Modern Environmental Science and Engineering (ISSN 2333-2581)
August 2017, Volume 3, No. 8, pp.
Doi: 10.15341/mese(2333-2581)/08.03.2017/
Academic Star Publishing Company, 2017
www.academicstar.us

From Grey to Green

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Abstract: Late 20th century has brought rapid urban development and prosperity to Hong Kong. While many local communities enjoy the fruit of success, Hung Hom, an old neighborhood on Kowloon Peninsula pays a high price of growth pains, resulting in environmental deterioration and degradation in neighborhood quality. The Hong Kong Polytechnic University, a major stake holder in this neighborhood finds that through an innovative "Green Deck" project, the current problems could be turned around to create a green and sustainable asset for the local community and the whole city.

Key words: green, sustainable, connectivity, urban growth

1. Introduction

In 1948 at the time when Sir Patrick Abercrombie prepared the Preliminary Planning Report of Hong Kong [1], Hung Hom was already a small residential neighborhood of medium density (200-1200 persons per acre) along the eastern shore of Kowloon Peninsula north of Tsim Sha Tsui. Large areas of reclamation were proposed in the harbor along the east coast of Kowloon Peninsula to be used for residential development in the south and industrial development in the north. Over the next half century, these reclamations were realized step by step, and finally becoming the present East Tsim Sha Tsui, Hung Hom and Whampoa. The Abercrombie's plan was prepared to guide city development in the next 50 years. At that time, the total population in Hong Kong was estimated to be about 1.5 million; and this plan had proposed an increase of 0.5 million to make a total of 2 million. One very interesting feature in this report was about the proposal of a cross-harbor tunnel from the center of Hong Kong Island to the tip of Kowloon Peninsula. This concept was also realized in 1972 by the completion of the Hong Kong-Hung Hom Cross Harbor Tunnel, linking Hung Hom on the Kowloon side to Wanchai on the side of Hong Kong Island. In 1974, two years after its completion, the tunnel's average daily traffic volume had reached almost 40,000 vehicles [9].

Looking back from today, the Hong Kong population projected in Abercrombie's plan was under by a long way. The 2001 Hong Kong Census has identified a total population of 6,708,389, 3.5 times higher than the projection. Hong Kong has transformed from a medium size city into a high density Metropolis. Today, Whampoa is largely residential, much of Hung Hom, a high density mixed development neighborhood and East Tsim Sha Tsui, a major urban commercial center. To support urban growth of the city, Hung Hom not only accommodates more people, it has provided homes for three major urban facilities, viz.the Hong Kong Polytechnic University (PolyU), the Hung Hom MTR Station and the Kowloon entrance to the Hung Hom Cross Harbor Tunnel. These facilities co-existing in a high density environment would create many opportunities if treated appropriately, or if not, many problems. Unfortunately today, the Hung Hom neighborhood around PolyU is facing many deeply rooted problems of enormous proportions resulting from 50 years rapid urban development with little

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Fig. 1 Conditions of the site in 2015.

Fig. 2 Artist impression of the green deck.

consideration on contextual implications, such as heavy traffic, polluted air, lack of amenities, broken down connectivity and depressed neighborhoods. Aiming to turn this negative situation around to become a sustainable and vibrant area, a Green Deck is proposed to be constructed over the cross-harbor tunnel toll plaza so as to achieve the following objectives:

- To improve district air quality and community health;
- To extend community connectivity and access to the harbour;
- To enhance local amenities and environmental quality;
- To revitalize depressed urban centers and upgrade local economy.

2. Air Quality and Community Health

With about 120,000 vehicles passing through the Hung Hom Cross Harbor Tunnel Toll Plaza daily [8], the tunnel design capacity of 78,000 vehicles per day has long been exceeded. The air quality in and around the toll plaza has remained to be extremely poor during most parts of the day due to constant traffic congestions in the toll plaza and vehicles slowly converging and moving into the tunnel tubes. A roadside monitoring station 400 m away from the Cross Harbor Tunnel entrance facing PolyU has found nitrogen dioxide (NO_2) and particulate matters (PM) concentrations exceeding the standards of the Hong Kong Air Quality Objectives. This study also cites much higher potential cancer risk for the bus waiting crowds due to long bus queues with running engines [14]. The current environment is a street cannon situation, with unfavorable wind and pollutant dispersions, thus people on the street are exposed to relatively high road-side pollutant concentrations [15].

It is anticipated that incorporating the proposed Green Deck with air treatment facilities, all pollutants will have a significant decrease. The improvement of PM and carcinogenic compound in the area would be from 30% to 60% and the Hong Kong Air Quality Objectives can be met. Consequently, the cancer risk of different target groups has 30% to 70% reduction. After Green Deck being built, the overall cancer risk would be decreased over 50% [14]. Furthermore, the proposed bus waiting lounges in the Green Deck would further protect passengers from exposure to polluted air. Other studies [16] have also supported that a clean and green environment can lower the risk of chronic illness including cardiovascular and respiratory diseases, obesity, depression and anxiety. In the long term, healthcare expenditure can be reduced as people may visit clinics and hospitals less often and length of stay in hospitals can also be shortened. A green environment with nicely built walking and bicycle paths, does not only enhance the connection of different areas, but also facilitate people to walk and exercise regularly.

In Hong Kong's sub-tropical climate, the summer is long, wet and hot, reaching above 30 degrees Celsius quite easily during the day. The existing toll plaza will

then become an enormous heat island causing agonizing discomfort to large crowds of people who pass through this area and adds to the cooling loads of buildings in the vicinity. The Green Deck would introduce urban greening to improve the environmental quality within urban areas by mitigating urban heat island (UHI) effect and improve thermal comfort by moderating micro-climatic conditions and providing shading. It can bring other benefits including the ability to attenuate noise levels, improve air quality, reduce urban storm water runoff and enhance stress recovery [3, 4].

3. District Connectivity through Pedestrian/Vehicular Separation

Since the Hung Hom MTR Station and the Hung Hom Cross Harbor Tunnel are located in close proximity, the volumes of vehicular, rail and pedestrian traffic in this area are all very heavy. Nearby neighborhoods are split up by roads, trunk roads, toll plaza and railroads into isolated islands leaving almost no rooms for pedestrians. Street environment has also deteriorated and become confusing to pedestrians. District connectivity amongst neighboring communities in Hung Hom, Homantin, King's Park and East Tsim Sha Tsui is almost broken down. There are two old pedestrian footbridges spanning across the toll plaza linking MTR Station to PolyU, which connect to outside areas, and they are heavily utilized especially during morning and evening peaks. A recent study [12] has found the congestion on the northern footbridge is particularly alarming. During morning peaks, congestion restricts on pedestrian flow (Level of Service, "LOS" D) and thus becomes undesirable. Evening peak conditions are even worse since pedestrians had to follow a high density crowd while moving slowly on the bridge ("LOS" E). Steep stairs are provided on the footbridges for passengers to transfer from bus to train, and vice versa. In a highly congested condition with large crowds moving through, these stairs could give rise to accidents especially for accident prone children and elderlies [12].

Upon completion of the proposed Green Deck, which includes a green park on the upper deck and a pedestrian concourse in the intermediate level, pedestrian circulation would be elevated above vehicular and rail traffic, thus it would greatly improve the current situation. The upper deck and the intermediate level of the proposed Green Deck would have significant effect in diverting pedestrians. Simulated pedestrian flows show that during both morning and evening peaks, the corresponding service standard would improve significantly ("LOS" B) [12].

The physical environment for pedestrian circulation would also improve considerably since the upper and intermediate levels of the proposed Green Deck would provide multiple points of pedestrian entry for multi-directional connections among the surrounding neighborhoods. The intermediate level would be all weather protected and with accesses to many social facilities which may be located on this level. As such, the proposed Green Deck would provide area wide connectivity to the Hung Hom, Homantin, King's Park, East Tsim Sha Tsui communities, the MTR station and the Hung Hom/East Tsim Sha Tsui harbor front.

4. Enhancing Local Amenities and Satisfying Social Needs

As most large scale social projects, the Green Deck would have many stakeholders [2]. Due to the high concentration of activities and movements, other than people who live, work and study locally, large crowds of people move through this area every day by using the MTR station, bus stops, and also passing through streets, walkways, and footbridges. For the tens of thousands of these people, there is a lack of public amenities to serve them. For example, very limited urban space is devoted to serve the pedestrians. There is not even a district wide pedestrian signage system. Within 1 km of the proposed Green Deck site, there is no public information center, no sizeable parks, no significant community facilities or libraries. Long

queues of bus passengers stand in lines under small canopies in the open engulfed in polluted air waiting for their buses every day.

A recent study has found that a significant proportion of residents were dissatisfied with the neighborhoods' air quality (29.6%), noise level (25.9%), and greenery (22.1%). Furthermore, the top three of areas which needed to be "greener" were Cross-Harbor Tunnel Toll Plaza (49.2%), MTR Hung Hom Station and Hong Kong Coliseum (44.5%), and Whampoa & Hung Hom (43.8%). Most people indicated that forest and botanical gardens (49.8%), tame grassland (38.5%) and sports and recreation facilities (38.5%) were the most needed in the neighborhoods [16].

The Green Deck would provide a landscaped park of about 43,000 m^2, which would consist of pleasant footpaths and a variety of outdoor and semi-outdoor venues for passive and active recreation, with a number of indoor facilities for sports and cultural activities all for public use. The intermediate level would further make available about 30,000 m^2. indoor space for bus waiting lounges and a variety of community facilities for different uses such as meeting, exhibition or retail.

Another study commends the 3-layer concept of the Green Deck: an upper level as an open green park; a middle level for circulation, meeting/exhibition, retail and mechanical functions, and a lower zone for the existing Cross Harbor Tunnel Toll Plaza. Thus, the Green Deck will in effect be a layering of three different programs with different purposes and functions to satisfy various social needs among different user groups such as locals, commuters, tourists, business people, students and the driving community [13].

The same study also identifies vital connections, which would be re-established by the Green Deck among various currently fragmented urban fabrics in this area and further extended out to neighboring communities as foot paths and bicycle tracks in a pleasant park like and other attractive settings [13], thus enticing the adoption of a walking and cycling habit by the local communities.

5. Revitalizing Depressed Urban Centers and Upgrading Local Economy

A feasibility study [6] was commissioned by PolyU in 2014, and the cost of construction of the proposed Green Deck was estimated at $5 billion at 2014 price level. Despite the high cost, the overall direct and indirect benefits are long term and substantial.

It is argued that the Green Deck would revitalize a depressed urban center covering parts of Hung Hom, East Tsim Sha Tsui, and Homantin, which are currently disconnected, underutilized and stagnant for many years, affecting the lives of hundreds of thousands people. Numerous studies, local and overseas, have found desirable view and environment would lead to higher values in properties [11]. In this light, the proposed Green Deck would have a catalyst effect on neighborhood improvements, upgrading both the physical conditions of the neighborhood and the values of thousands of properties in the vicinity. Government revenues would also be increased due to higher rates to be charged on these properties and future land sales [11].

The Hung Hom MTR Station deck and East Tsim Sha Tsui are currently underutilized prime urban sites with efficient infrastructural access and adjacent to the proposed Green Deck, thus positioned to potential substantial gains. In a conference at PolyU in December 2015, the Hong Kong Tourism Board proposed to develop a new conference center on the Hung Hom MTR Station deck, taking advantage of the location and the hotel, retail, entertainment facilities in East Tsim Sha Tsui, to support the constrained convention tourism due to a lack of suitable urban venues [5].

Tourism is one of the four pillar industries for Hong Kong employing nearly 80,000 people [7]. However lately, tourism development is losing steam due to a lack of new attractions. The proposed Green Deck

would be a unique attraction in its own right, and it would bring about an agglomeration effect to a cluster of other nearby attractions such as the clock tower, the Avenue of Stars, Tsim Sha Tsui promenade, the Science Museum and the History Museum [11].

The tangible and intangible benefits brought about by the Green Deck are widely spread and difficult to be accurately valuated. A recent study [10] identifies that urban green infrastructures are underrated. Since environmental and social goods are usually not traded in the market. By only evaluating the economic benefits, the total benefits of the investment would be underestimated as the non-marketed goods are neglected. Thus, from the social point of view, the proposed Green Deck could be beneficial to the public.

6. Conclusion

Through public consultation in the past few years, the proposed Green Deck has been receiving overwhelming supports from the society. Due to the high initial construction cost, what it would need is a strong political will and a vigorous government leadership for its implementation.

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