various focus group

Artist's impression of the Ang Mo Kio cycling town

discussions and active mobility forums. The public outreach and engagement process was also enhanced for the Ang Mo Kio project. Proposals were shared with the public in a roving exhibition from late 2014 to 2015, while a website (www.walkandcycle.sg) was also set up to share the proposals with more people and attract more public feedback.[121] The first phase of Ang Mo Kio model walking and cycling town proposals, which spans about 4 km, was completed in July 2016.

From Intra-town to Inter-town: Enhancing Cycling Access between Towns

Cycling in Singapore, however, is not limited to short-distance trips. While NParks's PCN has provided basic recreational cycling infrastructure island-wide since 1992, more can be done to make cycling journeys more seamless between towns and towards the city centre.

Ang Mo Kio walking and cycling town plan

As a key first step to creating seamless commuter cycling routes from housing towns to the city centre, LTA is planning to construct a 2.5-m-wide wide cycling path in Queenstown to fill in a gap between two PCNs so as to create a seamless inter-town route leading from Queenstown to the city centre. The URA has also commissioned a planning study to determine the technical feasibility of pedestrian- and cyclist-friendly crossings along the Kallang Park Connector. The 10-km route through various residential towns in central Singapore is currently interrupted by major expressways and canals; pedestrian overhead bridges and underpasses connect several segments.

If implemented, the proposed walking and cycling route along the Kallang Park Connector would benefit residents living in various towns and estates including Bishan, Ang Mo Kio, Toa Payoh, Serangoon, Balestier, Geylang and Kallang by offering them a safe and convenient way to cycle into the city, bringing Singapore one step closer to realising the National Cycling Plan and becoming a cycling nation.

FUTURE PROJECTS

Seoul

- Seoul Station 7017
- Remaking Seun

Singapore

- North-South Corridor and Bencoolen Street

Seoul: Seoul Station 7017

The Seoul Station Overpass is a 938 m-long, two-lane, bi-directional road that opened in 1970. It plays a big role in traffic movement, as the main line connecting Incheon, Yeouido, and the western and eastern regions. In 2015, the average number of vehicles using the Seoul Station Overpass per day was about 45,000.

Issues concerning safety began to arise in the mid-1980s, due to the rapid increase in the number of cars and wear and tear of the structure. Despite regular repair and maintenance, these issues persisted, and by 2008, the city announced that the overpass will be removed.

Inspired by New York City's High Line, Mayor Park, who also had a vision to make Seoul a pedestrian-friendly city, promised to convert the Seoul Station Overpass into a pedestrian "Sky Park" in 2014. Envisioned to be a landmark green space, the Overpass was to be reused for pedestrians, and filled with greenery. The Overpass would also be linked to nearby historic and cultural spaces, and serve as the leading project for urban regeneration in the Seoul Station area.

The official name of "Seoul Station 7017 Project" was announced in January 2015, symbolising the Overpass' year of construction (1970) and reconstruction (2017). It is expected to be reborn as a forest, when it opens to the public in April 2017.

Above: Artist's impression of the Seoul Station 7017 Project
Left: Artist's impression of Singapore's North-South Corridor, with street-level cycling and pedestrian paths, and underground roads for automobiles.

Artist's impression of the Seun Again Square

Seoul: Remaking Seun

Seun Arcade refers to a cluster of eight buildings—Hyundai Arcade (currently removed), Seun Arcade, Cheonggye Arcade, Dalim Arcade, Sampoong Arcade, Poongjeon Hotel, Shinseong Arcade and Jinyang Arcade. It was first built in 1966 and stretched over 1 km in length from north to south. The Arcade introduced many ground-breaking modernist planning concepts during its time, and is considered part of Seoul's architectural heritage. Once a commercial centre for electronics, its status fell in the early 1990s, when these businesses were relocated.

Talks to rejuvenate the Seun Arcade lasted for over thirty years, before the Seoul Metropolitan Government finally announced the Seun Arcade Regeneration Project in February 2015. The project focussed on preservation and regeneration of Seun Arcade, while boosting urban industry and minimising the burden of redevelopment on residents, and creating a more pedestrian-friendly city.

Throughout the development of the plans, the Seoul Metropolitan Government sought the views of experts, artists, and residents. Advisory committee meetings, conferences, forums, experimental programmes and interviews were held. An international design competition was held for Seun Arcade, and from the winning design, the regeneration project was named "Seun Again Regeneration Project" in January 2016. The first stage of construction is slated to be completed in May 2017.

The Seun Arcade will be redeveloped into an urban creative and innovative centre with a multi-level pedestrian network. This Seun Arcade Pedestrian Network will provide a south-north and east-west connection of pedestrian streets to other major commercial centres in the city, such as the Myeongdong area in the west and the Dongdaemun Shopping district in the east. This will allow people to pass through the area, greatly increasing the dynamism of the entire city. Once this project is successfully completed, there will be more attractions and entertainment in the city. This will not only help revitalise the city but, as with the Seoul Station Overpass, also serve as an example of pedestrian-friendly urban regeneration projects.

Top and bottom: Artist's impression of the North-South Corridor

Singapore: North-South Corridor and Bencoolen Street

The North-South Expressway (NSE) was originally conceived to be a 21.5 km road to connect growing towns in the north region to the city centre.

However, in line with the paradigm shift to promote walking, cycling and riding public transport to be the way of life for Singaporeans, the Land Transport Authority (LTA) will redesign the NSE to create the North-South Corridor (NSC) that will also serve public bus commuters, cyclists as well as pedestrians. The new design will incorporate dedicated bus lanes for express bus services serving the NSC. There will be a wide walking path along the surface corridor, with ample greenery for shade. A cycling trunk route in the city that spans the entire NSC to the city will also be built to connect several intra-town cycling networks together as well as to facilitate seamless long-distance inter-town cycling trips.

Similarly, in Bencoolen Street, LTA is taking a more inclusive approach to redesign the Street. Prior to the lane closures due to the construction of the Downtown line, Bencoolen Street had four car lanes. LTA realised that the public has gotten used to the reduced number of lanes and that the congestion was manageable. To promote walking and cycling and public transport, Bencoolen Street will be reopened with only two lanes in which one will be a dedicated bus lane. There will also be a cycling path along the street, with wider sidewalks for place-making activities.

Preliminary artist impression of Bencoolen Street

5. LESSONS FROM SEOUL AND SINGAPORE

Drawing from the experience of Seoul and Singapore, Centre for Liveable Cities (CLC) and Seoul Institute (SI) researchers have jointly identified some common lessons on how cities can be made friendlier to pedestrians and cyclists. These ideas range from how urban mobility policies can be formulated to how the private and people sectors can be involved in the journey towards walkable and bikeable cities.

1. Prioritise Pedestrians and Cyclists as the Basis for People-oriented Mobility Policies

Urban mobility affects every citizen's daily life. Mobility policies can also be highly contentious if they are perceived to benefit one group at the expense of others. This could result in divisive public debates on the rights of drivers versus pedestrians, for example.

Given the diverse urban population and variety of mobility options, what does a people-centred mobility policy entail? The Seoul Transport Vision 2030 aims to create a people-first transport system—and first on the list of its "11 Promises" is to prioritise pedestrians and cyclists. This generates more universal benefits for people regardless of their access to or preference for various modes of transport, since nearly everyone—driver, cyclist or commuter—is a pedestrian at some point of his/her journey.

Prioritising pedestrians and cyclists eventually transforms the city by redesigning spaces around people, rather than transport modes. In line with the pedestrian- and cyclist-first approach, Seoul has consistently rolled out people-friendly projects including pedestrian streets, transit malls and traffic-calmed neighbourhoods that everyone can benefit from, making the city more liveable.

A good example of a policy enhancement under the new people-first approach is Seoul's Car-free Zone project. The project before 2010 was merely a means of prohibiting cars where practical and necessary, for example along narrow traditional shopping streets like Myeongdong. The refreshed programme under the "Pedestrian-friendly Seoul Vision" goes beyond simply banning cars and aims instead to maximise benefits of car-free spaces for the people by managing street closures as cultural events in areas like Gwanghwamun.

2. Integrate Walking and Cycling into the Urban Mobility Eco-system

Most journeys are too long to be completed by walking and cycling alone, especially in large cities like Seoul and Singapore where average journey distances are 8.9 km (2010) and 9.5 km (2014)[122] respectively. Consequently, people often rely on more than one mode of transport and need the flexibility to switch between different modes.

Walking and cycling are essential modes for the first- and last-mile legs of public transport journeys. Singapore's experience shows that by making it safer, more convenient and more comfortable for people to complete their public transport journeys on foot or by bike can play a key role in reducing the city's reliance on private cars. For instance, intra-town cycling networks connect the Mass Rapid Transit (MRT) stations and bus interchanges in town centres with residents' homes. This allows people to complete the last leg of their journeys by bicycle. In addition, under the Walk2Ride programme, the Land Transport Authority (LTA) in Singapore also builds sheltered walkways within a 400 m radius of key transport nodes like MRT stations and bus interchanges, linking to destinations like schools and neighbourhood centres. This makes it more comfortable for people to walk as part of their everyday commutes in Singapore's tropical climate.

3. Reclaim Road Space to Prioritise Pedestrians

Promoting walking can be approached in many ways—building sheltered walkways, creating underground or overhead pedestrian linkages, or even just cursory designation of pedestrian priority areas with signage.

The key to truly prioritising pedestrians, however, is reclaiming road space from cars for people. Physical reallocation of road space by widening sidewalks and narrowing or removing car space not only makes it safer, more comfortable and convenient for pedestrians to reach their destinations through direct ground level connections; it also requires drivers to adapt to inconveniences as part of the overall mobility paradigm shift. This physical intervention sends a clear message to the public on the priority pedestrians have, especially in high-density areas.

With a relatively high percentage (23%) of urbanised land area dedicated to roads,[123] Seoul has been actively narrowing roads to expand pedestrian sidewalks and create dedicated bus lanes since the early 2000s. In Yonsei-ro, the creation of a transit mall not only enhanced the pedestrian experience, but also improved public transit service in the area, thereby providing a more attractive alternative to private cars for visitors to the area. Gwanghwamun Square also shows that the city traffic will eventually adapt to reduced road space. The main avenue, Sejong-daero had an average traffic speed of 24.6 km/h—only a slight decrease from before six of the car lanes were transformed into a public square.

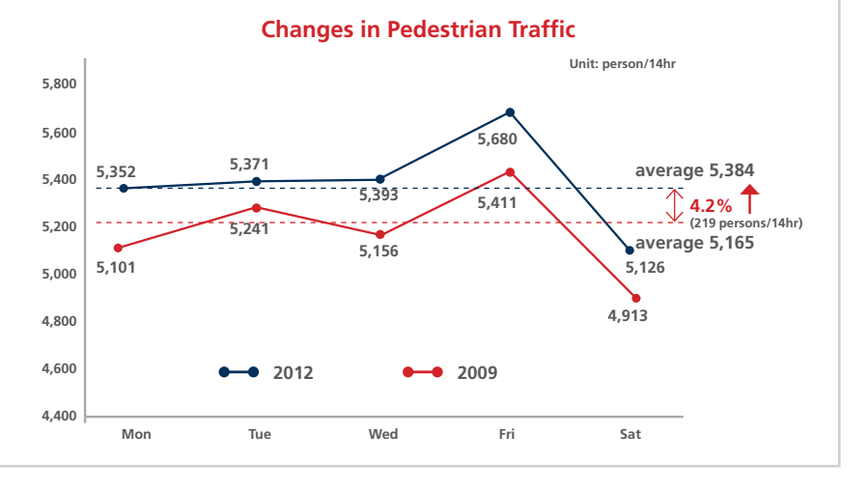
Seoul's efforts in reclaiming space for pedestrians have contributed to an average 4.2% increase in pedestrian traffic in the city centre between 2009 and 2012. Under the Seoul Transport Vision 2030, Seoul plans to further increase the "green space ratio"[124] by 30% by 2030. By taking precious urban space from cars and returning it to the people, Seoul has also made the city more vibrant and liveable for its citizens.

4. Create People-oriented Public Spaces as Part of the Paradigm Shift

While streets generally facilitate traffic movement through the city, they also serve the vital function of providing public space, especially in high-density cities like Seoul and Singapore. Reclaiming road space for people therefore not only helps to improve pedestrian conditions, but also gives rise to opportunities to create new public spaces. This generates positive outcomes for all—creating places that everyone can enjoy and achieving positive policy outcomes.

Myeongdong shopping district and Yonsei-ro Transit Mall are good examples of how commercial districts can be enhanced by focusing on people's needs and activities, rather than transport modes. The former shows how incremental and sensitive improvements help retain local characteristics like the intimate-scale shopping streets that visitors enjoy. The removal of cars in Myeongdong was in fact a natural progression from earlier efforts to maintain the unique street buzz of the area. In Yonsei-ro Transit Mall, the additional space reclaimed from the street created a more transformative impact—a crowded street that used to only facilitate vehicular and pedestrian movement now becomes a public space that accommodates more public life and activities, especially when the street is pedestrianised during weekends.

Beyond commercial streets, civic spaces like Seoul's Gwanghwamun Square and Seoul Plaza, and Singapore's Civic District require sustained place management efforts to ensure vitality is sustained after public spaces are reclaimed from roads. As excessive commercial presence may not be sensitive to the historical contexts, regular and appropriate public events have to be introduced to maintain the relevance of these places to the citizens.



However, streets do not always require permanent solutions to become public spaces. This may also be impractical in space-scarce high-density environments where streets need to perform multiple functions. Creative solutions can be introduced to cater to multiple situations. In Singapore's Civic District, streets are designed in a flexible manner to accommodate various kinds and scales of events, ranging from weekend concerts to large-scale National Day parades. This allows the space reclaimed from cars to be better used throughout the year.

Public spaces can also be created by temporary road closures. Singapore's weekend street closures like Club Street and Seoul's Car-free Zones programme are highly popular with the public in both cities. The fortnightly Sunday street closure at Sejong-daero and Gwanghwamun Square, for example, boasts a satisfaction rate of 95.2% among citizens and 85% among businesses.

5. Indentify "Quick-win" and Pilot Projects to Exemplify Benefits of Pedestrian-friendly Environments

Creating pedestrian-friendly streets need not be a long, arduous process of stakeholder negotiations and major reconstruction works. Places with high pedestrian volumes compared to vehicular traffic present opportunities for quick-win interventions to improve pedestrian conditions. Simple and relatively quick measures such as closing roads and widening sidewalks help exemplify the benefits and promote public acceptance of pedestrian-friendly and car-free policies.

Deoksugung-gil in Seoul is a case in point. Located in downtown Seoul, the street sees a large number of pedestrians during lunchtime from surrounding government institutions and offices. The pedestrian walkways however were narrow and crowds often spilled over onto the roads. A three-day pilot programme was conducted in May 2014 to pedestrianise the street during lunch hours. The pilot was hugely popular —93.4% of survey respondents agreed to pedestrianise the street. The Seoul Metropolitan Government (SMG) took the opportunity to introduce pedestrian-friendly features, including widened sidewalks and repaved street surfaces to improve the environment within the same year. Pedestrian volumes increased by 5% after the revamp.

In Singapore, the success of the pilot street closure at Club Street demonstrated how a vehicular road could be enjoyed by people, rather than occupied by cars. The Urban Redevelopment Authority (URA) received several requests from local stakeholders for similar street closures following the success of Club Street. This prompted the URA to set up the Streets for People programme to facilitate more ground-up requests from the community.

6. Adopt an Evidence-based Approach to Get Buy-in

Gathering support for pedestrian-friendly projects from stakeholders in the public sector and the community is just as important as formulating the solutions. In-depth studies, particularly those backed up by quantifiable data, equip key decision makers with useful and convincing information to assess the feasibility of proposals. Data and statistics are also useful in clearly communicating to the public the potential benefits of the proposals. This is particularly pertinent as public engagement has become an essential part of urban policy making processes in developed cities like Seoul and Singapore.

Seoul has consistently used professional research conducted by Seoul Institute to study and refine proposals for pedestrian-friendly projects. Comprehensive data is also collected alongside pilot projects to systematically track outcomes and justify further improvements. For example, 92.5% of visitors and 85% of businesses are satisfied with the Sunday street closures at Sejong-daero at Gwanghwamun Square, based on user surveys, with 21.9% of respondents highlighting the absence of cars as a critical factor. This helped to support further improvement plans for Gwanghwamun Square that will eventually convert the former 16-lane Sejong-daero into a 5-lane transit mall, with an even more people-friendly and accessible urban plaza.

In addition to project-specific studies and surveys, Seoul also conducts the Seoul Survey—an annual, wide-ranging city-wide public survey that covers topics from income levels, satisfaction with public transport and pedestrian conditions, to frequency of exercise among citizens. This allows public policymakers to make sense of complex relationships between interrelated information points, and time projects suitably in line with societal trends and needs. Results of the survey are also made public so that they can be cited by the government when engaging the public on project proposals.

7. Create Engagement Platforms to Establish Common Understanding

Effective engagement is important to implementing public policies successfully; however, the challenge is often in creating consensus among multiple stakeholders. In the case of pedestrian-friendly projects, the mobility needs of more vulnerable groups are often at odds with drivers' demands. The public sector needs to create platforms to help align the community's divergent needs and establish common understanding between different groups.

Street calming measures in residential neighbourhoods often have drivers bemoaning the inconveniences they need to tolerate. Seoul's A.Ma.Zone programme includes community workshops that involve public officers as well as residents who represent different groups from the neighbourhood. This creates an opportunity for different groups of people from the same community to come together and discuss a common issue. Through these discussions, which are guided by professionals, people are encouraged to look beyond their own interests, appreciate their neighbours' different needs, and understand the trade-offs they need to make as a community. For example, facilitators might encourage discussion by posing the question: Would you rather save five minutes of travel time each day, or would you rather ensure that your neighbours and the children were safe from speeding cars? The building of such common understanding can eventually help mitigate resistance to well-intentioned pedestrian proposals and encourage greater acceptance over time.

Feedback panel on pedestrianising Deoksugung-gil in Seoul

8. Create Platforms for Community Participation to Encourage Community Ownership

To ensure the sustainability of pedestrian-friendly initiatives, it is important to promote community ownership of the proposals. This in turn means the public sector also has to create opportunities for the community to take part in, or even to take the lead in finding solution for their environment, where possible. Stakeholders can then use their local knowledge and social networks to customise the solutions, and continue maintaining them after the interventions are in place.

Seoul's A.Ma.Zone programme empowers the local community to contribute in various ways to make their neighbourhood safer for the school-children. These range from community street art to allowing local businesses to close roads with street barriers during designated peak hours when school-children are on their way to school. Without such local involvement, additional resources would be required by the public sector in the long run to regulate street closures, possibly rendering such programmes unsustainable and impractical to replicate elsewhere. Similarly, Seoul's outreach programmes like the Walk & Bike Festival and Car-free Zone aim to enhance sustainability by promoting citizen participation with more community-led activities.

In Singapore, programmes such as Streets for People takes public involvement

Discovery Walk in Singapore, built over an existing canal

a step further by allowing citizens to propose street closures in their neighbourhoods. This allows the public sector to overcome the initial hurdle of stakeholder engagement by delegating the responsibility to local community champions. In the long run, the programme also helps to build capacity within the community to initiate and manage similar events and initiatives, thus ensuring sustainability.

9. Incentivise and Guide Private Developers to Integrate Pedestrian-friendly and Cyclist-friendly Features

In high-density urban environments, pedestrian movement is not limited to public streets and infrastructure, but inevitably extends into private developments. Promoting walkability hence requires private developments to integrate well with not only the public environment, but also adjoining the developments in order to create a comprehensive pedestrian network. Integration and coordination of private developments, however, cannot happen by itself. This requires active control, guidance, encouragement and incentives from the government to ensure that developers integrate pedestrian-friendly features into their developments.

Singapore's Orchard Road is a good example. While shopping malls elsewhere in the world often tend to be big box, standalone developments, Orchard Road malls are not only well integrated with the public streets and underground MRT stations but are also well connected to each other. The pedestrian-friendliness of Orchard Road did not occur by chance. This was achieved through detailed planning and a development framework for controlling and guiding developers to build a comprehensive and seamless pedestrian network for the shopping district. Incentives are also put in place to encourage developers to go beyond providing functional connections to create a richer pedestrian environment. For example, Gross Floor Area incentives are offered to encourage developers to install pop-out facades, creating a more interesting streetscape along Orchard Road and thereby contributing to the pedestrian experience. Ultimately, developers recognise the benefits of integrating pedestrian-friendly features in their developments, as it makes the district more attractive—which eventually translates into additional footfall and business.

Taking the integration of pedestrian- and cyclist-friendly features one step further, Singapore has announced the Walking and Cycling Plan (WCP). The WCP requires private developers for major commercial, retail, business park and school developments to include plans for walking and cycling routes when submitting their development plans for approval. In addition, facilities for pedestrians and cyclists, such as bike parking and showers, will also be required. The policy requirement to be implemented by July 2016 will ensure that the needs of pedestrians and cyclists are considered upfront in private development proposals.

10. Support People-friendly Policies with Strong Enforcement

Pedestrian- and cyclist-friendly proposals are generally welcomed if they are implemented well. However it often takes only a few errant drivers to spoil the party—illegal parking and driving on pedestrianised streets beyond designated hours, for instance, greatly compromise people's enjoyment of a car-free environment.

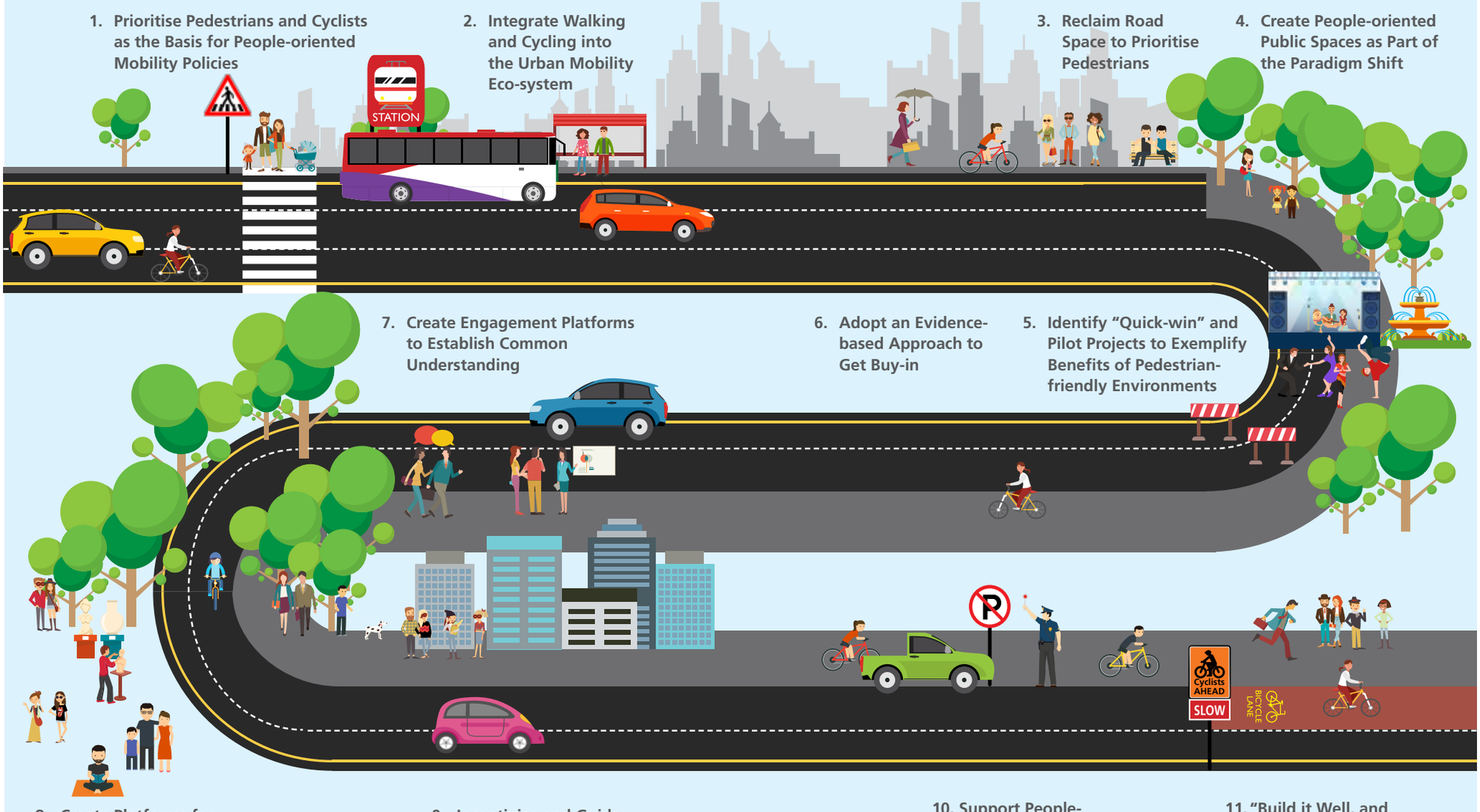
Good proposals need to be supported by strong enforcement to ensure that planning intentions and the interests of the majority are not compromised by an uncooperative minority. The success of regular street closures at locations like Club Street is very much dependent on the authorities' ability to consistently enforce against illegal parking and excessive noise to create a successful car-free public space next to an existing residential development. This sets the basis for acceptable civic behaviour which people are expected to adapt to over time. Once the rules are established by the public sector, the responsibility of addressing illegal parking is eventually handed over to the local community. By delegating responsibility to the community, Singapore encourages a sense of ownership of the programme, ensuring its sustainability.

11. "Build it Well, and They Will Come"

Encouraging cycling in the city is often a chicken-and-egg issue—should cycling infrastructure be built after demand is proven, or should it be built ahead of demand to attract more people to cycle?

Singapore's ambitious plan to build up to 700 km of cycling paths by 2030 is clearly a case of building ahead of demand in a city where only 1% of all trips are made on bicycles. Recognising the potential of cycling for short-distance trips within residential towns, LTA has been building cycling networks within towns and estates across Singapore. So far, the results have been positive—towns with cycling networks have consistently higher cycling rates, from about 1.5-3%, than those without, which have rates of 1% or below. This is despite the hot tropical weather, which many cite as the major deterrent to cycling in Singapore. Though still at the initial stages of implementation, Seoul's ambitious public bike share programme, which aimed to kick-start cycling demand in the city by providing low-cost and extensive public bike services, is also conceived in the same spirit of building ahead of demand.

Journey towards more Walkable and Bikeable Cities: Lessons from Seoul and Singapore



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2. Integrate Walking and Cycling into the Urban Mobility Eco-system
3. Reclaim Road Space to Prioritise Pedestrians
4. Create People-oriented Public Spaces as Part of the Paradigm Shift
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6. CONCLUSION

This book closely examines various policies and strategies to create a pedestrian-oriented built environment in Seoul and Singapore. Although both cities have different origins and histories, we nevertheless share many similarities, including our high-density urban environments and a common goal to make our cities more sustainable by reducing reliance on cars. We conclude our research process with the following.

How Should People-friendly Urban Mobility Policies be Positioned?

A people-first transportation policy does not have to entail promoting the convenience and safety of pedestrians at the sake of drivers. Rather, it must be positioned as a strategy that benefits all citizens. Car-free events in both cities, for example, have generally been successful in raising the public's consciousness about pedestrian-centric planning, while maximising the benefits of temporary car-free space for the people.

What Should be Done?

While the case studies from Seoul and Singapore offer a slew of measures to promote walkability, reclaiming road space for people is one of the most consistently applied approaches. This has been achieved in several ways—through systematic replacement of footbridges with crosswalks in Seoul, iconic public space projects like Gwanghwamun or "quick-win" car-free zones in both Seoul and Singapore.

The same approach could potentially be applied to cycling. In cities such as Seoul and Singapore where a citizen on average travels 10 km to work, cycling needs to be made a viable option to enable people to travel longer distances without using cars. Both Seoul and Singapore are still at the nascent stages of promoting commuter cycling, and have been building significant amount of cycling infrastructure in recent years.

To further promote cycling, the system has to be truly safe and convenient. However, space to create comprehensive, dedicated cycling networks remains limited in the two highly dense cities. Both cities have been creating and widening sidewalks by narrowing roads, starting at different points in time—Singapore started back in the 1970s when the Walkway Unit constructed sidewalks throughout the city, while Seoul began widening and building more sidewalks in the 2000s. Can protected cycling lanes also be created from road space to facilitate safe and convenient door-to-door cycling journeys?

Cycling on the roads in Singapore

This is in line with both Seoul and Singapore's efforts so far in building ahead of demand to promote cycling, and presents an area which both cities could explore further.

When Should it be Implemented?

Walkability in the city is intertwined with the state of the public transit system. Planners in Seoul considered an effective public transit system a pre-requisite for implementing environmentally-friendly transport policies and initiating pedestrian-oriented projects. Public transit reform in 2004 was a necessary step before they embarked on the Seoul Transport Vision 2030 in 2013. Singapore, meanwhile, has taken an integrated approach in recent years, and has worked to create a pedestrian-friendly environment while expanding public transport infrastructure at the same time.

While there is no definite answer to whether extensive public transit development should precede walking and cycling initiatives, the paradigm shift from cars to people-oriented mobility takes time. Planners need to give citizens time to re-orient their mind-sets towards pedestrian-first policies. Localised projects throughout Seoul and Singapore are a good head start. The two cities can continue to build on their successes by applying these place-based interventions without compromising the city's overall mobility system due to sustained improvements in standards and capacity of public transport. Over time, as the walking and cycling network becomes even more extensive and as people increasingly accept and support these policies, Seoul and Singapore can eventually become truly people-first, pedestrian-friendly cities that everyone can enjoy.

Alfresco dining on Club Street

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WALKABLE AND BIKEABLE CITIES

LESSONS FROM SEOUL AND SINGAPORE

Seoul and Singapore, two high-density Asian metropolises, share common aspirations today to be more walkable and bikeable. Much has been done in both cities to improve the pedestrian and cyclist environment. Seoul has been actively reclaiming road space for the people, with iconic projects like Gwanghwamun Square and Seoul Plaza. In Singapore, street closure events make the city centre a more vibrant place for everyone to enjoy, and projects like the Ang Mo Kio Model Cycling Town provide improved cycling infrastructure to encourage cycling for everyday short-distance trips.

Walkable and Bikeable Cities: Lessons from Seoul and Singapore is the first joint research publication between the Centre for Liveable Cities and the Seoul Institute. The publication offers insights into Seoul and Singapore's unique experiences in the common journey towards more walkable and bikeable cities. Selected case studies, as well as the relevant urban policies from both cities are examined to distil lessons on how cities can be friendlier for people and less reliant on cars.

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