CENTRE for LiveableCities SINGAPORE

Elevated Pedestrian Linkways — Boon or Bane?

In this edition

Vibrant, walkable streets rely on comprehensive pedestrian connectivity. Here, the impact of elevated pedestrian networks on street life is explored. How might international experiences with second-storey connectivity inform Singapore's use of elevated pedestrian networks? What design principles might guide pedestrian connectivity going forward?

"Life in buildings and between buildings seems in nearly all situations to rank as more essential and more relevant than the spaces and buildings themselves."
--Jan Gehl, Life Between Buildings: Using Public Space

Introduction

The idea of connectivity in the urban-scape of Singapore went as far back as the Raffles Town Plan. The 5-foot way mandated in the Town Plan threaded the front of shop-houses into a corridor that served not only practical purposes such as shelter from the elements but also evolved to embrace socio-economic dimensions over time. Itinerant businesses proliferated in the 5-foot way and interestingly, this sharing of spaces was peacefully accepted by the owners of the shop-houses. It created a particular form of inclusive street life that made Singapore's downtown vibrant then.

Singapore's traditional shop-houses provided shelter and a space for vibrant street life.

Source: Nicolas Lannuzel, Flickr, License: CC BY-SA 2.0

Forward to the present, Urban Redevelopment Authority (URA) requires that developments in the Downtown Core incorporate covered walkways to complement the adjacent open footpaths. This is part of the agency's vision of a comprehensive pedestrian network in the city centre. To promote this vision, developers are incentivised also to provide other

connectors such as through-block links; and to allow porosity at ground level via devices such as view corridors (eg. the open space of UOB Plaza at Raffles Place with its axial view of the Singapore River). Porosity provides and reinforces connectivity.

Clearly, there is considerable push and investment by the government for connectivity vis-a-vis pedestrian infrastructure and more recently, public transport connectivity. The effort is redoubled by the private sector. Together with strong support for active mobility, Singapore has witnessed steady improvements in connectivity and as a result, walkability. Street life has become more vibrant pushing up the liveability index of our city. No doubt, more linkages – street level, underground and overhead – will be added but it should be noted that these linkages with different relation to the ground plane do not contribute in equal measure to walkability.

This essay reviews specifically the impact of elevated pedestrian networks on street life and the vibrancy of a city. As we will learn, while practical, these elevated walkways have their limitations.

Elevated Pedestrian Linkways

The concept of the elevated pedestrian network is barely new and has been implemented in numerous cities across North America and Asia over the past decades. At home in Singapore, one of the earliest elevated walkway systems was built in the CBD to connect buildings at Collyer Quay to the waterfront via overhead shopping links. Planned by the URA, the proposals were implemented through the government land sales programme. The network at New Bridge Road that connects several retail podiums at 2nd level is another early example. In both cases, wide roads that are difficult to cross compelled the choice.
Where the first storey does not offer a safe and accessible walking environment or where there is poor or limited pedestrian infrastructure, elevated pedestrian networks add value. They separate pedestrians from at-grade traffic, provide shelter for pedestrians and offer alternative walking routes. Frequently, wide roads justify the construction of elevated pedestrian linkways.

However, elevated walkway linkways though pragmatic as a solution often exact a heavy price on street life; especially when they offer alternative paths with little regard for street-level pedestrian flow.

International Case Studies
Hong Kong

In Asia, a prime example is found in Hong Kong's Central. Evolved over 40 years, the system has its genesis in developer HongKong Land's initiative to connect their properties that straddle both sides of the heavily trafficked Connaught Road Central, a semi-expressway. The elevated pedestrian network also connects with Central MTR station and a bus and taxi interchange located at the first storey of Exchange Square (also a HongKong Land property). The system has been extended by both public and private parties and now reaches as far as the International Financial Centre and the Macau Ferries. Besides the un-crossable Connaught Road Central, narrow ground-level sidewalks compelled the building of Central's network. Clearly, the system handles additional pedestrian capacity, increases route choices and decreases safety risks at ground-level for pedestrians. Hong Kong's high density provides enough pedestrian volume to sustain vibrancy in Central's multi-layered pedestrian system that links basement, first storey and second storey.

Hong Kong's Central elevated walkway system while it works has led to a dearth of first storey activities for new developments along Connaught Road Central. Typically, to hook to the network, developers place entrances at second storey with connection to second storey

plazas while relegating service access and drop-offs to the first storey.

This shifting of street life to the second storey has alarmed many, one of whom is Paul Zimmerman, CEO of Designing Hong Kong (a non-profit organization for sustainable and well-designed planning). At the 2013 event Walkable City, Living Streets where one of the key themes was 'Pedestrian Network Planning', he noted: "So we all agree that we need priority for street-level. Footbridge[s] will never be an excuse for a removal of a pedestrian crossing…We have to get to the city where we do not have forced elevation entrance. Then it comes to the issue of what the problem is, the difference between an elevated pedestrian network and a ground level pedestrian network. The primary difference is public space and the public right of access, public right of recreation. We have not been able to envelop public right of access, public right of recreation at an elevated level and similarly, not at the subway level."

A pedestrian footbridge over Connaught Road, linking to Exchange Square.

Source: Michael Koh, Centre for Liveable Cities

In the same vein, the Hong Kong Institute of Planners called for the evaluation of elevated pedestrian walkways on street-level activity and character. Stated in their 2002 position paper - "It is important to acknowledge that street-level activities are part of our city," Elevated pedestrian walkways are "not the only solution for a pedestrian priority scheme".

Kuala Lumpur and Bangkok

Both Kuala Lumpur and Bangkok have elevated pedestrian walkways that provide alternatives to street-level pedestrian movements. While both cities boast of bustling street life, the narrow sidewalks and wide roads with heavy traffic hardly make for safe pedestrian movement.

The Bukit Bintang-KLCC Pedestrian Walkway provides alternative routes for pedestrians who would rather not walk along the congested roads between KLCC and Bukit Bintang. Besides compensating for KL's poor pedestrian accessibility, it provides views of iconic locations. Completed in 2012, the fully air-conditioned elevated walkway which is more than 500 meters long forms a "Retail and Tourism Trail" between the 2 anchor malls of Suria KLCC and Pavilion KL. The elevated walkway is part of a larger pedestrian connectivity plan that provides easier access to public transport nodes such as LRT and Monorail stations.

Similarly, the Bangkok Skyway system, suspended between the elevated Bangkok BTS (Skytrain) tracks and street level, provides pedestrians with quick and safe point-to-point

connectivity to places and buildings between rail stations. Owned and built by the city government, the Skyway runs for several kilometres.

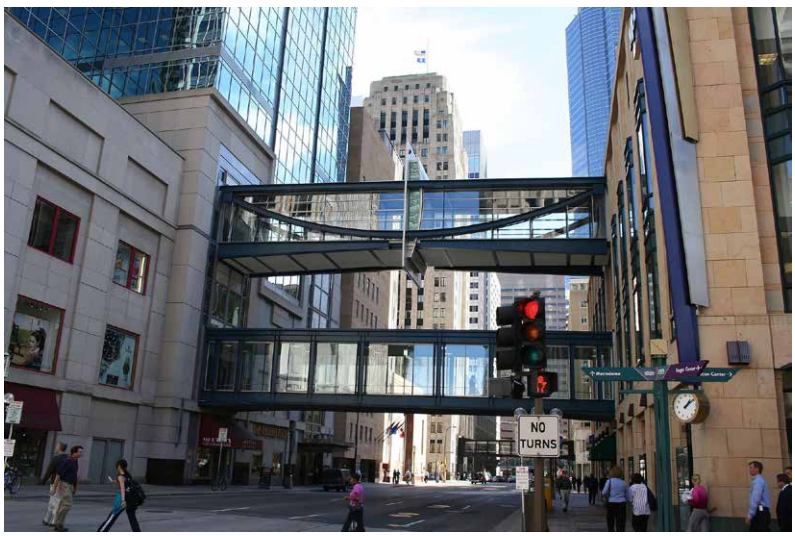
Kuala Lumpur's new climate-controlled pedestrian walkway.

Source: Azreey, Wikipedia Commons.

Like their Hong Kong predecessor, these systems help pedestrians evade the challenging street environment that both cities are notorious for. While successful, they deplete street life, block building facades and invade privacy when there is close adjacency between walkway and building.

Cincinnati, Minneapolis, Iowa, North Carolina & New York

While the reception of the elevated walkway network in Hong Kong is mixed, the systems in North American cities are largely disparaged. Implemented in the downtowns of many North American cities (Minneapolis, St. Paul, Cincinnati, Atlanta and across in Canada, Calgary, etc) to cater for pedestrian comfort and to boost retail activity, skywalks or skyways, as they are typically called in North America, are now blamed for empty downtown streets. Poor access from the skyways to streets below has led to the steep decline of street life. The mixed private ownership of the skyways also makes it difficult for enforcement of standard opening hours and security.



Minneapolis' network of skyways extends throughout downtown.

Source: Jim Winstead, Flickr. License: CC BY 2.0

Minneapolis in Minnesota currently has the most extensive system of elevated pedestrian walkways. Altogether, buildings in 69 blocks are connected by the system. Minneapolis' zoning code was amended to incentivise developers to include these connectors in their projects which quickly made them a primary means of movement for pedestrians. The

enclosed walkways provide protection from Minneapolis' extreme cold winters but critics argued that the skyways have made the downtown resemble a suburban mall. The popularity of the skyways came at the expense of street life which Minneapolis planners are now attempting to reverse by offering more pedestrian amenities at the first storey and connecting the skyways with the street. The iconic Nicollet Mall – the first transit mall in the United States and soon to be reconstructed – is being designed to bring people back to the ground.

The Peachtree Center Complex in Atlanta, designed over several decades starting in 1965, is a self-contained urban complex, containing many amenities (hotels, commercial, restaurant and conference facilities, etc) in a single walkable environment. It sits above an underground train station. A defining characteristic of the complex is its use of skyways, which have been widely criticized as disorienting and disregarding of the urban context.

Such frustrations were exposed in the 2005 New York Times article "Rethinking Skyways and Tunnels." The City of Cincinnati, struggling with its skyways blames it for eliminating pedestrian traffic and hurting street-level businesses. Charlie Luken, ex-Mayor of Cincinnati, remarked that the skywalk is ugly, the space beneath it dark, and the area dead for much of the day. Since 2002, the City has been slowly demolishing them. City leaders in Des Moines, Iowa blame skywalks for the "ghostly still sidewalks and ground-floor vacancy rates of 60%." Planners in Charlotte, North Carolina acknowledge that connecting downtown office buildings and retail shops with skyways was a mistake. White Plains, New York abandoned its plan for skywalks in the 1990s because, as then-executive officer Paul Wood said, "If you're up in a skywalk, you might as well be driving your car." These cities with extensive overhead pedestrian bridges in their downtown core have started dismantling them, often at significant costs. They now face the difficult task of rebuilding street-level vibrancy.

Even New York City which has few elevated pedestrian walkways is reclaiming streets for pedestrian use (example - Times Square). The second storey pedestrian deck at the former World Trade Center has been re-parcelled and reconstructed with a new emphasis on the street-level.

London

The elevated walkway system has also lost favour in Europe. London post-WWII reconstruction plan included an extensive elevated pedestrian walkway network. Named the London Pedway Scheme, the proposal incorporated into the City of London Corporation's development plan in the 1960s required that all developers provide first-floor access to the Pedway network. The plan was abandoned for reasons of cost and public objections. Over time, the consensus among planners changed and the idea of separating pedestrians from motorized traffic using an elevated walkway system began to be seen as outdated. Several pedestrian bridges that were built as part of the Pedway network have been demolished.

Singapore

Singapore does not boast overhead walkway networks as comprehensively planned as Hong Kong or Minneapolis. But those built brought similar problems. An extreme example is that of Marina Square. Completed in the 1980s, it exemplifies a building that privileges vehicles over pedestrians at street level. Parking, loading/unloading bays and service zones are located at street level while pedestrian flow is directed exclusively to the second storey. The strategy eliminated pedestrian activity at street-level and reduced ground level vibrancy to non-existent. The mall is now attempting to re-activate the street level with retail facilities.

The most recent example, J-Walk, located in the Jurong Gateway Area is an effective network of elevated pedestrian walkways that connect commercial, health-care and institutional developments to public transport facilities. Visitors enjoy quick and easy access between buildings while avoiding vehicular traffic. The MRT entrance and exit located at the second

storey makes it convenient and practical to plug J-Walk directly to the developments around it. J-walk crosses over wide roads which dissect the area and provides a complete covered network. It is a successful solution to the urban landscape it is located in.

J-Walk connects at second level Jurong Gateway's malls, office spaces, public institutions with Jurong East MRT station. The second storey is the plane of primary activity.

Source: Yimin Zhou, Centre for Liveable Cities

Unfortunately, this has resulted in a first storey that consists mainly of drop-offs, car park/ service access and service rooms. All these make up for non-activity uses along the street level, giving pedestrians less reasons for walking along the street. The elevated J-Walk has mostly replaced street level pedestrian activity. Increased street-level access and activities are now needed to attract people to activate the street level edges of the buildings and first storey walkways.

Elevated walkways research

That elevated pedestrian walkways are in themselves inhibitors of pedestrian movement can be proved empirically; and this was tested out via a collaborative study between Future Cities Lab (FCL) and URA.

In the study, a GIS tool was developed to –
1) quantify walkability by applying the concept of perceived walking time
2) measure the impact of physical characteristics on pedestrian route choice.

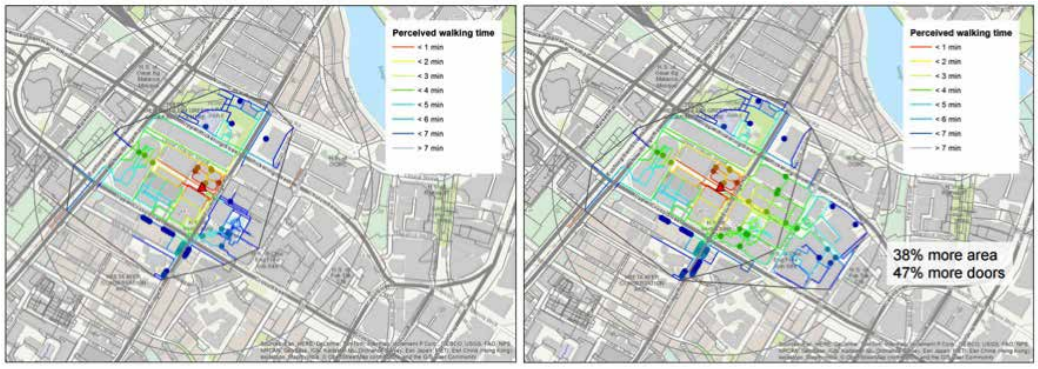
The tool was put to test in Singapore's CBD and Orchard areas. The study showed that while cover, greenery and shops decrease perceived walking time (thus improving walkability), the presence of non-standard crossings increases perceived walking time, (thus reducing pedestrian preference for that route). For example, waiting at a traffic light is perceived as 1 minute of the journey time but the number jumps substantially at obstacles such as a pedestrian overhead bridge. All in all, four other types of crossings were examined and the findings are -

1. jaywalking across 4 lanes (least preferable) – perceived as 4.9 minutes of journey time
2. pedestrian overhead bridges – perceived as 4.2 minutes
3. pedestrian overhead bridges with lifts, traffic lights – perceived as 2.2 minutes
4. jaywalking across 2 lanes - perceived as 0.8 minutes

Clearly, the overpass is perceived as a huge impediment to walkability.

The tool was applied to the study of a pedestrian overhead bridge connecting Hong Lim Complex with Nankin Road. The figures on the following page illustrate the findings; the

map on the left shows the difference between areas perceived as close (red) and areas perceived as far (blue) relative to the location of the pedestrian bridge. The map on the right shows that replacing the overhead bridge with a zebra crossing increases the walk shed by 38% and makes 47% more entrances available. One can see that pedestrian walkability can be extended by prioritising pedestrian crossings and allowing natural ground level pedestrian flows.



The barrier effect of the overhead bridge connecting Hong Lim Complex to Nankin Road. Note the extreme difference in perceived time from the start point at the red triangle to the other side of South Bridge Road. Replacing the overhead bridge with a zebra crossing reduces the barrier effect and extends the perceived walkability coverage by 38%, exposing the pedestrian to 47% more doors.

Source: Erath, Alex, Michael van Eggermond, Sergio Ordonez, Kay Axhausen (2015) Modelling for Walkability: understanding pedestrians' preferences in Singapore, IATBR 2015, Beaumont Estate, Windsor.

CLC aims to use the tool to evaluate the impact of second storey links in Singapore's CBD and Jurong East.

On-line platform Walkability Asia (http://walkability.asia.org) posits that walkability should be a development agenda in Asia and has identified the following parameters for determining walkability:

a. Modal conflicts
b. Availability of walking paths
c. Availability of crossings
d. Grade crossing safety
e. Motorist behaviour
f. Amenities
g. Disability infrastructure
h. Obstructions
i. Security from crime

The usefulness of the list is in the identification of provisions that make a people-centric urban environment. We can add to the list, the interface of pedestrian walkways with public spaces and parks and integration with building edges (which is already under the purview of URA). Safety and convenience are important considerations but just as important is the aspect of pleasure in the design of pedestrian infrastructure. There is also the larger issue of inclusivity (the provision of disability infrastructure being an example) that should be embraced in the push for walkability.

Principles For Planning Of Elevated Pedestrian Walkways

Elevated pedestrian walkways do offer benefits - better point-to-point connectivity and increased comfort especially at crossings of wide, high-speed roads. They also supplement a street-level system where pedestrian activities and building densities are high.

But as the case studies show, the gains often come at the expense of street-level life. Bridges, as the study conducted by FCL and URA has proven, inhibit pedestrian movement and hence street life. Detached skywalk structures visually cut up or conceal building facades destroying shop-front value in the process. Where sky-bridges are built close to buildings, privacy concerns can arise.

From the case studies, we have derived a set of principles which can be applied when planning elevated pedestrian walkways so as to reduce the problems they bring -

a. Plan for pedestrians upfront
b. Prioritise the first storey
c. Design to complement existing systems
d. Design to integrate with buildings
e. Evaluate impact on facades
f. Avoid affecting view corridors
g. Protect privacy of building users
h. Make it public

Conclusion

There should be some prudence in assessing the need to introduce elevated pedestrian walkways. As shown, their use should not dilute the vibrancy of the pedestrian ground-level domain. Fundamentally, where street-level pedestrian use is suitable, it should not be replaced with elevated walkways.

Street level walkability and use bring not only vibrancy but also a host of benefits, economic and others, to cities. One can think of New York as an excellent example. Despite its grid-iron uniformity, the streets are vibrant and they offer diversity (with the occasional spatial tension between blocks). Instead of barricading activity behind the gated confines of say a mall, life spills onto the streets. One can also think of the Zelkova-lined Omote Sando in Tokyo and the labyrinths of streets in the adjacent Harajuku area where pedestrians filter in and out of street-fronting shops or enjoy their cuppa at street level cafés. There is also Olmstead's Emerald Necklace that threads Boston into a walkable circuit, though this is of a different spectrum. We can learn from the 5-foot way from our own urban context. They were thoroughfares accessible and open to all and were instrumental in fostering communal life and community. The value that it has brought to the streets of Singapore is worthwhile continuing.

Sources:

"Central-Mid-Levels Escalator and Walkway System." *Transport Department*. Government of Hong Kong Special Administrative Region.

Dunlap, David W. "At New Trade Center, Seeking Lively (but Secure) Streets." *New York Times,* 7 Dec. 2006.

Erath, Alex, Michael van Eggermond, Sergio Ordonez, Kay Axhausen (2015) Modelling for Walkability: understanding pedestrians' preferences in Singapore, IATBR 2015, Beaumont Estate, Windsor.

Healy, Patrick O'Gilfoil. "Rethinking Skyways and Tunnels." *New York Times*, 3 Aug. 2005.

Lannuzel, Nicolas. "Shophouses in Chinatown." 30 Mar. 2013. Online image. Retrieved from https://www.flickr.com/photos/nlann/8628148678.

Minkjan, Mark. "The Downfall of London's Streets in the Sky." *Failed Architecture*. 6 Dec. 2013.

Rashid, Mahbub. "Revisiting John Portman's Peachtree Center Complex in Atlanta: A Study of the Effects of the Spatial Configuration of the Off-Grade Pedestrian Movement System on Downtown Urbanism." *Proceedings* Volume 1 (1997).

Rotmeyer, J. "Can Elevated Pedestrian Walkways Be Sustainable?" *WIT Transactions on Ecology and the Environment* 93 (2006): *WIT Press*.

Winstead, James. "double-decker skywalk." 27 Sep. 2005. Online image. Retrieved from https://www.flickr.com/photos/jimwinstead/47750284/in/photostream/

Woo, Patricia, Malone-Lee Lai Choo,. "Assessing Skywalk Systems as a Response to High Density Living in Hong Kong." Ed. Lin-Heng Lye, V. R. Savage, L. M. Chou, E. Y. Liya, and K. Harn-Wei. *Sustainability Matters*. Vol. 1: World Scientific, 2014. 259-94. Asia's Green Challenges.

Contributors:

Ms. Anna Ponting

Anna Ponting is a student fellow at the Centre for Liveable Cities. She has worked for the Mayor's Office of the City of New York and as an international public sector consultant for Bloomberg Associates. She has a degree in Urban Studies from Stanford University and will soon begin a Masters in Public Policy and Masters in Business Administration from Harvard University.

Mr. Vincent Lim

Vincent Lim graduated from The National University of Singapore in 1994. He practised at Bedmar & Shi Designers/B&S&T Architects (1994 to 2000), was a partner of VeTarchitecture (2000 – 2010) and is the principal of Visual Text Architects (VTxT) since 2010. He has been awarded various architectural awards, most recently having been nominated for Best Set Design for "Good People" in the 2008 Life Theatre Awards 2008 and featured in URA's "25 Under 45: The Next Generation" (2012). He has taught part-time at the Department of Architecture, National University of Singapore where he also held an adjunct position for 2 years.

Acknowledgements:

The authors thank Dr Limin Hee and Michael Koh at the Centre for Liveable Cities for their advisory role on this article.